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EDITORIAL

INTEGRATION OF TECHNOLOGY AND ELEARNING INTO MEDICAL EDUCATION IN ETHIOPIA: THE COVID-19 SILVER LINING?

Abebe Bekele, MD, FCS, FACS

For quite some time, it has become very clear that the most realistic way to achieve sustainable development in a country is through quality education, and by extension through research and innovation. Unfortunately, Africa has not benefited optimally from quality education due to various factors, several of which are obvious. One such factors is the very poor adaptation and integration of technology and eLearning into the education system in Africa (and Ethiopia). Health professional's education in the continent is one clear example of such a situation.

E-learning has several advantages over traditional learning. Digitalization of teaching and learning ensures availability of huge and filtered information, allows easy manipulation of contents, offers possibility of real-time update and exchange, and it also allows for recording of lessons for possible repetition in the future. Formative and summative assessment, student mentorship and support can also be easily integrated to it. Additionally, E-learning allows easy communication between the teacher and students that overcomes distance in space. In today's globalized world, the possibility of sharing of resources across partners (for free or procured) has also emerged as one advantage of eLearning.

Prior to the COVID epidemic, the full potential of technology and innovations in medical education in African and Ethiopia might not have been fully appreciated. However, it might not be out of place to say that technology and innovation saved medical education in the year 2020-21 all over the globe. The world witnessed the reality that educational technology and innovation could contribute significantly to medical education more than we probably had ever imagined. From the delivery of didactic teaching (lectures) remotely, simulation, clinical teaching, laboratory teaching, student mentorship and assessment (MCQs and clinical examinations), and the need to provide a hybrid form of teaching and training - the integration of technology played key role in many instances to support medical education.

One major point to emphasize at this juncture is that medical educators (and trainees) need to acquire new skills and competencies on how to use medical education technology and innovations. However, inappropriate, and reckless deployment of technology and innovation have the potential to do more harm than good. With emphasis on competency-based medical education, there is clear indication that when technology and innovations are used, there must be evidence that this is helping trainee achieve the desired goal: i.e. enhanced performance.

From our limited experience with eLearning (mostly Case Based Collaborative Learning) at the department of surgery of the Addis Ababa University, we have clearly seen that most medical students involved were very interested in eLearning as one modality of teaching. We found they were very aware of its many advantages but identified cost of internet as a major impediment. Most would strongly recommend similar sessions to their fellow students.

Stakeholders in medical education in Ethiopia now have more than enough evidence with regards to the place of technology in medical education. It might have been conventional to relegate its importance to the background prior to the year 2020 and this might simply be associated with lack of adequate appreciation of the roles of technology (and maybe be lack of financial means even though I strongly disagree); but doing the same thing post the COVID-19 pandemic might simply mean blatant ignorance of the reality of the current time. In certain instances, medical schools were first shut down almost indefinitely with the hope that the covid-19 situation would suddenly go away, and the schools would re-open to resume normal activities. However, the gross inequity in vaccine distribution in the globe has brought in a new reality.

I, therefore, would like to join several authors in advocacy for the institutionalized adaptation of eLearning and technology to the medical education arena in Ethiopia. Medical schools in Ethiopia should integrate E-learning into

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their routine pedagogical strategy. Stakeholders in medical education should consider investment in the most relevant technology – free and strong internet connection, and personalized devices to all students and faculty to say the least. Starting with dynamic approaches such as blended learning might help for ease of adaptation. Continuous skills development trainings should be provided to faculty and students.

REFERENCES

1. Prober CG, Khan S (2013). Medical education reimagined: a call to action. Acad Med. 88(10):1407-10. doi: 10.1097/ACM.0b013e3182a368bd. PMID: 23969367.
2. Goh P, Sandars J, (2020). 'A vision of the use of technology in medical education after the COVID-19 pandemic', MedEdPublish, 9, [1], 49,
3. Ruiz JG, Mintzer MJ, Leipzig RM. The impact of E-learning in medical education. Acad Med 2006;81:207212.
4. Remtulla R. (2020). The Present and Future Applications of Technology in Adapting Medical Education Amidst the COVID-19 Pandemic. JMIR medical education, 6(2), e20190. https://doi.org/10.2196/20190.

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ORIGINAL ARTICLE

EVALUATION OF SURGICAL GLOVE INTEGRITY: DOES AN AFRICAN COUNTRY RECEIVE INFERIOR QUALITY? EXPERIENCE FROM ADDIS ABABA, ETHIOPIA

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ABSTRACT

Introduction: *In a 2017 study, the incidence of glove perforation in Addis Ababa was found to be much higher than that of most publications—with an incidence of 60.14% for first surgeons. We hypothesized that poor surgical glove quality may have contributed to the high incidence of perforations.*
Method: *We tested the integrity of six widely used brands of sterile surgical gloves that were widely used throughout the nation. The assumption was that the perforation rate in these gloves would be higher than the standard acceptable quality level (AQL) of 1.5, the world standard for surgical gloves at the time of the study.*
Results*: From the 1,200 single gloves evaluated, 59 (4.9%) gloves had perforations and 1,141 (95.1%) did not. Among the brands evaluated, Brand 1 (13.5%) and Brand 5 (10%) had the highest rate of perforations. Compared to the standard AQL of 1.5, Brand 1 and Brand 5 had a significantly higher perforation rate (13.5%, CI=8.8%-18.2%, p=0.000) and (10.0%, CI=5.8%-14.2%, p=0.000), respectively.*
Conclusion*: Our study results showed unacceptably high rates of perforation for 2 glove brands, in which at least 1 out of every 10 gloves were defective. In view of our findings, we recommend, at minimum, that surgeons visually inspect gloves before and after donning. Relevant government institutions, contractors, importers, hospital administrators, and surgical teams must take collective responsibility for ensuring appropriate quality of gloves. Quality enforcement must be strengthened, and local production must be considered.*
Key word: *surgical glove, perforation, brand, quality*

INTRODUCTION

Surgical gloving is a standard sterile practice aimed at protecting the patient and caregivers from transmissible diseases. (1) Perforation of surgical gloves during procedures eliminates this protective barrier and increases the risks to both the patient and the caregiver. (1,2) Patients are two times likely to have a surgical-site infection (SSI) in procedures where gloves are perforated compared to those that maintain aseptic technique.[3] Moreover, as key incidents of patients contracting Hepatitis C virus (HCV) (4) and Hepatitis B Virus (HBV) (5) infections from infected surgeons through glove perforation have been reported in the literature . (6)

Surgical glove perforations may also pose a similar risk to surgical team members, as they may contract transmissible diseases such as Human Immunodeficiency Virus (HIV) (7), HCV (8,9) , and HBV. (3,9,10) One study has reported that surgeons risk more than one HBV infection per lifetime, and at least one in 1500 surgeons are likely to be infected by HIV over the next three decades due to risks posed from surgical glove perforation. (10)

Thus, the integrity of the surgical glove is essential to prevent cross-contamination and decrease the risk of acquired infections to both patients and caregivers alike. There is variability in the literature on the incidence of surgical glove perforations ranging from as low as 10% (6) to as high as 61.7% (11) in some procedures. Factors influencing the variability include type of surgery (12) with emergency surgeries accounting for a significantly higher incidence of glove perforation, (13) duration of surgical procedure with higher incidence of glove perforation in procedures exceeding 90-120 minutes (11), invasiveness of the surgery, experience of the surgeon (1,13) and surgical glove size. (14)

Double gloving is a protective factor which has consistently been shown to reduce the incidence of inner glove perforation. (12,13,15)

In our 2017 study, we found the incidence of glove perforation in Addis Ababa, Ethiopia to be much higher than in other studies with an incidence of 60.14% for first surgeons performing emergency surgery. (13)

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This poses a significant threat to both patients and the surgical workforce. Locally relevant factors that may have contributed to the higher incidence include the standard utilization of surgical residents as first surgeons for emergency procedures, and the limited supply of glove sizes resulting in a portion of the surgical team using inappropriate sized gloves. (13) In addition, because Low and Middle Income Countries (LMICs) like Ethiopia depend on imports, it is possible that poor surgical glove quality may have contributed to the relatively high incidence of surgical glove perforations. It is imperative for relevant stakeholders and policy makers to be aware of the quality of the procured products so they can develop a safer surgical environment for patients and healthcare providers.

We hypothesized that the perforation rate in these gloves would be higher than the standard acceptable quality level (AQL) 1.5, the world standard for surgical gloves at the time of the study. (16,17)

METHODS

Study Procedure:

In this cross-sectional study, 200 powdered size 7.5 latex single gloves from each of the 6 brands of surgical gloves available in pharmacies across Addis Ababa were randomly procured in June 2018. Each of the gloves studied here were manufactured by different companies, and in different countries. A total of 1,200 single gloves were examined. The characteristics of each brand of surgical glove including origin, constituent materials, cost, method of sterilization, quality assurance measures, available sizes, glove thickness, tensile thickness, elongation measures and storage recommendations were identified (Table 5). Since Ethiopia did not produce surgical gloves at the time of the study, local products were not included in the study.

Control testing for surgical glove integrity was conducted for each glove using a standardized visual and a European Norm (EN) 455-1 water-leak test method.[17,18] The tests were carried out by two individuals who were blinded to the surgical glove brand. The visual test assessed for overt damage by inspection. For the water-leak test, each glove was filled with 1L of water and methylene blue solution at room temperature followed by manual compression on the wrist of the glove for 1 minute. Leakage of blue water indicated perforation. The number and locations of the perforations were recorded for each glove.

Statistical Analysis

Descriptive statistics were computed for the categorical variables. A proportion t-test was utilized to test for difference in proportions between each brand and the null hypothesis of 0.04.

The null hypothesis was derived from what the acceptable maximum is (8 defects) for an AQL of 1.5 in an n=200 random sample. (17) A difference in proportions using proportion t-test was also conducted for: (1) the total right versus total left hand gloves perforated in the total sample, (2) perforation in the right versus left gloves among each of the 6 brands, (3) the total perforation in the palmar versus dorsal aspects in the total sample size, and (4) the perforation in the palm versus dorsum versus both sides among each of the 6 brands. A Pearson chi-square analysis was conducted to determine an association between the glove digits and the outcome, perforation. All p-values were two-sided with a statistical significance level of $p<0.05$. All statistical analyses were conducted using Stata (version 14.2, Stata Corp, College Station, Texas, USA).

RESULTS

From the 1,200 single gloves evaluated, 59 (4.9%) gloves had perforations and 1,141 (95.1%) did not. Among the brands evaluated, Brand 1 (13.5%) and Brand 5 (10%) had the highest rate of perforations, followed by Brand 3 (3.0%) Brand 6 (2.0%), Brand 2 (1.0%) and Brand 4 (0%) (Table 1). Compared to the standard AQL 1.5 for surgical gloves at the time of the study,[16,17] Brand 1 and Brand 5 had significantly higher perforation rate (13.5%, CI=8.8%-18.2%, p=0.000) and (10.0%, CI=5.8%-14.2%, p=0.000), respectively. There was no significant difference between the AQL and perforation rates for Brand 2 (2.0%, CI=-0.4%-2.4%, p=0.985), Brand 3 (3.0%, CI=0.6%-5.4%), p=0.985), Brand 4 (0.0%, CI=0.0%-0.0%, p=0.998) and Brand 6 (2.0%, CI=0.1%-3.9%, p=0.926) (Table 1).

Among the 600 right and 600 left hand gloves evaluated, there were a total of 35 (5.8%) right hand glove perforations and 24 (4.0%) left hand glove perforations. There was no statistically significant difference between total right (5.8%, CI=3.9%-7.7%) and total left hand (4.0%, CI=2.4%-5.6%) glove perforation rates (p=0.149) (Table 2). The right-hand perforation rate (16.0%, CI=8.8%-23.2%) was significantly higher than the left-hand perforation rate (4.0%, CI=0.2%-7.8%) in Brand 5 (p=0.005) (Table 2). The left-hand perforation rate (4.0%, CI=0.2%-7.8%) was significantly higher than the right-hand perforation rate (0.0%, CI=0.0% -0.0%) in Brand 6 (p=0.043).

There was no significant difference in the right and left glove perforation rates in Brand 1 (13.0% vs. 14.0%, p=0.836), Brand 2 (2.0% vs. 0.0%, p=0.155), and Brand 3 (4.0% vs. 2.0%, p=0.407). The p-value was not computed for Brand 4, which had 0 perforations (Table 2).

Table 1: Differences in perforation rate of surgical brands compared to the standard AQL

	Non-Perforated (n=200)	Perforated (n=200)	95% CI	p-value (Ha: p > 0.04)
Brands, n (%)				
Brand 1	173.0 (86.5%)	27.0 (13.5%)	8.8% - 18.2%	0.000
Brand 2	198.0 (99.0%)	2.0 (1.0%)	-0.4% - 2.4%	0.985
Brand 3	194.0 (97.0%	6.0 (3.0%)	0.6% - 5.4%	0.765
Brand 4	200.0 (100.0%)	0.0 (0.0%)	0.0% - 0.0%	0.998
Brand 5	180.0 (90.0%)	20.0 (10.0%)	5.8% - 14.2%	0.000
Brand 6	196.0 (98.0%)	4.0 (2.0%)	0.1% - 3.9%	0.926

CI= Confidence Interval; Ha=Null hypothesis

Table 2. Differences in glove perforation rate between right and left hands

	Right Hand (n=100)	95% CI	Left Hand (n=100)	95% CI, (%)	p-value
Brands, n (%)					
Brand 1	13.0 (13.0%)	6.4%-19.6%	14.0 (14.0%)	7.2%-20.8%	0.836
Brand 2	2.0 (2.0%)	-0.7%-4.7%	0.0 (0.0%)	0.0%-0.0%	0.155
Brand 3	4.0 (4.0%)	0.2%-7.8%	2.0 (2.0%)	-0.7%-4.7%	0.407
Brand 4	0.0 (0.0%)	0.0%-0.0%	0.0 (0.0%)	0.0%- 0.0%	N/A
Brand 5	16.0 (16.0%)	8.8%-23.2%	4.0 (4.0%)	0.2%-7.8%	0.005
Brand 6	0.0 (0.0%)	0.0%-0.0%	4.0 (4.0%)	0.2%-7.8%	0.043
Total, n (%) (n=600)	35.0 (5.8%)	3.9%-7.7%	24.0 (4.0%)	2.4%-5.6%	0.149

CI=Confidence Interval

Of the total 1200 gloves perforated, the palmar side was perforated at a significantly higher rate (4.5%, CI=3.3%-5.7%) than the dorsal side (0.5%, CI=0.1% -0.9%) (p=0.001). Among the brands evaluated, the palmar side was perforated at a significantly higher rate than the dorsal side in Brand 1 (12.0% vs. 0.2%, p=0.001), Brand 3 (3.0% vs. 0.0%, p=0.014) and Brand 5 (10.0% vs. 0.0%, p=0.001).

There was no significant difference in the perforation rates between the palmar and dorsal side in Brand 2 (1.0% vs. 0.0%, p=0.156) and Brand 6 (1.0% vs. 1.0%, p=1.000). The p-value was not computed for Brand 4, which had 0 perforations (Table 3).

Of the total perforated gloves with single digit perforations, the highest rates of perforations were found in Digit 1 (Thumb) (39.6%), followed by Digit 3 (Middle) and Digit 5 (Little) (17.0%), Digit 2 (Index) (15.1%), and Digit 4 (Ring) (11.3%). There was a statistically significant difference in the rates of perforation among the 5 digits evaluated (p=0.009).

Brand 5 had the highest rate of perforations for Digit 1 (71.4%) and Digit 5 (55.6%), Brand 1 for Digit 2 (75.0%) and Digit 3 (55.6%) and Digit 4 (100.0%) (Table 4). Only digit perforations that were independent were included in the analysis and six perforated gloves which had perforations in more than 1 digit were excluded from the digit specific analysis.

Table 3: Differences in glove perforation rate between palmar and dorsal aspects

	Palmar Aspect (n=200)	95% CI	Dorsal Aspect (n=200)	95% CI	p-value
Brands, n (%)					
Brand 1	24.0 (12%)	7.5%-16.5%	4.0 (0.2%)	0.1%-3.9%	0.001
Brand 2	2.0 (1.0%)	-0.4%-2.4%	0.0 (0.0%)	0.0%-0.0%	0.156
Brand 3	6.0 (3.0%)	0.6%-5.4%	0.0 (0.0%)	0.0%-0.0%	0.014
Brand 4	0.0 (0.0%)	0.0%-0.0%	0.0 (0.0%)	0.0%-0.0%	N/A
Brand 5	20.0 (10.0%)	5.8%-14.2%	0.0 (0.0%)	0.0%-0.0%	0.001
Brand 6	2 (1.0%)	-0.4%-2.4%	2 (1.0%)	-0.4%-2.4%	1.000
Total, n (%) (n=1200)	54 (4.5%)	3.3%-5.7%	6 (0.5%)	0.1%-0.9%	0.001

CI=Confidence Interval

Table 4: Differences in glove perforation rate by digit among the six brands

	Total Non-Perforated (n = 5947)	Total Perforated (n = 53)*	p-value
Digits, n (%)			
Digit 1 (Thumb)	¨1179 (19.8%)	¨21.0 (39.6%)	
~Brand 1	198.0 (16.8%)	2.0 (9.5%)	
Brand 2	198.0 (16.8%)	2.0 (9.5%)	
Brand 3	198.0 (16.8%)	2.0 (9.5%)	
Brand 4	200.0 (17.0%)	0.0 (0.0%)	
Brand 5	185.0 (15.7%)	15.0 (71.4%)	
Brand 6	200.0 (17.0%)	0.0 (0.0%)	
Digit 2 (Index)	¨1192 (20.0%)	¨8.0 (15.1%)	
~Brand 1	194.0 (16.3%)	6.0 (75.0%)	
Brand 2	200.0 (16.8%)	0.0 (0.0%)	^0.009
Brand 3	198.0 (16.6%)	2.0 (25.0%)	
Brand 4	200.0 (16.8%)	0.0 (0.0%)	
Brand 5	200.0 (16.8%)	0.0 (0.0%)	
Brand 6	200.0 (16.8%)	0.0 (0.0%)	
Digit 3 (Middle)	¨1191 (20.0%)	¨9.0 (17.0%)	
~Brand 1	195.0 (16.4%)	5.0 (55.6%)	
Brand 2	200.0 (16.8%)	0.0 (0.0%)	
Brand 3	198.0 (16.6%)	2.0 (22.2%)	
Brand 4	200.0 (16.8%)	0.0 (0.0%)	
Brand 5	200.0 (16.8%)	0.0 (0.0%)	
Brand 6	198.0 (16.6%)	2.0 (22.2%)	
Digit 4 (Ring)	¨1194 (20.1%)	¨6.0 (11.3%)	
~Brand 1	194.0 (16.2%)	6.0 (100.0%)	
Brand 2	200.0 (16.8%)	0.0 (0.0%)	
Brand 3	200.0 (16.8%)	0.0 (0.0%)	
Brand 4	200.0 (16.8%)	0.0 (0.0%)	
Brand 5	200.0 (16.8%)	0.0 (0.0%)	
Brand 6	200.0 (16.8%)	0.0 (0.0%)	
Digit 5 (Little)	¨1191 (20.0%)	¨9.0 (17.0%)	
~Brand 1	196.0 (16.5%)	4.0 (44.4%)	
Brand 2	200.0 (16.8%)	0.0 (0.0%)	
Brand 3	200.0 (16.8%)	0.0 (0.0%)	
Brand 4	200.0 (16.8%)	0.0 (0.0%)	
Brand 5	195.0 (16.4%)	5.0 (55.6%)	
Brand 6	200.0 (16.8%)	0.0 (0.0%)	

CI=Confidence Interval
** = Data includes only independent surgical glove perforations, excludes 6 surgical gloves that had perforations in more than 1 digit*
^ = p-value from the Pearson Chi Square analysis of association of rate of total perforations between the 5 digits
~ = Descriptive analysis of the total number of digits perforated and nonperforated in each where n =¨,the total number of perforations and non-perforations for each Digit

DISCUSSION

It is imperative to investigate underlying reasons for high post-operative glove perforation rates in the Ethiopian surgical space, as previous research has shown rates as high as 38.3% overall, and 60.14% in primary surgeons during emergency surgery. (13) These rates are higher than those from most other LMICs, (12,19) and intra-operative events may be insufficient to explain these findings. Pre-operative testing in our study revealed an overall perforation rate of 4.9% and peak brand perforation rates of 13.5% (Brand 1) and 10% (Brand 5) prior to glove use.

This constitutes a surgical safety hazard and represents a significant deviation from acceptable industry standards at the time of study of less than 8 defective gloves in 200 (AQL of 1.5). (17) Our findings sharply contrasts those by Hwang *et al,* from a Taiwan high income setting, in which pre-operative testing of 198 gloves from 4 manufacturers revealed a 0% perforation rate. (20) Green and Gompertz in the United Kingdom demonstrated 2%. (1) Albin *et al* demonstrated a defect rate in the United States of 1.9% before dental procedures and 5.5% before surgical procedures. (21) In 1989, just prior to the introduction of new and stringent regulations to the United States, similar rates to our findings (3-16%) were found on surgical glove testing by visualization and water fill by the US Food and Drug Administration. (22) As lower rates of pre-use perforations represent a proxy for increasing quality, this study raises significant quality questions for gloves in circulation within the country.

The brands with highest perforation rates in our study had significantly higher rates of perforation relative to other brands. On the lower end of the spectrum, Brand 4 gloves had no pre-use perforations. These results suggest that rates of glove perforation vary significantly with glove brand and manufacturer. Even though lot to lot variability within brands may exist, this quality variability reveals a standardization challenge in the Ethiopian surgical safety and medical importation regulatory space which needs to be addressed at governmental and institutional levels. Ethiopia can contextualize some HIC federal regulations which require random inspection of gloves using the Water Load Test. (16)

All gloves tested in this study were imported. The number of gloves imported into Ethiopia has steadily increased over the years, with an annual growth in quantity of imports of 137% per annum between 2015 and 2019. (23)

At around the time of the study, Ethiopia's import ranking for surgical gloves was 34th in the world, representing 0.5% of world imports for gloves. (23) The imported value of surgical gloves into the country in 2019 alone was US $10,457,000. (23) In Ethiopia, surgical gloves have a limited number of supplying markets, led by China, followed by India, Malaysia, Austria, the United Kingdom, Belgium and Germany. (23) Brands represented in this study reflected the bulk of the supplying market. Investing in the importation of gloves that are shown to have a lower rate of perforation prior to use is a potential solution to low quality market brands, but, better still, local production of surgical gloves to regulatory standards may represent a more feasible solution. It can be argued that these defective glove brands portend danger on the basis of handedness, surface and digits of perforation. Our findings with regards to the handedness of the perforations suggest no statistically significant differences overall ($p=0.149$), however in one of the precarious brands, right-handed perforations were significantly higher than left-handed perforations ($p=0.005$). Handedness of Ethiopian surgical staff has not yet been explored, but a wider review suggests that majority of surgeons are right-handed. (24)

Although the "holding" or non-dominant hand is at risk of intra-operative perforations (owing to a lower degree of dexterity and greater exposure to needle puncture), (12,13,20,21,25,26) our findings may suggest a subtle increase in danger to the patient and surgeon, as right handed surgeons who utilize these defective gloves on their dominant hands additionally have a higher risk of intra-operative perforations on their non-dominant hands. With regards to perforated glove surfaces, the palmar aspect was perforated at a significantly higher rate (4.5%, CI=3.3%-5.7%) than the dorsal aspect (0.5%, CI=0.1%-0.9%)($p=0.001$) overall. This finding was also specific to the most perforated brands (1 and 5). Palmar perforations arguably portend a greater danger than dorsal perforations with regards to the major surface of surgical contact. These pervasive perforations involved all digits, however, of the total single digit perforations, the highest rates of perforation were found on the thumb (39.6%). The thumb is the most important digit for grasping and fine surgical hand motions. The non-dominant thumb in combination with the non-dominant index finger have been established by research consensus as the most common sites of intra-operative glove perforation. (12,13,20,21,25,26) This trifecta of handedness, surface and digit elevates the danger of utilizing the defective brands.

In view of our findings of a large proportion of glove perforations prior to use, we recommend, at minimum, that surgeons visually inspect gloves before and after donning. The use of a double glove perforation indicator system may serve as an early warning system for pre-perforated gloves. For Ethiopian surgical teams who do not routinely use double glove for resource constraint reasons, results of our study strongly suggest right-sided double-gloving to mitigate risks associated with the demonstrated laterality of these pre-existing perforations. Widespread testing and Hepatitis B vaccination of surgical staff should still be encouraged, and Ethiopian authorities should intervene to protect surgeons and patients, to maximize investments in the surgical sector, and to drive down surgical site infections which now stand at a pooled prevalence of 12.2%. (27)

More importantly, possible facilitators of the entry of low-quality gloves into Ethiopia, like loose legislation, irregular public procurement, and substandard quality control need to be creatively addressed. Brands not meeting up to standards should be banned from the Ethiopian space and high-quality brands should be rewarded. Brand 4 has demonstrated that conforming to quality standards are possible, as is often the case in strictly controlled HIC environments. (20) All health systems are vulnerable to corruption. (28) Ethiopia seems to be taking corruption in the health sector seriously, however, some authors have referenced poorly functioning reporting systems around hospital procurement and distribution processes. (28)

Officials must ensure that there is no interference with the set standards for glove approval, compliance certification, and licensing. The present findings could also serve as a call to strengthen transparency and accountability and increase performance measurement, monitoring, and enforcement in existing quality enforcement agencies.

Limitations of this study include our inability to test all glove brands and all sizes in use. However, we assessed the brands and size most commonly used during operations in Ethiopia. Furthermore, despite the fact that this study assessed for perforations using the standard methods utilized by quality control agencies, some studies suggest that newer testing methods like electrical conductance tests, may have revealed higher perforation rates (29). Furthermore, the contribution of additional characteristics (including thickness and elasticity) of the gloves to perforation rates was not measured. Finally, following conclusion of this study, progress has been made by international regulators to raise quality standards for surgical gloves by reducing the AQL to 0.65. (18) Further studies should be carried out in Ethiopia to determine conformity to this new benchmark. (18)

Conclusion

Various brands of gloves manufactured in different countries are routinely imported for surgical procedures in Ethiopia, with high variability in quality between brands. Our study results show unacceptably high rates of perforation for 2 glove brands, in which at least 1 out of every 10 gloves were defective.

The implications of this are staggering for surgical staff. In Ethiopia, choice of surgical glove brand may be a determinant of surgical safety. These findings also indicate that unrecognized pre-operative perforations may be a contributing factor to the high post-operative glove perforations identified in our previous study. Further studies are needed to understand how the intrinsic characteristics of gloves contribute to these rates of perforation. Relevant government institutions, contractors, importers, hospital administrators, and surgical teams must take collective responsibility for ensuring appropriate quality of gloves. Quality enforcement must be strengthened, and local production must be considered.

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Conflicts of interest

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REFERENCES

1. Green SE, Gompertz RH. Glove perforation during surgery: what are the risks? *Ann R Coll Surg Engl.* 1992;74(5):306-8. PMID: 1416698; PMCID: PMC2497644.
2. Harnoss JC, Partecke LI, Heidecke CD, Hübner NO, Kramer A, Assadian O. Concentration of bacteria passing through puncture holes in surgical gloves. *Am J Infect Control.* 2010;38(2):154-8. doi: 10.1016/j.ajic.2009.06.013. Epub 2009 Oct 12. PMID: 19822380.
3. Misteli H, Weber WP, Reck S, Rosenthal R, Zwahlen M, Fueglistaler P, Bolli MK, Oertli D, Widmer AF, Marti WR. Surgical glove perforation and the risk of surgical site infection. *Arch Surg.* 2009;144(6):553-8; discussion 558. doi: 10.1001/archsurg.2009.60. PMID: 19528389.
4. Esteban JI, Gómez J, Martell M, Cabot B, Quer J, Camps J, González A, Otero T, Moya A, Esteban R, Guardia J. Transmission of hepatitis C virus by a cardiac surgeon. *N Engl J Med.* 1996 Feb;334(9):555-60. doi: 10.1056/NEJM199602293340902. PMID: 8569822.
5. Harpaz R, Von Seidlein L, Averhoff FM, Tormey MP, Sinha SD, Kotsopoulou K, Lambert SB, Robertson BH, Cherry JD, Shapiro CN. Transmission of hepatitis B virus to multiple patients from a surgeon with out evidence of inadequate infection control. *N Engl J Med.* 1996;334(9):549-54. doi: 10.1056/NEJM199602293340901. PMID: 8569821.
6. Kobayashi M, Tsujimoto H, Takahata R, Einama T, Okamoto K, Kajiwara Y, Shinto E, Kishi Y, Hase K, Ueno H. Association Between the Frequency of Glove Change and the Risk of Blood and Body Fluid Exposure in Gastrointestinal Surgery. *World J Surg.* 2020;44(11):3695-3701. doi: 10.1007/s00268-020-05681-1. Epub 2020 Jul 13. PMID: 32661693.
7. McKinney WP, Young MJ. The cumulative probability of occupationally-acquired HIV infection: the risks of repeated exposures during a surgical career. *Infect Control Hosp Epidemiol.* 1990;11(5):243-7. doi: 10.1086/646161. PMID: 2351810.
8. Kiyosawa K, Sodeyama T, Tanaka E, Nakano Y, Furuta S, Nishioka K, Purcell RH, Alter HJ. Hepatitis C in hospital employees with needlestick injuries. *Ann Intern Med.* 1991;115(5):367-9. doi: 10.7326/0003-4819-115-5-367. PMID: 1907441.
9. Shapiro CN. Occupational risk of infection with hepatitis B and hepatitis C virus. Surg Clin North Am. 1995;75(6):1047-56. doi: 10.1016/s0039-6109(16)46776-9. PMID: 7482133.
10. Palmer JD, Rickett JW. The mechanisms and risks of surgical glove perforation. J *Hosp Infect.* 1992;22 (4):279-86. doi: 10.1016/0195-6701(92)90013-c. PMID: 1363107.
11. Tlili MA, Belgacem A, Sridi H, Akouri M, Aouicha W, Soussi S, Dabbebi F, Ben Dhiab M. Evaluation of surgical glove integrity and factors associated with glove defect. *Am J Infect Control.* 2018;46(1):30-33. doi: 10.1016/j.ajic.2017.07.016. Epub 2017 Sep 20. PMID: 28893444.
12. Thanni LO, Yinusa W. Incidence of glove failure during orthopedic operations and the protective effect of double gloves. *J Natl Med Assoc.* 2003;95(12):1184-8. PMID: 14717474; PMCID: PMC2594859.
13. Bekele A, Makonnen N, Tesfaye L, Taye M. Incidence and patterns of surgical glove perforations: experi ence from Addis Ababa, Ethiopia. *BMC Surg*. 2017;17(1):26. doi: 10.1186/s12893-017-0228-8. PMID: 28320370; PMCID: PMC5359816.
14. Zaatreh S, Enz A, Klinder A, König T, Mittelmeier L, Kundt G, Mittelmeier W. Prospective data collec tion and analysis of perforations and tears of latex surgical gloves during primary endoprosthetic surger ies. *GMS Hyg Infect Control*. 2016;11:Doc25. doi: 10.3205/dgkh000285. PMID: 28066701; PMCID: PMC5175006.
15. Tanner J, Parkinson H. Double gloving to reduce surgical cross-infection. *Cochrane Database Syst Rev.* 2006;2006(3):CD003087. doi: 10.1002/14651858.CD003087.pub2. PMID: 16855997; PMCID: PMC7173754.
16. Food and Drug Administration, HHS. Medical devices; patient examination and surgeons' gloves; test procedures and acceptance criteria. Final rule. Fed Regist. 2006;71(243):75865-79. PMID: 17294550.
17. CEN 455–1, European Committee for Standardization. Medical gloves for single use—Part 1: Require ments and testing for freedom from holes. 2001.
18. CEN 455-1, European Committee for Standardization. Medical gloves for single use. Part 1, Require ments and testing for freedom from holes. Berlin: Beuth Verlag GmbH; 2020.
19. Medhioub F, Jaber E, Hamrouni A, Gharbi L. Unnoticed surgical gloves intraoperative perforation: A multicentric study of the leading factors. *Jr Med Res.* 2020; 3(3):9-12. https://doi.org/10.32512/jmr .3.3.2020/9.12
20. Hwang KL, Kou SJ, Lu YM, Yang NC. Evaluation of the quality of surgical gloves among four different manufactures. *Ann Occup Hyg.* 1999;43(4):275-81. PMID: 10432871.

21. Albin MS, Bunegin L, Duke ES, Ritter RR, Page CP. Anatomy of a defective barrier: sequential glove l eak detection in a surgical and dental environment. *Crit Care Med*. 1992;20(2):170-84. PMID: 1737454. doi:10.1097/00003246-199202000-00006
22. Medical devices; patient examination and surgeons' gloves; adulteration--FDA. Proposed rule. Depart ment of Health and Human Services. *Fed Regist*. 1989; 54(223): 48218.
23. International Trade Centre. Trade statistics for international business development [Internet]. Trade Map - Trade statistics for international business development. 2021 [cited 2021Mar10]. Available from: https:// www.trademap.org/Index.aspx
24. Tchantchaleishvili V, Myers PO. Left-handedness--a handicap for training in surgery? *J Surg Educ*. 2010;67(4):233-6. doi: 10.1016/j.jsurg.2010.06.001. PMID: 20816359.
25. Malhotra M, Sharma JB, Wadhwa L, Arora R. Prospective study of glove perforation in obstetrical and gynecological operations: are we safe enough? *J Obstet Gynaecol Res*. 2004;30(4):319-22. doi: 10.1111/ j.1447-0756.2004.00201.x. PMID: 15238110.
26 Yinusa W, Li YH, Chow W, Ho WY, Leong JC. Glove punctures in orthopaedic surgery. *Int Orthop*. 2004;28(1):36-39. doi:10.1007/s00264-003-0510-5
27. Shiferaw WS, Aynalem YA, Akalu TY, Petrucka PM. Surgical site infection and its associated factors in Ethiopia: a systematic review and meta-analysis. *BMC Surg*. 2020;20(1):107. doi: 10.1186/s12893-020-00764-1. PMID: 32423397; PMCID: PMC7236319.
28. Plummer J. Diagnosing corruption in Ethiopia: perceptions, realities, and the way forward for key sectors. Washington, D.C.: World Bank; 2012.
29. McLaughlin R, McNicholl B, Barton J. Intraoperative glove perforation. *Postgrad Med J*. 2002;78 (915):62. doi: 10.1136/pmj.78.915.62. PMID: 11796890; P

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ORIGINAL ARTICLE

RADIOLOGY RESIDENTS' PERCEPTION OF WORKING AND TRAINING FROM HOME DURING COVID-19 PANDEMIC

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ABSTRACT

Introduction: *The spread of coronavirus disease 2019 (COVID-19) pandemic disrupted the personal and professional lives of many throughout the world. To mitigate the spread of the virus, Addis Ababa University introduced an online teaching/learning method which minimized the physical engagement of faculty members and residents. Online teaching is a major shift in the history of the country's oldest and largest university.*

Objectives: *This study aimed to investigate how trainees managed to cope up with the sudden changes in the teaching/learning system, and assess the ensuing satisfaction with the new method of teaching/learning.*

Methods: *Descriptive research design was implemented and analysis of variance (ANOVA) and T-tests were used to test hypotheses. Analysis of data collected from 58 radiology residents found that, the residents appreciated the participatory nature of the newly introduced online learning method.*

Results: The results showed that residents have accepted the new teaching/learning method and are satisfied with it. Furthermore, tests of hypotheses revealed that there is no significant difference in level of satisfaction between female and male residents as well as throughout the three years of radiology residency training.

Conclusion: *The new method of teaching/learning has a positive acceptance among trainees and there was high level of satisfaction with the new method. Poor internet network, reduced in-person mentoring, failure to make engaging discussions due to large number of participants were the common challenges to online teaching in the setting.*

Key words:*COVID-19 Pandemic, Radiology Residents', teach and work from home*

INTRODUCTION

Since its discovery in Wuhan Province of China in December, 2019, it took COVID-19 only few months to become the number one global health issue. Slow reaction from political and health sector regulators immensely contributed to the virus' fast spread in different parts of the globe infecting nearly more than 35 million people and claiming the lives of millions of people(1, 2). As we are in the middle of the pandemic, no authoritative source could predict the exact impact of the pandemic and remains as subject for future research. One thing for sure is the life of human beings surviving the pandemic will never be the same.

Most importantly, despite various efforts to cure the virus, both modern/scientific and indigenous/ traditional knowledge-based(3-5), neither of them brought fruit. The basic recommendations from prominent scientists and international health organizations such as WHO and health sector regulators are keeping physical distance and staying at home as much as possible.

The demand for primary care physicians and medical specialists in the developed world was among the outstanding research inquiries over the last several decades (6-9). Hospital-based physicians such as radiologists and anesthesiologists, who once were at the higher level of job insecurity are now among the physicians at the greatest demand (10).

The issue of shortage of medical professionals, primary care physicians as well as medical specialists, needs no scientific enquiry when it comes to the developing world. Over those long years, regulators and hospital administrators throughout the world have endeavored to bridge the gap through various mechanisms including working extra hours and working from home.

The advent of technological innovations beginning from late 20th century has made working from home easier and comparative studies have also shown that working from home is as effective as medical center based services (11).

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Despite its contribution in alleviating the shortage of radiologists (12, 13), working from home has also adversely affected their health, social life, and professional productivity (14) resulting in stress (15) . The ever increasing need for real-time imaging interpretation has forced radiologists to even work extra hours beyond their regular working hours (14).

Global and national health sector organizations such as WHO and National Health Ministries promoted 'staying at home' among the first line preventive mechanisms to survive the pandemic. As a result, the pandemic compelled professionals around the world to stay at home and work from home. Working from home has become the 'new normal' for medical and non-medical professionals. For radiologists, though, working from home is not a phenomenon triggered by the COVID-19.

Unlike the practices in other parts of the world, 'working and teaching/learning from home' is a new phenomenon for developing countries like Ethiopia. Although the change in learning modality will definitely have an impact on trainees, discerning whether this impact (positive or otherwise) is worth investigating. The current study aimed to investigate how trainees managed to cope up with the sudden changes in the teaching learning process, assess the ensuing satisfaction with the new method of learning, and draw important lessons that must be either sustained or treated in the aftermath of the pandemic.

METHODOLOGY

Research Approach and Design

The study followed a mixed research approach whereby quantitative data were used to measure satisfaction and its association with respondent's attributes (specific objectives 1 & 2) and qualitative data using open ended questions were also used to identify the challenges of the new teaching and learning method introduced due to coronavirus pandemic. The study also followed descriptive research design for the level of satisfaction of radiology residents and to identify the challenges and opportunities of working and teaching from home in pandemic situation.

The Research Setting

The current research was conducted at Addis Ababa University, College of Health Sciences, Department of Radiology where a total of 25 academic staffs are working in the facilities of Tikur Anbessa Specialized Hospital. The Department has a Radiology Residency Teaching Program involves direct patient contact while performing radiological procedures such as ultrasound, contrast studies of the gastrointestinal systems and interventional radiology.

At undergraduate level, radiology course is given as a short course, as a result, graduate medical doctors have limited exposure as to the discipline. The residency, on the other hand, includes doing radiological procedures like Ultrasound (US), intervention, fluorography procedures and interpretation of the findings as well as interpreting other cross-sectional imaging like Computerized Tomography (CT) and Magnetic Resonance Imaging (MRI). This is also the practice in all radiological services throughout Ethiopia (16).

In Tikur Anbesa Specialized Hospital about 200 radiographs (X-rays) are taken and more than 120 patients are scanned with US in four exam rooms on each day. More than 60 patients are scanned with CT and 20-30 patients have MRI performed daily. In addition, about 20-25 US and/or CT-guided interventions are done by the department weekly. As part of the residency training program, all cases except ultrasound studies are also discussed daily in groups in each departmental unit which constitute 10-12 trainees including the consultants. Therefore, before the interruption following COVID-19 pandemic, in one reporting room with an area of 57.6 square meter, there will be 50-60 people discussing and reporting at a time.

Besides the consultation sessions, as part of the teaching learning process, trainees have daily afternoon teaching sessions from 1:30pm–3:00pm where all residents and staffs meet together to discuss on imaging of patients. The other activity of the department is daily interdepartmental joint conferences which take about 60-75 minutes to discuss cases which need collaborative discussions for clinical management. In the department conference room which is 57 sqm there will be more than 120 people. Following the pandemic beginning from March 2020, most of the residency program's activities went online to allow faculty members and trainees to work, teach and learn from home except for minimum possible physical gathering to sustain the departmental daily routines.

Data Source and Collection Methods

The research subjects were trainees of a three-year residency program at Department of Radiology in College of Health Sciences, Addis Ababa University during the academic year 2019/2020. The trainees were at first, second or third year of the residency program. In order to attain the objectives of the study, the researchers used primary source of data collected using a self-administered questionnaire. Therefore, the questionnaires were administered both in print and online versions.

While participants were encouraged (through email and text message reminders) to fill the questionnaires online to avoid physical contact; the principal means of the virus' spread, some willing participants preferred to complete the printout version of the instrument.

Since the face-to-face learning system was aborted in the middle of the academic year and was immediately replaced by the online learning system due to the surge of the global pandemic in Ethiopia, the study participants had the chance to recall their past experiences and provide feedback by comparing the two alternative systems of learning. Hence, in the survey, the residents were asked to compare the participatory nature of the newly introduced teaching learning method and to rate their satisfaction with it. They were also requested to list the challenges they face and the opportunities they explored due to the change in methods of instruction following measures to mitigate the impact of the pandemic. In order to avoid potential bias from power balance (Venaktesh et al., 2019); a bias that may happen if the survey is conducted by the trainer researcher (the first author) who is a faculty member of Department of Radiology, the survey was administered by the student researcher (the second author).

Hypotheses

In line with the second specific objective of the study, the researchers posit that satisfaction with the new method of learning might be affected by the participant's gender and her/his level of residency study (whether the trainee is from Year-I, Year-II or Year-III). Accordingly, the following two research hypotheses are formulated.

H_1: There is a significant difference in the level of satisfaction between female and male radiology residency program trainees.

H_2: There is a significant difference in the level of satisfaction among trainees from the three levels of radiology residency program.

Method of Data Analysis

The quantitative data collected was analyzed using descriptive statistics tools. Besides the descriptive statistics analysis, T-test and ANNOVA were used to test the two hypotheses; i.e. whether there is a difference in the level of satisfaction among gender groups and levels/years of residency study. Furthermore, the open-ended responses of participants were coded to extract common themes using qualitative data analysis tools.

Ethical Considerations

The authors obtained ethical approval from the Research and Ethics Committee of the department of radiology of the College of Health Sciences at Addis Ababa University and informed consent was obtained from the study participants.

RESULT

The following sub-sections provide analysis of data collected from radiology residency trainees pursuing their study in a developing country that introduced online-based learning in response to mitigating the spread of COVID-19.

A total of 58 respondents participated in this research among which 74% were male and 26% were female respondents. Forty-one percent of the respondents were in their first year of training, and those in second and third years of training accounted for 33% and 26% respectively.

Satisfaction with the New Learning System

Satisfaction with online learning system was measured by 10 items adapted from Sun et al., 2008(12). Some of the ten items were modified by the authors to fit the residency training situations in the University. The 10 items measuring students' satisfaction with the new online method of learning try to capture satisfaction from three different perspectives: (1) whether they support the decision (at department and at university levels) to resume the training program despite the pandemic situation, (2) whether they want to take online courses in the future or recommend the new method of teaching continued to be applied after the end of the current crisis, and (3) the nature of the courses and the way they were delivered. (Table 1)

All of the ten items measuring satisfaction have above average results. Besides, the minimum average satisfaction level per item was item number 10 where the average satisfaction rating was 6.15 out of 7 (Std. Dev. 1.15) (Table 2). This finding clearly indicates that on average, the new method of teaching/learning has a positive acceptance among radiology residents at Department of Radiology, Addis Ababa University.

Table 1: Descriptive statistics of Radiology residents' satisfactions with presentations and case discussions at TASH, 2020

Items	Mean	Std. Deviation
The Department's decision to continue residency teaching via the Internet was a wise one	6.67	0.57
If I had an opportunity to take another course via the Internet, I would gladly do so	6.52	0.71
I am satisfied with the University's decision to resume residency classes via the online teaching modality	6.45	0.98
I was disappointed with the way the on-line courses are worked out(R)	6.24	1.08
I would recommend my Department to continue teaching my junior fellows on-line	6.19	1.13
I was very satisfied with the on-line courses delivered by my Department	6.19	1.05
I will take as many courses via the Internet as I can in the future	6.11	1.16
Conducting the course via the Internet made it more difficult than other courses I have taken (R)	5.79	1.37
I feel that this e-learning served my needs well	5.69	0.94
If I had it to do over, I would not take the courses I am currently taking via the Internet(R)	5.68	1.68
Overall	6.15	1.15

* Questions Marked with (R) mark were reverse coded

Table 2: Descriptive statistics of *Radiology residents' perception of* Participatory nature of case discussions and seminar presentations at TASH, 2020

Items	Mean	Std. Deviation
I received prompt comments from instructors during my presentations	6.00	1.06
My instructors consider web-based online learning using different technologies useful	5.93	1.08
I received prompt comments on case consultations I seek online	5.17	1.48
I received prompt comments from classmates during my presentations	4.86	1.66
Overall	5.50	1.41

Participatory nature of the presentations and case discussions

We measured the participatory nature of case and seminar presentations using four questions. The first three questions evaluated the trainer to trainee dimension of the relationship while the fourth question focused on another important element of the relationship-the trainee-to-trainee relationship.

In the current study, participants had a higher average rating (5.50) for the participatory nature of presentations (Table 2) Further investigation of the individual components of the participation revealed that the trainer-to-trainee relation was a significant contributor of the observed higher satisfaction level. However, the trainee-to-trainee relationship has been impaired due to the introduction of the online learning system (4.86 out of 7).

Based on this finding we recommend that to increase students' satisfaction (17), trainers in Department of Radiology shall make consideration and facilitate student-to-student interactions in future online lectures and case presentations.

The effect of Respondents' Attributes on Level of Satisfaction

Besides the higher level of satisfaction with the new online based learning method observed from the descriptive data, in line with the second research objective, we wanted to further investigate whether there was a significant difference between different trainee attributes: the gender groups and level of residency training, by testing the two research hypotheses. The hypotheses in null and alternate/research forms are:
The subsequent two subsections present the test results and their interpretations.

Test of Difference in Satisfaction among Gender Groups

To test first hypothesis that *'there is no significant difference in the level of satisfaction between female and male radiology residency program trainees'* the two tailed test results were used. P value of 10.08% is well above 5% level of significance implying failure to reject the null hypothesis (Table 3).

Therefore, we concluded that there is no significant difference in the level of satisfaction with online learning system introduced by the Department of Radiology; the new teaching learning method served the needs of both female and male radiology trainees.

Table 3: Two-Sample t-Test showing the difference between male and female residents' satisfaction with online learning system at TASH, 2020

	Female	**Male**
Mean	6.29	6.11
Variance	0.12	0.49
Observations	15	43
Hypothesized Mean Difference	0	
Df	48	
t Stat	1.295	
P(T<=t) one-tail	0.1008	
t Critical one-tail	1.677	
P(T<=t) two-tail	0.2016	
t Critical two-tail	2.011	

Test of Difference in Satisfaction among Different Years of Residency Study

Due to the difference in the level of rigor, nature of courses, level of supervision, and learning objective in the different years of radiology residency training, the researchers were also interested in knowing whether there is a difference in the level of satisfaction with the new online system of learning among first, second and third year radiology residency trainees. This was done by testing the null hypothesis that '*There is no significant difference in the level of satisfaction among trainees from the three levels of radiology residency program.'*

In testing the difference in levels of satisfaction among the different levels of study, we had a single factor (satisfaction with online learning method) and three levels of study (first, second and third year radiology residency training). Therefore, we run a single factor analysis of variance (ANOVA) test and found the result (Table 4) that there was no evidence to reject the null hypothesis that '*there is no significant difference in the level of satisfaction among trainees from the three levels of the radiology residency program*'. This result indicated that students at all levels of the radiology residency program were equally satisfied. The evidence also implied that the university's decision to resume classes was able to bring a positive fruit in terms of keeping students satisfied even in the middle of an international health crisis.

Similar to the tests of difference in the level of satisfaction among different groups of trainees, we have conducted t-tests for test of difference in perception about the participatory nature of presentation between female and male trainees. In addition, we performed ANOVA test to check whether the participation levels were the same among the different years of residency training. While the t-test confirmed that there was a significant difference in perception about the participatory nature of the presentations among the gender groups, ANOVA results indicated that there was no difference among the three levels of residency study in trainees' perception of the participatory nature of online presentation (both results not reported).

Table 4: Single Factor ANOVA showing the difference in levels of satisfaction among the different levels of residency (Resident I – Resident III) at TASH, 2020

Groups	Count	Sum	Average	Variance
R-I	15	89.04	5.94	0.4712
R-II	19	116.60	6.14	0.5836
R-III	24	151.38	6.31	0.1780

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1.28	2	0.6402	1.6612	0.1993	3.1650

Results of Qualitative Data Analysis

This section presents analysis of qualitative information collected using two open ended questions in the data collection instrument. The first question requested respondents if they recommend the new system be sustained as part of the teaching learning system after the end of the pandemics. The second question on its part encouraged participants to list out the major challenges they had faced because of the introduction of the remote teaching learning system. The actual responses obtained are summarized as follows.

Analysis of open-ended responses on participants' view of whether they recommend the sustained use of the online teaching/learning system in the aftermath of the pandemic found that most trainees (72%) recommended continued use of the online learning system anticipating that the online teaching/learning system will ensure quality of training by (1) saving money, energy and time, (2) creating one-stop access to (audio, video and documentary) resources, (3) fostering experience sharing among specialists from in-country and abroad thereby building capacity of training institutions, (4) enhancing knowledge sharing between trainees and trainers in and out of the university, and (5) adding flexibility to the existing traditional face-to-face system. However the number of good reasons for recommending the online modality's use in the future, some of the participants doubted to recommend the online learning system for its disregard of in-person mentoring, failure to make engaging discussions, and neglect of practical aspects of most medical school trainings.

Finally, respondents were asked to express the major challenges they faced as a result of the introduction of online teaching/learning modality. Systematic coding and analysis of responses identified that poor internet network access, compromises practicality of trainings and difficulty of assessing trainees' engagement as the three major bottlenecks from obtaining the best out of the online teaching/learning system.

In addition, although the findings from statistical tests reveal no difference in level of satisfaction among the different levels of study, first year trainees spotted that the 'one size fits all' nature of presentations makes it difficult for them to identify and grasp the major focus areas of the discussions pertinent to their level.

DISCUSSIONS

'Working and Training from home' is a new concept introduced after the finding of coronavirus victims in Ethiopia. In many of the postgraduate specialty training programs in Addis Ababa University, teaching and learning activity was unthinkable without physical gathering of faculty and trainees before COVID-19. However, due to the spread of the virus in the country, especially in the capital city Addis Ababa (where the University is placed) students in the College of Health Sciences are obliged to continue studying amid increased spread of the pandemic by changing the mode of learning to online technology systems. Besides the health consequences (death and illness) of the pandemic, studies focusing on the psychological, socioeconomic and political consequences are beginning to emerge *(18, 19).* Education, including radiology training, is one of the sectors worst affected by the pandemic (16, 20)

Analysis of data collected from 58 radiology residency program trainees (of which 25% were female) found that, the residents appreciated the participatory nature of the newly introduced online learning method. The trainer-trainee dimension of the participatory nature of case presentations showed a higher rating. The result from measurement of the student-student dimension, however, provided an important feedback that Department of Radiology should take as potential area of improvement.

Furthermore, the result from analysis of trainees' satisfaction with the new online based teaching/learning method which requires the trainers to work from home indicates that the residents have on average higher levels of satisfaction which was also the case in other radiology institutions where virtual learning introduced during COVID-19 pandemic resulted in a high trainee satisfaction.(21) This finding implies that the trainees accepted the new method and are satisfied with it.

Hypotheses tests using t-test and analysis of variance were used to test whether there was significant difference between gender groups and the levels of years of study. The results confirmed that the satisfaction levels are the same both among gender groups and levels of residency training. Taking trainees' higher level of satisfaction as a wake-up call from the COVID-19 pandemic, the University shall use this opportunity to consider designing a teaching-learning system that blends form of the traditional face-to-face and the online learning system which was also shown to improve performance, satisfaction and engagement in medical education.(22, 23)

In addition, analysis of open-ended responses on whether participants recommend the continued use of the online teaching/learning system in the future found that the online teaching/learning system is recommended as it is believed to ensure quality of education by saving money, energy and time, ease sharing of knowledge and (audio, video and documentary) resources, and add flexibility to the existing traditional face-to-face system(22).

However, some participants expressed their view that the new teaching/learning system might disregard in-person mentoring, may not engage all attendants into discussions, and also huge reliance on the online system neglects the practical aspects of residency trainings.

The aforementioned points can take as potential areas of improvement for the radiology residency training program and thus would be a sufficient impetus for evaluating the weaknesses of the teaching learning system and start working towards a high-quality residency training program that could tap the benefits of using online teaching/ learning technologies.

Finally, when asked about the major challenges they encounter with the new modality, trainees spotted that poor internet network access, compromise of practical trainings, difficulty of assessing trainees' level of engagement and the *'one size fits all'* nature of presentations were the major bottlenecks of the online teaching/learning system.
Besides, this study has several limitations; among which are being single institution study involving a single department and didn't include faculty perceptions.

It can thus be concluded that although the coronavirus pandemic disrupted the radiology residency training program at Department of Radiology in Addis Ababa University like any other training institution, it has also given to the existing training system a timely wake-up call by bringing into light the demerits of the face-to-face that could be supplemented by introduction of online learning in the aftermath of the pandemic.

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REFERENCES

1. Djalante R, Lassa J, Setiamarga D, Sudjatma A, Indrawan M, Haryanto B, et al. Review and analysis of current responses to COVID-19 in Indonesia: Period of January to March 2020. Progress in Disaster Sci ence. 2020;6:100091.
2. Haeder SF, Gollust SE. From Poor to Worse: Health Policy and Politics Scholars' Assessment of the U.S. COVID-19 Response and Its Implications. 2020;12(4):454-81.
3. Lu Z-H, Yang C-L, Yang G-G, Pan W-X, Tian L-G, Zheng J-X, et al. Efficacy of the combination of modern medicine and traditional Chinese medicine in pulmonary fibrosis arising as a sequelae in conva lescent COVID-19 patients: a randomized multicenter trial. Infectious Diseases of Poverty. 2021;10 (1):31.
4. Nugraha RV, Ridwansyah H, Ghozali M, Khairani AF, Atik N. Traditional Herbal Medicine Candidates as Complementary Treatments for COVID-19: A Review of Their Mechanisms, Pros and Cons. Evidence -Based Complementary and Alternative Medicine. 2020;2020:2560645.
5. Zhao Z, Li Y, Zhou L, Zhou X, Xie B, Zhang W, et al. Prevention and treatment of COVID-19 using Tra ditional Chinese Medicine: A review. Phytomedicine. 2021;85:153308-.
6. Barber P, López-Valcárcel BG. Forecasting the need for medical specialists in Spain: application of a system dynamics model. Human Resources for Health. 2010;8(1):24.
7. Cooper RA. There's a shortage of specialists: is anyone listening? Academic medicine : journal of the Association of American Medical Colleges. 2002;77(8):761-6.

8. Bodenheimer TS, Smith MD. Primary Care: Proposed Solutions To The Physician Shortage Without Training More Physicians. Health Affairs. 2013;32(11):1881-6.
9. Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. Milbank Q. 2005;83(3):457-502.
10. Hawkins J. Addressing the Shortage of Radiologists. The journal of the Americal Health Care Radiology Administrators. 2001:4.
11. Steckel RJ, Batra P, Goldin JG, Zucker M, Sayre JW, Johnson SL. Supervision of residents by faculty radiologists using home workstations. Emerg Radiol. 2003;10(3):121-5.
12. Sunshine JH, Maynard CD. Update on the Diagnostic Radiology Employment Market: Findings Through 2007-2008. Journal of the American College of Radiology. 2008;5(7):827-33.
13. Meghea CI, Sunshine JH. Who's overworked and who's underworked among radiologists? An update on the radiologist shortage. Radiology. 2005;236(3):932-8.
14. Rohatgi S, Hanna TN, Sliker CW, Abbott RM, Nicola R. After-Hours Radiology: Challenges and Strate gies for the Radiologist. American Journal of Roentgenology. 2015;205(5):956-61.
15. Fishman MDC, Mehta TS, Siewert B, Bender CE, Kruskal JB. The Road to Wellness: Engagement Strate gies to Help Radiologists Achieve Joy at Work. RadioGraphics. 2018;38(6):1651-64.
16. Legesse T. Impact of CVID-19 pandemic in radiology residency training of Ethiopia. Ethiopian Medical Journal. 2020;58.
17. Croxton RA. The role of interactivity in student satisfaction and persistence in online learning. Journal of Online Learning and Teaching. 2014;10(2).
18. DW A. A Review on Psychological and Socio-Economic Impacts of Corona Virus Disease (Covid-19) the Case of Under Developing Countries. . Vol. 6 No. 4: 100. Med Clin Rev. 2020;6(4).
19. UNCT-Ethiopia. Socio-Economic Impact of COVID- 19 in Ethiopia. June 2020.
20. Alvin MD, George E, Deng F, Warhadpande S, Lee SI. The Impact of COVID-19 on Radiology Trainees. Radiology. 2020;296(2):246-8.
21. Larocque N, Shenoy-Bhangle A, Brook A, Eisenberg R, Chang Y-M, Mehta P. Resident Experiences With Virtual Radiology Learning During the COVID-19 Pandemic. Acad Radiol. 2021;28(5):704-10.
22. Vavasseur A, Muscari F, Meyrignac O, Nodot M, Dedouit F, Revel-Mouroz P, et al. Blended learning of radiology improves medical students' performance, satisfaction, and engagement. Insights into Imaging. 2020;11 (1):61.
23. Durán-Guerrero JA, Ulloa-Guerrero LH, Salazar-Díaz LC. Blended learning: An effective methodology for teaching radiology to medical students %J Revista de la Facultad de Medicina. 2019;67:273-7.

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ORIGINAL ARTICLE

FACTORS AFFECTING THE OUTCOME OF GUILLAIN-BARRE SYNDROME AMONG PEDIATRIC PATIENTS IN TIKUR ANBESSA SPECIALIZED HOSPITAL

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ABSTRACT

Introduction*: Guillain-Barré syndrome is an immune mediated acute illness featured by continual weakness and loss of deep tendon reflexes. The causes that govern the variant clinical presentations and outcome of this disease are not understood well. Neither are they studied in our setup.*

Objectives: *Assessed the factors affecting the outcomes of Guillain-Barré syndrome among children <15 years in Tikur Anbesa Specialized Hospital.*

Methods: *Institution based retrospective study was done among 91 patients with Guillain-Barré syndrome on follow-up identified by chart tracing and reviewed at Tikur Anbesa specialized hospital from October 1/2012 to January 30/2019. Required data was collected using a check list. The data was entered to computer using Ep-info and exported to Statistical Package for Social Sciences Version 23 for analysis.*

Results*: There were 91 patients with a male to female ratio of 1.1:1 and 80 % of them were between 2-10 years of age. Respiratory infections were the commonest preceding events in 27/91(29.7%). Cranial nerve involvement was found in 24/91(26.4 %) and 36/91(39.6%) patients had dysautonomia. The commonest sub-type was acute motor axonal neuropathy, 67/91 (73%). Functional independence was achieved by 47/91(52%) patients at 3 months and 80/91(88%) at 6 months. Poor functional outcome was significantly associated with the presence of sensory symptoms, dysautonomia, the need for mechanical ventilation, severity of weakness at nadir and longer hospital stay, P < 0.05.*

Conclusion: *The severity of motor weakness at nadir is associated with lower likely hood of functional independence signifying the requirement of longer time for self-efficient functionality.*

Key words: *Guillain-Barré syndrome, outcome, pediatric patients.*

INTRODUCTION

Guillain-Barré syndrome (GBS) is considered to be an autoimmune disease which is thought to mostly present post-infections. It affects the motor, sensory and autonomic nerves and it has a slight male preponderance with seasonal variation (1,2). Diagnosis of GBS is made by cerebro-spinal fluid (CSF) analysis and nerve conduction test (NCT). There are several treatment options like intravenous immunoglobulin (IVIg) and plasma exchange but outcomes of the disease are variable despite the uniform treatment modalities for unknown reason.

Furthermore, it has variable outcomes like decreased mobility, severe long-term fatigue syndrome and chronic pain(3–5). Since the elements that govern the different clinical and laboratory profiles of GBS and outcome are poorly understood, it creates an open ground for studies.

It has been shown in several studies that GBS is preceded by bacterial and viral infections and occasionally by vaccinations (6,7)but there hasn't been a strong evidence linking vaccination to GBS. Besides, it is a well-known fact that the benefits of vaccines outweigh the risk (8–10).

The nerve damage caused by GBS is histopathologically classified as demyelinating and axonal degenerating type. Acute inflammatory demyelinating polyradiculoneuropathy (AIDP) accounts for 80-90% of the cases in Europe and North America making it the commonest seconded by Acute motor axonal neuropathy (AMAN) accounting for 10-20% in the western countries and 50-60% in China and Japan (11–13).

There are various grading scales for prognostication of GBS based on which therapeutic strategies are planned.

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Some commonly used are Medical Research Council (MRC) score, the Erasmus GBS outcome score (EGOS), Erasmus GBS respiratory insufficiency score (EGRIS) and Hughes functional grading scale (HFGS) (12,14–16).Our study uses the HFGS which is an assessment of functionality of patients from their history since it is more practical for retrospective studies than the other modalities.

In a study done in South Africa, bulbar dysfunction, autonomic dysfunction and upper limb paralysis significantly predicted the need for mechanical ventilation (17,18). In a previous study done in our setup, the demographic and clinical characters were determined but outcome of patients on follow-up in clinic was not assessed. Furthermore, factors associated with poor outcome were not looked into (7).

Therefore, the main purpose of this study is to assess the 3rd and 6th month outcome of GBS patients in clinics with the available treatment modalities and to determine the factors affecting poor outcome. This is important in order to prepare one in anticipation of complications for better resource allocation, early intervention and better counseling of patients and care givers about the disease and future outcome.

MATERIALS AND METHODS

Study Area: the study was done in TASH which is the largest tertiary hospital and one of the few with pediatric intensive care units (ICU) in Ethiopia. It manages many patients that require ICU and hence, many of the national GBS cases.

Study design: The study was a hospital based retrospective study, conducted between May and July 2019 in TASH, Addis Ababa, Ethiopia.

Sample size: The calculated sample size using $N=Z^2P(1-p)/d^2$, where p was taken to be 15%, d=0.05 and Z=1.96 was 215, but only 94 patients with a diagnosis of GBS were identified from 0ctobor, 2012 to January 2019, from which one left against medical advice, one was referred out and the last one didn't fulfill the inclusion criteria making the total sample size 91. Those children who fulfilled the diagnostic criteria for GBS as per the operational definition were enrolled into the study.

Sampling procedure and data collection: A check list was prepared by using selected variables taken from patient health records and used as data collection tool. I, the principal investigator, collected the data. Consecutive sampling was used to collect medical record numbers of patients admitted with the assessment of GBS from the health management information system (HMIS) in all pediatric wards and cross referenced with the pediatric neurology clinic HMIS for follow-up. Data was extracted from the retrieved cards by the medical record keeping department and it was then checked, cleared and coded.

Data analysis and statistical methods: The data was entered to a computer using Ep-info and exported to Statistical Package for Social Sciences Version 23.0 for analysis. Univariate analysis was used for percentage and frequency distribution of the demographic and few other variables in the check list. Factors with significant association with the outcome on univariate analysis were selected for multivariate logistic regression which was used to identify independently associated factors with the outcome. Statistically significant association was taken to be a p -value of <0.05.

Operational definition

1. Pediatric patients- It is defined as children under the age of 14 years based on the hospital protocol.
2. Features Required for diagnosis of GBS based on NINDS diagnostic criteria(14).
    - A. Progressive motor weakness of more than one limb with hypore flexia or areflexia (loss of tendon jerks) and
    - B. Cerebrospinal fluid features strongly supportive of the diagnosis or
        - i. CSF cells Counts of 10 or fewer mononuclear leukocytes/mm3.
        - ii. Elevated protein levels more than 0.5g/L
    - C. Positive electro-diagnostic test as stated on the nerve conduction test.

Areflexia: Deep tendon reflex = 0/4
Hyporeflexia: deep tendon reflex= ¼
Albumin-cytological dissociation: It is defined as elevated protein levels more than 0.5g/L with normal cell counts; fewer or equal to 10 mononuclear cells in CSF.

Preceding event: It is defined as the presence of respiratory, gastrointestinal, febrile illness or vaccination in the preceded 4 weeks to the onset of illness.

Prolonged intubation**:** It is defined as intubation for more than two weeks requiring tracheostomy for ventilation.

Hughes scale (15,16).

1. Healthy
2. Minor symptoms/capable of running
3. Walk 5 meters without support /unable to run
4. Able to walk with an appliance
5. Confined to bed/chair
6. Requires assisted ventilation
7. Death

3. Outcome

A. Good – hughes score ≤ 2

B. Poor – hughes score ≥3

Ethical consideration: The research approval was made by the pediatric and child health department's research and publication committee (DRPC).

RESULTS

A total of 91 children were included in the final analysis. All demographic characters are well stated in Table 1. Around 62/91(68%) had a preceding event prior to the development of weakness while the remaining 29 (31.9 %) had no documented preceding event. Except 3 (3.3 %) children, all the remaining 88 (96.7%) had Hughes functional score above 2 at the time of nadir weakness.

Table1: Socio-demographic characteristics of GBS patients in TASH 2012-2019GC, AA, Ethiopia

Variables		F	Percent %,
Age (years)	<2	7	7.7
	2-5	40	44.0
	5-10	33	36.3
	>10	11	12.1
Sex	M	47	51.6
	F	44	48.4
Residence	AA	39	42.9
	Oromia	31	34.1
	Others	11	12.1
Seasonal variation	|Autumn	22	24.2
	Winter	19	20.9
	Spring	19	20.9
	Summer	31	34.1
Preceding event	Respiratory tract infections	27	29.7
	Acute gastroenteritis	22	24.2
	Vaccine	13	14.3
	None	29	31.9
Hughes score at nadir	≤2	3	3.3
	>2	88	96.7

The median duration of hospital stay is 13 days with inter-quartile range of 19 days. The maximum stay was 123 days. Patients in recovery phase were not admitted making the minimum days of stay zero. More than half of the patients, 50/91(55%) had a hospital stay of 2 weeks or less.

Another 22 patients had a hospital stay of 2-4 weeks making the hospital stay less than a month in 79 % of the patients. The median duration from the onset of the weakness to hospital admission was 5 days with inter-quartile range of 2 to 7 days.

The median duration from the onset of weakness to achieve maximum weakness was 3 days with inter-quartile range of 2 to 6 days. In most of the children, as depicted in the figure below, progression from onset to nadir weakness occurred on the 2nd and 3rd days of illness. More than a third of the children, 88% reached nadir weakness by one week, and progression was rare (2.2%) after 2 weeks.

The lower limb power was below 3 in 64/91 (70.4%) of the children at the time of presentation, with the remaining having a power of three to four. Lower limbs were areflexic in 47(51.5%) and hyporeflexic in 44 (48.4%) at presentation and 57 (62.7 %) had upper limb power 3-5.

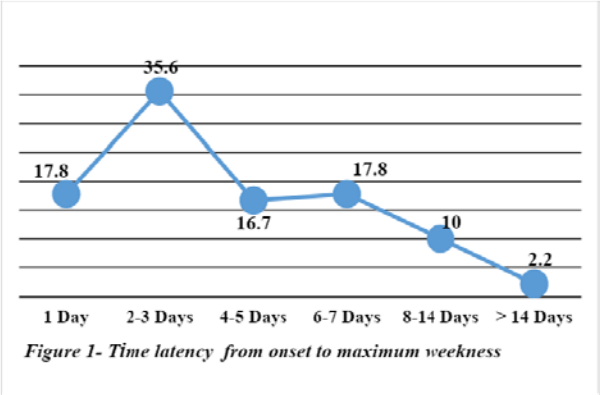

Figure 1- Time latency from onset to maximum weekness

Sensory symptoms of paresthesia and numbness were present in 40 (44 %), cranial nerve palsy in 24 (26.4 %), and features of dysautonomia in 36 (39.6 %) of the children. Of all patients with dysautonomia, 34/36 (94.4 %) had labile blood pressure and 15/36 (41.6 %) had arrhythmia but most (41.6%) had a combination of two or more.

Among the 73 patients with CSF analysis, 67/73 (91.8%) had albumino-cytologic dissociation (ACD). NCT was done for 59/91 (65%) of the children; accordingly, commonest subtype was AMAN-43/59 (73 %) followed by AIDP-14/59 (24 %), and the pattern of AMSAN was described only in 2/59 (3 %) children.

From all the patients admitted, 20/91 (22 %) required mechanical ventilation for respiratory failure, out of whom, 17/20 (85 %) had prolonged intubation. Children who received a total dose of 2 grams of intravenous immunoglobulin (IVIg) in five days accounted for 45/91 (50 %) of them.

Table 2: List of Investigations, treatment modalities and complications of patients with Guillain-Barre Syndrome (GBS) in TASH 2012-2019GC, AA, Ethiopia

Character		N	Percent
CSF analysis	No albumin-cytological Dissociation	12	13.2
	Albumin-cytological dissociation	61	67.0
	Not done	18	19.8
Nerve conduction test Sub-type	AMAN	43	47.3
	AIDP	14	15.4
	AMSAN	2	2.2
	No NCT	32	35.2
Mechanical ventilation	No	71	78.0
	Yes	20	22.0
Intravenous immunoglobulin	No	45	50.0
	Yes	45	50.0
Prolonged intubation	No	74	81.3
	Yes	17	18.7
Complications	No	64	70.3
	Yes	27	29.7

From a total of 91 patients, data at 3rd –month shows functional outcome of the first set of 50 patients only. Analysis of outcome at the 3rd month for these 50 cases showed that 26/50(52 %) children improved to Hughes score of ≤ 2. The second set of 50 patients from a total of 91 had their functional outcome analyzed at 6th month follow-up. By this time, only 6/50 (12 %) had Hughes functional score of > 2, only 4/50 (8 %) had lower limb power of below three, and only 2/50 (4 %) had absent Deep Tendon Reflex (DTR). None had upper limb power below 3 and absent DTR on 6th month.

On the analysis of bivariate association, different variables were significantly associated with functional outcome at three months. Poor functional outcome of GBS was significantly associated with the presence of sensory symptoms, dysautonomia and the need for mechanical ventilation $P < 0.05$, the severity of weakness at nadir, use of Intravenous Immunoglobulin IVIg, mean length of hospital stay and the presence of complications $P \leq 0.005$ and the duration to nadir weakness $P= 0.006$.

Table 3: Functional outcome of GBS patients in TASH 2012-2019GC, AA, Ethiopia

Follow up time		3 month N (%)	6 month N (%)
Hughes score	≤ 2	26 (52.0)	44 (88.0)
	> 2	24 (48.0)	6 (12.0)
LLP	<3	4 (8.0)	0
	3-5	46 (92)	50 (100)
LLR,	.00	2 (4.0)	0
DTR	1.00	28 (56.0)	13 (26.0)
	2.00	20 (40.0)	37 (74.0)
ULP	<3	1 (2.0)	0
	3-5	49 (98)	50 (100)
ULR	.00	2 (4.0)	0
	1.00	20 (40.0)	10 (20.0)
	2.00	28 (56.0)	40 (80.0)
Sensory	No	50 (100)	49 (98.0)
	Yes	0	1 (2.0)
Pain	No	47 (94.0)	48 (96.0)
	Yes	3 (6.0)	2 (4.0)

Table 4: Bivariate association of predictor variables with 3rd month functional outcome of GBS patients in TASH 2012-2019 GC, A.A, Ethiopia

Variables		Hugh's score at 3 months N (%) Good outcome ≤2	Poor outcome >2	P-value
Age in Years	<2	2 (7.7)	1 (4.2)	
	2-5	11 (42.3)	11 (45.8)	0.959
	5-10	10 (38.5)	9 (37.5)	
	>10	3 (11.5)	3 (12.5)	
Sex	Male	14 (53.8)	10 (41.7)	0.389
	Female	12 (46.2)	14 (58.3)	
Lower Limb power	0-2	9 (34.6)	23 (95.8)	0.000
	3-5	17 (65.4)	1 (4.2)	
Sensory symptoms	No	16 (61.5)	8 (33.3)	0.046
	Yes	10 (38.5)	16 (66.7)	
Cranial Nerve palsy	No	20 (76.9)	14 (58.3)	0.159
	Yes	6 (23.1)	10 (41.7)	
Dysautono-mia	No	20 (76.9)	11(45.8)	0.024
	Yes	6 (23.1)	13 (54.2)	
Nerve con-duction test Subtype	AMAN	16 (61.5)	12 (50.0)	0.690
	AIDP	3 (11.5)	3 (12.5)	
Mechanical ventilation	No	23 (88.5)	15 (62.5)	0.032
	Yes	3 (11.5)	9 (37.5)	
IV Immu-noglobulin	No	19 (73.1)	8 (33.3)	0.005
	Yes	7 (26.9)	16 (66.7)	
Prolonged intubation	No	23 (88.5)	16 (66.7)	0.063
	Yes	3 (11.5)	8 (33.3)	
Complica-tions	No	22 (84.6)	11 (45.8)	0.004
	Yes	4 (15.4)	13 (54.2)	
Time to Nadir	≤ 3day	9 (34.6)	17 (65.4)	0.006
	> 3 days	17 (73.9)	6 (26.1)	
Hospital Stay in days (mean± SD)		11.5 ± 12	35.5 ± 30	0.001

Those variables which were significantly associated with poor functional outcome were computed in multivariate analysis, only the severity of weakness at nadir was significantly associated with 3rd month poor functional outcome with AOR 30.115 (1.44- 628.7) at 95% CI.

Association of factors affecting outcome are only done on the 3rd month's follow-up to avoid bias secondary to inter-individual difference in genetic polymorphism since different sets of 50 patients had the 3rd and 6th months follow-up.

Table 5: Binary logistic regression of predictor variables with 3- month poor functional outcome of GBS patients in TASH 2012-2019GC, AA, Ethiopia

Variables		Hughes score at 3 months		P-value	AOR	95 % CI	
		≤2 N (%)	>2N (%)				
Lower Limb power	0-2	9 (34.6)	23 (95.8)	0.000	30.11	1.44	628.7
	3-5	17 (65.4)	1 (4.2)				
Sensory symptoms	No	16 (61.5)	8 (33.3)	0.046	.93	.13	6.61
	Yes	10 (38.5)	16 (66.7)				
Dysautono-mia	No	20 (76.9)	11(45.8)	0.024	.37	.05	2.74
	Yes	6 (23.1)	13 (54.2)				
Mechanical ventila-tion	No	23 (88.5)	15 (62.5)	0.032	.04	.00	1.28
	Yes	3 (11.5)	9 (37.5)				
IV immunoglo-bulin	No	19 (73.1)	8 (33.3)	0.005	4.98	.50	49.48
	Yes	7 (26.9)	16 (66.7)				
Complication	No	22 (84.6)	11 (45.8)	0.004	5.86	.23	150.4
	Yes	4 (15.4)	13 (54.2)				
Time to Nadir	≤ 3 D	9 (34.6)	17 (65.4)	0.006	1.20	.14	10.23
	> 3 D	17 (73.9)	6 (26.1)				
Hospital Stay in days	≤2wks	22(78.5)	6(21.4)	0.001	1.10	.99	1.21
	> 2wks	8(36.4)	14(63.6)				

DISCUSSION

In our study, acute motor axonal neuropathy (AMAN) and ascending weakness are the commonest variants. There are relevant numbers of patients requiring mechanical ventilation. Most of our patients showed a good functional out come with 88% functional independence at 6th month follow up. The severity of motor weakness at nadir is independently associated with poor functional outcome.

On the previous study in our setup, AMAN was the most common subtype accounting for 80% and AMSAN < 10% (7). In our study, the most common variant was AMAN which accounted for 73% of the cases followed by AIDP in 24% of the cases which is slightly higher than the previous study. This is in sharp contrast with western reports. AMSAN was the rarest variant which accounted for 3% of the cases strengthening the rarity of this variant in other reports (11–13).

In this study, 22% of children required mechanical ventilation for respiratory failure strengthening the general recommendation on meticulous follow up of respiratory status of GBS patients. There is an increase in use of the mechanical ventilation as compared with the previous study in our set up, 12.5% (7) which justifies the increased availability of the ICU setting.

In our study, 92.3% had ascending type of weakness which was in line with the research done by Saroj Kumar Bhagat et al in eastern Nepal showing 93.5% predominance(19). This pattern of motor weakness also accounted for 82.1 % of the 112 patients in the former study on GBS by Tigist et al. (7) in our setup.

It has been reported that, 85% of GBS patients will be functionally independent by one year, 10% will have functionally disabling weakness, and the rest 5% will die due to the GBS(15).

In our study, 14% became functionally independent (Hughes score ≤2) on discharge, 52% at three months and 88% at six months.

In contrast, the outcome on discharge in the study by Tigist et al. with mean duration of hospital stay being 18 days showed a 27.7 % good outcome and 36.6 % poor outcome with in-hospital GBS mortality of 8% and residual weakness frequency of 37 %(7). The in hospital mortality of GBS in our study was 2.2% comparable to that reported in the study by Alshekhlee A et al. (2.58%) in the United states of America (20) and in a study by Mahmoud Reza Ashrafi et al. (2.2%) in Iran(21). The lower mortality in our study compared to the previous study in TASH may indicate improvements achieved in health care quality in subsequent years, especially ICU care for respiratory failure. 38% of children did not improve completely in our study similar to the previous study (7). This observation is very similar with the general descriptions on the prognosis of GBS showing a relatively benign process compared to other neurologic conditions causing weakness (15,20,21).

Some clinical variables at presentation can indirectly suggest the poor likely hood of recovery and longer hospital stay; such as the severity of weakness at nadir, the rapidity of disease course and the presence of early cranial nerve palsies(21).

In our study, one variable which became independently associated with poor functional outcome on multivariate analysis was the severity of muscle weakness at nadir (p =0.028, AOR -30.115, 95%CI-1.44-628.7). The larger confidence interval shows the lesser power of the study due to the smaller sample size than calculated which signifies the requirement of a large size study for better assessment of predictive factors of outcomes of patients with GBS.

Conclusion

Most patients with GBS have good prognosis with highly improving functional independence in the first 6 months after initial presentation and the severity of motor weakness at nadir is associated with lower likely hood of functional independence.

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Conflict of interest

The authors have no conflict of interest to declare.

REFERENCES

1. Hughes RAC, Swan A V., Raphaël JC, Annane D, Van Koningsveld R, Van Doorn PA. Immunotherapy for Guillain-Barré syndrome: A systematic review. Brain. 2007;130(9):2245–57. https://**doi**.org/**10.1093**/**brain**/**awm004** .
2. Zhong M, Cai F-C. Current perspectives on Guillain-Barré syndrome. World J Pediatr. 2007;3(3):187–94. https://doi.org/10.1016/j.pediatrneurol.2011.06.007.
3. Pritchard J, Hughes RA, Hadden RD, Brassington R. Pharmacological treatment other than corticoster oids, intravenous immunoglobulin and plasma exchange for Guillain-Barré syndrome. Cochrane Database Syst Rev. 2016;2016(11). https://doi.org/10.1002/14651858.cd008630.pub4.
4. Witsch J, Galldiks N, Bender A, Kollmar R, Bösel J, Hobohm C, et al. Long-term outcome in patients with Guillain-Barré syndrome requiring mechanical ventilation. J Neurol. 2013;260(5):1367–74. https://doi.org/10.1007/s00415-012-6806-x.
5. Kuwabara S. Guillain-Barré syndrome: Epidemiology, pathophysiology and management. Drugs. 2004;64 (6):597–610. https://doi.org/10.2165/00003495-200464060-00003.
6. Sharma B, Paul M. Guillain-Barre Syndrome in 2016: The Centenary Advances. Int J Med Public Heal. 2016;6(3):111–2. http://dx.doi.org/10.5530/ijmedph.2016.3.2.
7. Heye TB. Guillain Barre Syndrome in Children at Tikur Anbessa Specialized Hospital. Res GATE. 2019;2009(April):18–25.
8. Schmidt-Ott R, Schmidt H, Feldmann S, Brass F, Krone B, Gross U. Improved serological diagnosis stresses the major role of Campylobacter jejuni in triggering Guillain-barré syndrome. Clin Vaccine Im munol. 2006;13(7):779–83. https://dx.doi.org/10.1128%2FCVI.00065-06.
9. Ang CW, Jacobs BC, Brandenburg AH, Laman JD, Van Der Meché FGA, Osterhaus ADME, et al. Cross-reactive antibodies against GM2 and CMV-infected fibroblasts in Guillain-Barre syndrome. Neurology. 2000;54(7):1453–8. https://doi.org/10.1212/wnl.54.7.1453.

10. Kieseier BC, Kiefer R, Gold R, Hemmer B, Willison HJ, Hartung H-P. Advances in understanding and treatment of immune-mediated disorders of the peripheral nervous system. Muscle Nerve [Internet]. 2004 Aug [cited 2021 Aug 13];30(2):131–56. Available from: https://pubmed.ncbi.nlm.nih.gov/15266629/ https://doi.org/10.1002/mus.20076
11. Zhang G, Li Q, Zhang R, Wei X, Wang J, Qin X. Subtypes and prognosis of Guillain-Barré syndrome in southwest China. PLoS One. 2015;10(7):1–8. https://doi.org/10.1371/journal.pone.0133520
12. Walgaard C, Lingsma HF, Ruts L, Van Doorn PA, Steyerberg EW, Jacobs BC. Early recognition of poor prognosis in Guillain-Barré syndrome. Neurology. 2011;76(11):968–75. https://doi.org/10.1212/wnl.0b013e3182104407
13. Akbayram S, Dogan M, Akgün C, Peker E, Sayin R, Aktar F, et al. Clinical features and prognosis with Guillain-Barr syndrome. Ann Indian Acad Neurol. 2011;14(2):98–102. https://doi.org/10.4103/0972-2327.82793
14. Jacobs BC, van den Berg B, Verboon C, Chavada G, Cornblath DR, Gorson KC, et al. International Guill ain-Barré Syndrome Outcome Study: protocol of a prospective observational cohort study on clinical and biological predictors of disease course and outcome in Guillain-Barré syndrome. J Peripher Nerv Syst. 2017;22(2):68–76. https://doi.org/10.1111/jns.12209
15. van Koningsveld R, Steyerberg EW, Hughes RA, Swan A V., van Doorn PA, Jacobs BC. A clinical prog nostic scoring system for Guillain-Barré syndrome. Lancet Neurol [Internet]. 2007 Jul [cited 2021 Aug 13];6(7):589–94. Available from: https://pubmed.ncbi.nlm.nih.gov/17537676/ https://doi.org/10.1016/s1474-4422(07)70130-8
16. Walgaard C, Lingsma HF, Ruts L, Drenthen J, Koningsveld R van, Garssen MJP, et al. Prediction of res piratory insufficiency in Guillain-Barré syndrome. Ann Neurol [Internet]. 2010 Jun [cited 2021 Aug 13];67(6):NA-NA. Available from: https://onlinelibrary.wiley.com/doi/10.1002/ana.21976 https://doi.org/10.1002/ana.21976.
17. van der Pijl J, Wilmshurst JM, van Dijk M, Argent A, Booth J, Zampoli M. Acute flaccid paralysis in South African children: Causes, respiratory complications and neurological outcome. J Paediatr Child Health [Internet]. 2018 Mar 1 [cited 2021 Aug 13];54(3):247–53. Available from: https:// p u b med.ncbi.nlm.nih.gov/28960591/ https://doi.org/10.1111/jpc.13709.
18. Ashrafi MR, Sagheb S, Mohammadi M, Vakili A, Nasirian A, Zamani GR. Clinical short term outcome of Guillain-Barré syndrome in children. Iran J Pediatr [Internet]. 2008 [cited 2021 Aug 13];18(1):11–9. Available from: https://www.researchgate.net/publication/26502512.
19. Alshekhlee A, Hussain Z, Sultan B, Katirji B. Guillain-Barré syndrome: incidence and mortality rates in US hospitals. Neurology [Internet]. 2008 Apr 29 [cited 2021 Aug 13];70(18):1608–13. Available from: http://www.neurology.org/cgi/doi/10.1212/01.wnl.0000310983.38724.d4, https://doi.org/10.1212/01.wnl.0000310983.38724.d4.
20. Asiri S, Altwaijri W, Ba-Armah D, Al Rumayyan A, Alrifai M, Salam M, et al. Prevalence and outcomes of Guillain-Barré syndrome among pediatrics in Saudi Arabia: a 10-year retrospective study. Neuropsy chiatr Dis Treat [Internet]. 2019 Mar [cited 2021 Aug 13];Volume 15(1):627–35. Available from: https://pubmed.ncbi.nlm.nih.gov/30880987/, https://doi.org/10.2147/NDT.S187994.
21. Bhagat SK, Sidhant S, Bhatta M, Ghimire A, Shah B. Clinical Profile, Functional Outcome, and Mortality of Guillain-Barre Syndrome: A Five-Year Tertiary Care Experience from Nepal. Neurol Res Int [Internet]. 2019 Jun 2 [cited 2021 Aug 13];2019(2):1–5. Available from: https://www.hindawi.com/journals/nri/2019/3867946/, https://doi.org/10.1155/2019/3867946.

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ORIGINAL ARTICLE

BURNOUT AND STRESS AMONG INTERNS IN AN ETHIOPIAN TEACHING HOSPITAL: PREVALENCE AND ASSOCIATED FACTORS

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ABSTRACT

Introduction: *Burnout is a psychological condition characterized by emotional and physical exhaustion, depersonalization, and low personal accomplishment. Workplace stress is a significant problem among physicians and is considered as a predecessor to burnout. Burnout negatively affects patient care and causes poor physician mental health. The objective of this study was to determine the level of burnout and stress among medical interns working at St. Paul's Hospital Millennium Medical College and associated factors.*

Methods: *A cross-sectional survey was conducted among 72 interns using a structured online survey. Burnout was assessed using Maslach Burnout Inventory. Burnout was considered when there is a high score on emotional exhaustion (> 26 points), depersonalization (> 9 points) or low score on personal accomplishment (< 34 points) subscale. Stress was evaluated using Perceived Stress Scale-10 questionnaire. Statistical package for social sciences version 23 was used for data analysis. Univariate and multivariate logistic regression analysis were used to determine association between variables. All variables with a p-value of < 0.05 in the multivariate regression model were considered to be statistically significant.*

Results: *High emotional exhaustion, high depersonalization, and highly reduced sense of personal accomplishment were seen in 69.4%, 41.7%, and 44.4% of participants respectively. High level of stress was seen in 37% of the participants. Logistic regression analysis showed that emotional exhaustion and depersonalization were independently associated with having plans to change profession, having financial worries, and high perceived stress, while depersonalization was associated with fear of medical errors. Reduced personal accomplishment was associated with high perceived stress. High level of perceived stress was associated with having plans to change profession.*

Conclusions: *The levels of burnout and stress among interns were found to be high. All concerned bodies must be aware of the findings of this study so they can help improve the mental wellbeing of interns. Support services for interns need to be enhanced.*

Key words: *Professional burnout, psychological stress, internship, teaching hospital*

INTRODUCTION

Internship is a critical point in medical students' journey reflecting transition to independently functioning physician and is an important experience in a physician's life (1,2). It is however faced with several challenges bringing a certain level of distress (1). These challenges include but not limited to long working hours, disturbances in sleep-wake cycles, excessive workload and having multiple responsibilities (1, 3, 4), which occur with significant lack of social support and uncertain future (1,5). These lead to high level of stress and dissatisfaction with 29 to 95% of interns and other physicians considering stress a significant problem (1, 4, 6).

High levels of workplace stress is considered precursor to burnout (1, 3, 4, 6).

The term 'burnout' was first described by the American psychologist Herbert Freudenberger in 1974 (7) and seen mainly in professions having significant contact with other individuals, specifically those that help people such as medicine (1, 7, 8).

Burnout syndrome is a psychological condition characterized by emotional and physical exhaustion, depersonalization, and low personal accomplishment (1, 3). The International Classification of Diseases 11th revision (ICD-11) now has coding for burnout and recognizes it as a syndrome conceptualized as resulting from chronic workplace stress and includes several elements in common with depression and neglect of physical health giving burnout a global recognition (9, 10).

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This will help further highlight the distinct nature of burnout, which traditionally had unclear distinction with other psychiatric diagnosis such as depression, adjustment disorder or chronic fatigue syndrome (11).

Burnout negatively affects patient care, desire to help, willingness to work and increases medical errors (1, 12, 13, 14). It reduces cognitive skills and affects patient and physician satisfaction contributing to brain drain and strains healthcare systems (1, 3, 13, 15, 16). It causes poor physician mental health contributing to depression, anxiety, and poor quality of life (1, 14, 15). It also affects physical wellbeing resulting in inadequate sleep, and adverse health outcomes (1, 9, 15).

The prevalence of burnout among physicians and medical students is reported to be high (15). Data from low and middle-income countries is scarce, but few studies in sub-Saharan Africa reported burnout as a major challenge (13, 16, 17). Prevalence of burnout in interns has also been studied showing levels from 16.7% in Jeddah to as high as 75% in Australia (1, 3, 5, 18).

Several factors affect occurrence of burnout including lack of support, dissatisfaction with education, undefined work roles, sleep deprivation and high work burden (1, 3, 15). Substance use such as smoking and excessive alcohol consumptions seems to increase the risk (15). Salary was also a major contributor in studies among physicians outside internship years (13).

Knowing the magnitude of stress and burnout and contributing factors will help recommend possible solutions. Burnout was studied among Ethiopian physicians and medical students. However, we are not aware of any previous studies that evaluated the level of stress and burnout among interns working in Ethiopia.

The aim of this study was to determine the level of burnout and stress and associated factors among medical interns working at St. Paul's Hospital Millennium Medical College (SPHMMC).

MATERIALS AND METHODS

Study setting and design

The study was conducted at SPHMMC in Addis Ababa, Ethiopia; a tertiary teaching hospital established in 2007 after a medical college was opened in a hospital built in 1968 (19). Interns have rotations of 12 weeks each in of the departments of internal medicine, pediatrics, surgery and obstetrics and gynecology and 6 week rotation in psychiatry and emergency medicine. A cross-sectional survey was conducted from August 24 to September 20, 2020 on interns that worked in the hospital for a minimum of 6 months.

Sample size was calculated using single population proportion formula. The value of P was taken as 22%, according to a study done in similar population in India (5). A desired confidence level of 95% and margin of error of 5% was used resulting in a sample size of 264. There were 106 interns actively working in the hospital. Since this number exceeded the total number of interns, it was planned to include all interns in the data collection.

Survey instrument

Data collection was made using structured electronic online questionnaire. All interns were invited to participate in the survey via social media platform used for a group communication. Filling out the survey proceeded after electronic consent was given.

The questionnaire had four parts. First part included sociodemographic data (age, gender, marital status, residence in college compound, and living with family or not). Second part included a group of structured questionnaires for assessing burnout using Maslach Burnout Inventory (MBI), and stress using Perceived Stress scale-10 (PSS-10) (8, 20). MBI was validated in South Africa for assessment of burnout and has been used in previous studies in Ethiopia (13, 21).

MBI is a 22-item questionnaire instrument assessing burnout (8). It has three components, each assessing emotional exhaustion (EE), depersonalization (DP) and personal accomplishment (PA). EE includes 9 items with a maximum score of 54 and is classified high for score > 26, moderate for scores 19-26 and low for scores below 19. DP has 5 items scored out of 30 and is classified as high if > 9 points, moderate for 6-9 points and low below 6 points. Finally, PA containing 8 items scored out of 48 is scored low for scores < 34, moderate for scores 34-39 and high for above 39.

Since PSS-10 is recommended as a tool to assess the level of stress over the last one month and not a diagnostic instrument, there is no cut off for classification of stress. Dividing the PSS-10 values in to tertiles was done (22, 23). The highest tertile (PSS≥18) was considered to be associated with a higher degree of perceived stress while intermediate score (PSS=18-22) and low score (≤17) was considered lower degree. PSS-10 is validated in Ethiopia (24).

The final parts assessed factors affecting burnout, including individual and work related factors.

Data analysis

Data were generated from the electronic questionnaire in Excel format and checked for completeness. It was then entered into Statistical Package for Social Sciences version 23 and analyzed. Data were summarized using percentages, mean, standard deviation (SD) and presented in tables and figures. Reliability of burnout and stress assessment tools were done. Logistic regression model was used to examine the independent association between burnout, stress and associated factors. Variables with P-value <0.2 in the univariate analysis were included in the multivariate logistic regression model. All variables with a p-value of < 0.05 in the multivariate model were considered statistically significant. Associations between variables were presented in odds ratios (OR) with 95% confidence interval (CI).

Ethical approval

The study was approved by the Institutional Review Board of SPHMMC (IRB code: PM 28/103). Written informed consent was obtained from all participants.

Each participant's information was collected using anonymous electronic questionnaire.

RESULTS

Socio-demographic characteristics

Out of the 106 interns actively working in the hospital, there were 72 responses giving a response rate of 68%. Out of the respondents, 59.7% were males and except for one married individual, all were single. The mean age (SD) was 24.57 (1.46) years and ranged from 23 to 34 years. Most of the participants (70.8 %) live inside the college compound in the dormitories. Over half (54.2%) said their families reside in the capital Addis Ababa and among them 61.5 % do not live with their families during work and reside in the dormitories (Table 1).

Table 1: Sociodemographic characteristics of interns, SPHMMC, Addis Ababa, 2020

Characteristic	Number	Percent
Age Group		
Up to 24 years	44	61.1
25 years and above	28	38.9
Gender		
Female	29	40.3
Male	43	59.7
Place of residence		
Inside college compound	51	70.8
Outside college compound	21	29.2
Family residence		
Addis Ababa	39	54.2
Outside of Addis Ababa	33	45.8
Current rotation		
Emergency medicine	10	13.9
Internal Medicine	17	23.6
Obstetrics/Gynecology	15	20.8
Pediatrics	13	18.1
Psychiatry	5	6.9
Surgery	12	16.7

Other co-morbid conditions

Several individual-related factors were assessed. Six participants reported as having been diagnosed with psychiatric conditions in a healthcare setting which included three individuals with major depressive disorder and two with generalized anxiety disorder. The average number of night duties per week ranged from 0 to 4 with 68% having 2 duty shifts while, 26% having 3 duties.

Two respondents said they smoke cigarettes or chew khat regularly and 6 individuals consumed alcohol regularly. A total of 8 (11.1%) individuals regularly used any of the mentioned substances. Eighty-three percent were not aware of any support service in the hospital. Finally, 69.4% of respondents had planned to leave the country and 43.1% had planned to change their profession (Table 2).

Table 2: Other co-morbid conditions of interns, SPHMMC, Addis Ababa, 2020

Factor assessed	Number	Percent
Regular physical activity		
No	61	84.7
Yes	11	15.3
Average number of duty per week		
<3	51	70.8
≥3	21	29.1
Excessively worried about COVID-19 pandemic		
No	43	59.7
Yes	29	40.3
Awareness of support services		
No	60	83.3
Yes	12	16.7
Plans to leave the country		
No	22	30.6
Yes	50	69.4
Plans to change profession		
No	41	56.9
Yes	31	43.1

COVID-19: Coronavirus Disease 2019

Reliability of survey questionnaire

Evaluation of the internal consistency (cronbach's alpha) of the instrument was done and α-values of 0.908, 0.801, and 0.694 were obtained for EE, PA, DP subscale respectively. All α-values were above 0.6 and were acceptable. Similarly, a good internal consistency of α = 0.879 was seen for PSS-10 questionnaire.

Burnout assessment

The burnout assessment of interns showed that 69.4%, 41.7%, and 44.4% of them reported high EE, high DP, and highly reduced sense of PA respectively. The mean scores of MBI components for EE was 33.4 (range: 4 to 54) reflecting a high level. In contrast, the mean scores for DP and PA respectively, were 9.4 (range: 0 to 25) and 34.1 (range: 16 to 48) reflecting moderate levels of DP and reduced PA (Figure 1).

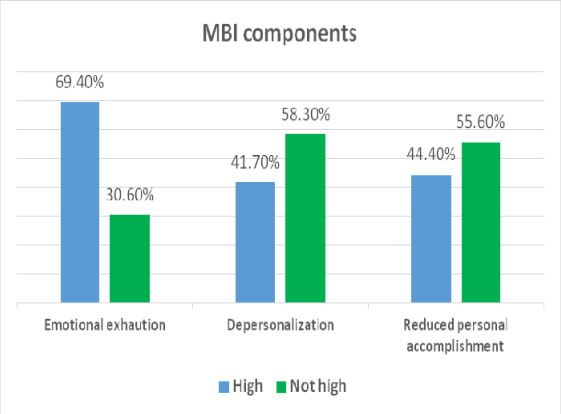

Figure 1: Burnout status of study participants, SPHMMC, Addis Ababa, 2020

Ten (13.9%) interns had high level of burnout in all three MBI components and 13 (18%) in two components.

Stress

The mean PSS-10 score was 21.03, which lied in the high tertile range and 37% of responses were in this range reflecting a high level of perceived stress. The rest 36.1% and 26.4% were in the moderate and low group respectively (Table 3).

Work related challenges faced during internship

The interns were asked to rate the challenges they faced on a 5-point likert scale. The biggest challenge identified from the responses was 'Poorly defined role as an intern' whereby 97.2% said that they 'agree' or 'strongly agree'. Ninety percent agree with having excessive work load and 92.7% complained of fatigue and sleep deprivation (Table 4).

Factors associated with burnout

The odds of having EE was five times higher in individuals having plans to change profession (AOR, 5.13; 95% CI, 1.31-21.11) and had excessive financial worries (AOR, 5.57; 95% CI, 1.23-25.15) and six times higher in individuals who reported high level of perceived stress (AOR, 6.17; 95% CI, 1.29- 29.59) after controlling for the other variables. Similarly, all the three factors were independently associated with high DP. Fear of medical errors increased the odds of DP (AOR, 4.56; 95% CI, 1.14-18.23). Participants who reported high level of perceived stress had three times increased odds of reporting low levels of PA (AOR, 3.09; 95% CI, 1.03-9.29). Having plans to change profession increased the odds of reporting high stress by five-fold (AOR, 5.16; 95% CI, 1.411-18.924) (Table 5).

Table 3: Characteristics of high perceived stress, SPHMMC, Addis Ababa, 2020

Variable	PSS-10 high	
	Number	Percent
Age group in years		
<25	16	36.4
≥25	11	39.3
Gender		
Female	15	51.7
Male	12	27.9
Place of residence		
Inside college compound	18	35.3
Outside college compound	9	42.9
Family residence		
Addis Ababa	18	46.2
Outside of Addis Ababa	9	27.3
Department		
Internal Medicine	10	58.8
Pediatrics	3	23.1
Obstetrics and gynecology	7	46.7
Emergency medicine	2	20
Psychiatry	0	0
Average number of duties in the last week		
<3	17	33.3
≥3	10	47.6
Regular physical activity		
No	22	36.1
Yes	5	45.5
Drink alcohol regularly		
No	23	34.8
Yes	4	66.7
Excessively stressed/ worried about COVID-19 pandemic		
No	17	39.5
Yes	10	52.6
Awareness of support services		
No	25	41.7
Yes	2	16.7
Plans to leave the country		
No	5	22.7
Yes	22	44
Plans to change profession		
No	10	24.4
Yes	17	54.8

Table 4: Work-related factors, SPHMMC, Addis Ababa, 2020

Challenges faced during work	Strongly agree or agree	Percent
Lack of support	44	61.1
Excess work overload	65	90.2
Difficulty integrating well with the team	5	6.9
Inadequacy of clinical skills	7	9.7
Inadequacy of clinical knowledge	5	6.9
Feeling inadequately prepared to work as a doctor	11	15.2
Difficulty balancing work with personal life	24	33.3
Difficulty interacting with senior staff	28	38.8
Having poorly defined role as an intern	70	97.2
Having financial worries	24	33.3
Having future and career uncertainty	64	88.8
Conflict with allied health professionals	49	68
Difficulty attaining education and practical skills needs	49	68
Fear of error leading to patient suffering	36	50
Fear of medico-legal consequences	30	41.6
Excess fatigue and sleep deprivation	66	91.7
Lack of recognition	64	88.9
Finding a comfortable place to sleep/rest while on duty	53	73.7

Table 5: Multivariate logistic regression analysis of factors associated with burnout and stress, SPHMMC, Addis Ababa, 2020

	Crude OR	95% CI	P-value	Adjusted OR	95% CI	P-value
Emotional exhaustion						
Plans to change profession	5.28	1.56 – 17.85	0.005	5.13	1.31 – 21.11	**0.019**
Financial worries	3.0	0.88 – 10.18	0.07	5.568	1.23 – 25.15	**0.026**
High perceived stress	5.85	1.53 – 22.2	0.006	6.17	1.29 – 29.6	**0.023**
Plans to leave country	2.64	0.91 – 7.62	0.069	0.7	0.16 – 3.11	0.639
Lack of support	2.55	0.91 – 7.13	0.071	2.3	0.63 – 8.67	0.206
Fear of medical error	2.23	0.79 – 6.26	0.125	2.4	0.65 – 8.9	0.189
Finding a place to sleep	2.77	0.93 – 8.29	0.064	2	0.47 – 8.4	0.346
Difficulty with staff interactions	2.87	0.93 – 9.07	0.062	2.5	0.562 – 10.96	0.23
Depersonalization						
Plans to change profession	5.64	2.02 – 15.7	0.001	5.09	1.79-14.45	**0.002**
Financial worries	2.8	1.02 – 7.68	0.043	3.98	1.19 – 13.33	**0.025**
High perceived stress	3.22	1.19 – 8.7	0.019	4.27	1.31-13.93	**0.016**
Number of duties per week	2.44	0.87 – 6.9	0.091	1.57	0.36 – 6.77	0.547
Difficulty with staff interactions	2.86	1.07 – 7.62	0.034	2.57	0.63 – 10.6	0.19
Fear of medical error	0.41	0.15 – 1.13	0.056	4.56	1.14 – 18.23	**0.032**
Difficulty attaining education	0.41	0.15 – 1.13	0.08	0.247	0.06 – 1.04	0.057
Personal accomplishment						
High perceived stress	3.4	1.25 – 9.22	0.014	3.09	1.03 – 9.29	**0.044**
Difficulty attaining education	0.37	0.14 – 1.03	0.055	0.378	0.13 – 1.14	0.084
Difficulty with staff interactions	3	1.12 – 7.98	0.027	0.75	0.96 – 7.83	0.059
Perceived stress						
Plans to change profession	3.76	1.38 – 10.28	0.01	5.16	1.41-18.92	**0.015**
Gender	2.77	1.03 – 7.43	0.043	3.43	0.94 – 12.52	0.62
Plans to leave country	2.61	0.85 – 8.38	0.092	1.75	0.46 – 6.61	0.409
Awareness of support service	0.28	0.56 – 1.39	0.12	0.263	0.04 – 1.71	0.163

OR - odds ratio

DISCUSSION

A high level of burnout was reported by the participants. High EE was reported in 69.4% of the participants in our study. This figure is much higher than previous reports from studies done in Ireland, Mexico, Saudi Arabia, India and Australia which showed high EE from 34% to the highest of 55% in an Irish study (1, 3, 5, 9, 18).

However, a study from United States of America exceeds this figure with 84% reporting high EE (12). The level of high DP (41.7%) was in the range of reports from the mentioned studies which ranged from 39% to 84.9 % (1, 3, 5, 9, 12, 18).

Highly reduced PA (44.4%) was comparable to most studies reporting figures from 41.6% to 75.5% (1, 3, 9, 12) but markedly different from an Indian study report of 77% (5) and an Australian one of 15% (18). These differences might be a reflection of the differences of settings the studies were done including the types of hospitals (public or private), the difference in workload, culture, socioeconomic status, type of patients seen and availability of treatments.

All of these studies reflect the significance of burnout and the importance of addressing it not only in medical students and higher level physicians but also in interns.

Financial issues have been found to be significant contributors to burnout in all physicians (1, 25). A Saudi Arabian study reasoned that living in a self-owned house provides financial security and subsequently leads to less burnout (9). Burnout has also been found to be more common in individuals contemplating changing their careers as it reflects the level of frustration with their life and career (9). An association between intern stress and medical errors has been reported (18). In addition, medical errors can be a source of burnout while burnout by itself can increase medical errors showing that it can also affect patients and potentially lead to litigation (11).

Not only were components of burnout high, but so was the level of perceived stress. Previous studies have shown that high level of stress poses a threat to increasing burnout (26, 27). This has also been reflected in interns whereby 43% in one study with high burnout reported mild to severe degrees of distress assessed by the 12-item general health questionnaire (1). Our study also supports this association by reflecting the significance of stress on all three components of burnout.

There was also significant difference with regards to gender and burnout. Previous studies show inconsistencies with which gender is more affected. Most studies in interns, however, reveal that gender might not be significant (1, 3, 5, 9). The same was true for dormitory residence and places of family residence. Similar to our findings, more than 80% of participants in a comparative study were not aware of support services which may hinder them from seeking help (1). A comparative percentage (around 70%) wish to leave their country in the future (1). This is an alarming number and contributes to the high physician attrition the country faces (28). The increasing saturation of many cities with physicians, particularly general practitioners, is leading to rising unemployment, which can further affect medical students and junior doctors (29). Contemplating to change profession can stem from lack of employment prospects, which was shown to be related to components of burnout on a study from Ethiopia (30).

It is critical to raise awareness about the significance of stress and burnout among interns. Interns are not provided with the concern given to other physicians, which is reflected by the paucity of previous studies on the subject on interns. Burnout is as common, if not more, compared to physicians who completed internships. Subsequently, the impact on mental and physical well-being can be mitigated (16). Healthy and satisfied physicians are essential for providing appropriate care for patients by minimizing medical errors, reducing physician fatigue, and improving patient satisfaction (3, 5, 18, 31).

Support services including psychological support that is designed to address their challenges must be made available and they should be aware of it as soon as they start internship. Mentorship by physicians that have passed their internship and have experience dealing with its challenges can help by addressing the issues they might have.

To our knowledge, this study is the first of its kind done to assess burnout among interns in Ethiopia. An internationally validated instrument was used to assess burnout and a locally validated one was used for evaluation of stress. It will serve as an important starting point for further research. However, it has some limitations. Response rate of 68% may not be representative of all interns, but is higher than 35% and 45% in other similar studies (1, 9). The number of participants is low and it is recommended that future large scale multi-center studies be done. This was a cross-sectional study and definitive conclusions about causality cannot be made. Initial baseline data collection and serial follow-up was not made.

Conclusions

In summary, levels of burnout and stress in was high among interns. The results underscore the need to raise awareness on the problem. Promoting mental well-being and optimizing preventative and psychosocial support services is essential. The college must make the mental wellbeing of its physicians a priority and act early.

Financial and job security must be safeguarded so that junior physicians can work in a more conducive work environment. Further studies on the subject with more detailed assessments on impacts of burnout on other components of mental health needs to be conducted.

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Conflict of interests

All authors declare that they have no conflict of interest regarding this manuscript.

REFERENCES

1. Hannan E, Breslin N, Doherty E, McGreal M, Moneley D, Offiah G. Burnout and stress amongst interns in Irish hospitals: contributing factors and potential solutions. Ir J Med Sci. 2018;187: 301-307
2. Swaid AI, Elhilu AH, Mahfouz MS. Medical internship training in Saudi Arabia: interns' views and perceptions. Adv Med Educ Pract. 2017;8:121-128
3. Miranda-Ackerman RC, Barbosa-Camacho FJ, Sander-Möller MJ, Buenrostro-Jiménez AD, Mares-Paíset R, Cortes-Flores AO, et al. Burnout syndrome prevalence during internship in public and private hospi tals: a survey study in Mexico. Med Educ Online. 2019; 24(1) :1593785
4. Lam TP, Wong JG, Ip MS, Lam KF, Pang SL. Psychological well-being of interns in Hong Kong: What causes them stress and what helps them. Med Teach. 2010;32(3):e120-e126
5. Niranjan V, Udey B, Razdan RG. Evaluation of burnout in medical interns: an institutional study. Int J Res Med Sci. 2017;5(5):2173-2175
6. Abdulghani HM, Irshad M, Zunitan MA, Sulihem AA, Dehaim MA, Esefir WA, et al. Prevalence of stress in junior doctors during their internship training: a cross-sectional study of three Saudi medical coll eges' hospitals. Neuropsychiatr Dis Treat. 2014;10:1879-1886
7. Freudenberger HJ. Staff burnout. J Soc Issues. 1974;30(1):159–165
8. Maslach C, Jackson SE. The measurement of experienced burnout. J Org Behav. 1981;2:99-113
9. Mufarrih SH, Naseer A, Qureshi NQ, Anwar Z, Zahid N, Lakdawala RH, et al. Burnout, Job Dissatisfac tion, and Mental Health Outcomes Among Medical Students and Health Care Professionals at a Tertiary Care Hospital in Pakistan: Protocol for a Multi-Center Cross-Sectional Study. Front Psychol. 2019; 10:2552
10. The lancet. ICD-11. Lancet. 2019 Jun 8;393(10188):2275
11. Kaschka WP, Korczak D, Broich K. Burnout: a fashionable diagnosis. Dtsch Arztebl Int. 2011;108 (46):781-787
12. Doolittle BR, Windish DM. Correlation of burnout syndrome with specific coping strategies, behaviors, and spiritual attitudes among interns at Yale University, New Haven, USA. J Educ Eval Health Prof. 2015;12:41
13. Lrago T, Asefa F, Yitbarek K. Physicians' Burnout and Factors in Southern Ethiopia Affecting It. Ethiop J Health Sci. 2018;28(5):589-598
14. Kim MH, Mazenga AC, Yu X, Simon K, Nyasulu P, Kazembe PN, et al. Factors associated with burnout amongst healthcare workers providing HIV care in Malawi. PLos One. 2019;14(9):e0222638
15. Haile Y.G, Senkute A.L, Alemu BT, Bedane DM, Kebede KB. Prevalence and associated factors of burnout among Debre Berhan University medical students: a cross-sectional study. BMC Med Educ. 2019;19(2):413
16. Dubale BW, Friedman LE, Chemali Z, Denninger JW, Mehta DH, Alem A, et al. Systematic review of burnout among healthcare providers in sub-Saharan Africa. BMC Public Health 2019; 19(1):1247
17. Selamu M, Thornicroft G, Fekadu A, Hanlon C. Conceptualisation of job-related wellbeing, stress and burnout among healthcare workers in rural Ethiopia: a qualitative study. BMC Health Serv Res. 2017; 17 (1):412.
18. Willcock SM, Daly MG, Tennant CC, Allard B. Burnout and psychiatric morbidity new medical gradu ates. MJA 2004;181(7):357-360
19. SPHMMC SPHMMC. About – Saint Paul's Millennium Medical College. Retrieved from: https:// sphmmc.edu.et/about/ (accessed: Aug 20)
20. Cohen S, Kamarck T, Mermelstein R, A global measure of perceived stress. J Health Soc Behav. 1983;24 (4):385-396.
21. Naude J.L, Rothmann S. The validation of the Maslach Burnout Inventory – Human Services Survey for emergency medical technicians in Gauteng. SA J Ind Psychol. 2004;30(3):21-28
22. Alosaimi FD, Alawad HS. Alamri AK, Saeed AI, Aljuaydi KA, Alotaibi AS, et al. Patterns and determi nants of stresss among consultant physicians working in Saudi Arabia. Adv Med Educ Pract. 2018;9:165-174
23. Pangtey R, Basu S, Meena GS, Banerjee B. Perceived Stress and its Epidemiological and Behavioral Cor relates in an Urban Area of Delhi, India: A Community-Based Cross-Sectional Study. Indian J Psychol Med. 2020;42(1):80-86
24. Manzar MD, Salahuddin M, Peter S, Alghadir A, Anwer S, Bahammam AS, et al. Psychometric proper ties of the perceived stress scale in Ethiopian university students. BMC public health. 2019;19(1):41.

25. Wiederhold BK, Cipresso P, Pizzioli D, Wiederhold M, Riva G. Intervention for physician burnout: A systematic Review. Open Med (Wars). 2018;13:253-263
26. Yates SW. Physician Stress and Burnout. Am J Med. 2020;133(2):160-164
27. Elit L, Trim K, Mand-Bains IH, Sussman J, Grunfeld E. Job satisfaction, stress, and burnout among Cana dian gynecologic oncologists. Gynecol Oncol. 2004;94(1):134-9
28. Berhan Y. Medical doctors profile in Ethiopia: In memory of 100-years Ethiopian modern medicine and t he new Ethiopian millennium. Ethiop Med J. 2008; 46 Suppl 1:1-77
29. Assefa T, Haile Mariam D, Mekonnen W, Derbew M. Health system's response for physician workforce shortages and the upcoming crisis in Ethiopia: a grounded theory research. Hum Resour Health. 2017;15 (1):86
30. Selamu M, Hanlon C, Medhin G, Thornicroft G, Fekadu A. Burnout among primary healthcare workers during implementation of integrated mental healthcare in rural Ethiopia: a cohort study. Hum Resour Health. 2019 Jul 18;17(1):58
31. Nason GJ, Liddy S, Murphy T, Doherty EM. A cross-sectional observation of burnout in a sample of Irish junior doctors. Ir J Med Sci. 2013;182(4):595-9

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ORIGINAL ARTICLE

AGE AT MENARCHE, FACTORS THAT INFLUENCE IT, AND MENSTRUAL PATTERN OF SECONDARY SCHOOL ADOLESCENTS IN ADDIS ABABA, ETHIOPIA

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ABSTRACT

Introduction: *Menarche is the first menstrual period of a girl. Age at menarche is a complex trait and has a strong genetic component. The mean age of menarche varies from population to population and is known to be a sensitive indicator of various characteristics of the population, including nutritional status, geographical location, environmental conditions, and magnitude of socioeconomic inequalities in society.*

Objectives: *To determine the mean age of menarche, and assess influencing factors and menstrual patterns of secondary school adolescent females in Addis Ababa, Ethiopia.*

Methods: *This is a cross-sectional study conducted from January to May 2017 in selected high schools in Addis Ababa, Ethiopia. Female adolescents in the selected schools who were in grades 9th and 10th and who fulfilled the eligibility criteria were included. A self-administered questionnaire tool was used to collect data. Data was cleaned, entered and analyzed using SPSS version 21.*

Results: *The mean and median ages at menarche in this study were 13.75* ***(±1.30)*** *and 13 years, respectively. The mean age at menarche was 0.96 years younger for private school girls (12.82 years) compared to government school girls (13.78 years). The private school girls had about 4 times higher odds of having menarche at an earlier age (AOR 4.12; 95% CI 2.44-6.95). The most common perimenstrual symptoms experienced by the students were dysmenorrhea (abdominal cramps) 303 (75.8 %), backache 188 (47.0 %), and headache 16%. In this study, abnormal menstrual cycle lengths occurred in 25.1 % of our respondents. Of the total study population, 77 (19.3%) adolescents had a menstrual cycle length shorter than 21 days.*

Conclusion: *The mean age at menarche in this study was 13.26 ±1.319 years. This age at menarche was earlier than prior reports from Ethiopia. Socioeconomic status was identified as a factor significantly associated with the age at menarche. Dysmenorrhea was the commonest perimenstrual symptom.*

Key words: *Age at menarche, adolescents, perimenstrual symptom.*

INTRODUCTION

Menarche is the first menstrual bleeding and represents a major landmark event in the reproductive life of an adolescent girl. (1) It is the most accurately recalled indicator of puberty. (2) Age at menarche (AAM), as a result, is one of the most significant traits, which is commonly used in retrospective epidemiological studies of female sexual maturation. (3)

Menarche is part of the complex process of growing up. Its onset is preceded by a complex cascade of hormonal changes during puberty which is susceptible to various factors from the very beginning of prenatal life. (4) The mean age at menarche varies from population to population and is known to be a sensitive indicator of various characteristics of the population including nutritional status, geographical location, environmental conditions, and socioeconomic status. (5-7)

Studies suggest that menarche tends to appear earlier in life as the sanitary, nutritional, and economic conditions of a society improve. (8)

Over time, the age at menarche has been found to show a steady decline of about two to three months per decade in developed countries (9), and about six months per decade in developing countries. (10) The mean age at menarche in the United States of America is 12.55 and 12.0 years among black and white girls, respectively. (5) The reported ages at menarche in India were 15.9 and 15.6 years for rural and urban girls respectively. (11) Two studies done in rural Ethiopia revealed the mean age at menarche to be 15.8 ± 1 and 13.9 ± 1.2 years. (3, 12)

The normal range for menstrual cycles is between 21 and 35 days while the duration of menstrual flow ranges from two to seven days.

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Menstrual abnormalities are more common among younger girls, becoming less frequent as they grow older, 3–5 years after menarche. (13-17) For the first few years after menarche, irregular and longer cycles are common. (15-18) Menstruation may also be associated with various symptoms occurring before or during menstrual flow. A significant number of young students complain of dysmenorrhea, and this is more common among older girls with longer bleeding periods. (18)

Knowledge on age at menarche and pattern in menstrual cycles is necessary for patient education and to guide individualized clinical care. To our knowledge there is no published study in our country comparing age at menarche and menstrual patterns between different socioeconomic groups. The purpose of this study, hence, was to determine the age at menarche and patterns of menstruation among secondary school girls of different socioeconomic status in Addis Ababa.

METHODS

Study design: This is a cross-sectional study conducted from January through May 2017 in selected high schools in Addis Ababa, Ethiopia. Study setting: Addis Ababa has 10 administrative districts and subcities. The total number of secondary schools in the city was 212. Study population: Secondary school adolescents who have started to menstruate and attending secondary schools in Addis Ababa, Ethiopia.

Sample size: The sample size was determined using a single proportion formula with a level of significance of 5%, Z = 1.96 (confidence level at 95%), and the absolute precision or margin of error d=0.05. The 50% proportion (P=0.5) was taken for the sake of having a larger sample size. Sampling procedure: A two-stage sampling was used. In the first stage, one administrative district was selected randomly. In the second stage, four high schools, two from government and two from non-governmental schools, were selected randomly from the selected district. The two study government schools were Tikur Anbessa and Atse Naod High schools. The two non-governmental schools were Lycée Guebre Mariam (an international school) and the Nativity Girls School (a missionary school). The study sites also presented a comparative advantage in that each group of schools represented children from low and high socioeconomic groups.

Operational definition: The age at menarche was determined by questioning the age of the girl at having her first menstruation.

Data collection: Data was collected using a self-administered pre-tested questionnaire during school hours. Grades 9 to 11 students who already had menarche were included in the study using quota sampling on convenience till the sample size is reached. Of the total sampled 422 adolescents, 400 (95%) had their menarche and were eligible for analysis.

Data compilation and analysis: The collected data was coded, cleaned, and analyzed using SPSS version 21 statistical software. Descriptive statistics were used to present the results. Tables and different graphs were used to assist data presentation. The chi-square test of independence was done between the independent (socio-demographic variables) and dependent variables (age of menarche). The tested independent variables were the type of school, place of residence, religion, paternal and maternal educational levels, maternal and paternal occupation, and family size. The dependent variable was the age of menarche.

A stepwise analysis was conducted to explore the presence and strength of the association between the independent variables and age at menarche. Regression analysis was implemented between selected independent variables and age at menarche as a dichotomous variable (≤13 and >13 years). Earlier age at menarche was taken as age at menarche of below the identified mean age at menarche in the present study. Initially, bivariate regression analysis was conducted for each independent variable with a chi-square value of <0.2 on cross-tabulation for the test of independence. Multiple regression analysis was then employed for those with a significant association (P<0.05) on bivariate analysis to control for confounding effects among the variables. Odds ratios (ORs) with their 95% confidence intervals were computed to identify the presence and strength of association and P-values<0.05 were taken as statistically significant.

Ethical considerations: Ethical approval was obtained from the Institutional Review Board of the College of Medicine and Health Sciences of the AAU. Permission to conduct the study was also obtained from the principals of participating schools. Participation in the assessment was completely voluntary with ascent and written informed consent was acquired from every participant and their parents before participation. No names were recorded to keep the identity of respondents anonymous.

RESULTS

Data for the present study was collected from 400 eligible schoolgirl study participants. The current age of the study participants ranged from 14 to 18 years, while the mean age was 15.98 (±1.14) years.

Sociodemographic variables

As shown in table-1 below, 230 (57.5%) of the participants were from private schools. The majority of the study participants were from Addis Ababa and Orthodox in religion with proportions of 367 (91.8%) and 303 (75.8%), respectively. About two-thirds, 276 (69%) were grade 9 students. The paternal and maternal education level was higher education (above high school) for 184 (46%) and 148 (37%) of the participants, respectively.

Table 1: Socio-demographic characteristics of adolescents at selected high schools in Addis Ababa, Ethiopia, January - May 2017GC.

Characteristics	Frequency n (%)
Current age in years (n=400)	
14 years	35 (8.8)
15 years	115 (28.7)
16 years	117 (29.3)
17 years	89 (22.3)
18 years	44 (11.0)
Type of school (n=400)	
Private	230 (57.5)
Government	170 (42.5)
Residence (n=400)	
Addis Ababa	367 (91.8)
Outside Addis Ababa	33 (8.2)
Education level (Grade) (n=400)	
9	276 (69)
10	3 (0.8)
11	121 (30.2)
Religion (n=400)	
Catholic	12 (3.0)
Muslim	40 (10.0)
Orthodox	303 (75.8)
Protestant	41 (10.2)
Others	4 (1.0)
Paternal Education (n=389)	
Elementary or less	98 (24.5)
High school complete	107 (26.7)
Higher education	184 (46.0)
Unknown	11 (2.8)
Maternal Education (n=384)	
Elementary or less	118 (29.5)
High school complete	118 (29.5)
Higher education	148 (37.0)
Unknown	16 (4.0)
Family size (n=400)	
1-3	46 (11.5)
4-6	288 (72.0)
>6	66 (16.5)

Age at menarche

The mean and median ages at menarche in the present study were 13.75 (±1.30) and 13 (IQR 2) years, respectively. Demonstrated below in Figure 1 is the age at menarche of the study participants. The age at menarche ranged from 10 to 16 years. Nearly all, 392 (98%) had their menarche by 15 years.

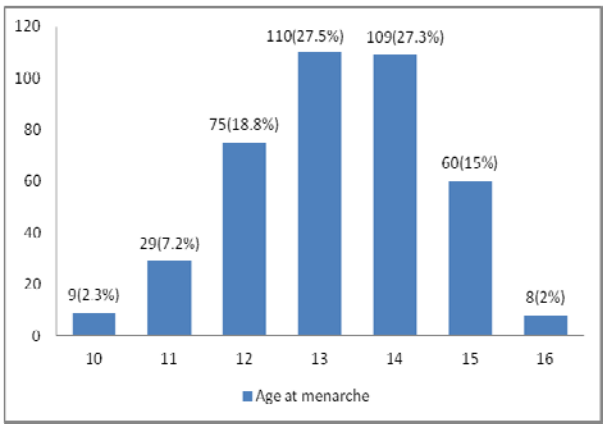

Figure 1: Age at menarche of schoolgirls at selected high schools in Addis Ababa, Ethiopia, January - May 2017GC. (n=400)

Regression analysis was implemented between selected independent variables and age at menarche as a dichotomous variable (≤13 and >13 years). Earlier age at menarche was taken as age at menarche of below the identified mean age at menarche in the present study.

A stepwise analysis was conducted to explore the presence and strength of the association between the independent variables and age at menarche. Initially, bivariate regression analysis was conducted for each independent variable with a chi-square value of <0.2 on cross-tabulation for the test of independence. Bivariate regression analysis implemented using age at menarche as a dichotomous variable above and below the mean age at menarche (≤13 years and >13 years) revealed associations between earlier age at menarche (≤13 years) and selected independent variables. On multivariate analysis, however, only type of school and religion remained to be significantly associated (P<0.05) with earlier age at menarche (≤13 years).

Table 2 shows the results of the logistic regression model of selected socio-demographic variables vs. earlier age at menarche for adolescents.

The mean age at menarche was 0.96 years younger for private school girls (12.82 years) compared to government school girls (13.78 years). The private school girls had about 4 times higher odds of having menarche at an earlier age (AOR 4.12; 95% CI 2.44-6.95).

The study subjects who were Catholic in religion had a mean age of 12.6 years, which is 1.15 years earlier than the overall mean age at menarche (13.75 years). The Catholics had about 10 times higher odds of having menarche at an earlier age compared to protestants (AOR 9.5; 95% CI 1.04-86.76).

As shown in the table, study participants whose paternal and maternal education levels were elementary and high school had a significant association with earlier age at menarche in the bivariate analysis (P<0.05), while the association was lost in multiple regression models.

Menstrual cycle pattern

Table 3 below demonstrates the menstrual cycle pattern of the study participants. Of the total study population, 77 (19.3%) adolescents had a menstrual cycle length shorter than 21 days. More than half, 211 (52.8%) had a cycle length between 21 and 28 days. In 23 of them (5.8%), the menstrual cycle interval was longer than 35 days. The majority, 282 (70.5%), had a menstrual duration of flow of 3-5 days, while only 4 (1.0%) had a duration of fewer than 3 days. The menstrual cycles were described as regular by half and 203 (50.7%) of the participants. Nearly half of the participants, 199 (49.7%), used 3-4 sanitary pads per day during menstruation. Only 22 (5.5%) used > 4 pads per day.

Peri-menstrual symptoms

Table 4 below demonstrates the perimenstrual symptoms reported by the study participants. Abdominal cramps and backaches were the shared reported symptoms experienced by 303 (75.8%) and 188 (47%) of the participants, respectively. A quarter of them, 102 (25, 5%), reported having been absent from school due to perimenstrual symptoms. The use of medication for the symptoms was practiced by 98 (24.5%) of the participant girls.

Table 2: Regression analysis of selected socio-demographic variables vs earlier age at menarche of Adolescents at selected high schools in Addis Ababa, Ethiopia, January - May 2017GC

Characteristics	Mean age at menarche	OR for earlier age at menarche (≤13 years) COR** P-value	95% CI	AOR*** P-value	95% CI
Type of school (n=400)					
Private	12.83	0.000	3.88 (2.55-5.90)	0.000	4.12 (2.44-6.95)*
Government	13.78		1		1
Religion (n=400)					
Catholic	12.67	0.031	10.48 (1.24-88.75)	0.046	9.50 (1.04-86.76)
Muslim	13.48	0.908	1.05 (0.44-2.52)	0.097	2.24 (0.86-5.79)
Orthodox	13.21	0.610	1.19 (0.62-2.28)	0.545	1.24 (0.62-2.50)
Others	13.37	0.963	0.95 (0.12-7.42)	0.779	0.73 (0.08-6.42)
Protestant	13.00		1		1
Paternal Education (n=389)					
Unknown	13.64	0.499	1.53 (0.45-5.19)	0.818	0.86 (0.23-3.15)
Elementary or less	13.48	0.002	2.24 (1.36-3.70)	0.836	0.93 (0.44-1.94)
High school complete	13.36	0.028	1.80 (1.11-2.92)	0`.341	0.74 (0.40-1.39)
Higher education	13.00		1		1
Maternal Education (n=384)					
Unknown	13.25	0.429	1.52 (0.54-4.33)	0.53	9.70 (0.24-2.11)
Elementary or less	13.53	0.000	2.49 (1.51-4.09)	0.97	8.99 (0.46-2.11)
High school complete	13.28	0.047	1.65 (1.01-2.72)	0.88	1.05 (0.56-1.97)
Higher education	12.96		1		1

Table 3: Menstrual cycle pattern of adolescents at selected high schools in Addis Ababa, Ethiopia, January - May 2017 GC (n=400)

Age (years)	Frequency	Percent	Cumulative Percent
Length of Menstrual cycle (days)			
< 21	77	19.3	19.3
21-28	211	52.8	72.0
29-35	89	22.3	94.3
>35	23	5.8	100.0
Duration of flow (days)			
< 3	4	1.0	1.0
3 – 5	282	70.5	71.5
6-8	114	28.5	100
Regularity of menstrual cycle			
Regular	203	50.7	50.7
Not regular	197	49.3	100.0
Number of sanitary pads used per day			
1-2	179	44.8	44.8
3-4	199	49.7	94.6
>4	22	5.5	100

Table 4: Peri-menstrual symptoms and related effects of adolescents at selected high schools in Addis Ababa, Ethiopia, January - May 2017GC. (n=400)

Age (years)	Frequency	Percent
Type of peri-menstrual symptom reported		
Abdominal cramp	303	75.8
Backache	188	47.0
Headache	64	16.0
Nausea	44	11.0
Vomiting	22	5.5
Diarrhea	2	0.5
Others	17	4.3
Absence from school due to symptoms		
Yes	102	25.5
No	298	74.5
Use of medications for symptoms		
Yes	98	24.5
No	302	75.5

Source of information about menstruation

Only 7 (1.8%) of the study participants had no information about menstruation before menarche. The most important source of information for the adolescents was mothers, reported by 270 (65.7%) of the participants. Sisters, friends, and teachers were other sources of information for 67 (16.8%), 56 (14%), and 44 (11%) of the participant's students, respectively. Other sources like books and magazines were reported as sources of information by 24 (6%) participants.

DISCUSSION

This study found that the majority of study participants experienced menarche between ages 13 and 15, with a mean recall age at menarche of 13.26 ±1.319 years. The mean age at menarche in the present study was earlier than previous reports from Ethiopia and some other developing countries (19-21), but later than that in developed countries like USA, Italy, and Canada (5, 17, 18, 22, 23)

Prior studies done in Ethiopia revealed age at menarche of 13.9 ± 1.2 years at Sawla town (3), 14.8 (13.9 -15.3) years at Dabat and Koladiba (12), 14 years in Tigray (24) and 13.72 ± 1.31 years in Addis Ababa (25) which were all above the present finding. This possibly is due to the fact that the current study was conducted in a capital city where social welfare is higher than in other parts of the country. And the second reason may be linked to the time effect: these studies were done nearly a decade ago between 2007 and 2013. This may also reflect a declining trend of age at menarche in Ethiopia as well, which may be a proxy indicator of the ongoing improvement in the socioeconomic status of the population in the country.

The age at menarche in our study, however, was higher than some in African countries, 12.5 years in South Africa (26), and 12.49 years in Egypt (27), 13.66, and Northern Ghana (28). The mean AAM was also higher than reports from developed countries, 12.54 years in the United States (29), 12.7 years in the UK (30), and 12.72 (±1.05) years in Canada (23). The higher AAM in the present study may be related to socioeconomic differences between the countries

Factors influencing age at menarche

The study showed that there were statistically significant differences in menarcheal ages based on the category/class of school they attend (aOR 4.12, 95%CI 2.44-6.). Seventy percent of students attending private schools had a menarche age of lower than 13 years compared to 37% of those from public schools. The difference here and compared to other countries may be explained by the economic disparity between the two natures of schools. (25)

The effect of socioeconomic circumstances on the age of menarche has been shown in several studies with girls in more deprived situations experiencing later menarche as they are unable to obtain the appropriate nutrition for proper growth and development (5, 28, 31). The proportion of students based on religion whose age at menarche was less than 13 years was Catholic (91.1%), Orthodox (54.4%), Muslim (52.5%), and Protestant (51.2%). The differences in menarche age based on religion were statistically significant (aOR 9.50, 95% CI 1.04-86.76). This may reflect the disparities in the standard of life among different religious followers.

Menstrual pattern

Menstruation may be associated with various kinds of symptoms occurring before and during menses. In this study, the most common symptoms experienced by the students were dysmenorhea (abdominal cramps) 75.8 %, backache 47.0 %, and headache 16%. This finding is comparable to studies done in Ethiopia (3), India (32) and Malasya (33). Dysmenorrhea was a major cause of school absenteeism 25.5%). The school absenteeism due to dysmenorhea in this study was higher than in Indian study (34), comparable to a Saudi Arabian study (35), but less than reports from Ethiopia (12)), Malaysia 33 and USA (36) It is important that school girls are given adequate counselling and offered proper guidance on dysmenorhea and other perimenstrual symptoms..

Menstrual cycle abnormalities (irregular and longer cycles) are more common among younger girls in the first few years after menarche. 12 = (10) In this study abnormal menstrual cycle lengths occurred in 25.1 % of our respondents, which is in the range of 13.2 % to 37.2 % noted in some studies. (33, 37)

Conclusion and implications

The mean age at menarche of the respondents in this study was 13.26 ±1.319 years. This age at menarche was earlier than prior reports from Ethiopia. Socioeconomic status was identified as a factor significantly associated with the age at menarche. Dysmenorrhea was the commonest perimenstrual symptom.

Sociodemographic attributes may be a marker for the age of menarche and symptoms. Prospective studies are needed to better understand the influence of biological markers and the age at which young girls begin their menstrual cycle and the symptoms they experience.

Limitation of the study

The study population is not representative of the population of the country. Thus outcomes of the study may not be generalizable to the general population.

Availability of Data

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Conflict of Interest

All authors declare that they have no competing interests.

Contribution of Authorship

EK designed and implemented the study. This included seeking IRB approval, collecting data, and cleaning data. EK reviewed the reference articles and wrote the initial manuscript. EM contributed to data analysis, constructed summary tables, and wrote the final manuscript. MS contributed to initial manuscript writing and data analysis.

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REFERENCES

1. Ersoy B, Balkan C, Gunay T, Egemen A. The factors affecting the relation between the menarcheal age of mother and daughter. Child: care, health and development. 2005 May 1; 31(3):303–8.
2. Cole TJ: The secular trend in human physical growth: a biological view. Economics and Human Biology 2003, 1:161-68.
3. Ayele E, Berhan Y. Age at menarche among in-school adolescents in Sawla Town, South Ethiopia. Ethiop J Health Sci. 2013;23(3):189-200.
4. Amir DJ, M. R.Bribiescas, R. G. A Longitudinal Assessment of Associations between Adolescent Environment, Adversity Perception, and Economic Status on Fertility and Age of Menarche. PLoS One. 2016;11(6).
5. Chumlea WC, Schubert CM, Roche AF, Kulin HE, Lee PA, Himes JH, et al. Age at menarche and racial comparisons in US girls. Pediatrics. 2003 Jan 1; 111(1):110–13. PMID: 12509562
6. Swenson I, Havens B. Menarche and menstruation: a review of the literature. J Community Health Nurs. 1987;4(4):199–210.
7. Thomas F, Renard F, Benefice E, de Meeüs T, Guegan JF. International variability of ages at menarche and menopause: patterns and main determinants. Hum Biol.2001;73(2):271–90.

8. P K. Pubertal development in girls: secular trends. Current Opinion in Obstetrics & Gynecology. 2006; 18 (5):487-491.
9. Wyshak G, Frisch RE. Evidence for a secular trend in age of menarche. N Engl J Med. 1982; 306:1033–5.
10. Bagga A, Kulkarni S. Age at menarche and secular trend in Maharashtrian (Indian) girls. Acta Biologica Szeged. 2000;44(1-4):53–7.
11. Ambade R, Sagdeo M. Age at menarche and the menstrual pattern of secondary school adolescents in central India. Int J Res Med Sci 2017; 5:3610-4.
12. Zegeye DT, Megabiaw B, Mulu A. Age at menarche and the menstrual pattern of secondary school adolescents in northwest Ethiopia. BMC women's health. 2009; 9(1):29.
13. Apter D, Viinikka L, Vihko R: Hormonal pattern of adolescent menstrual cycles. J Clin Endocrinol Metab 1978, 47(5):944–954.
14. Chan SS, Yiu KW, Yuen PM, Sahota DS, Chung TK: Menstrual problems and health-seeking behaviour in Hong Kong Chinese girls. Hong Kong Med J 2009, 15(1):18–23.
15. Treloar AE, Boynton RE, Behn BG, Brown BW: Variation of the human menstrual cycle through reproductive life. Int J Fertil 1967, 12(1 Pt 2):77–126.
16. Vollman RF: The menstrual cycle. Major Probl Obstet Gynecol 1977, 7:1–193.
17. Rigon F, Bianchin L, Bernasconi S, Bona G, Bozzola M, Buzi F, Cicognani A, De Sanctis C, De Sanctis V, Radetti G, Tatò L, Tonini G, Perissinotto E: Update on age at menarche in Italy: toward the leveling off of the secular trend. J Adolesc Health 2010, 46(3):238–244.
18. Rigon F, De Sanctis V, Bernasconi S, Bianchin L, Bona G, Bozzola M, et al. Menstrual pattern and menstrual disorders among adolescents: an update of the Italian data. Ital J Pediatr. 2012; 38-38.
19. Ameade EPK, Garti HA (2016) Age at Menarche and Factors that Influence It: A Study among Female University Students in Tamale, Northern Ghana. PLoS ONE 11(5): e0155310. doi:10.1371/journal.pone.0155310,
20. Tunau KA, Adamu AN, Hassan MA, Ahmed Y, Ekele BA. Age at menarche among school girls in Sokoto, Northern Nigeria. Annals of African medicine. 2012; 11(2):103–7. doi: 10.4103/1596-3519. 93533 PMID: 22406670.
21. Padez C. Age at menarche of schoolgirls in Maputo, Mozambique. Annals of human biology. 2003 Jan 1; 30 (4):487–95. PMID: 12881146
22. Carfagna M, Figurelli E, Matarese G, Matarese S. Menarcheal age of schoolgirls in the district of Naples, Italy, in 1969–70. Human Biology. 1972 Feb 1:117–25.
23. Al-Sahab B, Ardern CI, Hamadeh MJ, Tamim H. Age at menarche in Canada: results from the National Longitudinal Survey of Children & Youth. BMC Public Health. 2010 Nov 28; 10(1):736.
24. Bayray A. Assessment of Menstrual Perceptions and Preparation of Rural Adolescent Females, South Eastern Zone of Tigray, Ethiopia. Scholarly Journal of Medicine. 2011;1:12-21.
25. Abera Y. Menarche, Menstruation related Problems and Practices among Adolescent High School Girls in Addis Ababa. Medicine. 2003;Corpus ID: 78417016.
26. Laura L, Jones PLG, Shane A Norris, John M Pettifor, Noël Cameron Age at Menarche and the Evidence for a Positive Secular Trend in Urban South Africa. Am J Hum Biol. 2009; 21(1):130-2.
27. Hatem I. Abdelmoty MY, corresponding author Shimaa abdallah, Khaled Abdel-Malak, Nawara M. Hashish, Dalia Samir, Moutafa Abdelbar, Ahmed Naguib Hosni, Mohamed Abd-El Ghafar, Yasser Khamis, and Mostafa Seleem. Menstrual patterns and disorders among secondary school adolescents in Egypt. A cross-sectional survey. BMC women's health. 2015; 15: 70.
28. Evans Paul Kwame AG, Helene Akpene. Age at Menarche and Factors that Influence It: A Study among Female University Students in Tamale, Northern Ghana. PLoS ONE 2016; 11(5).
29. Demerath EW, Towne B, Chumlea WC, Sun SS, Czerwinski SA, Remsberg KE, et al. Recent decline in age at menarche: The Fels Longitudinal Study. American Journal of Human Biology. 2004; 16(4): 453-7.
30. Morris DH, Jones ME, Schoemaker MJ, Ashworth A, Swerdlow AJ. Determinants of age at menarche in the UK: analyses from the Breakthrough Generations Study. Br J Cancer. 2010; 103 (11): 1760-4.
31. KarapanouO PA. Determinants of menarche. Reprod Biol Endocrinol. 2010;30;8 (115):20920296.
32. Singh A, Kiran D, Singh H, Nel B, Singh P, Tiwari P: Prevalence and severity of dysmenorrhea: a problem related to menstruation, among first and second year female medical students. Indian J Physiol Pharmacol 2008, 52(4): 389–397.)
33. Lee LK CP, Le KK, Kaur J. Menstruation among adolescent girls in Malaysia: a cross sectional survey. Singapore Med J. 2006; 47(10):869-74.
34. Dharampal G. D., Sanjay V. W., Jayesh Y. D. Age at Menarche and Menstrual Cycle Pattern among School Adolescent Girls in Central India. Global Journal of Health Science Vol. 4, No. 1; January 2012. doi:10.5539/gjhs.v4n1p105 URL: http://dx.doi.org/10.5539/gjhs.v4n1p105).

35. Ibrahim N AM, Al-Shaibani A, AlAmri F, Alharbi H, Al-Jadani A, Alfaidi R. Dysmenorrhea among female medical students in king Abdulaziz University: prevalence, predictors and outcome. Pak J Med Sci. 2015; 31 (6): 1312-7.
36. Banikarim C, Chacko MR, Kelder SH: Prevalence and Impact of Dysmenorrhea on Hispanic Female Adolescents. Arch Pediatr Adolesc Med 2000, 154(12):1226-1229.
37. Houston AM AA, Huang Z, D'Angelo LJ. Knowledge, attitudes, and consequences of menstrual health in urban adolescent females. Pediatr Adolesc Gynecol. 2006;19(4):271-5.

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ORIGINAL ARTICLE

INTESTINAL PARASITES AND RISK AWARENESS OF PEOPLE LIVING WITH HIV/AIDS IN DEBRE BREHAN REFERRAL HOSPITAL, DEBRE BREHAN, ETHIOPIA

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ABSTRACT

Introduction*: Intestinal parasites are a significant cause of morbidity and mortality in most developing countries which affected more than 3.5 billion people throughout the world. The prevalence of intestinal parasites is relatively high in people living with HIV/AIDS. However, data on the prevalence of intestinal parasites among people living with HIV/ AIDS are insufficient in the study area. Hence, this study aimed to determine the prevalence of intestinal parasites and associated risk factors among people living with HIV/AIDS at Debre Brehan Referral Hospital, Central Ethiopia.*

Methods*: A cross-sectional study was conducted among 350 people living with HIV/AIDS from March to August 2019. Stool samples were collected with clean screw cupped containers and processed using direct microscopy, formol-ether concentration and modified acid-fast staining laboratory techniques.*

Results: *The overall prevalence of intestinal parasites among HIV/AIDS patients was 20.3% (71/350). Among these, Entamoeba histolytica/dispar takes the highest rank (13.4%) followed by Gardia lamblia (2.9%). Lack of latrine, high viral load count, and bad health practice of the participants were significantly associated with intestinal parasitosis.*

Conclusion*: The prevalence of intestinal parasites in this study was high. Thus to reduce the disease burden; government officials and stakeholders should work on reducing risk factors and increase awareness how to prevent and control of acquiring the disease.*

Key words*: Intestinal parasites, HIV/AIDS, Prevalence, Debre Brehan, Ethiopia.*

INTRODUCTION

Intestinal parasitosis (IPs) is a gastrointestinal infection caused by helminthes (multicellular) and protozoa (unicellular) (1, 2). Epidemiological studies indicate that both helminthes and protozoa are prevalent in developing countries whereas protozoan parasites are more dominant in developed countries (3, 4). More than 3.5 billion people are affected with intestinal parasites (IP) in the world, among which 450 million are in sub-Saharan Africa, affected by associated morbidities (5-7). Parasitic co-infection with Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS) is the major public health crisis of the world, mainly in Sub-Saharan Africa (8).

The most common type of helminthes that are strongly associated with morbidity and mortality of HIV/AIDS patients are: *Ascaris lumbricoides*, *Trichuris trichiuria*, Hookworm and *Strongyloid stercoralis* that occupy the human intestine (9-11), whereas *Entamoeba histolytica/dispar* and *Giardia lambellia* are the dominant species among protozoans (1).

Protozoan parasites are also the foremost prevalent in tropical and subtropical regions of the developing world where water and sanitation facilities are insufficient (12-16). The main transmission mode of IPs is feco-oral route due to poor personal hygiene and environmental contaminations (17). More importantly, improper disposal of human excreta in Sub-Saharan countries like Ethiopia is the major contributing factor for the increased distribution of IPs (18). HIV/AIDS patients with poor knowledge, and bad health practices for IP infection prevention and control are more susceptible to opportunistic and non-opportunistic parasitic infections (19, 20).

There are about 36.9 million people infected with HIV/AIDS globally; among these Sub-Saharan Africa accounts for more than half (22.4 million) (14, 21), and where Ethiopia had a prevalence of 2.4% (8, 22). Moreover, HIV infection results in weakening of the human immune system which leads to the occurrence of opportunistic infections (OIs) (21-25).

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Almost 80% of AIDS patients die from AIDS-related infections like intestinal parasites rather than HIV infection itself (4). Opportunistic parasites, such as, *Cryptosporidia*, *Isospora,* and *Microsporidia* have been strongly linked to cause diarrhea among HIV/AIDS patients (12, 26). These parasites enhance the progression of HIV infections to AIDS unless such co-infections are diagnosed and treated properly (4, 26-28). Diarrhea is the most common clinical symptom of the intestinal parasitic infections. Reports designated that 30-60%, and 90% of AIDS patients can develop diarrhea in developed and developing countries respectively (4, 6, 29-31).

The utilization of anti-retroviral therapy (ART) can reestablish immunity by increasing the number of CD4 cells able to protect against opportunistic infections, and reduced the incidence of diarrhea (32). Most of the previous studies suggest that patients with CD4 counts <200 cells/µl are more vulnerable to opportunistic infections than patients with CD4 counts > 200 cells/µl (33).

Although there's an improvement in the survival of people living with HIV/AIDS (PLWHA) in Ethiopia, there are still a considerable number of deaths related to AIDS across the country (26). Intestinal parasitosis is one among the foremost common causes of morbidity and mortality due to the depletion of host immunity (3). Furthermore, little is known about the prevalence of both pathogenic and opportunistic intestinal parasites, KAP as well as associated risk factors among PLWHA in Debre Brehan, Ethiopia. Hence, this study aimed to work out the prevalence of intestinal parasites, KAP and associated risk factors among PLWHA attending at ART clinic in Debre Brehan Referral Hospital, Ethiopia.

MATERIALS AND METHODS

Study design and setting

A cross-sectional study was conducted from March 01, 2019 to August 30, 2019 among PLWHA at Debre Brehan Referral Hospital, Central Ethiopia. Debre Brehan is 130 Km north of the capital city of the country, Addis Ababa. During the study period, there were 2950 people living with HIV/AIDS registered for ART care and treatment service in the Hospital.

Debre Brehan is situated at an altitude of 2840 meter above sea level with a mean annual rainfall of 964 mm. Few months from March to September had precipitation ranges from 40% to 75% and the mean annual temperature ranges from 10 to 16 °C (34). The town is totally highland and has relatively cold, dry, and windy weather conditions with two distinctive seasons, summer and winter.

All people living with HIV/AIDS attending at the ART clinic in Debre Brehan Referral Hospital during the study period, which fulfills the inclusion criteria, were recruited for the study.

Sample size determination and Sampling method

The required sample size was calculated using single population proportion formula by referring a similar study conducted in Gondar, 29.1% prevalence of intestinal parasites among HIV/AIDS clients in University of Gondar Hospital (26), 5% desired precision and 95% confidence interval (CI) was considered.

$$n = \frac{(Z^2_{\alpha/2})p(1-p)}{d^2}$$

$$n = \frac{(1.96)^2 0.291(1-0.291)}{(0.05)^2}$$

$$n = 317 + (317x\ 10\%\ non-respondents) = 349 \approx 350$$

Where, n = sample size, Z = statistic for a level of confidence, p = expected prevalence or proportion, d = degree of precision.

So based on the standard sample size calculation, 10% non-respondent rate added, and the total of 350 samples were collected during the study period.

The study participants were selected conveniently among HIV/AIDS patients visiting ART department for regular follow up service during the study period. The study participants were evaluated for inclusion criteria and invited for the study.

After a written consent was obtained from the study participants, they were interviewed using questionnaire about their socio-demographic characteristics, and their exposure to risk factors of intestinal parasitosis. In addition, viral load counts were taken from their medical records of the most recent data within six months.

We also assessed KAP towards intestinal parasitosis by using yes or no questions targeting on the cause and transmission of the infection. The questionnaire was prepared in English and translated to the local language (Amharic). The questionnaire was checked for consistencies and completeness on thirty-five study participants in the same study population before the study period.

Inclusion and exclusion criteria

All HIV/AIDS patients registered for ART follow up program and volunteer to participate in the study were included, while those who were on anti-parasitic therapy within the last two weeks, those who registered for ART service with less than six months and didn't have viral load count within the last six (6) months were excluded from the study.

Laboratory Diagnosis Methods for Stool Sample

Stool sample collection

Instruction was given to each study participant not to contaminate the stool with urine, water and soil. In addition, they are also informed to collect forty gram of fresh stool sample or 10 ml of diarrheic sample with clean, wide mouthed, grease free and screw cupped plastic containers. Moreover, emphasis was given to diarrhea stool samples by giving priority due to its less time stability of trophozoites in the diarrheal stool sample. Besides, formed and semi-formed stool samples were preserved by 10% formalin for further examination by microscope and concentration techniques in case of unavoidable delay. Direct wet mount, Formol-ether concentration and smear for modified acid-fast staining techniques were performed as per the standard operating procedures (SOP) of each method soon after collection within 30 minutes (35) (*see supporting information for detail of SOP*).

Direct microscopy

A stool sample was collected in a labeled cup from all study participants and a direct saline wet mount of each sample was done immediately at the laboratory for motile trophozoites, ova, cyst, and larvae stage of intestinal parasites. The wet mounts were examined under a light microscope at 10X eye pieces and 40X objective (36).

Formol- Ether concentration technique

Formol-ether sedimentation technique, in which parasites are concentrated by centrifugal force, was applied to concentrate the parasite. Briefly, one gram of stool sample was placed in a clean 15ml volume capacity conical centrifuge tube containing 7ml 10% formalin and stirred with an applicator stick. The resulting suspension was filtered through a sieve into another conical centrifuge tube. After adding 3ml of diethyl ether to the stool containing formalin suspension, it was centrifuged at 3200 rpm for 3 minutes. The supernatant was poured away and the tube was being placed in its rack. Finally, the smear was prepared on clean grease-free microscope slide from the sediment, covered with cover slide and observed under a microscope with a magnification of 10x eyepieces and 40x objective (12, 35).

Modified Ziehl Nelson method

A small portion of the fresh stool sample was processed for the detection of opportunistic parasites using the modified Ziehl Nielsen method. Briefly, the thin smear was prepared directly from the sediment of concentrated stool and allowed to air dry. Then the slides were fixed with methanol for 5 minutes and it was stained with 1% carbol fuchsine for 30 minutes. After washing the slides with tap water, slides were being decolorized with 1% acid alcohol for 1–3 minutes and stained with 0.5% methylene blue for 1 minute. The slides were then washed with tap water and observed under a light microscope with a total magnification of 1000X (12). Slides were rechecked by senior experts at the Ethiopian public health institute (EPHI).

Data Analysis

The data were entered and analyzed using SPSS version-20 software. Descriptive and logistic regression statistics were used for data analysis. The mean, percentage, and frequency were used to see the distribution. The relative contribution of independent variables for the outcome variables was assessed using logistic regression. A P-value of less than 0.05 was considered as a statistically significant association between the presence of intestinal parasites and each contributing factor. The results of our findings were presented in text, graphs, and tables.

Quality Assurance

The questionnaires were checked for their consistencies and completeness on thirty-five study participants in the same study population before the study period. Internal quality control was also performed for each of laboratory techniques based on the quality control policy of Debre Brehan Referral Hospital Laboratory.

Operational Definition

Good knowledge: Individuals who answered ≥50% of the knowledge questions in the questionnaire.

Poor knowledge: Individuals who answered <50% of the knowledge questions.

Positive attitude: Individuals who answered ≥50% of the attitude questions.

Negative attitude: Individuals who answered <50% of the attitude questions.

Good practice: Individuals who answered ≥50% of the practice questions that supports IP prevention activities.

Bad practice: Individuals who answered <50% of the practice questions.

Intestinal parasitosis: A gastrointestinal infection caused by intestinal parasites

Ethical consideration

Ethical approval was obtained from ethical review committee of the Department of Medical Laboratory Sciences, College of Health Sciences, Addis Ababa University with a reference number MLS/02/2019. Permission letter was obtained from the institutional review board of Debre Brehan Referral Hospital. Written informed consent was taken from each study participants, and for children between 12 and 18 years old, both consent and assent were taken from their parents / guardians and children themselves respectively. The study participants were informed about their right to refuse or participate in the study, and withdraw at any time during the study period without affecting their right to access other health services. All personal information was kept confidential, and those who were positive for intestinal parasite were linked to the attending physician for further clinical management.

RESULTS

Socio-demographic characteristics of the study population

A total of 350 study participants living with HIV/AIDS were enrolled in the study. Of which 46.6% were males and 77.7% were urban residents. The mean ± SD age of study participants' was 37.04 ±12.99 years, ranged from 6-80 years (Table 1).

Prevalence of intestinal parasites

The overall prevalence of IP among people living with HIV/AIDS attending at the ART clinic in Debre Brehan Referral Hospital was 20.3% (71/350). Among these, *E. histolytica/dispar* accounted for the highest rank 47 (13.4%) followed by *G. lamblia* 10 (2.9%). Hookworm, *Ascaris lumburcoids*, *Hymenolepis nana*, *Tanea species* and *Strongyloid stercoralis* accounted the least frequency of infection having proportion of 3 (0.8%), 3 (0.8%), 2 (0.6%), 2 (0.6%) and 1 (0.3%) respectively.

Distribution of helminthes was dominated by protozoan parasites which accounted for protozoa 61 (82.4%) and helminthes 13 (17.6%). Most of the intestinal parasitic infections were single infections 68 (95.8%). On the other hand, multiple infections were seen in 3 (4.2%) of the study participants. Two of the co-infections were *E. histolytica/dispar* with Hookworm and one was *E. histolytica/dispar* with *G. lamblia*. In this study, no opportunistic parasite was identified (Fig. 1).

Table 1: Socio-demographic characteristics of PLWHA at Debre Brehan, Ethiopia, 2019.

Variables		Frequency	Percent
Gender	Male	163	46.6
	Female	187	53.4
Residence	Urban	272	77.7
	Rural	78	22.3
Age group	<= 15	8	2.3
	16-30	123	35.1
	31-45	138	39.4
	46-60	67	19.1
	>= 60	14	4.0
Marital status	Married	220	62.9
	Single	91	26
	Divorced	31	8.9
	Widowed	8	2.3
Educational status	No reading and writing	34	9.7
	Reading and writing	41	11.7
	Grade 1 - 8 complete	110	31.4
	Grade 9 - 12 complete	96	27.4
	College and above complete	69	19.7
Occupation	Agriculture	52	14.9
	Merchant	59	16.9
	Office work	58	16.6
	Daily wage laborer	49	14
	Student	44	12.6
	Driver	29	8.3
	House wife	47	13.4

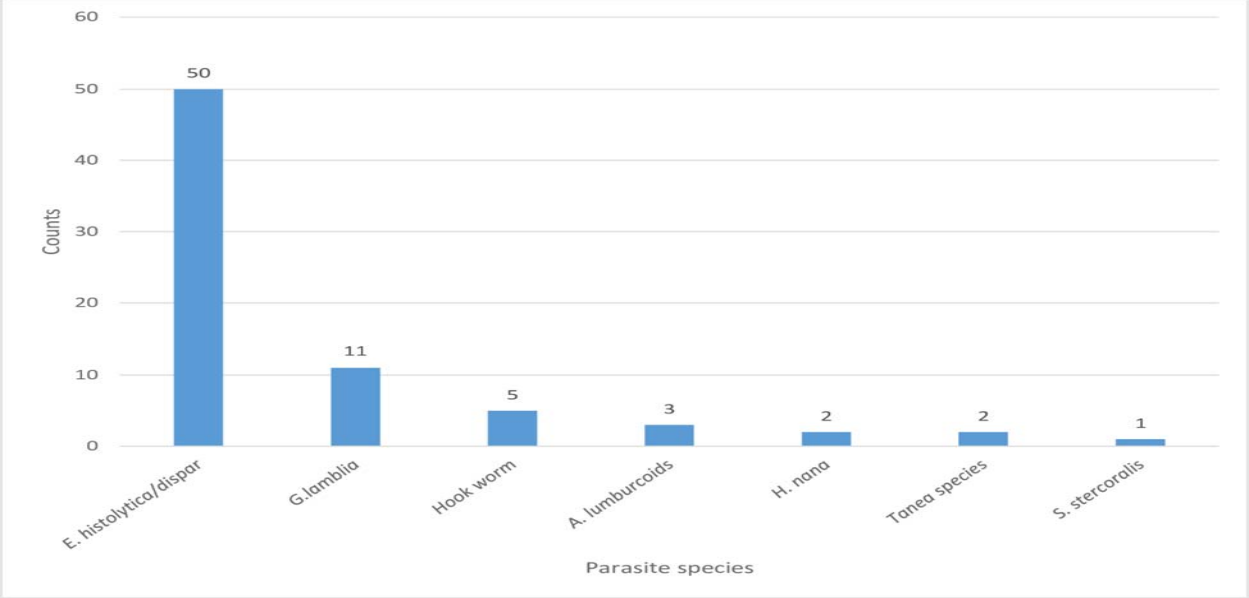

Figure 1. Intestinal parasite species distribution among people living with HIV/AIDS in Debre Brehan Referral Hospital, Ethiopia from March 01 to August 30, 2019.

Association of intestinal parasite infection with socio -demographic and other risk factors

As shown in the socio-demographic characteristics features of our study participants (Table 1) most of the study participants were urban residents (77.7%) and had the occupational status of trade and office work, 16.9% and 16.6% respectively.

From all study participants, 334 (97.7%) had regular hand washing habit with soap before and after the meal, and 323 (94.6%) of them had latrine. Among all participants, 319 (93.4%) had regular water supply and washed their hands after the toilet frequently. Most of the study participants had pure/tape water supply (88.8%), vegetable feeding habits (68.9%), raw meat eating habits (58.3%), and animal contacts in their living settings (60%) (Table 2).

Multivariate analysis was done to know the association of the potential confounding factors such as place of residence, type of occupation, presence of latrine/ toilet, source of water supply, and viral load levels with intestinal parasitosis. As a result, only the viral load level and availability of latrine showed a significant association. People living with HIV/AIDS who had viral load count >1000 cps/ml were almost four times more likely to develop parasitic infection than those who had viral load count results TND (target not detected) (AOR = 4.2, 95% CI: 1.4, 12.4) and those who did not have latrine were four times more likely to acquire intestinal parasite infection than those who had latrine in their home (AOR = 3.97, 95% CI: 1.3, 11.84) (Table 2).

Knowledge, attitude and practice of study participants towards intestinal parasitosis

Among all study participants, those whose age was greater than 15 years were interviewed for their knowledge, attitude, and practice towards intestinal parasitosis, N= 342 (97.7%). In general from these interviewed participants; 182 (53.2) had good knowledge about intestinal parasitosis, its transmission, and prevention mechanisms. Only 66 (19.3%) of the study participant understood the relationship between intestinal parasitosis and HIV/AIDS that all responded as HIV/AIDS increases the morbidity due to intestinal parasitosis (table 3).

Among 342 study participants, 260 (76%) considered IP infection as a communicable disease. The majority of them, 255 (72.9%) agreed on the transmission from person to person. From all respondents, 199 (58.2%) believed that HIV/AIDS increases the risk of acquiring intestinal parasite infection, and 147 (43%) believed that using antiretroviral treatment prevents intestinal parasite infection (table 4).

From study participants who responded for practice questions, 337 (98.5%) had regular hand washing habit with soap before and after the meal. The participants who had latrine were 323 (94.4%). Among all respondents, 303 (88.6%) had pure/tape water supply for drinking and sanitary use. The proportion of vegetable feeding habits of the study participant were about 237 (68.9%); of them, 211 (89%) ate vegetable by cooking (table 5).

Table 2: Prevalence of Intestinal parasitic infections with regards to socio-demographic information and other associated risk factors among PLWHA, Debre Brehan, Ethiopia, 2019.

Characteristics		Intestinal parasite		COR (95% CI)	P-value	AOR (95% CI)	P- value
		Positive (%)	Negative (%)				
Sex	Male	36 (22.1)	127 (77.9)	1			
	Female	35 (18.7)	152 (81.3)	0.81(0.48, 1.37)	0.43		
Age group	≤15	2 (25)	6 (75)	1.24(0.24, 6.53)	0.79		
	16-30	26 (21.1)	97 (78.9)	1			
	31-45	25 (18.1)	113 (81.9)	0.83(0.45, 1.5)	0.54		
	46-60	14 (20.9)	53 (79.1)	0.98(0.47, .05)	0.97		
	≥60	4 (28.6)	10 (71.4)	1.49(0.43, 5.1)	0.53		
Residence	Urban	46 (16.9)	226 (83.1)	1		1	
	Rural	25 (32.1)	53 (67.9)	2.3(1.3, 4.1)	0.004	1.45 (0.55,3.86)	0.45
Educational status	Unable to read and write	8 (23.5)	26 (76.5)	1.21(0.45, 3.24)	0.71		
	Read and write	9 (22)	32 (78)	1.1(0.43, 2.84)	0.83		
	Grade 1-8	22 (20)	88 (80)	0.98(0.46, 2.1)	0.96		
	Grade 9-12	18 (18.8)	78 (81.2)	0.9(0.42, 1.97)	0.8		
	College and above	14 (20.3)	55 (79.7)	1			
Occupational status	Farmer	19 (36.5)	33 (63.5)	3.13(1.3, 7.8)	0.014	1.5(0.45, 5.1)	0.5
	Merchant	13 (22)	46 (78)	1.54(0.6, 3.94)	0.37	1.33(0.5, 3.6)	0.57
	Daily worker	5 (10.2)	44 (89.8)	0.62(0.19, 1.99)	0.42	0.5(0.15, 1.6)	0.25
	Student	10 (22.7)	34 (77.3)	1.6(0.59, 4.36)	0.357	1.37(0.48, 4.0)	0.56
	Driver	6 (20.7)	23 (79.3)	1.42(0.45, 4.47)	0.55	1.5(0.48, 4.99)	0.47
	House wife	9 (19.1)	38 (80.9)	1.29(0.47, 3.56)	0.62	0.85(0.28, 2.58)	0.78
	Office work	9 (15.5)	49 (84.5)	1		1	
Availability of latrine	Yes	58 (18)	265 (82)	1		1	
	No	11 (57.9)	8 (42.1)	6.21(2.4, 16.1)	<0.001	3.97(1.33, 11.84)	0.013*
Source of water supply	Pipe	55(18.3)	248(81.7)	1		1	
	Pond	11(35.5)	20(64.5)	2.45(1.11,5.4)	0.026	1.1(0.4, 3.24)	0.83
	Spring	3(37.5)	5(62.5)	2.67 (0.62,11.5)	0.19	1.1(0.18, 6.1)	0.95
Viral load	TND	44(17.7)	205(82.3)	1		1	
	<20 cps/ml	10(19.2)	42(80.8)	1.1(0.52, 2.4)	0.79	1.0(0.45, 2.27)	0.99
	20-1000 cps/ml	9(30)	21(70)	1.99(0.86, 4.65)	0.11	2.4(0.94, 6.1)	0.07
	>1000 cps/ml	8(42.1)	11(57.9)	3.4(1.3, 8.9)	0.013	4.2(1.4, 12.4)	0.009*

TND: Target not detected, **cps/ml**: copies/milliliter, **COR**: Crude odd ratio, **AOR**: Adjusted odd ratio, **CI**: confidence interval, ***** statistically significant

Table 3: Knowledge of PLWHA about transmission and prevention of intestinal parasitosis, Debre Brehan, Ethiopia, 2019.

Knowledge variables (Total no N)	**Yes number (%)**	**No number (%)**
Knowledge about intestinal parasitosis (342)	200 (58)	142 (42)
Knowledge about the relationship between intestinal parasitosis and HIV/ AIDS (342)	66 (19.3)	276 (80.7)
Knowledge about the transmission ways of intestinal parasitosis (342)	189 (55.3)	153 (44.7)
Source of information about intestinal parasitosis (200):		
Parent	20 (10)	
Friends	44 (22)	
Reading books and journals	95 (47.5)	
Mass media	41 (20.5)	
Response for the most common transmission ways of IP (189):		
By eating contaminated food	172 (91)	
By drinking contaminated water	16 (8.5)	
By lack of personal hygiene	1 (0.5)	
Knowledge about the best treatment for intestinal parasitosis (342):		
Medicine prescribed by Doctors	326 (95.3)	
Traditional medicine	13 (3.8)	
No treatment required	3 (0.9)	
Overall knowledge level		
Good knowledge(N=342)	182 (53.2)	
Poor knowledge (N=342)	160 (46.8)	

Table 4: Attitude of PLWHA about transmission and prevention ways of IP infection, Debre Brehan, Ethiopia, 2019.

Attitude variables (N=342)	**Agree (No (%))**	**Disagree (No (%))**	**No idea (No (%))**
IP infection is communicable disease.	260 (76)	9 (2.6)	73 (21.3)
IP infection can be transmitted from person to person	255 (72.9)	8 (2.3)	79 (22.6)
HIV/AIDS increases the risk of IP infection	199 (58.2)	15 (4.4)	128 (37.4)
IPI can cause severe complications and death if not treated	264 (77.2)	25 (7.3)	53 (15.5)
Use of antiretroviral treatment prevents IP infection	147 (43)	36 (10.5)	159 (46.5)
Use of toilet and good personal hygiene practice protects from IP infection	317 (92.7)	4 (1.2)	21 (6.1)
If not protected well, water can be a potential source of IPI	312 (91.2)	7 (2)	23 (6.8)
Raw meat should not be eaten, since it can transmit IPI	226 (66.1)	54 (15.8)	62 (18.1)
Without cooking, washing vegetables is enough to prevent IPI	63 (18.4)	240 (70.2)	39 (11.4)
IP infection can be acquired from animal and animal products	266 (77.8)	4 (1.2)	72 (21)
Overall attitude level			
Positive attitude (N=342)	289 (84.5)		
Negative attitude (N=342)	53 (15.5)		

Table 5: Practices of PLWHA related to prevention and control of IP infections, Debre Brehan, Ethiopia, 2019.

Practice variables (342)	Yes (no(%)	No (no(%)
Hand washing before and after meal (342)	337 (98.5)	5 (1.5)
Availability of latrine (342)	323 (94.4)	19 (5.6)
Type of latrine (323)		
Private	282 (87.3)	
Public	41 (12.7)	
Source of water supply (342)		
Pipe water	303 (88.6)	
Pond	31 (9.0)	
Spring	8 (2.4)	
Vegetable eating habit (342)	237 (69.3)	105 (30.7)
Vegetable feeding methods (237)		
Raw vegetable without washing.	3 (1.3)	
By washing	23 (9.7)	
By cooking	211 (89)	
Raw meat eating habit (342)	145 (42.4)	197 (57.6)
Animals living with humans (342)	206 (60.2)	136 39.8)
Overall practice level		
Good practice (N=342)	314 (91.8)	
Bad practice (N=342)	28 (8.2)	

This study showed that 182 (53.2%) of the study participants had good knowledge and 160 (46.8%) of the participants had poor knowledge, 289 (84.5%) had a positive attitude while 53 (15.5%) had a negative attitude and study participants also had good practice 314 (89.7%) and poor practice 28 (10.3%) about transmission, prevention and control of intestinal parasites. Although the knowledge and attitude of study participants didn't show an association, the overall performance of health practices was significantly associated with intestinal parasitosis. Persons who had poor health practices towards intestinal parasitosis were almost three times more likely to develop intestinal parasitosis than persons with good health practices related to transmission and prevention of IPI (AOR = 2.88, 95% CI: 1.2, 6.88).

DISCUSSION

This study determined the prevalence of intestinal parasites, assessed potential associated risk factors and awareness of the study participants about the transmission, prevention, and control of the disease in Debre Brehan, Central Ethiopia. In the present study, the overall prevalence of IP among PLWHA following ART treatment and care programs in the study area was 20.3% (71/350). This was relatively consistent with studies performed in Dessie Hospital on ART patients, Ethiopia (17.6%) (12), in Abuja, Nigeria (24.7%) (14), and Hospital of Kathmandu, Nepal (19.17%) (4). On the other hand, our finding was much lower compared to studies conducted in different parts of Ethiopia; Arbaminch Hospital, (45.4%), East Gojjam, (36.8%), Butajira, (35.9%) and Gondar Hospital, (28%) (3, 18, 26, 37).

Our findings were higher when it also compared with previous studies among non-HIV persons, revealed as IP infection in Kobo Health Center, 10%, 2014 (38), Debre Brehan Referral Hospital, 17.4%, 2014 (34) and Debre Brehan, 9.8%, 2016 (39) in Ethiopia. This variation in the magnitude of parasitic infection might be due to the difference in the geographical location of the study site, endemicity of parasite, HIV status of the study participants, methodology, time gaps of the studies, and climatic conditions at different study sites. Also, the lower IP prevalence in our findings might be due to increment in awareness of PLWHA and improvements in the clinical management system.

The parasite distribution of single infections was observed in which *E. histolytica/dispar (*69.1%*)* showed higher proportion when compared to other studies in Dessie, Ethiopia (45.5%), East Gojjam, Ethiopia (24%), and Arbaminch, Ethiopia (7.4%) (3, 12, 18). However, the other parasite's frequency in our study *G. lamblia* (14.7%), *A.lumburcoids* (4.4%), and *S. stercoralis* (1.5%) were lower than a study conducted in Dessie, East Gojjam, and Arbaminch(3, 12, 18). There was no opportunistic parasite in this study similar with the study conducted in Dessie (12), but studies in Arbaminch, East Gojjam, and Butajira revealed the highest number of opportunistic parasitic infections observed as 20%, 4.9%, and 8.7% respectively (3, 12, 18).

The difference in frequency of individual parasites might be due to the difference in geographical location, altitude, the climatic condition of study areas, and hygiene and sanitation practice of study population. Furthermore, the decrement of opportunistic infections especially *Cryptosporidium species* and *I. belli* suggested an increase in the health-seeking behavior of the community.

Intern resulted in good adherence of HIV/AIDS clients to ART treatment and care programs. An improvement in the immunologic conditions of the patients and better response to infections also might be the reason. Opportunistic parasites were known to be resolved spontaneously with immune restoration among HIV/AIDS patients on ART (1).

Study participants who had a viral load count >1000 cps/ml had higher IP infections when compared to patients with <1000 cps/ml viral load counts. In this study, study participants who had viral load count of > 1000 cps/ml were about four times more likely to be infected with intestinal parasites than those who had a viral load counts Target not detected (AOR = 4.2, 95% CI: 1.4, 12.4). This showed that increased viral load counts of the study participants contributed to the acquisition of intestinal parasite infections.

The other association was with the availability of latrine, where our study indicated that 323 (94.6%) of the study participants had latrine in their home. This study revealed that participants who did not have latrine were four times more likely to be infected with intestinal parasite than those having latrine (AOR = 3.97, 95% CI: 1.33, 11.84). This result was in line with a study in Gondar, Ethiopia that study participants didn't have latrine were six times more likely infected with IP than those having latrine (AOR = 6.2, 95% CI: 1.75, 22.06) and also supported by a similar study in Dessie, Ethiopia that patients who did not have latrine had IP infections almost 8 times more likely than those having latrine (AOR = 7.56, 95% CI: 1.3, 44.2) (12). These relative comparable results suggested the similarities in accessibility and using habit of the toilet in those study sites.

In this study, knowledge, attitude, and practice of the individual participants towards intestinal parasitosis were assessed using a structured questionnaire. As a result, 53.2% of study participants had good knowledge about transmission, distribution, and prevention of intestinal parasitosis and its association with HIV/AIDS whereas the remaining 46.8% had poor knowledge. About 189 (55.3%) of study participants knew the transmission ways of intestinal parasitosis. Of which, 172 (91%) understood that it was through eating contaminated foods.

This result was slightly higher than the study conducted in Addis Ababa, Ethiopia in which 49.4% understood the transmission ways and 63.5% of them believed transmission was through contaminated foods (40). This variation might be due to the socio-demographic difference of study participants and the time gap of studies. About 92.7% of study participants agreed that the use of toilets contributes to protecting individuals from intestinal parasitic infections or failure to use toilet exposes for the infection. This result was higher compared to the study in Asmara, Eritrea provided that 60.3% of study participants agreed that defecating in the open air or fail to use toilet contributes to intestinal parasitic infections (20). The difference might be due to the difference in the pathological outcome of the endemic intestinal parasite species in the study sites.

The current study revealed that 98.5% (337/342) of study participants had practiced hand washing before a meal and 94.4% (323/342) of study participants had a latrine. Of latrine users, 87.3% (282/323) had private latrine while 12.7% (41/323) had a public latrine. This result was higher compared to another study among street dwellers conducted in Addis Ababa, Ethiopia shown that 15.6% of the study participants practiced regular hand washing before a meal and 95% had a latrine. Of these latrine users, 56.5% had private latrine and 38.5% had public latrine (40). The difference might be due to variation in the economic and educational level of the study participants.

Health practices of the study participants were significantly associated with intestinal parasitosis. Persons who had poor health practices towards intestinal parasitosis were almost three times more likely to develop intestinal parasitosis than persons with good health practices related to transmission and prevention of IPI (AOR = 2.88, 95% CI: 1.2, 6.88).

Limitation of the study

- According to the current national treatment protocol every person tested for HIV and results become positive needs to start treatments immediately. Due to this reason, it was difficult to get any ART naïve PLWHA during the study period and unable to analyze the outcomes comparatively for both groups of ART status.
- There was no CD4 count data available during the study period instead only viral load count had been used and analyzed.
- Advanced molecular diagnostic methods were not implemented that would increase the detection of opportunistic parasites.
- Non-probability sampling method has been used in this study that limits the chance of getting equal opportunity of the participants to involve in the study.

Conclusion

This study updated the prevalence of intestinal parasites and associated risk factors among people living with HIV/AIDS following ART treatment in the study area. In the study *E. histolytica/dispar* and *G. lamblia* showed greater proportion of parasite distribution. The absence of latrine and increased viral load count for PLWHA were identified as the potential risk factors for the acquisition of intestinal parasitic infections. The study showed that most of the study participants had positive attitude, good practices and poor knowledge related to the transmission and prevention activities of intestinal parasitosis. Health practices of the study participants related to transmission and prevention showed significant association with intestinal parasitosis. Thus to reduce the disease burden, the community health workers, other government officials, and related stakeholder give attention on increase awareness of latrine use, importance of strict follow up of clinician advice which help to reduce viral load count, and avoid bad health practice, as well as encourage frequent diagnosis of patients to decrease the burden of intestinal parasites among PLWHA.

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Supplementary Materials

All supplementary materials used during the study are archived with this manuscript. These are: information sheet that enables the study participants to be introduced about the study, questionnaires that used to gather information from study participants, informed consent/assents that guarantees the permission of the participants to use their information/ sample for the study and SOPs are the short descriptions of the procedures and principles of the laboratory methods.

Conflict of interest:

The authors has no conflict of interest to declare.

REFERENCES

1. Cerveja BZ, Tucuzo RM, Madureira A, et al. Prevalence of Intestinal Parasites Among HIV Infected and HIV Uninfected Patients Treated at the 1 De Maio Health Centre in Maputo, Mozambique. EC Microbiol. 2017;9(6):231-40.
2. Norhayati M, Fatmah M, Yusof S, Edariah A. Intestinal parasitic infections in man: a review. Med J Ma laysia. 2003;58(2):296-305.
3. Tadesse A, Worku A, Girma A. Prevalence of intestinal parasites and associated factors among adult pre-ART and ART patients in Goncha Siso Enesie Woreda, East Gojjam, Northwest Ethiopia, 2014. J AIDS Clin Res. 2017;8(10):1-8.
4. Sharma HN, Chalise BS, Rai G, Adhikari N, Bastola A, Singh A. Prevalence of intestinal parasitic infec tions among people living with HIV/AIDS visiting a central hospital of Kathmandu Nepal. Asian J Med Sci. 2017;8(5):87-92.
5. Hailegebriel T. Prevalence of intestinal parasitic infections and associated risk factors among students at Dona Berber primary school, Bahir Dar, Ethiopia. BMC Infect Dis. 2017;17(1):362.
6. Jaiswal S, Sharma S, Bhat SR, Pokhrel T, Chaudhary N, Sharma I. Distribution of intestinal parasite in people living with HIV/AIDS of different care centre of Pokhara Valley, Nepal. Scholars J Appl Med Sci. 2014;2(6G):3366-9.
7. Wegayehu T, Tsalla T, Seifu B, Teklu T. Prevalence of intestinal parasitic infections among highland and owland dwellers in Gamo area, South Ethiopia. BMC Public Health. 2013;13(1):151.
8. Fekadu S, Taye K, Teshome W, Asnake S. Prevalence of parasitic infections in HIV-positive patients in southern Ethiopia: a cross-sectional study. J Infect Dev Ctries. 2013;7(11):868-72.
9. Haque R. Human intestinal parasites. J Health Popul Nutr. 2007;25:387-91.
10. Bar-Yoseph H, Zohar Y, Lorber M. Strongyloidiasis-Related IRIS: A Case Report and Literature Review. J Inter Assoc prov AIDS Care (JIAPAC). 2017;16(1):8-10.

11. Marami D, Hailu K, Tolera M. Prevalence and associated factors of intestinal parasitic infections among asymptomatic food handlers working at Haramaya University cafeterias, eastern Ethiopia. Ann Occup Environ Med. 2018;30(1):53.
12. Missaye A, Dagnew M, Alemu A, Alemu A. Prevalence of intestinal parasites and associated risk factors among HIV/AIDS patients with pre-ART and on-ART attending dessie hospital ART clinic, Northeast Ethiopia. AIDS Res Ther. 2013;10(1):7.
13. Tandukar S, Ansari S, Adhikari N, et al. Intestinal parasitosis in school children of Lalitpur district of Nepal. BMC Res Notes. 2013;6(1):1-6.
14. Abaver D, Nwobegahay J, Goon D, Iweriebor B, Anye D. Prevalence of intestinal parasitic infections among HIV/AIDS patients from two health institutions in Abuja, Nigeria. Afr Health Sci. 2011;11(3):24-7.
15. Abossie A, Seid M. Assessment of the prevalence of intestinal parasitosis and associated risk factors among primary school children in Chencha town, Southern Ethiopia. BMC Public Health. 2014;14 (1):166.
16. Ramos JM, Rodríguez-Valero N, Tisiano G, et al. Research Note Different profile of intestinal protozoa and helminthic infections among patients with diarrhoea according to age attending a rural hospital in southern Ethiopia. Trop Bio. 2014;31(2):392-7.
17. Kipyegen CK, Shivairo RS, Odhiambo RO. Prevalence of intestinal parasites among HIV patients in Bari ngo, Kenya. Pan African Medical Journal. 2012;13(1).
18. Gerzmu T, Fantahun E, Hailu E, Kibe H, Fesseha O, Godana W. Prevalence of intestinal parasitosis among HIV/AIDS patients attending ART clinic of Arbaminch Hospital. Afr J Sci Res. 2015;4(5):13-7.
19. Barcelos NB, Dias RFG, Menezes Filho HRd, Rodrigues RM. Opportunistic and non-opportunistic intes tinal parasites in HIV/AIDS patients in relation to their clinical and epidemiological status in a specialized medical service in Goiás, Brazil. Rev Inst Med Trop Sao Paulo. 2018;60:1-9.
20. Ahmed KS, Siraj NM, Fitsumberhan H, et al. Knowledge, Attitude and Practice (KAP) Assessment of Intestinal Parasitic Infection among School Children in Asmara, Eritrea. Health. 2016;9(1):57-68.
21. Solomon FB, Angore BN, Koyra HC, Tufa EG, Berheto TM, Admasu M. Spectrum of opportunistic in fections and associated factors among people living with HIV/AIDS in the era of highly active anti-retroviral treatment in Dawro Zone hospital: a retrospective study. BMC Res Notes. 2018;11(1):604.
22. Adeleke OA, Yogeswaran P, Wright G. Intestinal helminth infections amongst HIV-infected adults in Mthatha General Hospital, South Africa. Afr J Prim Health Care Fam Med. 2015;7(1):1-7.
23. Nissapatorn V, Sawangjaroen N. Parasitic infections in HIV infected individuals: diagnostic & therapeutic challenges. Indian J Med Res. 2011;134(6):878.
24. Kulkarni S, Kairon R, Sane S, et al. Opportunistic parasitic infections in HIV/AIDS patients presenting with diarrhoea by the level of immunesuppression. Indian J Med Res. 2009;130(1):63.
25. Amoo JK, Akindele AA, Amoo AOJ, et al. Prevalence of enteric parasitic infections among people living with HIV in Abeokuta, Nigeria. Pan Afr Med J. 2018;30:1-9.
26. Eshetu T, Sibhatu G, Megiso M, et al. Intestinal parasitosis and their associated factors among people living with HIV at University of Gondar Hospital, Northwest-Ethiopia. Ethiop J Health Sci. 2017;27 (4):411-20.
27. Wolday D, Mayaan S, Mariam ZG, et al. Treatment of intestinal worms is associated with decreased HIV plasma viral load. J Acquir Immune Defic Syndr 2002;31(1):56-62.
28. Tian L-G, Chen J-X, Wang T-P, et al. Co-infection of HIV and intestinal parasites in rural area of China. Parasit Vectors. 2012;5(1):36.
29. Cimerman S, Cimerman B, Lewi DS. Prevalence of intestinal parasitic infections in patients with acquired immunodeficiency syndrome in Brazil. Int J Infect Dis. 1999;3(4):203-6.
30. Paboriboune P, Phoumindr N, Borel E, et al. Intestinal parasitic infections in HIV-infected patients, Lao People's Democratic Republic. PLoS One. 2014;9(3):e91452.
31. Kiros H, Nibret E, Munshea A, Kerisew B, Adal M. Prevalence of intestinal protozoan infections among I ndividuals living with HIV/AIDS at Felegehiwot Referral Hospital, Bahir Dar, Ethiopia. Int J Infect Dis. 2015;35:80-6.
32. Khalil S, Mirdha BR, Sinha S, et al. Intestinal parasitosis in relation to anti-retroviral therapy, CD4+ T-cell count and diarrhea in HIV patients. The Korean journal of parasitology. 2015;53(6):705.

33. Gebretsadik D, Haileslasie H, Feleke DG. Intestinal parasitosis among HIV/AIDS patients who are on anti-retroviral therapy in Kombolcha, North Central, Ethiopia: a cross-sectional study. BMC research notes. 2018;11(1):613.
34. Zemene T, Shiferaw MB. Prevalence of intestinal parasitic infections in children under the age of 5 years attending the Debre Birhan referral hospital, North Shoa, Ethiopia. BMC Res Notes. 2018;11(1):58.
35. Cheesbrough M. District laboratory practice in tropical countries. 2nd ed. New York: Cambridge univer sity press; 2006.
36. Anteneh T, Giday A, Alano A, Awoke A. Intestinal Parasitosis. Hawassa University, Ethiopian Health Center Team; 2008.
37. Gedle D, Kumera G, Eshete T, Ketema K, Adugna H, Feyera F. Intestinal parasitic infections and its asso ciation with undernutrition and CD4 T cell levels among HIV/AIDS patients on HAART in Butajira, Ethiopia. J Health Popul Nutr. 2017;36(1):15.
38. Bugssa G DB, Tarekegn H, Kassaw M, Tafete A. The Prevalence of Intestinal Parasites in HIV Positive and HIV Negative Individuals in Kobo Health Center,
Northeastern Ethiopia: Comparative Cross Sectional. BRITISH BIOMEDICAL BULLETIN. 2014;2 (3):569-76.
39. Zelelie TZ, Gebreyes DS, Tilahun AT, Craddock HA, Gishen NZ. Enteropathogens in Under-Five Chil dren with Diarrhea in Health Facilities of Debre Berhan Town, North Shoa, Ethiopia. Ethiopian journal of health sciences. 2019;29(2).
40. Mekonnen B, Erko B, Legesse M. Prevalence of intestinal parasitic infections and related risk factors among Street Dwellers in Addis Ababa, Ethiopia. J Trop Dis 2014;2(2):1-7.

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ORIGINAL ARTICLE

DEMOGRAPHIC CHARACTERISTICS AND THE CLINICAL PROFILE OF VULVAR CANCER PATIENTS TREATED ATTIKURANBESSA SPECIALIZED HOSPITAL, A FIVE YEARS RETROSPECTIVE STUDY

Esayas Berhanu, MD[1], Carolyn M. Johnston, MD[2]

ABSTRACT

Introduction: *Vulvar cancer is a rare disease that occurs most often in older women; however, this is not seen in clinical practice at TikurAnbessa Specialized Hospital (TASH). Overall there is limited information regarding vulvar cancer in Ethiopia.*
Aim: *The aim of this study was to describe demographic characteristics and the clinical profile of Vulvar Cancer patients treated at TASH.*
Methods: *This is a retrospective study. Data on primary vulvar cancer patients were collected from patients' chart between August 2012 and July 2017 and analyzed.*
Results: *A total of 118 study participants' charts were reviewed. The median/mean age was 39/43.17 ranging from 22 to 85 years. The patients presented with more than one symptom. The mean duration of the symptoms was about 2 years. Labium majus(91.5%), labium minus (89%) were mainly affected. In most (79.7%) patients the disease was locally advanced. Sixty six percent of the cases were positive for HIV.The mean/ median duration of HIV infection was 72.14/72 months. All of them were taking HAART. The majority 38 (32.2%) were treated with chemoradiation followed by surgery alone (16.9%). A Surgical procedure was done for 22 patients. Few patients developed complications.*
Conclusions*: In this study the burden of VC is higher among young and HIV positive women. Most women present in late stage of the disease despite visiting a health care facility for HIV care/HAART and long standing symptoms.*
Recommendations: *Creating awareness of patirnts on vulvar cancer, particularly HIV positive ones, and health care providers may ameliorate the disease burden in Ethiopia.*
Key words: *Cancer, vulva cancer, demographic aspect, clinical profile, HIV*

INTRODUCTION

Vulvar cancer is a rare gynecological cancer, accounting for 3 to 5 % of gynecological cancers(1, 2). The disease occurs mainly among women in the age of 50s or 60s(3-5). About 15% of vulva cancers occur in women <40 years and could be due to human papilloma virus infection (HPV)(6). Unlike in developed nations, it is diagnosed in late stage in less developed countries(5, 7). The main presenting symptoms of patients are genital mass, genital or vulvar pruritis, genital ulceration, vulvar pain; of which genital tumor and genital itching are most common, accounting for 70.59% and 56.47% (8-10), respectively.

The occurrence of Vulvar cancer in younger women is increasing all over the world due to High Risk-HPV (HR-HPV) infection. Human immunodeficiency virus (HIV)-positive women are at increased risk for persistent HPV infection.

In the advent of highly active antiretroviral therapy (HAART) in the recent decades, HIV positive patients live long and acquire HPV related cancers including vulvar cancer(11).To the best of our knowledge, there has been no specific study about vulvar cancer in Ethiopia. This study was done to describe the demographic characteristics and clinical profile of vulvar cancer.

METHODOLOGY

Study design: Is a retrospective case-series study.
Study area and period
The study was done over the period of August 2012 to July 2017. It was conducted in Tikur Anbessa Specialized Hospital, a teaching University Hospital found in the capital city of Ethiopia. It has different departments and specialized units including gynecology oncology, and radiation and medical oncology units.

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The radiation unit is the only center for the country.

Study Population
All patients with a diagnosis of primary vulvar cancer managed at either the gynecology oncology unit or the radiotherapy unit at TASH during the study period.

Inclusion and Exclusion Criteria
All the patients who had histologically confirmed primary vulvar cancers were included in the study. Those with secondary vulvar carcinoma were excluded.

Data collection tools and procedures
Data were collected using a self-prepared and anonymous questionnaire to gather relevant data from the patients' files. The questionnaire had two parts, namely, the sociodemographic characteristics and the clinical profiles of the patients. The tool was pretested at Zewditu Memorial Hospital. Data were collected by Interns, who were trained for a half-day on the objective of the study and the data collection tool. At each step, the principal investigator checked for the completeness of data. Data were cleaned, coded, and entered using SPSS. Results were presented using proportions and percentages.

RESULTS

Socio-demographic profiles
One hundred eighteen charts of primary vulvar cancer patients were able to be retrieved.
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Table1 shows the socio-demographic characteristics of the 118 VC cases. The median/mean age was 39/43.17 ranging from 22 to 85 years.

Presenting symptomsand HIV Status
As shown in table 2, the patients often presented with more than one symptom, the commonest being vulvar mass (76.3%) followed by ulcer (47.5%). In most (79.7%) patients, the disease extended to the adjacent involved organs beyond the vulva, including vagina (46.6%), anus (29.7%), urethra (22.9%) and inguinal lymph nodes (45.8%). The mean diameter of the lesion was 5.89cm (range 1 to 20cm). The mean duration of the interval between the onset of the symptoms and first medical consultation was 25.43 months (range 1 month to 168 month).

Seventy eight (66.1%) patients were HIV positive. Most (83%) of the HIV positive patients were lying between the age of 22 and 40 years. The duration of HIV infection ranged between 5 and 204 months. Of note, 52.5% of patients had HIV infection for 1-24 months. All(78) of them were on HAART.

Table 1: Socio-demographic characteristics of the patients (n=118)

Variable	Frequency	Percent
Age (years)		
Mean	43.17	
Median	39.00	
22-29	18	15.3
30-39	42	35.6
40-49	23	19.5
50-59	16	13.6
60-69	11	9.3
70+	8	6.8
Total	118	100
Residence (Regions)		
Addis Ababa (Capital city)	44	37.3
Oromia	34	28.8
Amahara	26	22
Tigray	8	6.8
Others	6	5.1
Marital Status		
Single	4	3.4
Married	101	85.6
Divorced	8	6.8
Widowed	1	.8
Unknown	4	3.4
Parity		
Mean No of children	2.66	
Nullipsrous	19	16.1
1-4	81	68.6
5+	18	15.3

Treatment modalities and complications
Of 118 patients, shown in table 3, 30 (25.4%) were scheduled for treatments that were not provided, including 12.7% scheduled for radiotherapy, 10.2% for chemo-radiation and 2.5% for surgery.

A surgical procedure was done for 18.6 % of the patients, consisting of Local vulvectomy and bilateral inguinofemoral lymphadenectomy 12(54.5%), radical vulvectomy and bilateral inguinofemoral lymphadenectomy 9(41%) and excisional vulvectomy1(4.5%). Five (23.7%) of the women developed complications including wound infection. Of this women, 2(9%) patients, vaginal stenosis 2(9%) and 1(4.5%) developed wound break down, delayed healing, lymphocyst and altered skin pigmentation.

Table 2: Clinical characteristics and HIV status of the patients (n=118)

Variable	Frequency	percent
Symptoms		
Vulvar mass	90	76.3
Ulcer	56	47.5
Pruritus	50	42.4
Pain	40	33.9
Discharge	54	45.8
Bleeding	32	27.1
Others	7	5.9
Mean duration (months)	25.43	
Sites of lesion		
Confined to vulva	24	20.3
Extension to adjacent organs	94	79.7
Mean largest diameter (cm)	5.89	
HIV status		
Negative	38	32.2
Positive	78	66.1
Unknown	2	1.7
HIV Pos age category		
22-30	16	20
31-40	49	63
41+	13	17
HIV duration (months)		
Mean duration	72.14	
1 month - 24 month	62	52.5
25month – 48 month	4	3.4
49 month – 72 month	19	16.1
73 month – 96 month	10	8.5
97+	23	19.5

Table 3: Types of Treatment (N=118)

Variable	Frequency	percent
Type of treatment		
Surgery scheduled that were not done	3	2.5
Radiotherapy scheduled that were not given	15	12.7
Chemoradiation scheduled that were not given	12	10.2
Chemoradiation given	38	32.2
Radiation alone given	17	14.4
Chemotherapy alone	11	9.3
Surgery done	20	16.9
Surgery followed by chemoradiation	2	1.7

DISCUSSION

Vulvar cancer is typically a disease of elderly women. The median age in some developed countries were between 65 to 70 years(3,5, 7). Studies in two West African countries showed a higher incidence of the disease in older women; in Burkina Faso the mean age was 57, and it was 56.3 in Ghana (5).

The median/mean age was 39/43.17 in our patients. Similarly, other authors in both hemispheres have noted a lower age of onset(12, 13, 15). In this study, as most of the women are HIV positive and most (91%) of those women are in the younger age group (less than 50); this probably explains the difference in the age distribution with other studies. The age distribution of vulvar cancer in this study is also similar with that of cervical cancer in this country (24), and may have similar etiologic factors.

The young age at presentation of our population, and the stage at presentation lend a huge challenge to the management and subsequent adverse outcomes for these women with respect to familial, sexuality, fertility and psychosocial outcomes. The high rate of HIV positivity in our vulvar cancer population is not surprising given their young age, and Ethiopia's high adult HIV infection prevalence (30) as compared to that of developed countries and West Africa. It is, however, surprising that those women are doing well on HAART and are receiving long term facilities care at HIV/HAART health. We propose that a first steps towards awareness and potential of earlier diagnosis would be the education of Health care workers at these facilities and the inclusion of an assessment of gynecologic symptoms at each visit with direct referral to a gynecologist as indicated.

HIV positive patients have been shown to be at increased risk of persistent HPV infection. Persistent high risk-HPV infection is associated with essentially all squamous cell carcinoma of the cervix, 80% to 90% of anal cancers, a higher proportion of vaginal and vulvar cancers and with oropharyngeal-cancer(23).

In the review of the literature assessing the relationship between HR-HPV and vulvar cancer, Smith *et al* (27), noted 40.1 % prevalence in vulvar cancer. Faber *et al* also noted a similar pooled prevalence of HPV at 39.7% (CI: 35-44.4%) (28) in their updated review of 64 papers with 5015 cases of vulvar cancer. Siriaunksul *et al* noted a 40% prevalence of vulvar cancer in Thailand(29).

Our study could not assess HPV prevalence, but we showed that most of the patients were younger and HIV positive. As in other studies (90%-95%) squamous histology was the most common type of vulvar carcinoma in this study(5, 7, 13, 19).

This study indicates that most patients were from Addis Ababa, the capital city of Ethiopia, where this hospital is located. This is again similar to the pattern noted with cervical cancer(24). A number of factors could account for this including the ability to travel for care, poor knowledge of VC in outlying areas and misidentification of the actual place of residence at the time of registration due to staying with family who reside in Addis Ababa. In literature pruritis is the most common and long lasting reported symptom of vulvar cancer, followed by vulvar bleeding, discharge, dysuria and pain(25). In our patients genital mass is the most common presenting symptom (76.3%) followed by ulcer (47.5%). Pruritus is still the significant presenting symptom.

The difference may be due to the associated lichen sclerosis in older patients in the other studies. In Burkina Faso, pain and ulceration are also the main presenting symptoms(5) while in Ghana(7) swelling and ulceration are most common.

The larger size, mean diameter of the largest ulcer and mass is 5.89 cm (range 1 cm to 20 cm), the multiple lesion and bilateral involvement of the vulva are strikingly important finding in these patients which would be consistent with HPV related cancers. It also contributes to the challenge of an adequate primary surgical resection even if not metastatic which is why most of the patients were not treated with surgical resection.

In the USA, 90% of cases of vulvar cancer are diagnosed with *in situ* or early invasive stage(22). However, this study is consistent with the findings of studies in Burkina Faso and Ghana in which most of the patients presented with locally advanced stage (4,5,7). This has a deleterious effect on the outcome of the disease. Most of our patients sought medical care after several months of the onset of the symptoms. Similarly the Ghana women consulted professionals after failure of improvement following consultations of other alternatives that led to advanced stage.

We plan to determine the primary factors that contribute to late presentation and to make recommendations to address them. Surgical removal of the primary tumor and inginal lymph nodes remains the corner stone of the treatment of vulvar cancer with strong trends towards a less radical more conservative, and more individualized approach in early stage disease.

Radical partial vulvectomy in localized lesion with SLN biopsy is suggested with favorable outcomes but not an option in Ethiopia. Chemoradiation is indicated for advanced cases(7, 13, 19, 22). In our study, 9 out of 22 patients underwent radical vulvectomy and bilateral inguinofemoral lymphadenectomy due to large tumor size and multiple localities while 12 underwent a smaller vulvectomy and bilateral inguinal lymphadenectomy. Post operative surgical complication rate and severity were relatively low, 5 out of 22 patients. This could be due to the retrospective nature of the study and post operative follow up is not always consistent in our population.

Conclusions

In this study, the burden of vulvar cancer is higher among young and HIV positive women. Most of them present at a late stage of the disease despite visiting health care facilities for HIV care/HAART and long standing multiple symptoms.

Recommendations

Creation of awareness of patients onvulvar cancer, particularly those who are HIV positive and health care providers and the inclusion of a gynecologic assessment of symptoms at each visit with direct referral to a gynecologist as indicated would allow earlier diagnosis, either at premalignant or early stage of the disease, and may ameliorate the disease burden in Ethiopia. HPV serotype study and HPV vaccination, which has been provened to be highly effective against ano-genital disease, could make an important contribution to the reduction of the risk of VC in these young women.

Ethics Considerations

The study was approved by the Department of Obstetrics and Gynecology Research and Publication Committee and Institutional Review Board (IRB) of College of Health Sciences, Addis Ababa University for ethical clearance (Protocol number AAUMF 03-008). All procedures were followed in accordance with the ethical standards. Permission was obtained from the department of medical and radiation oncology, and an outpatient department to access the patient medical records.

Competing Interests

There is no conflict of interests to declare.

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REFERENCES

1. de Martel C, Ferlay J, Franceschi S, al. e. Global burden of cancers attributable to infections in 2008: a review and synthetic analysis. Lancet Oncol. 2012;13(6):607-15.
2. Hacker NF,et al. Cancer of the vulva. Int J Gynaecol Obstet. 2015;131 76-8.
3. Hampl M, al. e. New aspects of vulvar cancer: changes in localization and age of onset. Vulvar cancer in women less than fifty in United States, 1980-2005. Gynecol Oncol. 2009.
4. Mary Ann Dadzie, al. e. Vulva cancer in Ghana - Review of a hospital based data. Gynecologic Oncology Reports. 2017; 108-111.
5. Zongo, et al. Cancer of the vulva in Burkina Faso: a hospital-based case series. Infect Agents and Cancer 2016;11:33.
6. Siddiqui N. The management of vulval cancer. Obstet Gynaecol. 2002;12 (2): 97-103.
7. Mary Ann Dadzie et al. Vulva cancer in Ghana – Review of a hospital based data. Gynecologic Oncology Reports 2017;108-111.
8. Thakur, et al. Clinical analysis of vulvar carcinoma. . Gynecology 2013. 2013.
9. Singh DK, Anastos K, Hoover DR, ;. ea. Human papillomavirus infection and cervical cytology in HIV-infected and HIV-uninfected Rwandan women. J Infect Dis. 2009;199:1851-61.
10. Denny L, Boa R, Williamson AL, al. e. Human papillomavirus infection and cervical disease in human immunodeficiency virus-1-infected women. Obstet Gynecol. 2008;111:1380-7.
11. Brickman C, JM P. Human papillomavirus in the HIV-infected host: epidemiology and pathogenesis in the antiretroviral era. 2015.
12. Hampl M, Deckers-Figiel S, Hampl JA, et al. aspects of vulvar cancer: changes in localization and age of onset. Gynecol Oncol. 2009.
13. Singh, et al. A cohort study of vulvar cancer. Indian Journal of Cancer 2016;53 (3).
14. Hacker NF, Eifel PJ, J vdV. FIGO cancer report 2012. Cancer of the vulva. Int J Gynecol Obstet. 2012;119 90-6.
15. Okolo CA, Odubanjo MO, Awolude OA, et al. A review of vulvar and vaginal cancers in Ibadan, Nigeria. . Am J Med Sci 2013;6:76-81.
16. Madeleine MM, Daling JR, Carter JJ, Wipf GC, Schwartz SM, McKnight B, et al. Cofactors with human papillomavirus in a population-based study of vulvar cancer. J Natl Cancer Inst. 1997;89:1516- 23.
17. Canavan TP, D. C. Vulvar cancer. Am Fam Physician. 2002;66:1269-74.
18. Al-Ghamdi A et al. Vulvar squamous cell carcinoma in young women: a clinicopathologic study of 21 cases. . Gynecol Oncol. 2002 84(1):94-101.
19. Alkatout, et al. Vulvar cancer: epidemiology, clinical presentation, and management options International Journal of Women's Health. 2015;7.
20. Ahizechukwu C Eke et al. Management options for vulvar carcinoma in a low resource setting. World J Surg Oncol. 2010;8:94.
21. Nkyekyer, K. Pattern of gynaecological cancers in Ghana. . East Afr Med J. 2000;77 10.
22. Stroup AM et al. Demographic, Clinical, and Treatment Trends among Women Diagnosed with Vulvar Cancer in the U.S. Gynecol Oncol. 2008 108(3):577-83.
23. Clemente et al. Multiple preinvasive and invasive HPV-related lesions of the anogenital tract in a female patient with HIV infection:A case report Medicine (2017) 96:4 Cervical Cancer, an open access journal.
24. Sefinew Migbaru Abate https://www.omicsonline.org/open-access/trends-of-cervical-cancer in Ethiopia for the years 1997-2012.
25. Alkatout et al. Vulvar cancer: epidemiology, clinical presentation, and management options International Journal of Women's Health 2015:7.
26. Stoup AM et, al. Demographic, Clinical, and Treatment Trends Among Women Diagnosed with Vulvar Cancer in the U.S. *Gynecol Oncol*. 2008 March; 108(3): 577–583.
27. Smith et al. Human Papillomavirus Type-Distribution in Vulvar and Vaginal Cancers and Their Associated Precursors.
28. Faberetal. Prevalence and type distribution of human papillomavirus in squamous cell carcinoma and in traepithelial neoplasia of the vulva.Int J Cancer. 2017 Sep 15; 141(6):1161-1169.
29. Siriaunkgul et al. HPV Detection and Genotyping in Vulvar Squamous Cell Carcinoma in Northern Thai land. Asianpacific Journal of Cancer Prevention. *2014,* 15 (8), 3773-3778.
30. Ethiopia HIV country profile. WHO 2016.

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ORIGINAL ARTICLE

CULTIVATING COMPETENT LEADERS WHO CAN MANAGE AND GOVERN THE HEALTH DELIVERY SYSTEM IN NORTHWEST ETHIOPIAN: QUASI-EXPERIMENTAL STUDY

Yeshambel Agumas Ambelie, PhD[*1], Getu Degu Alene, PhD[1], Damen Hailemariam Gebrekiros, MD, PhD[2]

ABSTRACT

Introduction: *Nurturing leadership and governance is salient to strengthen health systems. However, literature that reports the effect of programs related to this, particularly in low and middle-income countries' health systems is limited.*

Aim: *To examine the effect of integrated health system leadership, management, and governance capacity-building program on institutional delivery performance.*

Methods: *A prospective quasi-experimental study, on one-hundred-thirty-four health facility teams,was conducted in northwest Ethiopia. Teams were allocated to intervention and control groups in a 1:1 ratio, non-randomly. Integrated leadership, management, and governance capacity-building program was employed in teams of the intervention group over six months. Using a challenge model, they implemented a six-month project on institutional delivery performance. The outcome of interest was mean institutional delivery performance. Data from each group were collected at baseline and end line. Data were analyzed using analysis of covariance. Statistical significance was determined at p-value<0.05. The program's effect size was reported using partial eta squared.*

Results: *Integrated leadership, management, and governance capacity-building program had a statistically significant effect on mean institutional delivery performance (p-value<0.001). The program's effect size was 65%.*

Conclusions: *Integrated leadership, management, and governance capacity-building program is a plausible cause of improved mean institutional delivery performance. The current findings could make the program sustainable across time and scalable across similar settings. To identify the program's true causation, further research could be done using a randomized control trial.*

Keywords: *Effect, Integrated, Leadership, Management, Governance, Institutional delivery*

INTRODUCTION

A strong health system is required to address universal health coverage (1, 2). Leadership and governance is identified as the health system building block that directly impact the health outcomes (3, 4). However, it remains challenging to implement and measure, particularly in low and middle-income countries' health systems (4, 5). Yet, nurturing this building block is salient to improve the health system performance and health outcomes.

This has enforced the development of integrated Leadership, Management, and Governance (LMG) capacity-building program (4, 6). Contemporarily, this program centers the integrated leadership, management, and governance for results framework (**Figure 1**).

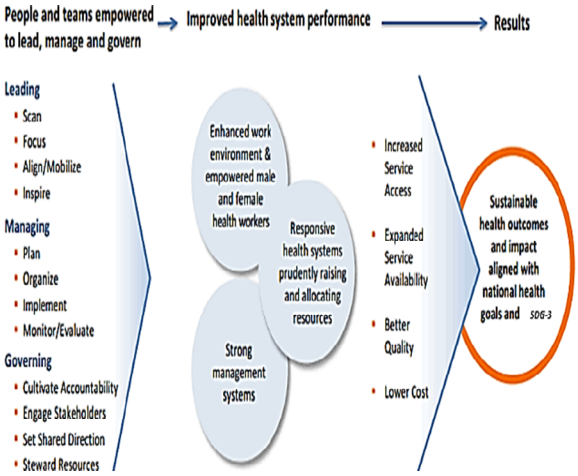

Figure 1: Integrated leadership, management and governance for results framework (Source: MSH, 2017)

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The practices of the three paths indicated in **figure 1** are highly interdependent and mutually reinforcing constructs in the context of health (5, 7). Thus, interacting with each of the practices in a balanced way is important to achieve better results.

Integrated LMG capacity-building program has been deployed in a considerable number of low and middle -income countries' health systems including Ethiopia (3). Despite this enormous expansion, there is limited empirical literature on how the program improves the health system performance and thereby health outcomes (8-11).

The studies done in Kenya (9), Egypt (10) and Mozambique (11) reported that applying the leadership development program increased selected health-service delivery indicators by average coverage rate of 10%, 41%, and 10%, respectively. On the contrary, a study done in Afghanistan reported that the program had no statistically significant effect on health system performance, rather, many indicators worsened in the intervention group (8).

These studies examines the program that only centers either the leading and managing practices (9, 10) or the governing practices (8, 11). All of these studies used an average coverage rate of two and more health services as an outcome of interest. Most of them used a retrospective approach and lacked to use control groups (9-11). None of them did control the plausible confounding factors (8-11). Other studies showed that leadership is a requirement for effective governance and effective management (5, 6). Moreover, there is a recommendation to further researching the program's effect using a single outcome of interest (9). Therefore, the current study aimed at examining the effect of integrated health system leadership, management, and governance capacity-building program on institutional delivery performance.

METHODS

Theoretical Approach

The theory of change is the theoretical foundation of this study (12, 13). Theory of change refers to a systematic and cumulative study of the links between inputs, activities, outputs, outcomes, and context of any initiative (12). There are three identified attributes to achieve the potential of this theory: plausibility, doability, and testability (13). Plausibility refers to whether activities implemented should lead to desired outcomes. Doability reflects about availability of all resources to carry out the initiative. Testability explains the presence of specific and complete theory of change to track its progress in incredible and useful ways.

Linking between inputs, activities, outputs, outcomes, and context of the initiative is influenced by the competence of the people and teams to lead, manage and govern the health delivery system (6). As noted earlier, studies indicate that people and teams empowered to lead,manage and govern the health delivery system improved performance and thereby increased health outcomes (5, 9, 10). This shows that how developing one's competence to lead, manage, and govern the service delivery system is critical to achieve improved results. Anyone can further imagine the value of the integrated LMG capacity-building program when it is firmly grounded in the target population.

Study design and teams

This study was designed to be a prospective team-based (14) quasi-experiment, aimed at examining the effect of the integrated LMG capacity-building program on institutional delivery among health facility teams. Quasi-experiment is an empirical study design used to estimate the plausible causal impact of an intervention on its target population without random assignment (15, 16). The study was conducted among one hundred thirty-four health facility teams in northwest Ethiopia. Teams were allocated to intervention and control groups in a 1:1 ratio, non-randomly. Each team had three members. The team members in both the groups were intact and worked together over the intervention period. In all the 134 study teams, there were a total of 402 participants. **Table 1** indicates sex, age, residence, and service year of the study team members.

Table 1: Sex, age, residence, and service year of the study team members, Northwest Ethiopia, 2018 (n = 402)

Variable	Category	Frequency	Percent
Sex	Male	184	45.8
	Female	218	54.2
Age in years (mean = 32.6, SD = 5.5)	<25	4	1.0
	25-29	145	36.1
	30-34	135	33.6
	>34	118	29.4
Residence	Rural	239	59.5
	Urban	163	40.5
Service year in years (Mean = 8.6, SD = 4.8)	<2	15	3.7
	2-4	59	14.7
	5-8	150	37.3
	>8	178	44.3

Intervention

The integrated LMG capacity-building program was the intervention. This is a capacity-building program that has been endorsed by the Ethiopian ministry of health to empower health facility teams to lead people, manage tasks and govern organizations. It comprised of five modules: (I) Overview and context of the health system in Ethiopia, (II) Introduction to LMG, (III) Improving performance through enhanced LMG, (IV) Health facility resources management, and (V) Health service delivery management. The integrated LMG capacity-building program was deployed over six months in the intervention group.

Basic concepts that enable the teams to face challenges and achieve results were transferred with two consecutive off-site three-day workshops. Only nine to ten teams (twenty-seven to thirty participants) were recruited to a single workshop. Based on this, seven workshop cohorts were established to address all the intervention teams. The main task that the teams carried out in the first workshop was developing the six-month project on institutional delivery performance using a challenge model (6, 10) (**Figure 2**).

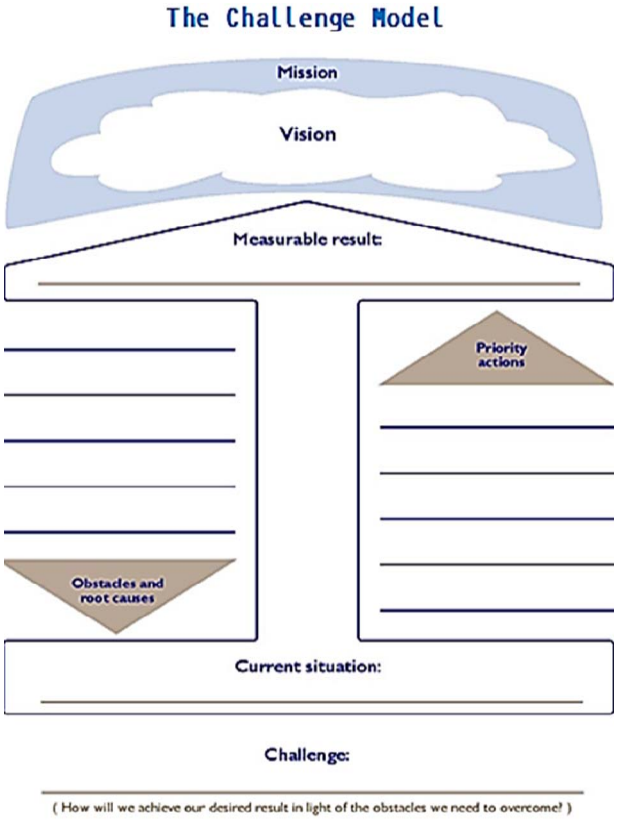

Figure 2: The challenge model (Source, MSH, 2017)

In line with the integrated leadership, management and governance for results framework (**Figure 1**), the challenge model was the key tool to track the plausibility, doability, and testability of the integrated LMG capacity-building program. Elements of this model that the teams worked out step-by-step were: reviewing facility mission, setting a shared vision, developing six-month measurable result on institutional delivery, assembling current institutional delivery performance (baseline), identifying obstacles and root causes, developing inspirational challenge statement, and designing priority actions to eliminate obstacles. In the meantime, each team identified key stakeholders to align and mobilize resources.

With all the above activities done, the teams went back to their working place, taking an assignment of validating the project with other staff and key stakeholders. For example, one of the major issues to be validated was the specificity, measurability, achievability, realisticity and time boundedness of the desired measurable result.

After an average period of one month, ensuring that the teams carried out their workplace assignments, they were called back for the second workshop. It began with presentations and discussions on the validated projects. Furthermore, the teams facilitated development of an action plan and monitoring and evaluation plan to implement the six-month project. Moreover, concepts of coaching, communication, managing facility resources, and health services delivery were discussed. In the end, they went back to their working place for the actual implementation of the projects.

In the next month, the facilitators' made an on-site coaching visit to each team using a structured coaching guide. They addressed issues like challenges faced, solutions taken and lessons learned. Facilitators were certified experts for integrated LMG in-service capacity building trainer of trainees from the Ethiopian federal ministry of health. Participatory, inquiry-based and practice-oriented facilitation approaches were employed.

Note that the control group was followed using the standard procedure.

Variables and measurements

Mean end line institutional delivery was the dependent variable, while the baseline institutional delivery was a covariate. Institutional delivery perfomance referred to the percentage of women who gave birth at a health facility.

It was a continuous scale variable measured by percentage. The expected pregnant women were denominators, while the women who gave birth at the facility were nominators. The main independent variable was the group. Note that any statement of mean institutional delivery performance in this study refers to the end line mean institutional delivery performance.

Data collection and analysis

Data were collected at baseline and end line using a checklist. Analysis of covariance was unlocked to analyze the data. Before the final analysis, five stages of analyses were conducted using the statistical package for the social sciences version 20. First, descriptive analysis was carried out to characterize the study teams and the ordinary mean institutional delivery performance. Second, assumptions of no presence of significant outliers, and approximately normally distributed data for each group were assessed by boxplot and Shapiro-Wilk test ($p<0.05$), respectively. Third, in the absence of the covariate, the effect of the group on the mean institutional delivery (dependent variable) was tested using analysis of variance. It gave significant result: partial eta squared (η^2) = 0.37, and p-value<0.001.

The η^2 measured the proportion of the total variance (effect size) on the dependent variable that was associated with the membership of different groups defined by a group (17). Fourth, the group-covariate interaction effect was checked using a custom model of analysis of covariance. This analysis technique tested differences between the group means when we knew that an extraneous variable affected the dependent variable (18, 19). It provided non-significant output: $\eta^2 = 0.01$ and p-value = 0.21. The other important output displayed from this analysis was the result of Levene's test: p-value<0.001. This result indicated that the group variances were not equal and hence the assumption of homogeneity of variance was violated. This further showed that we failed to reject the null hypothesis in that there was no group by covariate effect on the dependent variable (19). Last, the effect of the group on the covariate was also tested using analysis of variance and gave non-significant result: $\eta^2 = 0.02$ and p-value = 0.09.

Considering the above outlooks, analysis of covariance with the full factorial model was unlocked to evaluate the effect of the group on the dependent variable. This analysis technique is developed to increase the power of the test of the predictor variable, by removing error variance in the dependent variable that is associated with the covariate (18). Statistical significance was determined at p-value<0.05. The group's effect size on the dependent variable was measured using η^2.

Ethical considerations

The study was registered at Clinicaltrials.gov, NCT03639961 on 27 May 2017. Ethical clearance was secured from the corresponding author's institute with a protocol record 090/18-04. Written consent was obtained from each member of the study teams, and data were protected. This work is an extension of our previous work (20).

RESULTS

Ordinary means

Table 2 displays the ordinary mean and standard deviation of institutional delivery performances with 95% CI. The ordinary mean (±SD) difference between the baseline and end line institutional delivery performances were 14.6±7.2 and 1.1±2.2 in the intervention group and the control group, respectively.

Table 2: Ordinary mean and Standard Deviation (SD) institutional delivery performances, Northwest Ethiopia, 2018 (n= 134)

		Ordinary mean and SD institutional delivery performance							
		Baseline			**End line**				
	Measure	Statistic	95% CI		Statistic	95% CI			
			Lower	Upper		Lower	Upper		
Group									
Intervention	Mean	34.2	30.7	37.5	48.8	46.2	51.9		
	SD	12.8	10.6	14.8	12.6	10.4	14.4		
Control	Mean	30.9	28.6	33.2	32.0	29.5	34.6		
	SD	9.5	7.1	11.5	9.1	6.9	11.2		

Estimated means

Table 3 presents the adjusted mean institutional delivery performances that were the original means adjusted for the covariate. The means had changed compared to those found in the ordinary means.

Table 3: Adjusted mean institutional delivery performances, Northwest Ethiopia, 2018 (n= 134)

Group	Mean	Std. Error	95% CI	
			Lower Bound	Upper Bound
Intervention	47.4	0.627	46.2	48.6
Control	33.4	0.627	32.2	34.6

Note: The covariate appearing in the model was evaluated at the following value: baseline institutional delivery performance = 32.6.

Effect of integrated LMG capacity-building program

Table 4 shows that there was an overall statistically significant difference in the mean institutional delivery performance between the groups once their means had been adjusted for the covariate (p-value<0.001).

The output also displayed a 65% ($\eta^2 = 0.65$) effect size of the group on the mean institutional delivery performance. This showed that including the covariate in the analysis increased the group's (intervention's) effect size from 37% (noted in the methods part) to 65%.

Table 4: Outputs of between-subjects effects on adjusted means, Northwest Ethiopia, 2018 (n = 134)

Source	Type III Sum of Squares	Df	Mean Square	Sig.	Partial Eta Squared
Corrected Model	21955.8	2	10977.9	0.000	0.87
Intercept	2169.6	1	2169.6	0.000	0.39
Covariate	12460.4	1	12460.4	0.000	0.79
Group	6435.3	1	6435.3	0.000	0.65
Error	3410.4	131	26.0		
Total	244108.0	134			
Corrected Total	25366.2	133			

Note: R Squared = 0.87, Adjusted R Squared = 0.86

DISCUSSION

The current study findings inform that the integrated LMG capacity-building program intervention causes a statistically significant difference in the mean institutional delivery performance between the groups. The intervention is led by the theory of change to signify the expected relationships between inputs, activities, outputs, and outcomes in a given context (12). This theory has three important attributes: plausibility, doability, and testability that support achievement of the expected outcome of any initiative (13). In the current case, this could be comprehended as a reasonable narrative of the interactions between the various components of the integrated LMG capacity-building program and the plausible pathways through which they have related with the elements of the health facility system to achieve the expected outcome.

The current and few previous studies (9, 10) use the challenge model, in common, to show the logical relationships between facility mission, shared vision, measurable result, current situation, obstacles and root causes, challenge statement, and priority actions. Alongside these relationships, the teams identify key stakeholders to align and mobilize resources and develop an action plan and monitoring and evaluation plan to achieve better results. These pathways can support to track the scientific reliability and empirical scalability of the program.

Differently, the current study examined the integrated LMG capacity-building program that centers the integrated leadership, management, and governance for results model (5). In resource-limited settings including Ethiopia, empowering people and teams using such a model is crucial.

This is comparable with stabilizing a three-legged stool to get a balanced sit on a rough ground (21, 22).

The other unique characteristics of the current study are adjusting the original means for the covariate, and including the control group. These have five-fold benefits (19): (I) it reduces the within-group error variance; (II) it eliminates potential confounders; (III) it provides additional evidence of causality; (IV) it identifies assumption attributes in trends between the groups; and (V) it determines the effect size of the program.

In the current study, the adjusted mean institutional delivery performance (**Table 3**) compared with the ordinary mean institutional delivery performance (**Table 2**) is less in the intervention group, but greater in the control group. This shows that adjusting the mean by removing error variance in the dependent variable that associates with the covariate provides unbiased or uncontaminated mean. Additionally, the adjusted mean institutional delivery performances in both the groups are greater compared with the 2016 Ethiopian demographic health survey institutional delivery performance report (26%). Whereas, compared with the 2019 survey report (48%), the result in the intervention group is comparable, but the result in the control group is less. This finding is supported by a recently published field action report from Ethiopia that reported a 40% institutional delivery performance increase (23). These magnifies the importance of implementing the integrated LMG capacity-building program in improving performances and health outcomes.

The current ordinary mean achievement increased in the intervention group, 14.6%, is slightly greater compared to the average achievement increase reported in the studies done in Kenya, 10% (9) and Mozambique,10% (11). Whereas, it is lower compared with the average achievement increase reported in the study done in Egypt, 41% (10). These increments in general, and the differences, in particular, might be due to that people and teams more empowered to lead, manage, and govern improves the workgroup environment, management system, and responsiveness of the health system (24, 25).

Generally, the current study has important implications for policymaking, planning, implementing and researching in the context of the low and middle-income countries' health systems. Health authorities who lead and manage and govern in these countries and who wish to achieve better results could consider a contextualized integrated LMG capacity-building program(5, 26).

Away from the implications, there were potential limitations in conducting this study. The first drawback was absence of randomization pocedure (15) leading to the second limitation of whether analysis of covariance is used in alike data. Nonetheless, this was applied since there was no preexisted group affecting the covariate (19, 22). The third limitation was use of the statistical principle of regression to the mean in establishing causality (18).

This widespread statistical phenomenon can result in wrong conclusion that an effect is due to the intervention when in reality it is due to chance. The degree of this caution was diminished by implementing the intervention in a real-world setting. The last limitation was the short duration of the intervention in which six months may not be enough to overcome barriers and achieve a significant result.

Conclusions

The integrated LMG capacity-building program is a plausible cause of improved institutional delivery. The program brings a statistically significant difference in the mean institutional delivery between the groups once their means adjusted for the covariate. The program's effect size is 65%. The findings provided from this study might make the program sustainable across time and scalable across similar countries' health systems. To identify the program's true causation, further research could be done considering a randomized control trial.

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Conflict of interest

All the authors declare that they have no both financial and non-financial competing interests.

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REFERENCES

1. Murray CJ, Frenk J. A framework for assessing the performance of health systems. Bulletin of the world Health Organization. 2000;78:717-31.
2. Peters DH, El-Saharty S, Siadat B, Janovsky K, Vujicic M. Improving health service delivery in develop ing countries: from evidence to action: The World Bank; 2009.
3. Daire J, Gilson L, Cleary S. Developing leadership and management competencies in low and middle-income country health systems: a review of the literature. Cape Town: Resilient and Responsive Health Systems (RESYST). 2014.
4. Rauscher M, Walkowiak H, Djara MB. Leadership, Management, and Governance Evidence Compen dium. 2018.
5. Rice JA. Synthesis paper on effective governance for health. 2012.
6. Management Sciences for Health. Rice JA, Shukla, Mahesh, Johnson Lassner, Karen et al. Leaders Who Govern. 2015.
7. Vriesendorp S, De La Peza L, Perry C, Seltzer J, ONeil M. Health systems in action: an ehandbook for leaders and managers. 2010.
8. Anwari Z, Shukla M, Maseed BA, Wardak GFM, Sardar S, Matin J, et al. Implementing people-centred health systems governance in 3 provinces and 11 districts of Afghanistan: a case study. Conflict and health. 2015;9(1):2.
9. La Rue KS, Alegre JC, Murei L, Bragar J, Thatte N, Kibunga P, et al. Strengthening management and leadership practices to increase health-service delivery in Kenya: an evidence-based approach. Human resources for health. 2012;10(1):25.
10. Mansour M, Mansour JB, El Swesy AH. Scaling up proven public health interventions through a locally owned and sustained leadership development programme in rural Upper Egypt. Human Resources for Health. 2010;8(1):1.
11. Perry C. Empowering primary care workers to improve health services: results from Mozambique's lead ership and management development program. Human resources for health. 2008;6(1):14.
12. Connell JP. New Approaches to Evaluating Community Initiatives. Concepts, Methods, and Contexts. Roundtable on Comperhensive Community Initiatives for Children and Families: ERIC; 1995.
13. Connell JP, Kubisch AC. Applying a theory of change approach to the evaluation of comprehensive com munity initiatives: progress, prospects, and problems. New approaches to evaluating community initia tives. 1998;2(15-44):1-16.
14. Salas E, DiazGranados D, Klein C, Burke CS, Stagl KC, Goodwin GF, et al. Does team training improve team performance? A meta-analysis. Human factors. 2008;50(6):903-33.
15. Harris AD, McGregor JC, Perencevich EN, Furuno JP, Zhu J, Peterson DE, et al. The use and interpreta tion of quasi-experimental studies in medical informatics. Journal of the American Medical Informatics Association. 2006;13(1):16-23.
16. DiNardo J. Natural experiments and quasi-natural experiments. Microeconometrics: Springer; 2010. p. 139-53.
17. Richardson JT. Eta squared and partial eta squared as measures of effect size in educational research. Educational Research Review. 2011;6(2):135-47.
18. Cochran WG. Analysis of covariance: its nature and uses. Biometrics. 1957;13(3):261-81.
19. Miller GA, Chapman JP. Misunderstanding analysis of covariance. Journal of abnormal psychology. 2001;110(1):40.
20. Ambelie YA, Alene GD, Gebrekiros DH. Effect of integrated health system leading-managing-and-governing for results model on institutional delivery: Team-based quasi-experiment. bioRxiv. 2019:775858.
21. Johnson RL. CEO must have authority to coordinate governance, management, medical staff. Hospital progress. 1984;65(4):49-53.
22. Levey S, Vaughn T, Koepke M, Moore D, Lehrman W, Sinha S. Hospital leadership and quality improve ment: rhetoric versus reality. Journal of Patient Safety. 2007;3(1):9-15.
23. Bayou B, Hailu T, Jenberie A, Minalu Y, Tesfamichael T. Transforming primary health care unit service delivery through leadership, management and governance (LMG) training: A field action report from Ethiopia. The Ethiopian Journal of Health Development (EJHD). 2020;34(2).
24. Rajkumar AS, Swaroop V. Public spending and outcomes: Does governance matter? Journal of develop ment economics. 2008;86(1):96-111.
25. Delavallade C. Corruption and distribution of public spending in developing countries. Journal of eco nomics and finance. 2006;30(2):222-39.
26. Ambelie Y, Alene G, Gebrekiros D. Modeling a reliable and valid framework for building and measuring the health system workforce's competence to lead, manage and govern in Ethiopia: Factor analysis ap proach. 2020.

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ORIGINAL ARTICLE

ORAL PARACETAMOL VERSUS ORAL DICLOFENAC IN THE CONTROL OF UTERINE CRAMPING PAIN AFTER VAGINAL BIRTH

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ABSTRACT

Introduction: *Uterine cramping pain is a documented morbidity in the immediate postpartum period but there is no protocol for its management. The study aims to compare the effectiveness of multiple doses of oral paracetamol and diclofenac in the control of uterine cramping pain in women that had spontaneous vaginal delivery*
Methods: *It is a randomized controlled study among 291 women that had spontaneous vaginal delivery at LAUTECH Teaching Hospital Ogbomoso. They were recruited in the labour ward and randomized into Paracetamol, Diclofenac or Placebo groups. Initial pain intensity was assessed followed by administration of the drugs within 1hour of delivery and then 8 hourly until 24 hours. The instrument of survey was a proforma, and data were analyzed using SPSS 22. Primary outcomes were adequacy of pain relief, onset of breastfeeding and maternal satisfaction. Secondary outcome was potential maternal side effects of the drugs.*
Results: *The incidence of after-pain was found to be 100% with a large proportion (97.9%) being severe. Respondents' age, gestational age, duration of labour and oxytocin augmentation of labour correlated significantly with severity of pain. Diclofenac was significantly better than paracetamol which in turn was better than placebo in relieving the pain, mean SPID- 8.71 (SD-1.17; CI-8.48-8.95), 6.78 (SD-2.25; CI-6.33-7.24) and 1.54(SD-1.35, CI-1.26-1.31), F-487.31; p< 0.001 for diclofenac, paracetamol and placebo, respectively. Side effects were seen only in diclofenac group.*
Conclusion: *Multiple doses of oral Diclofenac and Paracetamol were effective in relieving uterine cramping after-pain although pain relief was more with diclofenac.*
Key words: *uterine cramp, after-pain, postpartum analgesia, Diclofenac and Paracetamol*

INTRODUCTION

Child birth is known to be a pain-associated event which gives considerable physical and psychological distress to the parturient and her care giver and if improperly managed could jeopardise the woman's reproductive career. (1-3) Apart from the pain experienced during labour and delivery, new mothers may experience pain following child birth from incision of caesarean delivery, perineal lacerations including episiotomy, the nipple while breastfeeding and uterine contractions associated with uterine involution. (3,4) Shift of attention from the mother to her newborn makes the management of after birth pains to be less researched unlike the management of labour pains. (5, 6)

A significant event of the puerperium is uterine involution which is the physiological process by which the uterus returns to the pre-pregnancy state after delivery through cytoplasmic autolysis aided by uterine contraction. (6, 7) This uterine contraction is what is perceived as uterine cramping after pain and has been found to be more in multipara than primipara. (2,7,8) Although this pain is subjective and can be confusing to new mothers, it has invariably been described as being similar to menstrual pain, felt in the lower abdomen and back with severity likened to that of labour pain. (7,8) This pain has been described as being severe enough to require the most potent analgesia.(7-9,10,11)

The justification for this study is based on the fact that uterine cramping pain can impair successful breastfeeding, the mother's ability to care for her newborn and the establishment of good-quality mother-baby interaction. (11-13) it can also result in maternal neuro-hormonal stress responses, sleep and emotional disorders, anxiety, depression and mother's inability to perform her daily routine. (3,12,14,15) Hence, the goals of safe motherhood cannot be achieved without effective management of after-pain from uterine cramps. (16,17)

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The study aimed to determine the incidence, pattern and determinants of after pain and to compare the efficacy of multiple doses of oral paracetamol 1000mg, diclofenac potassium 50mg and that of placebo in relieving it.

MATERIALS AND METHODS

It was a randomized controlled study among consenting women that had spontaneous vaginal delivery in the labour ward of LAUTECH Teaching Hospital Ogbomoso, South-Western Nigeria. Exclusion criteria were women that had postpartum haemorrhage, women on drugs with known or possible analgesic or anxiolytic effects including women who had epidural analgesia in labour, women with history of peptic ulcer disease or bleeding disorders, significant renal or liver impairment, preeclampsia, asthma, women with intrauterine fetal death or stillbirth and women on anticoagulants.

Approval was obtained from the ethical committee of the hospital with protocol number LTH/OGB/EC/2016/118. Consenting participants were randomized into intervention (diclofenac or paracetamol) or control (placebo) groups using simple random sampling. The interventional group was either diclofenac potassium tablets (Cataflam® by Novartis pharmaceuticals) administered at the dose of 50mg 8hourly or paracetamol tablets (Easadol® by May & Baker pharmaceuticals) administered at the dose of 1000mg 8hourly. The control group had placebo administered in two tablets 8 hourly.

Sample size for the study was 291 (n=97 in each group) calculated using formula for multiple arm randomized control trial for continuous variable.(18) The social class of the patients was determined by the patient's level of education and her husband's occupation using Olusanya and co-workers classification system. (19)

The mean Summed Pain Intensity Difference employed was obtained from a pilot study assuming effect size of 0.54, power of 90% at 95% confidence level and attrition rate of 10%. Women attending antenatal clinic were informed about the study but recruitment was done when they presented in labour. The management of labour, delivery and postpartum period was done according to the departmental protocol. This included active management of labour, partho-graphic monitoring of labour and administration of intramuscular pethidine 100mg 4hourly until cervical dilatation was 6cm.

Immediately after vaginal delivery, (within 1 hour of initiating breastfeeding or within 1hour post-delivery, for parturients that could not breastfeed), all the women that met the inclusion criteria were counselled and written consent was obtained followed by baseline pain evaluation and then randomisation into the study groups. The chosen drug was then administered. Thus Easadol® 1000mg or Cataflam® 50mg or Placebo was administered orally, after food, to the assigned group. Subsequently, at 8th, 16th and 24thhour or at discharge, whichever came first, administration of drug was repeated and other aspects of the proforma were appropriately administered. The study was discontinued in any respondent who developed known side effects associated with any of the drugs. Any participant that expressed uncontrolled pain in between the stipulated hours of drug administration was given tramadol tablet 50mg, per oris, statim for the break through pain.

The baseline pain intensity within 1 hour post-delivery and at each of 8th, 16th and 24th hour was assessed using 11-point numeric pain intensity scale with zero indicating no pain and 10 the worst pain. For the extent of pain relief, the difference between two consecutive pain intensity measurements was calculated. The resultant pain intensity difference at each time was summed to give one numerical value, the Summed Pain Intensity Difference (SPID), for each subject. The higher the SPID the greater is the pain relief. Maternal satisfaction about pain relief was also assessed using Pain Relief Satisfaction Scale.

Primary outcomes were adequacy of pain relief, onset of breastfeeding and maternal satisfaction. Secondary outcome was potential side effects of the study drugs.

IBM SPSS version 22(20) was used for data entry and analysis. To determine significance, chi square test was used for categorical variables while ANOVA test was used when comparing difference in more than two means. Post Hoc test was performed to confirm any difference that occurred between two groups whenever ANOVA test showed overall statistical difference in the group means. Correlation analysis (Spearman rho and Pearson) were used to test relationships. Logistic regression analysis was also performed to check the effect of the need for additional analgesia among the groups. Level of significance was set at p value ≤ 0.05.

RESULTS

The study was carried out between 25th July 2017 and 12th May 2018. Table 1 depicts the baseline profile of the participants.

The participants were evenly distributed across the study groups as the observed difference in the distribution was not statistically significant.

Table 1: Characteristics of participants

Variables	Study Group			Total N(%)	Test statistics	p-value
	Diclofenac n(%)	Paracetamol n (%)	Placebo n(%)			
Age (in years)					**χ^2=7.859**	0.447
<25	20 (34.5)	19 (32.8)	19 (32.8)	58(100)		
25 – 29	23 (34.8)	20 (30.3)	23 (34.8)	66(100)		
30 – 34	23 (27.1)	32 (37.6)	30 (35.8)	85(100)		
35 – 39	24 (43.6)	13 (23.6)	18 (32.7)	55(100)		
40 and above	7 (25.9)	13 (48.1)	7 (25.9)	27(100)		
Total	97	97	97	291		
Mean Age ±SD	30.43±6.4	30.92±6.6	30.20±6.4	30.51±6.4	**F= 0.322**	0.725
Religion					**χ^2= 7.293**	0.065
Christians	52 (28.7)	62 (34.3)	67 (37.0)	181(100)		
Muslims	45 (41.3)	35 (32.1)	29 (26.6)	109(100)		
Others	0 (0.0)	0 (0.0)	1 (100.0)	1(100)		
Total	97	97	97	291		
Ethnicity					**χ^2=4.259**	0.802
Hausa	4 (26.7)	5 (33.3)	6 (40.0)	15(100)		
Igbo	10 (41.7)	8 (33.3)	6 (25.0)	24(100)		
Yoruba	74(31.9)	78(33.6)	80 (34.5)	232(100)		
Others	9 (42.1)	6 (31.6)	5(26.3)	20(100)		
Total	97	97	97	291		
Marital Status					**χ^2= 1.373**	0.616
Single	5 (50.0)	2 (20.0)	3 (30.0)	10(100)		
Married	92 (32.7)	95 (33.8)	94 (33.5)	281(100)		
Total	97	97	97	291		
Socio-economic class						
High	0 (0)	0 (0)	0 (0)	0(0)		
Middle	97 (33.3)	97 (33.3)	97 (33.3)	291(100)		
Low	0 (0)	0 (0)	0 (0)	0(0)		
Total	97	97	97	291		
Parity					**χ^2= 4.626**	0.328
Primiparous	23 (41.8)	15 (27.3)	17 (30.9)	55(100)		
Multiparous	66 (30.7)	73 (34.0)	76 (35.3)	215(100)		
Grand multiparous	8 (38.1)	9 (42.9)	4 (19.0)	21(100)		
Total	97	97	97	291		
Gestation age at delivery					**χ^2=3.141**	0.222
Preterm	9 (50)	6 (33.3)	3 (16.7)	18(100)		
Term	88 (32.2)	91 (33.3)	94 (34.4)	273(100)		
Total	97	97	97	291		
Types of Gestation					**χ^2=3.655**	0.169
Single	94 (33.5)	91 (32.4)	96 (34.2)	281(100)		
Multiple	3 (30.0)	6 (60.0)	1 (10.0)	10(100)		
Total	97	97	97	291		
Duration of Labour					**χ^2=24.08**	**<0.001**
≤8hours	22 (73.3)	4 (13.3)	4 (13.3)	30(100)		
>8hours	75 (28.7)	93 (35.6)	93 (35.6)	261(100)		
Total	97	97	97	291		
Augumentation of Labour	38 (45.8)	22 (26.5)	23 (27.7)	83(100)	**χ^2=8.125**	**0.020**
Yes	59 (28.4)	75 (36.1)	74 (35.6)	208(100)		
No	97	97	97	291		
Total						
Commenced Breastfeeding within 1 hour of delivery	86 (31.9)	92 (34.1)	92 (34.1)	270(100)	**χ^2=3.695**	0.207
Yes	11 (52.4)	5 (23.8)	5 (23.8)	21(100)		
No	97	97	97	291		
Total	11 (52.4)	5 (23.8)	5 (23.8)	21(100)		
Reason for not commencing BF	8.77± 1.19	8.91± 1.00	8.78± 0.97	8.82±1.06	**F 0.480**	0.619
Baby is in SCBU						
Baseline Pain Intensity						
Mean ±SD						

A total of 291 women who gave informed consent were enrolled for the study and randomised equally into intervention groups; diclofenac (n – 97), placebo (n – 97) and control (placebo) group (n – 97).

Table 2: Incidence and pattern of after pain intensity among the study participants

Pain Intensity	Frequency	Percentage
No pain	0	0.0
Mild pain	0	0.0
Moderate pain	6	2.1
Severe pain	285	97.9

All participants completed the study and were analysed.

Table 2 shows the incidence and pattern of uterine cramping after pain among the participants. The incidence of uterine cramping after pain was 100%.

No respondent reported no or mild pain intensity. Most (97.9%) of the respondents reported severe pain while only 2.1% reported moderate pain intensity.

Table 3: Factors affecting severity of pain among the respondents

Factors	Pain Severity				Total	χ^2	p-values
	Moderate		Severe				
	n	(%)	n	%			
Marital Status							
Married	5	1.8	276	98.2	281(100)		
Single	1	10.0	9	90.0	10(100)	3.232	0.072
Number of gestation							
Single	6	2.1	275	97.9	281(100)		
Multiple	0	0.0	10	100.0	10(100)	0.218	0.641
Augumentation							
Yes	4	4.8	79	95.2	83(100)		
No	2	1.0	206	99.0	208(100)	4.372	0.037
Religion							
Islam	2	1.8	107	98.2	109(100)		
Christianity	4	2.2	177	97.8	181(100)	0.069	0.966
Others	0	0	1	100	1(100)		
	Pain intensity						
			Pearson Correlation Coefficient (r)				p-value
Age			0.225				<0.001
Parity			0.083				0.158
Gestational age			0.177				0.002
Duration of labour (in minutes)			0.190				0.001

Table 3 shows the relationship between the respondents' socio-demographic profile and severity of pain. Oxytocin augmentation of labour, respondents' age, gestational age and duration of labour were positively correlated with the pain intensity.

Table 4: Efficacy of Analgesic on After Pain Relief: using SPID, maternal satisfaction, need for additional analgesia and maternal side effects

		Mean	SD	95% Confidence Interval for Mean Lower Bound	Upper Bound	Min	Max	F	p-value
Maternal satisfaction	Diclofenac	9.51	1.12	9.28	9.73	2.00	10.00	515.18	<0.001
	Paracetamol	6.87	2.46	6.37	7.36	.00	10.00		
	Placebo	1.60	1.35	1.33	1.87	.00	8.00		
	Total	5.99	3.72	5.56	6.42	.00	10.00		
Summed Pain Intensity Difference	Diclofenac	8.71	1.17	8.48	8.95	6.00	10.00	487.32	<0.001
	Paracetamol	6.78	2.25	6.33	7.24	.00	10.00		
	Placebo	1.54	1.35	1.26	1.81	.00	8.00		
	Total	5.68	3.46	5.28	6.08	.00	10.00		

Need for additional analgesia/maternal side effects

Variables	Study Group Diclofenac n (%)	Paracetamol n (%)	Placebo n (%)	Test statistics	p value
Need for additional analgesia					
Yes	3 (2.8)	19 (17.9)	84 (78.2)	X2= 163.86	<0.00
No	94 (50.8)	78 (42.2)	13 (7.0)		1
Total	97	97	97		
Reason for additional analgesia					
Abdominal pain	1 (100)	0 (0.0)	0 (0.0)	X2= 204.18	<0.00
Uterine Contraction pain	2 (1.92)	16 (15.38)	86 (82.70)		1
Side effect*					
Dyspepsia	2 (100)	0 (0.0)	0 (0.0)	X2=2.65	0.331
Epigastric pain	6 (100)	0 (0.0)	0 (0.0)	X2=9.47	0.004
Others					

Post Hoc test of Maternal Satisfaction and SPID

Dependent Variable	(I) identification	(J) identification	Mean Difference (I-J)	Sig.	95% Confidence Interval Lower Bound	Upper Bound
Maternal satisfaction	Diclofenac	Paracetamol	2.63918*	<0.001	2.0482	3.2301
		Placebo	7.90722*	<0.001	7.3163	8.4982
	Paracetamol	Diclofenac	-2.63918*	<0.001	-3.2301	-2.0482
		Placebo	5.26804*	<0.001	4.6771	5.8590
	Placebo	Diclofenac	-7.90722*	<0.001	-8.4982	-7.3163
		Paracetamol	-5.26804*	<0.001	-5.8590	-4.6771
Summed Pain Intensity Difference	Diclofenac	Paracetamol	1.92784*	<0.001	1.3674	2.4883
		Placebo	7.17526*	<0.001	6.6148	7.7357
	Paracetamol	Diclofenac	-1.92784*	<0.001	-2.4883	-1.3674
		Placebo	5.24742*	<0.001	4.6870	5.8079
	Placebo	Diclofenac	-7.17526*	<0.001	-7.7357	-6.6148
		Paracetamol	-5.24742*	<0.001	-5.8079	-4.6870

Table 4, the mean SPID was most in diclofenac group: 8.71 [SD-1.17; 95% CI- 8.48-8.95] and least in placebo group: 1.54 [SD-1.35; CI-1.26-1.81].

The test of association was significant (F-487.31; p-<0.001) in all the groups.

DISCUSSION

The participants were evenly distributed across the study groups. The mean age of the respondents was 30.6 ± 6.5years which is similar to the mean age (30.4 ± 4.8years) of the women in Imarengiaye and co-workers' study. (10) This could be due to similar geographical location, Nigeria. However, this mean age is higher than the mean age (27.9 ± 4.2 years) obtained by Mahin and co –workers in Iran.21 This could be due to lower age of marriage among Arab women. (21) Yoruba ethnic group constituted majority (80%) of the study population, this is because of the geographical location of the study setting, Ogbomoso south-western Nigeria, which is a Yoruba land. Although all the women in this study belonged to the middle socioeconomic class, majority of them (57%) had tertiary level of education, 30% of them had secondary level of education and only 13% of them had primary level or no formal education. This is similar to the finding of Olayemi and co-workers which showed that the Yoruba ethnic group has high educational status. (22)

The incidence of uterine cramping after-pain was 100%, similar to the finding of Holdcroft and co-workers in which 96% of the respondents reported after - pain. (11) Also, Imarengiaye and co-workers found a large percentage (82.8%) of their respondents reporting after-pain. (10) In the present study, the mean baseline pain intensity was 8.82 [SD- 1.06; 95% CI-8.69-8.94; F -0.480; p-0.619] which is similar to the baseline pain intensity obtained in the pilot study, 8.24. This could be due to similar geographical region and hence, similar population study. In this study, a larger proportion (97.9%) reported severe pain, while only 2.1% reported mild pain, and no respondent reported mild or no pain. This could be because majority of the study population were of high educational status in similarity to the finding of other studies in which high educational status was shown to correlate positively with increased westernization and hence increased perception and desire for pain relief.(22,23) This is also similar to Thompson and co-workers' finding of larger proportion (52.1%) of their respondents reporting severe pain. (24) However, Declercq and co-workers found more respondents (50-80%) reporting moderate pain and less (10-18%) reporting severe pain; this could be due to difference in the study population as the participants were mostly of low parity and the study was limited to women who gave birth to single baby and could participate in English. (25)

In this study, correlation analysis shows that increasing parity correlated positively with pain intensity which agrees to the findings of Holdcroft and Eshkevari, Declerq and co-workers in which parity correlated positively with severity of pain intensity. (11,25,26)

Moreover, respondents' age, gestational age, duration of labour and oxytocin augmentation of labour were found to correlate significantly with severity of pain intensity. This is similar to previous documentations in literature that longer duration of labour and delivery cause more stress and fatigue for mothers and this correlated positively with need for additional narcotics after delivery. (11-13)

However, Taffazoli and co-workers found no significant association between socioeconomic factor, oxytocin augmentation, duration of labour and severity of after-pain. This could be due to difference in sampling method and study population. (21) Taffazoli and co-workers used convenience sampling and the study group was composed, mainly, of younger age group and housewives. Also, breastfeeding was an exclusion criterion. In this study, test of significance could not be applied to socioeconomic class as all the respondents were of middle class; this could be due to the study setting (tertiary health facility).

In this study, analysis of post intervention pain intensity, using ANOVA, showed significance in the three groups at each of 8^{th}, 16^{th} and 24^{th} hour post-delivery ($p = 0.000$). Post Hoc analysis of these variables revealed that placebo and paracetamol groups were responsible for the difference in pain intensities. Placebo group had higher pain intensity than paracetamol group, the pain intensity of which in turn was more than that of diclofenac group. This is similar to the finding of Skovlund and co-workers, (27) in which placebo group had higher pain intensity compared to paracetamol group at 2 hour post intervention. Moreover, ANOVA showed statistical significance in pain relief evaluation among the three study groups. The Post Hoc analysis revealed that the significance was in the diclofenac and paracetamol group ($p<0.001$). Diclofenac was significantly better than paracetamol which in turn was better than placebo in relieving uterine cramping after-pain. This is similar to the conclusion in the study by Huang *et al* and the Cochrane review which stated that NSAIDS were significantly better than placebo in the control of uterine cramping after pain.(28,29) It is also similar to Skovlund and co-workers' finding of oral paracetamol 1000mg being significantly better than placebo in the control of uterine involution pain. (27)

Majority (92.7%) of the respondents in this study commenced breastfeeding within one hour of delivery, while only 7.3% did not.

The reason reported for not commencing breastfeeding was that baby was admitted into the special care baby unit. Uterine cramping after pain was not associated with breastfeeding in this study, unlike the finding in a survey of childbearing experiences in USA in which 71% of the women reported difficulty in breastfeeding mainly due to uterine cramping pain. This could be because the latter study was an observational study which enabled unmodified assessment of the effect of breastfeeding on uterine cramping after-pain.(17)

Side effects were significantly higher in diclofenac when compared to the paracetamol and placebo groups but similar in paracetamol and placebo groups. The side effect was mainly epigastric pain which was ameliorated with the administration of antacid. None of the respondents with side effects expressed concern to necessitate the need to discontinue the study on account of the side effects.

This is in keeping with the conclusion of the Cochrane review in which paracetamol 1000mg had similar maternal side effects as placebo. (29)

Conclusion

Multiple doses of either oral Diclofenac or oral Paracetamol were effective in significantly relieving uterine cramping after-pain, although more with diclofenac at the risk of more maternal side effect compared to paracetamol or placebo.

Conflict of interest: All authors declare that they have no competing interests.

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REFERENCES

1. Pirdel M, Pirdel L. Perceived environmental stressors and pain perception during labor among primiparous and multiparous women.J Reprod Infertil. 2009;10:217-23.
2. Fawole AO, Adesina OA. Complaints in the puerperium. In: Ebeigbe PN. editor. Foundations of clinical obstetrics in the tropics.Benin: Fodah Global Ultimate Limited; 2012. p. 232-6.
3. Onasoga OA, Opiah MM, Osaji TA, Iwolisi A. Perceived effects of midwives attitude towards women in labour in Bayelsa State, Nigeria. Arch. Appl. Sci. Res. 2012;4:960-4.
4. James J, Prakash K, Ponniah M. Awareness and attitudes towards labour pain and labour pain relief of urban women attending a private antenatal clinic in Chennai, India. Indian J Anesth. 2012;56:195.
5. Al-hakim NH, Alidreesi ZM. The effect of local anaesthetic wound infiltration on postoperative pain after caesarean section. J Surg Pakistan. 2010;15:131-4.
6. Ebirim LN, Buowari OY, Ghosh S, editors. Physical and psychological aspects of pain in obstetrics. [Internet]. INTECH: Open Access Publisher; 2012 [cited 2016 April 26]. Available from: http:// www.intechopen.com./…/pain.
7. Anne EM. The effect of pain and its management on mother and foetus. Clin Obstet Gynaecol. 1998;12:423.
8. Jacob A. A comprehensive textbook of midwifery. 3rded. New Delhi: Jaypee Brothers Publications; 2012. p.208-16.
9. Iliadou M. Labour pain and pharmacological pain relief practice points. Health Sci J. 2009;3:197-201.
10. Imarengiaye CO, Akhideno I, Omoifo EC. Characteristics of postpartum pain associated with vaginal and caesarean births. West Afr J Med. 2013;33:3-6.
11. Holdcroft A, Snidvongs S, Cason A, Doré CJ, Berkley KJ. Pain and uterine contractions during breast feeding in the immediate post-partum period increase with parity. J Pain. 2003;104:589-96.
12. McKinney ES, James SR. Maternal child health nursing. 3rd ed. London: Elsevier Publishers; 2009. p.474-95.
13. Sleep J. Perineal care: A series of five randomised controlled trials. In: Robinson S. Thompson A, editors. Midwives, Research and Childbirth. London: Chapman and Hall; 1991. p.199-251.
14. Loubert C, Hinova A, Fernando R. Update on modern neuraxial analgesia in labour: a review of the literature of the last 5 years. Br J Anaesth. 2011;66:191-212.
15. Audu B, Yahaya U, Bukar M, El-Nafaty A, Abdullahi H, Kyari O. Desire for pain relief in labour in Northeastern Nigeria. J Public Health Epid. 2009;1:053-7.
16. Bloomfield SS, Mitchell J, Cissell G, Barden TP. Analgesic sensitivity of two post-partum pain models. J Pain. 1986;27:171-9.

17. Windle ML, Booker LA, Rayburn WF. Postpartum pain after vaginal delivery. A review of comparative analgesic trials. J Reprod Med. 1989;34:891-5.
18. Chow S, Shao J, Wang H. Sample Size Calculations in Clinical Research. In: CRC Biostatistics Series. London: Chapman & Hall; 2008. p. 58.
19. Olusanya O, Okpere E, Ezinmokhai M. The importance of social class in voluntary fertility control in a developing country. West Afr J Med 1985; 4:205-212.
20. IBM Corp. IBM SPSS statistics for windows, version 22.0. Armonk, NY: IBM Corp;2013.
21. Taffazoli M, Khadem Ahmadabadi M. Assessment of factors affecting afterpain in multiparous women delivered in Mashhad 17-Shahrivar Hospital, Mashhad, Iran. J midwifery reproductive health. 2013;2:60-5.
22. Olayemi O, Aimakhu CO, Akinyemi OA. The influence of westernisation on pain perception in labour among parturients at the University College Hospital, Ibadan. J Obstet Gynaecol. 2006; 26: 329–31.
23. Faponle AF, Kuti O. Perception of labour pain by pregnant women in Southwestern Nigeria. Trop. J. Ob stet. Gynaecol. 2004; 21:153-5.
24. Thompson JF, Roberts CL, Currie M, Ellwood DA. Prevalence and persistence of health problems after childbirth: associations with parity and method of birth. Birth. 2002;29:83-94.
25. Declercq ER, Sakala C, Corry MP, Applebaum S, Herrlich A. Major Survey Findings of Listening to Mothers III: New Mothers Speak Out. J Perinat Educ. 2014;23:17.
26. Eshkevari L, Trout KK, Damore J. Management of postpartum pain. J Midwifery Womens Health. 2013;58:622-31.
27. Skovlund E, Fyllingen G, Landre H, Nesheim BI. Comparison of postpartum pain treatments using a se quential trial design. I. Paracetamol versus placebo. Eur J Clin Pharmacol. 1991;40:343-7.
28. Huang YC, Tsai SK, Huang CH, Wang MH, Lin PL, Chen LK, et al. Intravenous tenoxicam reduces uter ine cramps after Cesarean delivery. Can J Anesth.2002;49:384-7.
29. Deussen AR, Ashwood P, Martis R. Analgesia for relief of pain due to uterine cramping/involution af ter birth. The Cochrane Library. 2011.

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BRIEF COMMUNICATIONS

BUILDING A COVID-19 REPOSITORY WEBSITE FOR HEALTHCARE PROFESSIONALS IN ETHIOPIA

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ABSTRACT

Health professionals dealing with the COVID-19, both in clinical care and in the public health domain, require up-to-date and relevant scientific information. The Diaspora and Ethiopian Advisory Councils on the COVID-19 pandemic in Ethiopia joined forces with the Ethiopian Medical Association to create a local repository of comprehensive peer-screened information on COVID-19. We describe the motivating factors for such a repository, the process of creating the website, and the utilization of this information resource for Ethiopian healthcare professionals.

INTRODUCTION

The international medical community has had minimal experience with the fast-evolving COVID-19 pandemic (1). For medical professionals in low-resource countries such as Ethiopia, the learning curve is even steeper due to the lack of an authoritative, comprehensive COVID-19 information resource specifically targeted for the country. In response to this deficit, the Children's Hospital of Philadelphia (CHOP) Department of Radiology's Global Radiology Outreach and Education team collaborated with the Ethiopian Diaspora High-Level Advisory Council on the COVID-19 Pandemic in Ethiopia, the Ethiopian Health Professionals Advisory Council on the COVID-19 Pandemic in Ethiopia, People to People (P2P), and the Ethiopian Medical Association (EMA) to establish a comprehensive COVID-19 medical information website (2).

Ethiopian healthcare professionals can access and navigate this repository to find up-to-date COVID-19 resources that will inform clinical and public health practices. Each publication, guideline, or webinar on the website is peer-screened to ensure its relevance for medical and public health practice in the country. The project was initiated in April 2020 and the webpage was launched on June 19, 2020. In this paper, we describe the background for initiating this project, the process of creating it, and the outcome of our effort.

Lack of a local comprehensive COVID-19 information resource for Ethiopian healthcare professionals : The volume of information on COVID-19 on the internet is staggering (3, 4, 5). In a Google search on April 19, 2020, the term "COVID-19" generated 2.3 billion entries (6). In comparison, the word "Ebola" garnered only 59.9 million entries (6). On the same day, the central resource for scientific medical publications, PubMed, showed 5,279 publications on COVID-19 since January 2020, i.e., published within fewer than 4 months (7). In contrast, on PubMed there are only 9,045 publications on Ebola spanning the past 43 years. These numbers illustrate how daunting it can be for busy healthcare professionals to navigate through the myriad of scientific and non-scientific information on COVID-19.

In a matter of weeks, the COVID-19 pandemic became a worldwide crisis (8). The dearth of knowledge has spurred a flurry of research activities leading to publications in unprecedented numbers and at a breakneck pace (9). For the first time, publications are bypassing formal online or print processes and being circulated in early formats in order to accelerate the sharing of new scientific information (10). Furthermore, most journals have made COVID-19 publications available as free downloads. In addition to the scientific publications, epidemiological reports from a multitude of sources are appearing in real time (11). Healthcare institutions and government agencies are quickly generating COVID-19 guidelines and recommendations, which are frequently revised as our understanding of the virus develops.

In Ethiopia there was no authoritative local resource of comprehensive information on COVID-19 that had been designed specifically to support healthcare professionals. In the early months of the pandemic, as medical knowledge about the new virus rapidly evolved, it was imperative to provide a central, well-organized,

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easily accessible source of information with peer-selected clinical, research, and educational materials that would support Ethiopian healthcare professionals in combatting the spread of COVID-19. The Ethiopian Ministry of Health (MOH) was providing information primarily targeted to the public. On accessing its website on April 19, 2020, we found 19 posters, 2 brochures, 2 videos, 2 documents, and 3 online courses that required login access (12). Only the latter two resources were meant for healthcare professionals. Similarly, EMA had on the front page of its website some information about "Do's and Don'ts regarding COVID-19" and a resource tab with a COVID-19 page.

On April 19, 2020, this page contained 19 COVID-19 protocols, which were mostly local resources (13). EMA and the Diaspora COVID-19 Advisory Councils collaborated to address the discrepancy between the abundance of COVID-19 information worldwide and what was easily accessible to Ethiopian healthcare professionals. In response, we developed an organized, comprehensive medical information resource targeting healthcare professionals.

The development of the COVID-19 repository website: The development of the website was a collaboration between CHOP's Department of Radiology's Global Radiology Outreach and Education team and EMA. The repository lives on the main website (www.ethiopianmedicalass.org) of EMA (Figure 1). This publicly accessible site serves as a local and centralized resource center with a repository for comprehensive and peer-screened information on COVID-19 which is available as full pdf files or videos. It also houses COVID-19 oriented diagnostic and treatment protocols selected for local healthcare professionals. Other professional societies and agencies, including those of all ancillary health services, are encouraged to establish links on their websites that would direct users to this central EMA COVID-19 repository.

The first task in developing the repository was to designate a coordinator. The person in this role communicated with peer screeners, facilitated selection of documents, and sent documents to the EMA webmaster. A webmaster was necessary to create and maintain the webpage, organize documents into pre-determined categories, and provide webpage access data. In order to ensure that the repository did not become an indiscriminate "dumping place" of COVID-19 information, 49 medical specialists and sub-specialists served as peer-screeners to share publications they deemed important for their specialty and to review the documents in their category for suitability.

Most relevant subspecialties related to COVID-19 were represented from both the clinical and public health aspects. Included in the clinical subspecialties were the following: Anesthesiology, Cardiology, Emergency Medicine, Hematology, Intensive Care Medicine, Internal Medicine, Neurology, Obstetrics, Palliative Medicine, Pulmonology, Pathology, Pediatrics, Radiology, Primary Health Care/ Family Medicine, Surgery, and Treatment. The public health sector encompassed Epidemiology, Infection Prevention & Control, Mental Health, Modelling, Pharmaceuticals, Personal Protective Equipment, Testing, and Vaccination. Nursing was incorporated as well. The peer screeners were from Ethiopia (28) and the diaspora (21). Most of the peer screeners from Ethiopia and the diaspora were paired in their respective subspecialties to ensure a smooth transition when the website is eventually taken over by EMA.

The management of the COVID-19 repository website: Management of the website includes the following components: the coordinator contacts peer-screeners bi-weekly for any publications needed to be uploaded to the webpage, requests peer screeners to review entries in their designated category, searches for new scientific literature, and sends new publications to the webmaster to upload to the site. The coordinator ensures documents are saved using a uniform naming system and keeps track of submitted documents.

The website contains a wide range of clinical content under the most important subspecialties regarding COVID-19, encompassing important public health sub-categories, nursing, and a section for recorded webinars on various clinical and public health topics. It also provides clearly visible sections for guidelines and recommendations from the Ethiopian Diaspora and Local High-Level Advisory Council on the COVID-19 Pandemic in Ethiopia, the MOH, and the World Health Organization (WHO) COVID-19 websites.

The repository website was not meant to replace PubMed or other similar resources. Instead, the unique offerings of this website are the disease focus, the fact that the documents have been peer-screened and are relevant specifically for clinical care and public health practice in Ethiopia, that its PDFs are directly available for fast resource download, and its easy webpage navigation and search function. Finally, a key feature is that this is a locally maintained website easily accessible to Ethiopian healthcare professionals.

COVID-19 repository website traffic outcome and sustainability: A webinar launch was held on June 19, 2020 to inaugurate the COVID-19 repository webpage. The leadership of all the medical and public health professional societies in Ethiopia were invited to attend this virtual meeting. The webinar was also livestreamed on the EMA's Facebook page to reach a broader audience. By April 2021, 584 documents were uploaded on the website and over 31,000 people accessed it. On average, documents have been downloaded 2,856 times monthly by site visitors (Figure 2). Since the release of the website, site visitors from Ethiopia have downloaded documents 20,230 times. In fact, the publications have also been downloaded from other countries, including the USA, India, and China (Figure 3).

The goal is for the repository website to be sustained by local stakeholders. The collaboration between CHOP and the EMA is meant to initiate the first phase of this repository. Soon, there will be a transition of the coordination from CHOP to EMA, and EMA will take on the responsibility of maintaining the site and curating up-to-date resources.

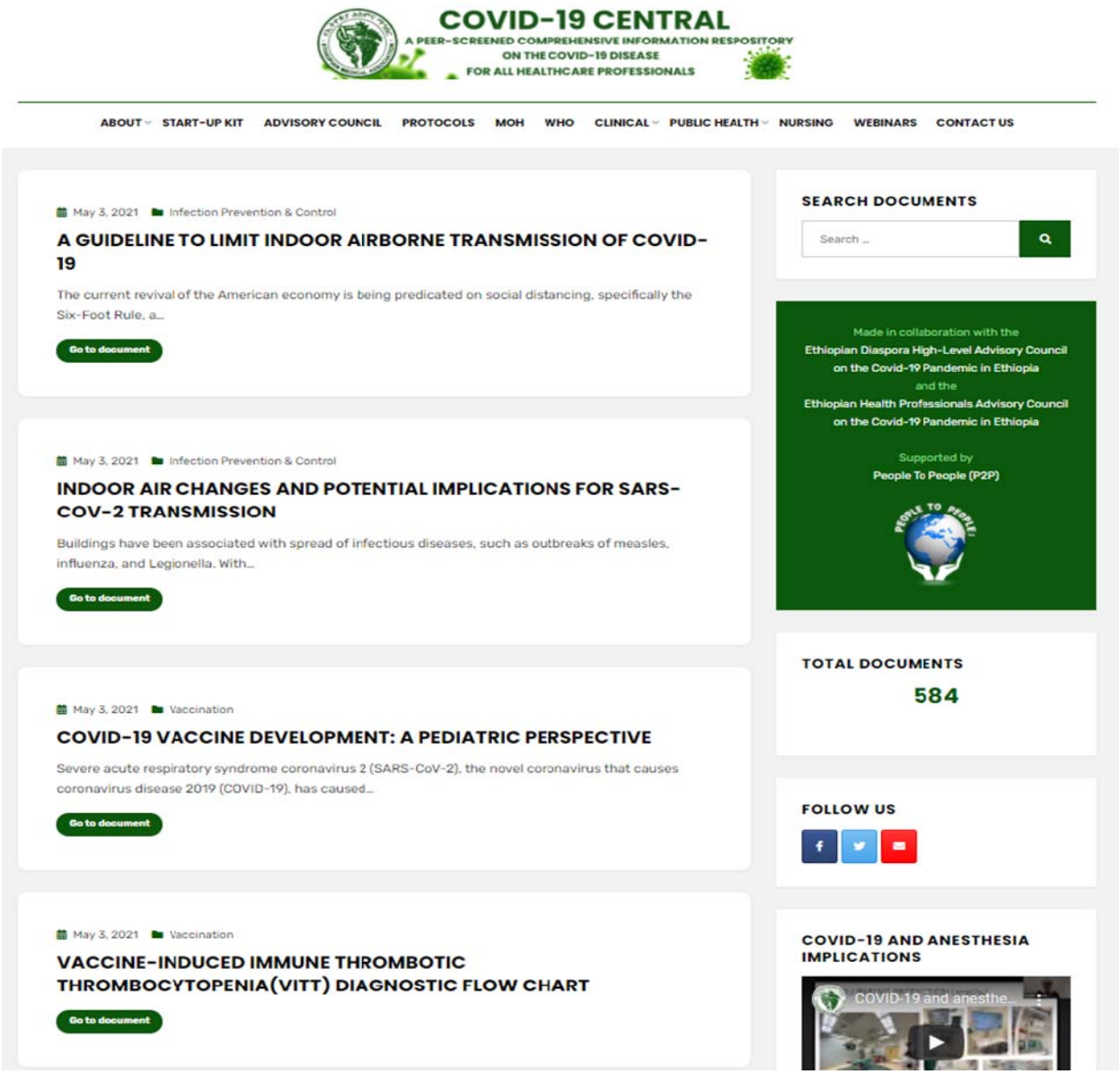


Figure 1: The front webpage of COVID-19 Central on the website of the Ethiopian Medical Association (EMA).

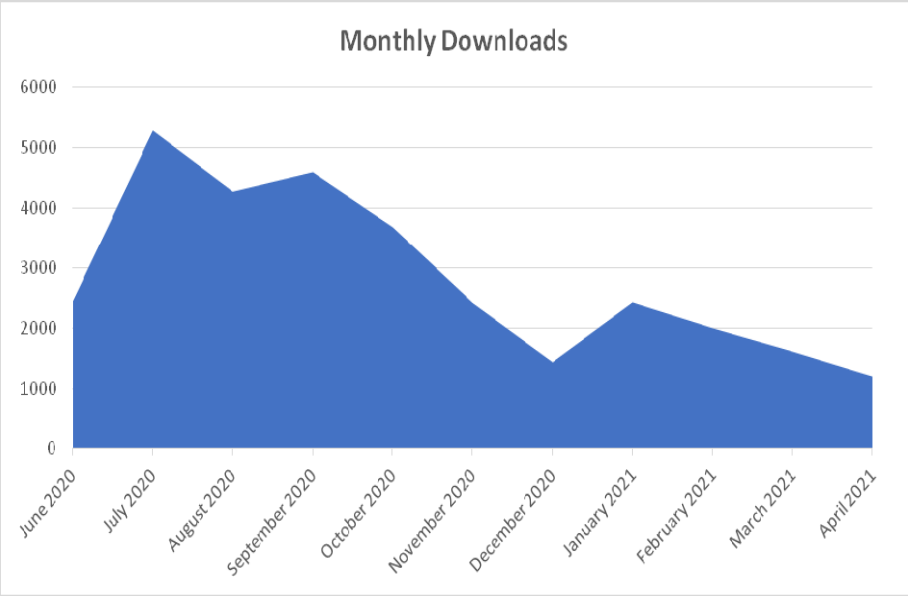
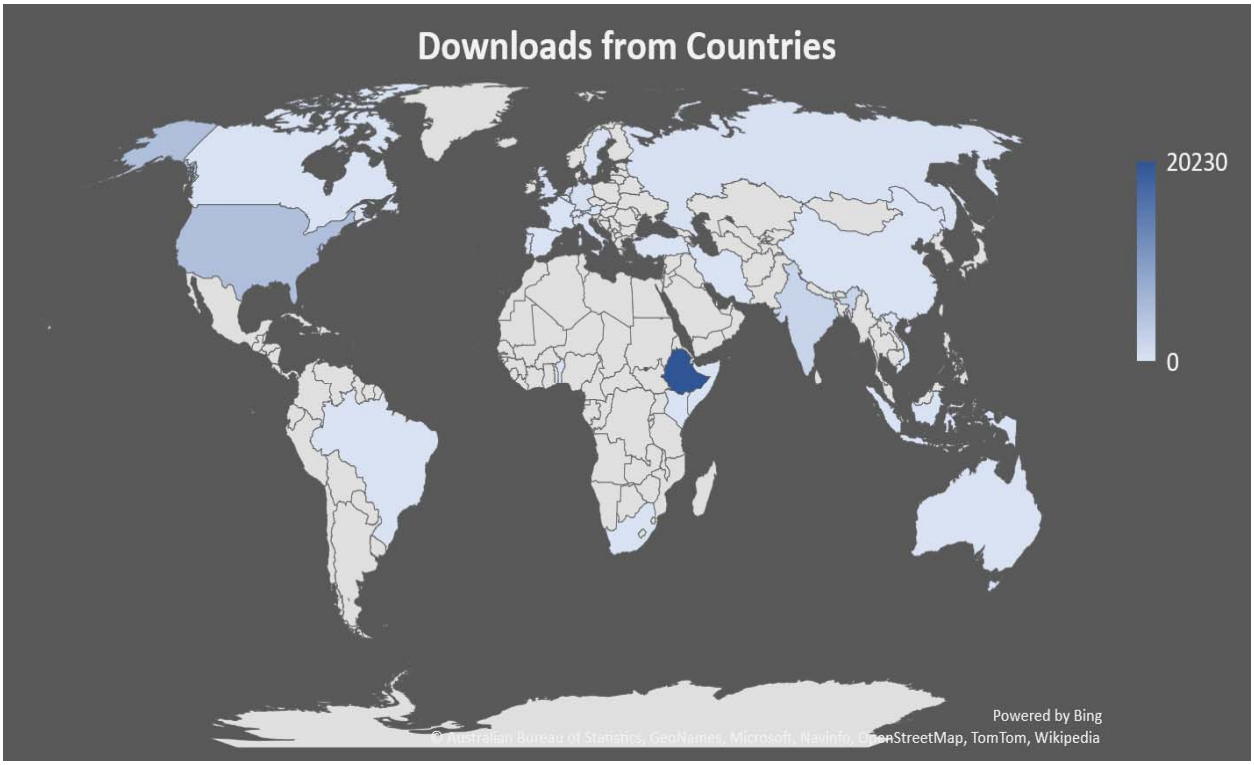


Figure 2: The number of monthly downloads from the COVID-19 Central webpage on the Website of the Ethiopian Medical Association (EMA).

Figure 3: Geographic distribution of downloads from the COVID-19 Central webpage on the website of the Ethiopian Medical Association (EMA).



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Conflict of interest: All authors declare that they have no competing interests

REFERENCES

1. Kupferschmidt K. Preprints bring 'firehose' of outbreak data. Science. 2020 Feb 28;367(6481):963-964. doi: 10.1126/science.367.6481.963.
2. Ethiopian Medical Association (Internet). (cited 2020 Jun 19). Available from: www.emacovid19resourcecenter.org.
3. Teixeira da Silva JA, Tsigaris P, Erfanmanesh M. Publishing volumes in major databases related to Covid -19. Scientometrics. 2020 Aug 28:1-12. doi: 10.1007/s11192-020-03675-3.
4. Chen, Q., Allot, A., & Lu, Z. (2020). Keep up with the latest coronavirus research. Nature, 579(7798), 193. doi: 10.1038/d4158 6-020-00694 -1.
5. Fry, C. V., Cai, X., Zhang, Y., & Wagner, C. S. (2020). Consolidation in a crisis: Patterns of international collaboration in early COVID-19 research. PLoS ONE, 15(7), e0236307.
6. Google (Internet). (cited 2020 Apr 19). Available from: www.google.com
7. PubMed (Internet). (cited 2020 Apr 19). Available from: www.pubmed.ncbi.nlm.nih.gov
8. Nowakowska J, Sobocińska J, Lewicki M, Lemańska Ż, Rzymski P. When science goes viral: The re search response during three months of the COVID-19 outbreak. Biomed Pharmacother. 2020 Sep; 129:110451. doi: 10.1016/j.biopha.2020.110451.
9. Else H. How a torrent of COVID science changed research publishing - in seven charts. Nature. 2020 Dec;588(7839):553. doi: 10.1038/d41586-020-03564-y.
10. Aviv-Reuven, S., & Rosenfeld, A. (2020). Publication patterns' changes due to the COVID-19 pandemic: A longitudinal and short-term scientometric analysis. arXiv preprint arXiv:2010.02594.
11. Prieto-Alhambra D, et al. Unraveling COVID-19: a large-scale characterization of 4.5 million COVID-19 cases using CHARYBDIS. Res Sq (Preprint). 2021 Mar 1s44. doi: 10.21203/rs.3.rs-279400/v1.
12. The Ethiopian Ministry of Health (Internet). (cited 2020 Apr 19). Available from: www.moh.gov.et/ejcc/.
13. Ethiopian Medical Association (Internet). (cited 2020 Apr 19). Available from: www.ethiopianmedicalass.org.

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CASE REPORT

INABILITY TO SWALLOW TABLETS OFFERS AN OPPORTUNITY FOR DETECTION AND SUCCESSFUL TREATMENT FOR A RARE LIFETIME CAUSE OF DYSPHAGIA

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ABSTRACT

Introduction: *This case presents an adult who was diagnosed with viral hepatitis C, and offering treatment for this potentially life-threatening illness provided an opportunity for diagnosis and therapy of a previously unrecognized long-standing cause of dysphagia.*

Case Presentation: *A 37-year-old female was diagnosed to have Hepatitis C virus (HCV) infection. Non-invasive assessment showed that she had moderate fibrosis and was recommended treatment with oral direct-acting antiviral (DAA) drugs. However, the patient was hesitant claiming that she had not been able to swallow any tablets for the last 30 years. Prior evaluation for her dysphagia was done with a barium swallow, which was reportedly normal. She was advised to have an upper endoscopy (EGD) evaluation, and it revealed a prominent proximal esophageal web. This was that treated endoscopically and resulted in resolution of her long-standing dysphagia.*

Conclusion: *Causes of dysphagia can be obscure and lead to significant compromise in quality of life and inability to take life saving drug treatment. Esophageal webs can present with a long history of dysphagia and due to the proximal nature, could be missed by routine investigations. High index of suspicion is important to persuade for an endoscopy procedure in undiagnosed long-standing cause of dysphagia.*

Keywords*: Esophageal web; Dysphagia; Barium swallow; Upper GI Endoscopy*

INTRODUCTION

This is a case of an adult patient with a long history of dysphagia whose diagnosis has been delayed due to a false reassurance by normal barium swallow study. The case was subsequently diagnosed as the patient was persuaded to undergo an upper gastrointestinal endoscopy (EGD) as she was unable to swallow tablet. The investigation revealed a proximal circumferential esophageal web.

CASE PRESENTATION

A 37-year-old female patient presented to our medical institution with a history of chronic fatigue and weight loss. The weight loss had been longstanding and she claimed that she has been basically consuming liquid diets and has trouble eating solid food including medications, for the last 30 years. The patient and her family believed the symptoms started since childhood, but the diagnosis was obscured for a long period. During her childhood, she has been evaluated at different centers, but to no avail, and the patients said that she started to 'live with it' being dependent on liquid and semisolid diets. General appearance showed a chronically ill-appearing woman with a BMI 0f 18kg/m^2.

On routine investigation, she was found to have a positive hepatitis C virus (HCV) antibody and subsequently was diagnosed to have ongoing viremia with a viral load of 582, 000 copies/ml. Further investigations revealed that she has HCV genotype 4 infections and an abdominal ultrasound showed no obvious signs of cirrhosis. Other laboratory parameters showed hemoglobin of 11 gm/dl: all other laboratory evaluations (Liver chemistry tests, renal function tests, electrolytes) were unremarkable. HBsAg and HIV antibody test were negative. Fibroscan (Echosens 402) was done as non-invasive marker of assessing fibrosis severity and it was 9.0 suggesting moderate/severe fibrosis.

The patient was advised to undergo an upper GI endoscopy (EGD), which she strongly refused. For this reason, she was investigated with a barium swallow which showed a normal finding. This gave a false reassurance that her condition might be related to a globus sensation or some type of psychological stress. On the other hand, because of concern that she has significant hepatic fibrosis, it was recommended to treat with oral direct-acting antiviral (DAA) agents for her chronic hepatitis C.

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The patient, however, was very reluctant and declined therapy repeatedly claiming that she could not swallow any medication pills. She was finally persuaded to have an upper GI endoscopy with anesthesia support. The endoscope was difficult to pass down beyond the upper esophageal sphincter as there was a circumferential web, which was causing lumen narrowing and even the scope with a surrounding diameter of 8 mm could not pass [Figure 1]. This led to the diagnosis of a proximal esophageal web.

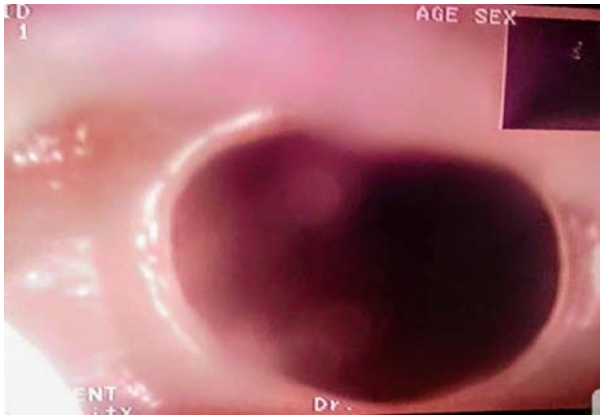

Figure 1: An upper esophageal web revealed on EGD in our 37-year old Ethiopian patient

The esophageal ring was then dilated with a pneumatic dilator cautiously to avoid aspiration and it was successful leading to rupture of the membranous ring (See Figure 2).

Figure 2: The image after an esophageal balloon dilatation has been done showing a rupture of the esophageal web

After the procedure, the patient was complaining of some discomfort while swallowing, which resolved slowly, but could not get herself to be convinced that she can swallow and be able to take her drugs. A subsequent pneumatic dilatation was performed after a week and at this time, the scope was able to pass and the remnant ring ruptured easily and the patient was given psychological support and reassurance. After this second therapy, the patient started eating solid food and she also started taking her drugs. She then showed marked improvement of her nutritional status. She successfully completed three months of DAA therapy (Velpatasvir + Sofosbuvir) and had a successful response with virological cure (sustained virological response/SVR) with undetectable virus at week 12 follow-up (SVR 12). She also slowly improved in her overall wellbeing with gratitude and has gained weight. It has been more than a year since she was put off follow up, and there are no complains of dysphagia.

DISCUSSION AND CONCLUSION

Esophageal web is an eccentric, thin < 2mm horizontal membrane and protrudes into the lumen of the esophagus. It is covered with stratified squamous epithelium and occurs anteriorly commonly in the cervical and middle esophagus. (1) It is associated with focal narrowing in the post-cricoid area and mainly affects middle-aged females (2). Patients are usually asymptomatic and the true prevalence is not clearly known. Patients may have dysphagia and regurgitation based on the site of the stenosis and especially when the stenosis is severe.

Hepatitis C Virus is one of the hepatotoxic viruses that could lead to chronic liver disease with liver failure, decompensation and lier cancer. It has affected 71 million of the world population and currently has effective therapies that can lead to cure within 2-3 months of treatment. (3) Hepatitis C has also an extrahepatic manifestations involving different organs of the body, but there was no reports of esophageal web in the literature. (4)

In patients undergoing barium esophagogram for dysphagia, 5 to 15 % of patients could have an esophageal web. In different literatures, it has been noted that patients usually do not become symptomatic until after 40 years of age (5). Our patient came to our attention at the age of 37 years, even though, she has had long standing intermittent symptoms. Her case could be explained as one of the postulated mechanisms, the developmental theory, where the webs are expected to occur when a pleat of mucosa is formed by in-folding of redundant esophageal mucosa due to shortening of the esophagus.

Esophageal webs are developmental anomalies with unknown pathogenesis. Unlike rings these anomalies rarely encircle the lumen but instead protrude from the anterior wall, extending laterally but not to the posterior wall (6). Webs are common in the cervical esophagus and are best demonstrated on an esophagogram with the lateral view. In up to 5% of cases, they are identified in an asymptomatic state, but when they are symptomatic they cause dysphagia for solids. Webs are fragile membranes and so respond well to esophageal bougienage with mercury weighted dilators (7). Symptomatic patients usually present with dysphagia to solids particularly hard ones (e.g., meat/ bread), often intermittent, and patients may modify how they eat (chewing more thoroughly, etc.). In our patient, she had been avoiding swallowing hard solid foods including tablets and she was taking longer to chew before attempting to swallow foods.

Esophageal webs are associated with Zenker's diverticulum, dermatologic and immunological disorders, and iron deficiency anemia. There has also been a case report of celiac disease in association with esophageal web (8). In this current case, the patient's evaluation did not reveal any of the above associations or findings, although she was incidentally noted to have presence of chronic Hepatitis C Virus infection.

Literatures have shown that most children are asymptomatic, and, thus, they are far less detected and could adjust their life style and dietary habits as found in this case. This has been described as esophageal webs can present as a congenital manifestation and can stay until fourth decade without being diagnosed.

The diagnosis of esophageal web can be made by barium swallow study, however, if the esophagus is not distended adequately, it will give the appearance of subtle narrowing and can easily be missed (1). In a study published in 1985, the investigators found that barium detection rate can be evident in only 17 to 49 when proper techniques are not followed (9). Our patient had a normal barium swallow and this is an important lesson to improve our techniques in detection of esophageal webs and rings. It also showed that a normal barium swallow should not rule out upper esophageal pathology and additional investigations such as an upper endoscopy (EGD) may need to be done, especially in patients with long-standing symptoms. EGD shows a smooth, thin membrane that is usually non-circumferential and caution should be taken due to proximity to the upper esophageal sphincter. Once the diagnosis is made, management is usually performed with esophageal dilation and small webs usually rupture during the endoscope traverses the web. The goals of management are relief of dysphagia and the prevention of recurrent symptoms and patients usually have an excellent improvement on follow-up (10).

Our patient required sequential sessions of pneumatic dilations after which she had marked improvement of her symptoms and was able to complete taking her oral DAA drugs for her chronic hepatitis C infection resulting in successful treatment and achieving sustained virological response (virological cure). She was also able to have improved sense of well-being and she was able to eat more sold diets and also gained weight. In conclusion, we would like to state that patients with long standing dysphagia should be investigated for rare causes that can be easily treated with an upper GI endoscopy resulting in symptomatic relief and improved quality of life. In the case of our patient who was only 37 years old, unless an upper GI endoscopy had been done, the patient would have likely gone undiagnosed with persistent symptoms of her dysphagia and poor quality of life and potentially continued progression of her underlying chronic Hepatitis C virus infection.

Abbreviations: GI-Gastrointestinal, DAA-Direct Acting Antiviral, EGD- EsophagoGastroduodenoscopy, SVR-Sustained Virological Response, HCV-Hepatitis C Virus

Informed Consent:- The patient gave an informed consent about the publication;

PATIENT PERSPECTIVE :- Patient feels marked improvement from the intervention and happy that persuasion for the HCV treatment helped the diagnosis which will otherwise never be attempted.

Ethics approval and consent to Participate
Waiver request was secured from the Institutional Review Board at St. Paul's Hospital Millennium Medical College.

Consent for Publication: A written informed consent to publish this information was obtained from study participant.
Availability of Data and material:- The data is available from the corresponding author upon a reasonable request.

Competing Interest:-None

Funding: The authors declare that no conflict of interests.

Authors' Contributions
HD is the primary treating physician and responsible for writing the primary draft. HC has been a consultant in the case, reviewed the draft and both have agreed to submit the manuscript.

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REFERENCES

1. Wanamaker R, Grimm I. Encyclopedia of Gastroenterology. Gastroenterology. 2004 Oct 1;127(4):1274-5.
2. Gouda MS, Al-lakani AI, Bedewy MM. Endoscopic findings in Egyptian patients with oesophageal dysphagia at different age groups. Am J Internal Med. 2015;3:224-30.
3. Mohamed AA, El-Toukhy NER, Said EM, et al. Hepatitis C Virus: Efficacy of New DAAs Regimens. Infect Disord Drug Targets. 2020;20(2):143-149).
4. Younossi Z, Park H, Henry L, Adeyemi A, Stepanova M. Extrahepatic Manifestations of Hepatitis C: A Meta-analysis of Prevalence, Quality of Life, and Economic Burden. Gastroenterology. 2016;150:1599-1608.)
5. Nosher JL, Campbell WL, Seaman WB. The clinical significance of cervical esophageal and hypopharyngeal webs. Radiology. 1975 Oct;117(1):45-7.
6. Feldman M, Friedman LS, Brandt LJ, editors. Sleisenger and Fordtran's Gastrointestinal and Liver Disease E-Book: Pathophysiology, Diagnosis, Management. Elsevier; 2020 Jun 9.
7. Atmatzidis K, Papaziogas B, Pavlidis T, Mirelis CH, Papaziogas T. Plummer–Vinson syndrome. Diseases of the Esophagus. 2003 Jun 1;16(2):154-7.
8. Sinha SK, Nain CK, Udawat HP, Prasad KK, Das R, Nagi B, Singh K. Cervical esophageal web and celiac disease. Journal of gastroenterology and hepatology. 2008 Jul;23(7pt1):1149-52.
9. Chen YM, Ott DJ, Gelfand DW, Munitz HA. Multiphasic examination of the esophagogastric region for strictures, rings, and hiatal hernia: evaluation of the individual techniques. Gastrointestinal radiology. 1985 Dec 1;10(1):311-6
10. Beyler AR, Yurdaydin C, Bahar K, Gören A, Soykan I, Uzunalimoğlu Ö. Dilation therapy of upper esophageal webs in two cases of Plummer-Vinson syndrome. Endoscopy. 1996 Feb;28(02):266-7.

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CASE REPORT

TRAUMATIC TENSION PNEUMOCEPHALUS IN A 16 MONTH OLD CHILD: CASE REPORT AND REVIEW OF THE LITERATURE

Alemayehu Ginbo Bedada, MD[1*], Imran Fizzah, MOI[2], Sesay Sheikha, MD[3], Georges Azzie, MD[4]

ABSTRACT

Traumatic Tension Pneumocephalus is a rare condition especially in children. It occurs most often as a result of temporal or basal skull fracture, and may cause neurological deterioration. CT scan findings are considered pathognomonic. A 16-month-old girl presented with unstable vital signs and a seizure episode after being struck by a reversing car. A day later she developed rhinorrhea and high grade fever. CT scan of the brain demonstrated a Mount Fuji sign. Her neurological status remained essentially normal. She was managed non-operatively and was discharged uneventfully eight days after the accident. In selected paediatric cases, traumatic tension pneumocephalus may be managed non-operatively.

Key words: *Child, Mount Fuji sign, Non-surgical treatment, Traumatic tension pneumocephalus*
Work done*: At Princess Marina Hospital, Department of Surgery, Gaborone, Botswana*

INTRODUCTION

Traumatic Pneumocephalus (TP) is characterized by the abnormal presence of air in the cranial cavity following traumatic injury (1-6). It has been reported in 3.9% 9.7% of head injuries (1-3). Trauma is incriminated in 67% - 74% of pneumocaphalus cases (4-7).

Tension traumatic pneumocephalus (TTP) is a clinical entity characterized by continued buildup of air within the cranial cavity, leading to abnormal pressure exerted on the brain and subsequent neurologic deterioration (2-4). TTP is classified as acute when it occurs within 72 hours of the traumatic event and as delayed when it occurs thereafter (1,2,4,5).

Two mechanisms are postulated TP: the 'inverted soda bottle effect', where CSF loss creates negative intracranial pressure, drawing air into the subarachnoid space (1-5,8), and the "ball-valve" theory where there is a unidirectional movement of air into the cranial cavity, most often the extradural space (1,2,4-7).

Clinical presentations of TP include nausea, vomiting, poor feeding in children, irritability, dizziness, headache, seizure, depressed mental status, cerebrospinal fluid rhinorrhea, pupillary abnormalities and hemodynamic changes (1,2,4,7). More serious presentations include cardiac arrest and blindness (4). Head CT remains the most accurate imaging study with the ability to detect as little as 0.5 cm^3 of air (1,2,4-8).

The CT finding of bilateral compression of the frontal lobes is called the peaking sign (5). When there is progression to TTP the increased pressure not only compresses, but separates the frontal lobes, thus creating the so-called "Mount Fuji" sign (1,2,4-7). This finding is considered virtually pathognomonic of TTP.

Uncomplicated TP tends to resolve spontaneously (2-5). Evidence of progression to TTP based on deteriorating neurological status or the Mount Fuji sign on CT scan usually mandates surgical intervention. Out team describes the rare case of traumatic tension pneumocephalus in a 16-month-old child (the "youngest" in literature), and reviewed and summarized the current knowledge on TTP.

Case Presentation

A 16-month-old girl presented to the hospital after being struck by a reversing car. The mother reported an episode of generalized seizure, however, There was no vomiting or loss of consciousness. On examination, she was alert, with a heart rate of 193 beats/min, respiratory rate 36 breaths/min, temperature 37.5 ^{0}C and oxygen saturation 99% on room air. Her Glasgow coma scale (GCS) score was 15/15 with no focal neurological deficits, and no other abnormalities. Her laboratory tests, chest, cervical and pelvic-rays were all normal. CT scan of the head demonstrated a right temporoparietal linear skull fracture, as well as cerebral edema and a right scalp hematoma.

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She received analgesics, antibiotics and seizure prophylaxis. On day two of admission, she was noted to have rhinorrhea. Her temperature rose to 39.4 ^{0}C, and her pulse rate increased to 210 beats/min. There was no hypotension, and her oxygen saturation was 98% on room air. A repeat CT scan of the head was done which demonstrated pneumocephalus, a Mount Fuji sign (**Figure 1**) and a basal skull fracture (not detected on the initial CT). A diagnosis of TTP was made. Despite this, her neurologic condition did not deteriorate. Cefotaxime (Claforan, Sanofi-Aventis) was increased to meningitis dose as there was no other explanation for the raised temperature. She was nursed in a Fowler's position (30 degrees head up). In spite of the Mount Fuji sign on CT head, we opted for a non-operative approach given her stable and otherwise normal neurological condition.

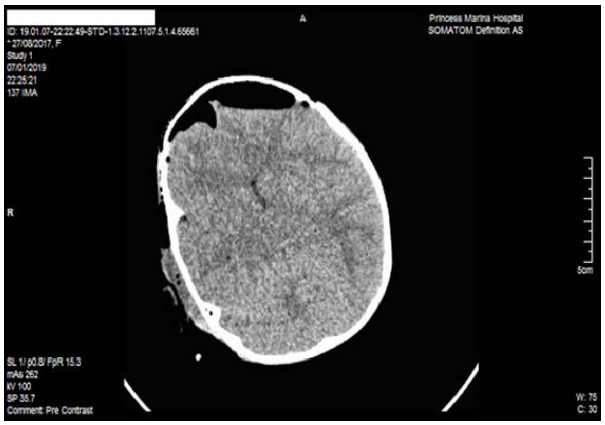

Figure 1: The second CT head demonstrating "Mount Fuji sign" (see arrow).

The patient improved: her heart rate and temperature normalized. Her rhinorrhea completely resolved by the 6th day of admission. She was discharged on the 8th day of admission. She was formally re-evaluated one and four months post discharge: she was asymptomatic and had a normal neurologic examination. The follow up CT brain at four months after discharge was within normal limits. (**Figure 2**)

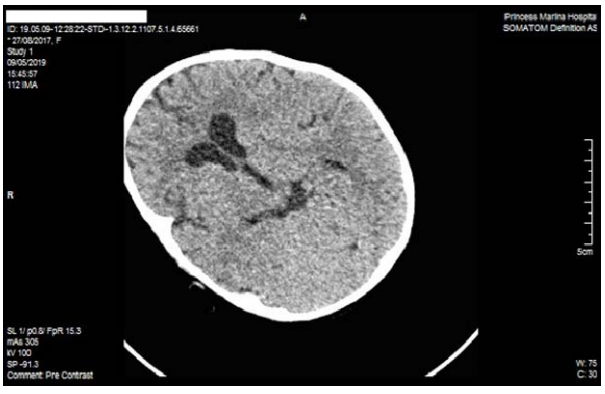

Figure 2:. The third CT head demonstrating a normal finding.

DISCUSSION

Our one year old patient is the youngest reported in the literature, and the second case reported in Africa. In the largest series reported, of 101 patients, the youngest was three and the oldest 91years (3).

The air in TP is commonly located in the subdural space (5,7) but can be found in the epidural, intraventricular and intracerebral spaces (3,5-7). The etiologic factors were motor vehicle collision in 30%, blunt assault in 25%, fall in 20% motorcycle accident in 15%, gunshot in 5%, and stabbing in 5% (4). Our patient was struck by a reversing car.

The most common symptom reported in the literature is headache (1,2,4,7). Given the age of our patient, we could not appreciate this with certainty. The predominant symptoms in our patient were agitation and feeding intolerance. The major sign was rhinorrhea. The pathognomonic finding on CT of the head was the Mount Fuji sign.

In the setting of trauma, the most common source of pneumocephalus is thought to be a temporal bone fracture (6,8). The second CT scan demonstrated a significant Mount Fuji sign, which is considered strongly suggestive of TTP. Of particular interest in this case, the alarming CT scan finding was not accompanied by any obvious deterioration in neurological status.

In the eyes of many, the finding of a Mount Fuji sign on the CT scan of a patient with a history of head trauma constitutes a neurosurgical emergency and mandates prompt operative management. There are, however, a few cases reported with Mount Fuji sign who did not require surgical intervention (1,2,5,6). Elements described in the non-operative management include adequate analgesia, Fowler position of 30^0, avoiding Valsalva maneuver, 100% oxygen, prophylactic antimicrobial therapy (especially in posttraumatic cases), frequent neurologic checks, and repeat CT scans (1,2,4). Because our patient did not have neurological deterioration, we opted for close observation and non-operative management. She was given antibiotics and pain medication, and she was placed in a Fowler position (30^0 head-up (5).

Surgical intervention is required when the air within the cranial vault causes increased pressure and deterioration in the level of consciousness (5). Surgical management targets removal of intracranial air. This may be accomplished through a burr hole, a craniotomy or a needle aspiration (3-5).

Outcomes seem best when the TP occurs solely in combination with a bony fracture of the vault (3).

This was the case in our patient. When TP occurs in combination with an acute subdural hematoma or is diagnosed in association with the presence of multiple air bubbles scattered over the basal cisterns and the posterior fossa, outcomes are less favorable (3).

Conclusion

Although vary rare, a diagnosis of TTP should be considered even in very young trauma patients. TTP may be treated non-surgically in selected patients, especially if there is no neurological deterioration. While many consider the presence of a Mount Fuji sign on CT head to be strongly suggestive of TTP, this finding in and of itself may not necessarily mandate surgical intervention.

ACKNOWLEDGMENT

We are thankful to the patient's mother who kindly agreed to share our experience with the medical fraternity.

Conflict of interest: The authors declare no conflict of interest.

Funding: No fund involved.

Ethical consideration: The mother to the child consented to the publication of this report for the purpose of education without patient identifier.

Authors' contribution: All four authors did literature review. The first draft of the manuscript was prepared by AGB, and critically revised by AGB and GA. SS reported on all CT head films. AGB and IF followed the patient. All four authors reviewed the final version of the manuscript and agreed to submit to Ethiopian Medical Journal for publication.

REFERENCES

1. Solomiichuk VO, Lebed VO, Drizhdov KI. Posttraumatic delayed subdural tension pneumocephalus. Surgical neurology international. 2013;4.
2. Kankane VK, Jaiswal G, Gupta TK. Posttraumatic delayed tension pneumocephalus: Rare case with review of literature. Asian journal of neurosurgery. 2016;11(4):343.
3. Steudel WI, Hacker H. Acute intracranial pneumocephalus: Prognosis and management-a retrospective analysis of 101 cases. Neurosurgical review. 1989;12(1):125-36.
4. Pillai P, Sharma R, MacKenzie L, Reilly EF, Beery PR. Traumatic tension pneumocephalus–Two cases and comprehensive review of literature. International journal of critical illness and injury science. 2017;7(1):58.
5. Dabdoub CB, Salas G, Silveira ED, Dabdoub CF. Review of the management of pneumocephalus. Surgical neurology international. 2015;6.
6. Gill HS, van As AB. Tension pneumocranium in childhood trauma. World Journal of Pediatrics. 2008;4 (3):231-3.
7. Raza R, Shakil A, Anwar M. Tension Pneumocranium: The Largest Case Series. PJR. 2016;26(3).
8. Martin RJ, Holthouse DJ, Wayne TG. Localising the source of pneumocephalus: a diagnostic problem. Journal of clinical neuroscience. 2002;9(2):216-8.

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CASE REPORT

UNDIAGNOSED URETEROVAGINAL FISTULA IN CONGENITAL DUPLEX KIDNEY WITH ECTOPIC URETERIC INSERTION TO URETHRA; SOMETHING TO LOOK FOR?

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ABSTRACT

Continuous urinary incontinence in young female with normal voiding pattern should prompt proper assessment for ectopic ureter.

We report a young female who presents with continuous urinary incontinence and malodourous urine. She was frequently treated as recurrent urinary tract infection and subsequently referred to our urology unit. Initial imaging revealed right duplex kidney with ectopic ureter, hence she had undergone right heminephrectomy. However her symptoms does not improve significantly. Further evaluation revealed uretero–urethral fistula and uretero–vaginal fistula. She then underwent urethroureteral and ureterovaginal fistula repair, which resolved her distressing urinary incontinence.

Keywords: *Ectopic ureter; urinary incontinence; female; urinary tract fistula*

INTRODUCTION

The term "ectopic ureter" denotes a ureter that inserts at or distal to the bladder neck. Ectopic ureters most commonly occur in females and often drain into upper moiety of a duplex kidney (1). In most females with an ectopic ureter, the ureter has its insertion either into genital tract or urethra (2). This leads to typical symptom of continuous urinary incontinence with an otherwise normal voiding pattern. Screening with ultrasonography and/or intravenous urography (IVU) could assist in confirming the affected system which likely to be upper pole moiety of a duplex collecting system (3,4). We report a case of young lady who presents with urinary incontinence since childhood and frequent urinary tract infection, then found out to have ectopic ureter with uretero–urethral fistula and uretero –vaginal fistula.

Case Presentation

We report a 31-year-old lady presented to us with a complaint of urinary incontinence since the age of 8, without any prior history of trauma or fall. She denied having bowel or neurological symptoms. She had frequent visits to the hospital and was treated as a recurrent urinary tract infection. Micturition cystourethrogram (MCUG) revealed right distal ureteric bulbous distension and right duplex kidney, with no demonstrable fistulous connection. Contrasted enhanced computed tomography (CT) of the abdomen/pelvis revealed complex right duplex kidney. Right upper moiety revealed hydronephrosis and hydroureter with possible ectopic ureteric insertion. Subsequently intravenous urography (IVU) revealed the poorly function of the right upper moiety with normal function of right lower moiety.

She had undergone right retrograde pyelogram with ureterorenoscope and right ureteric stenting, followed by right heminephrectomy and ureterectomy at the age of 24. Histopathological examination report revealed ureteritis in right upper moiety ureter and chronic pyelonephritis in right upper moiety nephrectomy.

Postoperatively she continued to complain of foul–smelling urine dribbling from the vagina that persisted for many years. Repeated MCUG revealed residual right ureteric stump with evidence of reflux from the urethra during micturition phase and likely urethrovaginal fistula (Figure 1).

Rigid cystoscopy and contrast study revealed urethrorectal fistula at 7 o'clock just distal to the bladder neck. There were 2 openings seen at 4 o'clock and 10 o'clock location in the ectopic ureter, contrast injection showed communication with the vagina (Figure 2A and 2B). On table retrograde urethrography done through the urethroureteral fistula revealed remaining right ectopic ureter up to mid part of ureter.

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At the age of 30-years, she was subjected to urethroureteral and ureterovaginal fistula repair by transvaginal approach.

Intraoperatively the opening of urethroureteral fistula was identified just below the bladder neck and separated from the normal urethra opening.

The fistula was ligated and closed with four layers followed by Martius Flap to prevent recurrence (Figure 3).

Postoperatively, she did not complain of urinary incontinence anymore during clinic follow up.

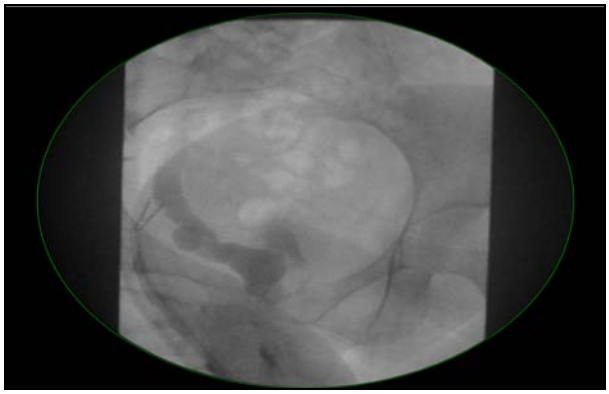

Figure 1: Repeated MCUG after initial surgery revealed reflux to the remnant of stump on the right side. The stump is seen arising from the urethra and extending superiorly into the lower border of sacral ala. Posteriorly, there is fistulous communication between the urethra and vagina with opacification of the vagina and uterine cavity.

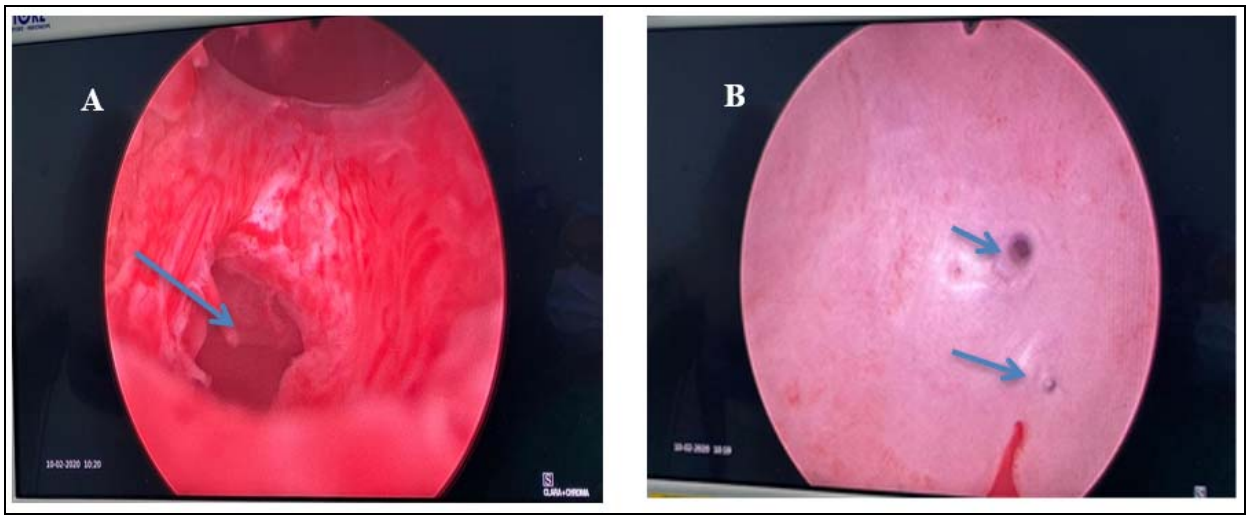

Figure 2 (A): Cystoscopy view showing (arrow) opening of right ectopic ureter below the bladder neck.

Figure 2 (B): Cystoscopy view showing image inside the right ectopic ureter, there is ureterovaginal fistula with 2 opening (arrow).

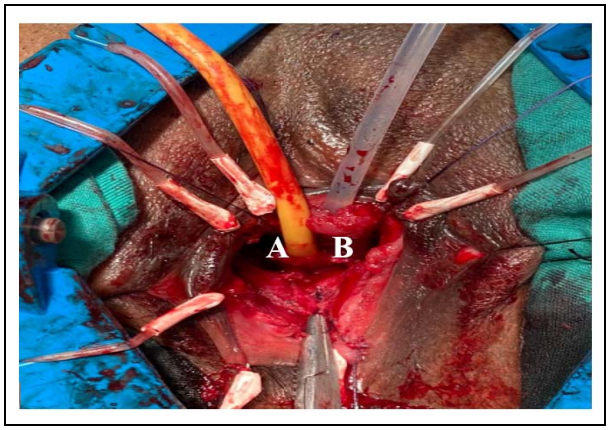

Figure 3: Intraoperative view: right ectopic ureter was separated from urethra and ligated, primary repair of urethra with Martius fat Flap done. (A)Ectopic ureter with urethroureteral fistula, (B)Normal urethra opening

DISCUSSION

An ectopic ureter is known as a ureter that abnormally place at or distal to the bladder neck, or outside of the urinary tract entirely. This is commonly due to embryological malformation, where the ureteric bud arises more cephalad than usual on the mesonephric duct, leading to distal ectopic ureteric insertion. The ureter remains attached to the mesonephric duct for longer, migrates more caudally than usual and inserts into either the urinary tract distal to the bladder or the genital tract (5).

The mesonephric duct remnant will turn into the epoophoron, oophoron and Gartner's duct in the female. When the ectopic ureteric bud included into the adjacent structures of paramesonephric duct origin, this will lead to urinary drainage into the female genital tract (1,5). Usual sites of ectopic ureter in the female include urethra (35%), vestibule (34%) and vagina (25%) (2), which is demonstrated in our case who was found to have urethra – ureter fistula and uretero vaginal fistula. She complained of continuous urinary incontinence due to the insertion of ectopic ureter distal to the urethral sphincter as well as into vagina.

The female with an ectopic ureter has continuous urinary incontinence with otherwise normal urinary pattern, often associated with abnormal urine odour which warrants a thorough assessment. They often suffer from wet and erythematous perineal rash due to persistent incontinence from an ectopic ureter. Detailed inspection may demonstrate urine leak from the vestibule and / or vaginal orifice (1).

The imaging studies should aim to recognize any additional poorly functioning renal parenchyma, particularly when initial imaging reported a "solitary" kidney. IVU is useful to demonstrate if duplex system is present, though occasionally required a delayed phase (6).

Studies had showed that laparoscopic nephroureterectomy is comparable to its open counterpart (6 – 8). Irrespective of the technique used, it is imperative to identify the ectopic / dysplastic kidney and / or ureter involved. Urinary incontinence can be cured with removal of poorly functioning ectopic kidney and its ectopic ureter.

Conclusions

An ectopic ureter assessment should be considered in females with continuous urinary incontinence with normal voiding patterns, irrespective of age. Imaging studies can be helpful, from initial ultrasonography and/or IVU, followed by detailed imaging such as CT or fluoroscopy.

Once the ectopic ureter and affected renal unit are identified, we can offer a cure for this disturbing symptom and provide a better quality of life in these affected patients.

Competing interests

There was no funding for the study and no conflicts of interest to disclose.

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REFERENCES

1. J.G. Borer et al. A Single – system ectopic ureter draining an ectopic dysplastic kidney: delayed diagno sis in the young female with continuous urinary incontinence. British Journal of Urology. 1998; 81, 474–78.
2. Ellerker AG. The extravesical ectopic ureter. Br J Surg. 1958; 45, 344 – 53
3. Borer JG, Corgan FJ, Krantz R, Gordon DH, Maiman M, Glassberg K. Unilateral single vaginal ectopic ureter with ipsilateral hypoplastic pelvic kidney and bicornuate uterus. J Urol 1993; 149: 1124–7
4. Gharagozloo AM, Lebowitz RL. Detection of a poorly functioning malpositioned kidney with single ec topic ureter in girls with urinary dribbling: imaging evaluation in five patients. Am J Roentgen 1995; 164: 957–61.
5. Schlussel RN, Retik AB. Anomalies of the ureter. In Walsh PC, Retik AB, Vaughan ED Jr, Wein AJ, eds, Campbell's Urology, 7th edn, Vol. 2. Philadelphia: WB Saunders, 1997: 1820–9

6. Liu KKW, Yeung CK, Lee KH, Ku KW. Ectopic ureter as a cause of wetting: the role of laparoscopy in its management. Aust NZ J Surg 1996; 66: 325–6.
7. Suzuki K, Ihara H, Kurita Y et al. Laparoscopic nephrectomy for atrophic kidney associated with ectopic ureter in a child. Eur Urol 1993; 23: 463–5.
8. Moores D, Cohen R, Hayden L. Laparoscopic excision of pelvic kidney with single vaginal ectopic ureter. J Pediatr Surg 1997; 32: 634–5.

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- Teklu B. Disease patterns amongst civil servants in Addis Ababa: an analysis of outpatient visits to a Bank employee's clinic. *Ethiop Med J 1980;18:1-6*
- Tsega E, Mengesha B, Nordenfelt E, Hansen B-G; Lindberg J. Serological survey of human immuno-deficiency virus infection in Ethiopia. *Ethiop Med J 1988; 26(4): 179-84*
- Laird M, Deen M, Brooks S, et al. Telemedicine diagnosis of diabetic retinopathy and glaucoma by direct ophthalmoscopy (Abstract). *Invest Ophthalmol Vis Sci 1996; 37:104-5*

Books and chapters from books:

- Henderson JW. Orbital Tumors, 3rd ed. Raven Press New York, 1994. Pp 125-136.
- Clipard JP. Dry Eye disorders. In Albert DM, Jakobiec FA (Eds). Principles and Practice of Ophthal-mology. W.B Saunders: Philadelphia, PA 1994 pp257-76.

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ETHIOPIAN MEDICAL JOURNAL
October 2021

Abebe Bekele. *Ethiop Med J, 2021, Vol. 59, No. 4*

EDITORIAL

INTEGRATION OF TECHNOLOGY AND ELEARNING INTO MEDICAL EDUCATION IN ETHIOPIA: THE COVID-19 SILVER LINING?

Abebe Bekele, MD, FCS, FACS

For quite some time, it has become very clear that the most realistic way to achieve sustainable development in a country is through quality education, and by extension through research and innovation. Unfortunately, Africa has not benefited optimally from quality education due to various factors, several of which are obvious. One such factors is the very poor adaptation and integration of technology and eLearning into the education system in Africa (and Ethiopia). Health professional's education in the continent is one clear example of such a situation.

E-learning has several advantages over traditional learning. Digitalization of teaching and learning ensures availability of huge and filtered information, allows easy manipulation of contents, offers possibility of real-time update and exchange, and it also allows for recording of lessons for possible repetition in the future. Formative and summative assessment, student mentorship and support can also be easily integrated to it. Additionally, E-learning allows easy communication between the teacher and students that overcomes distance in space. In today's globalized world, the possibility of sharing of resources across partners (for free or procured) has also emerged as one advantage of eLearning.

Prior to the COVID epidemic, the full potential of technology and innovations in medical education in African and Ethiopia might not have been fully appreciated. However, it might not be out of place to say that technology and innovation saved medical education in the year 2020-21 all over the globe. The world witnessed the reality that educational technology and innovation could contribute significantly to medical education more than we probably had ever imagined. From the delivery of didactic teaching (lectures) remotely, simulation, clinical teaching, laboratory teaching, student mentorship and assessment (MCQs and clinical examinations), and the need to provide a hybrid form of teaching and training - the integration of technology played key role in many instances to support medical education.

One major point to emphasize at this juncture is that medical educators (and trainees) need to acquire new skills and competencies on how to use medical education technology and innovations. However, inappropriate, and reckless deployment of technology and innovation have the potential to do more harm than good. With emphasis on competency-based medical education, there is clear indication that when technology and innovations are used, there must be evidence that this is helping trainee achieve the desired goal: i.e. enhanced performance.

From our limited experience with eLearning (mostly Case Based Collaborative Learning) at the department of surgery of the Addis Ababa University, we have clearly seen that most medical students involved were very interested in eLearning as one modality of teaching. We found they were very aware of its many advantages but identified cost of internet as a major impediment. Most would strongly recommend similar sessions to their fellow students.

Stakeholders in medical education in Ethiopia now have more than enough evidence with regards to the place of technology in medical education. It might have been conventional to relegate its importance to the background prior to the year 2020 and this might simply be associated with lack of adequate appreciation of the roles of technology (and maybe be lack of financial means even though I strongly disagree); but doing the same thing post the COVID-19 pandemic might simply mean blatant ignorance of the reality of the current time. In certain instances, medical schools were first shut down almost indefinitely with the hope that the covid-19 situation would suddenly go away, and the schools would re-open to resume normal activities. However, the gross inequity in vaccine distribution in the globe has brought in a new reality.

I, therefore, would like to join several authors in advocacy for the institutionalized adaptation of eLearning and technology to the medical education arena in Ethiopia. Medical schools in Ethiopia should integrate E-learning into

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their routine pedagogical strategy. Stakeholders in medical education should consider investment in the most relevant technology – free and strong internet connection, and personalized devices to all students and faculty to say the least. Starting with dynamic approaches such as blended learning might help for ease of adaptation. Continuous skills development trainings should be provided to faculty and students.

REFERENCES

1. Prober CG, Khan S (2013). Medical education reimagined: a call to action. Acad Med. 88(10):1407-10. doi: 10.1097/ACM.0b013e3182a368bd. PMID: 23969367.
2. Goh P, Sandars J, (2020). 'A vision of the use of technology in medical education after the COVID-19 pandemic', MedEdPublish, 9, [1], 49,
3. Ruiz JG, Mintzer MJ, Leipzig RM. The impact of E-learning in medical education. Acad Med 2006;81:207212.
4. Remtulla R. (2020). The Present and Future Applications of Technology in Adapting Medical Education Amidst the COVID-19 Pandemic. JMIR medical education, 6(2), e20190. https://doi.org/10.2196/20190.

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ORIGINAL ARTICLE

EVALUATION OF SURGICAL GLOVE INTEGRITY: DOES AN AFRICAN COUNTRY RECEIVE INFERIOR QUALITY? EXPERIENCE FROM ADDIS ABABA, ETHIOPIA

Abebe Bekele MD FCS FACS[1,2*], Mesikir Abate MD MPH, [1,3] Nardos Mekonnen,[4] Barnabas Alayande MBBS FMCS[1,4], Dieudonne Hakizimana MSc MGHD,[1] Mulat Taye, MD[2], Daniel Zemenfes MD,[2]

ABSTRACT

Introduction: *In a 2017 study, the incidence of glove perforation in Addis Ababa was found to be much higher than that of most publications—with an incidence of 60.14% for first surgeons. We hypothesized that poor surgical glove quality may have contributed to the high incidence of perforations.*
Method: *We tested the integrity of six widely used brands of sterile surgical gloves that were widely used throughout the nation. The assumption was that the perforation rate in these gloves would be higher than the standard acceptable quality level (AQL) of 1.5, the world standard for surgical gloves at the time of the study.*
Results*: From the 1,200 single gloves evaluated, 59 (4.9%) gloves had perforations and 1,141 (95.1%) did not. Among the brands evaluated, Brand 1 (13.5%) and Brand 5 (10%) had the highest rate of perforations. Compared to the standard AQL of 1.5, Brand 1 and Brand 5 had a significantly higher perforation rate (13.5%, CI=8.8%-18.2%, p=0.000) and (10.0%, CI=5.8%-14.2%, p=0.000), respectively.*
Conclusion*: Our study results showed unacceptably high rates of perforation for 2 glove brands, in which at least 1 out of every 10 gloves were defective. In view of our findings, we recommend, at minimum, that surgeons visually inspect gloves before and after donning. Relevant government institutions, contractors, importers, hospital administrators, and surgical teams must take collective responsibility for ensuring appropriate quality of gloves. Quality enforcement must be strengthened, and local production must be considered.*
Key word: *surgical glove, perforation, brand, quality*

INTRODUCTION

Surgical gloving is a standard sterile practice aimed at protecting the patient and caregivers from transmissible diseases. (1) Perforation of surgical gloves during procedures eliminates this protective barrier and increases the risks to both the patient and the caregiver. (1,2) Patients are two times likely to have a surgical-site infection (SSI) in procedures where gloves are perforated compared to those that maintain aseptic technique.[3] Moreover, as key incidents of patients contracting Hepatitis C virus (HCV) (4) and Hepatitis B Virus (HBV) (5) infections from infected surgeons through glove perforation have been reported in the literature . (6)

Surgical glove perforations may also pose a similar risk to surgical team members, as they may contract transmissible diseases such as Human Immunodeficiency Virus (HIV) (7), HCV (8,9) , and HBV. (3,9,10) One study has reported that surgeons risk more than one HBV infection per lifetime, and at least one in 1500 surgeons are likely to be infected by HIV over the next three decades due to risks posed from surgical glove perforation. (10)

Thus, the integrity of the surgical glove is essential to prevent cross-contamination and decrease the risk of acquired infections to both patients and caregivers alike. There is variability in the literature on the incidence of surgical glove perforations ranging from as low as 10% (6) to as high as 61.7% (11) in some procedures. Factors influencing the variability include type of surgery (12) with emergency surgeries accounting for a significantly higher incidence of glove perforation, (13) duration of surgical procedure with higher incidence of glove perforation in procedures exceeding 90-120 minutes (11), invasiveness of the surgery, experience of the surgeon (1,13) and surgical glove size. (14)

Double gloving is a protective factor which has consistently been shown to reduce the incidence of inner glove perforation. (12,13,15)

In our 2017 study, we found the incidence of glove perforation in Addis Ababa, Ethiopia to be much higher than in other studies with an incidence of 60.14% for first surgeons performing emergency surgery. (13)

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This poses a significant threat to both patients and the surgical workforce. Locally relevant factors that may have contributed to the higher incidence include the standard utilization of surgical residents as first surgeons for emergency procedures, and the limited supply of glove sizes resulting in a portion of the surgical team using inappropriate sized gloves. (13) In addition, because Low and Middle Income Countries (LMICs) like Ethiopia depend on imports, it is possible that poor surgical glove quality may have contributed to the relatively high incidence of surgical glove perforations. It is imperative for relevant stakeholders and policy makers to be aware of the quality of the procured products so they can develop a safer surgical environment for patients and healthcare providers.

We hypothesized that the perforation rate in these gloves would be higher than the standard acceptable quality level (AQL) 1.5, the world standard for surgical gloves at the time of the study. (16,17)

METHODS

Study Procedure:

In this cross-sectional study, 200 powdered size 7.5 latex single gloves from each of the 6 brands of surgical gloves available in pharmacies across Addis Ababa were randomly procured in June 2018. Each of the gloves studied here were manufactured by different companies, and in different countries. A total of 1,200 single gloves were examined. The characteristics of each brand of surgical glove including origin, constituent materials, cost, method of sterilization, quality assurance measures, available sizes, glove thickness, tensile thickness, elongation measures and storage recommendations were identified (Table 5). Since Ethiopia did not produce surgical gloves at the time of the study, local products were not included in the study.

Control testing for surgical glove integrity was conducted for each glove using a standardized visual and a European Norm (EN) 455-1 water-leak test method.[17,18] The tests were carried out by two individuals who were blinded to the surgical glove brand. The visual test assessed for overt damage by inspection. For the water-leak test, each glove was filled with 1L of water and methylene blue solution at room temperature followed by manual compression on the wrist of the glove for 1 minute. Leakage of blue water indicated perforation. The number and locations of the perforations were recorded for each glove.

Statistical Analysis

Descriptive statistics were computed for the categorical variables. A proportion t-test was utilized to test for difference in proportions between each brand and the null hypothesis of 0.04.

The null hypothesis was derived from what the acceptable maximum is (8 defects) for an AQL of 1.5 in an n=200 random sample. (17) A difference in proportions using proportion t-test was also conducted for: (1) the total right versus total left hand gloves perforated in the total sample, (2) perforation in the right versus left gloves among each of the 6 brands, (3) the total perforation in the palmar versus dorsal aspects in the total sample size, and (4) the perforation in the palm versus dorsum versus both sides among each of the 6 brands. A Pearson chi-square analysis was conducted to determine an association between the glove digits and the outcome, perforation. All p-values were two-sided with a statistical significance level of $p<0.05$. All statistical analyses were conducted using Stata (version 14.2, Stata Corp, College Station, Texas, USA).

RESULTS

From the 1,200 single gloves evaluated, 59 (4.9%) gloves had perforations and 1,141 (95.1%) did not. Among the brands evaluated, Brand 1 (13.5%) and Brand 5 (10%) had the highest rate of perforations, followed by Brand 3 (3.0%) Brand 6 (2.0%), Brand 2 (1.0%) and Brand 4 (0%) (Table 1). Compared to the standard AQL 1.5 for surgical gloves at the time of the study,[16,17] Brand 1 and Brand 5 had significantly higher perforation rate (13.5%, CI=8.8%-18.2%, p=0.000) and (10.0%, CI=5.8%-14.2%, p=0.000), respectively. There was no significant difference between the AQL and perforation rates for Brand 2 (2.0%, CI=-0.4%-2.4%, p=0.985), Brand 3 (3.0%, CI=0.6%-5.4%), p=0.985), Brand 4 (0.0%, CI=0.0%-0.0%, p=0.998) and Brand 6 (2.0%, CI=0.1%-3.9%, p=0.926) (Table 1).

Among the 600 right and 600 left hand gloves evaluated, there were a total of 35 (5.8%) right hand glove perforations and 24 (4.0%) left hand glove perforations. There was no statistically significant difference between total right (5.8%, CI=3.9%-7.7%) and total left hand (4.0%, CI=2.4%-5.6%) glove perforation rates (p=0.149) (Table 2). The right-hand perforation rate (16.0%, CI=8.8%-23.2%) was significantly higher than the left-hand perforation rate (4.0%, CI=0.2%-7.8%) in Brand 5 (p=0.005) (Table 2). The left-hand perforation rate (4.0%, CI=0.2%-7.8%) was significantly higher than the right-hand perforation rate (0.0%, CI=0.0% -0.0%) in Brand 6 (p=0.043).

There was no significant difference in the right and left glove perforation rates in Brand 1 (13.0% vs. 14.0%, p=0.836), Brand 2 (2.0% vs. 0.0%, p=0.155), and Brand 3 (4.0% vs. 2.0%, p=0.407). The p-value was not computed for Brand 4, which had 0 perforations (Table 2).

Table 1: Differences in perforation rate of surgical brands compared to the standard AQL

	Non-Perforated (n=200)	Perforated (n=200)	95% CI	p-value (Ha: p > 0.04)
Brands, n (%)				
Brand 1	173.0 (86.5%)	27.0 (13.5%)	8.8% - 18.2%	0.000
Brand 2	198.0 (99.0%)	2.0 (1.0%)	-0.4% - 2.4%	0.985
Brand 3	194.0 (97.0%	6.0 (3.0%)	0.6% - 5.4%	0.765
Brand 4	200.0 (100.0%)	0.0 (0.0%)	0.0% - 0.0%	0.998
Brand 5	180.0 (90.0%)	20.0 (10.0%)	5.8% - 14.2%	0.000
Brand 6	196.0 (98.0%)	4.0 (2.0%)	0.1% - 3.9%	0.926

CI= Confidence Interval; Ha=Null hypothesis

Table 2. Differences in glove perforation rate between right and left hands

	Right Hand (n=100)	95% CI	Left Hand (n=100)	95% CI, (%)	p-value
Brands, n (%)					
Brand 1	13.0 (13.0%)	6.4%-19.6%	14.0 (14.0%)	7.2%-20.8%	0.836
Brand 2	2.0 (2.0%)	-0.7%-4.7%	0.0 (0.0%)	0.0%-0.0%	0.155
Brand 3	4.0 (4.0%)	0.2%-7.8%	2.0 (2.0%)	-0.7%-4.7%	0.407
Brand 4	0.0 (0.0%)	0.0%-0.0%	0.0 (0.0%)	0.0%- 0.0%	N/A
Brand 5	16.0 (16.0%)	8.8%-23.2%	4.0 (4.0%)	0.2%-7.8%	0.005
Brand 6	0.0 (0.0%)	0.0%-0.0%	4.0 (4.0%)	0.2%-7.8%	0.043
Total, n (%) (n=600)	35.0 (5.8%)	3.9%-7.7%	24.0 (4.0%)	2.4%-5.6%	0.149

CI=Confidence Interval

Of the total 1200 gloves perforated, the palmar side was perforated at a significantly higher rate (4.5%, CI=3.3%-5.7%) than the dorsal side (0.5%, CI=0.1% -0.9%) (p=0.001). Among the brands evaluated, the palmar side was perforated at a significantly higher rate than the dorsal side in Brand 1 (12.0% vs. 0.2%, p=0.001), Brand 3 (3.0% vs. 0.0%, p=0.014) and Brand 5 (10.0% vs. 0.0%, p=0.001).

There was no significant difference in the perforation rates between the palmar and dorsal side in Brand 2 (1.0% vs. 0.0%, p=0.156) and Brand 6 (1.0% vs. 1.0%, p=1.000). The p-value was not computed for Brand 4, which had 0 perforations (Table 3).

Of the total perforated gloves with single digit perforations, the highest rates of perforations were found in Digit 1 (Thumb) (39.6%), followed by Digit 3 (Middle) and Digit 5 (Little) (17.0%), Digit 2 (Index) (15.1%), and Digit 4 (Ring) (11.3%). There was a statistically significant difference in the rates of perforation among the 5 digits evaluated (p=0.009).

Brand 5 had the highest rate of perforations for Digit 1 (71.4%) and Digit 5 (55.6%), Brand 1 for Digit 2 (75.0%) and Digit 3 (55.6%) and Digit 4 (100.0%) (Table 4). Only digit perforations that were independent were included in the analysis and six perforated gloves which had perforations in more than 1 digit were excluded from the digit specific analysis.

Table 3: Differences in glove perforation rate between palmar and dorsal aspects

	Palmar Aspect (n=200)	95% CI	Dorsal Aspect (n=200)	95% CI	p-value
Brands, n (%)					
Brand 1	24.0 (12%)	7.5%-16.5%	4.0 (0.2%)	0.1%-3.9%	0.001
Brand 2	2.0 (1.0%)	-0.4%-2.4%	0.0 (0.0%)	0.0%-0.0%	0.156
Brand 3	6.0 (3.0%)	0.6%-5.4%	0.0 (0.0%)	0.0%-0.0%	0.014
Brand 4	0.0 (0.0%)	0.0%-0.0%	0.0 (0.0%)	0.0%-0.0%	N/A
Brand 5	20.0 (10.0%)	5.8%-14.2%	0.0 (0.0%)	0.0%-0.0%	0.001
Brand 6	2 (1.0%)	-0.4%-2.4%	2 (1.0%)	-0.4%-2.4%	1.000
Total, n (%) (n=1200)	54 (4.5%)	3.3%-5.7%	6 (0.5%)	0.1%-0.9%	0.001

CI=Confidence Interval

Table 4: Differences in glove perforation rate by digit among the six brands

	Total Non-Perforated (n = 5947)	Total Perforated (n = 53)*	p-value
Digits, n (%)			
Digit 1 (Thumb)	¨1179 (19.8%)	¨21.0 (39.6%)	
~Brand 1	198.0 (16.8%)	2.0 (9.5%)	
Brand 2	198.0 (16.8%)	2.0 (9.5%)	
Brand 3	198.0 (16.8%)	2.0 (9.5%)	
Brand 4	200.0 (17.0%)	0.0 (0.0%)	
Brand 5	185.0 (15.7%)	15.0 (71.4%)	
Brand 6	200.0 (17.0%)	0.0 (0.0%)	
Digit 2 (Index)	¨1192 (20.0%)	¨8.0 (15.1%)	
~Brand 1	194.0 (16.3%)	6.0 (75.0%)	
Brand 2	200.0 (16.8%)	0.0 (0.0%)	^0.009
Brand 3	198.0 (16.6%)	2.0 (25.0%)	
Brand 4	200.0 (16.8%)	0.0 (0.0%)	
Brand 5	200.0 (16.8%)	0.0 (0.0%)	
Brand 6	200.0 (16.8%)	0.0 (0.0%)	
Digit 3 (Middle)	¨1191 (20.0%)	¨9.0 (17.0%)	
~Brand 1	195.0 (16.4%)	5.0 (55.6%)	
Brand 2	200.0 (16.8%)	0.0 (0.0%)	
Brand 3	198.0 (16.6%)	2.0 (22.2%)	
Brand 4	200.0 (16.8%)	0.0 (0.0%)	
Brand 5	200.0 (16.8%)	0.0 (0.0%)	
Brand 6	198.0 (16.6%)	2.0 (22.2%)	
Digit 4 (Ring)	¨1194 (20.1%)	¨6.0 (11.3%)	
~Brand 1	194.0 (16.2%)	6.0 (100.0%)	
Brand 2	200.0 (16.8%)	0.0 (0.0%)	
Brand 3	200.0 (16.8%)	0.0 (0.0%)	
Brand 4	200.0 (16.8%)	0.0 (0.0%)	
Brand 5	200.0 (16.8%)	0.0 (0.0%)	
Brand 6	200.0 (16.8%)	0.0 (0.0%)	
Digit 5 (Little)	¨1191 (20.0%)	¨9.0 (17.0%)	
~Brand 1	196.0 (16.5%)	4.0 (44.4%)	
Brand 2	200.0 (16.8%)	0.0 (0.0%)	
Brand 3	200.0 (16.8%)	0.0 (0.0%)	
Brand 4	200.0 (16.8%)	0.0 (0.0%)	
Brand 5	195.0 (16.4%)	5.0 (55.6%)	
Brand 6	200.0 (16.8%)	0.0 (0.0%)	

CI=Confidence Interval
** = Data includes only independent surgical glove perforations, excludes 6 surgical gloves that had perforations in more than 1 digit*
^ = p-value from the Pearson Chi Square analysis of association of rate of total perforations between the 5 digits
~ = Descriptive analysis of the total number of digits perforated and nonperforated in each where n =¨,the total number of perforations and non-perforations for each Digit

DISCUSSION

It is imperative to investigate underlying reasons for high post-operative glove perforation rates in the Ethiopian surgical space, as previous research has shown rates as high as 38.3% overall, and 60.14% in primary surgeons during emergency surgery. (13) These rates are higher than those from most other LMICs, (12,19) and intra-operative events may be insufficient to explain these findings. Pre-operative testing in our study revealed an overall perforation rate of 4.9% and peak brand perforation rates of 13.5% (Brand 1) and 10% (Brand 5) prior to glove use.

This constitutes a surgical safety hazard and represents a significant deviation from acceptable industry standards at the time of study of less than 8 defective gloves in 200 (AQL of 1.5). (17) Our findings sharply contrasts those by Hwang *et al,* from a Taiwan high income setting, in which pre-operative testing of 198 gloves from 4 manufacturers revealed a 0% perforation rate. (20) Green and Gompertz in the United Kingdom demonstrated 2%. (1) Albin *et al* demonstrated a defect rate in the United States of 1.9% before dental procedures and 5.5% before surgical procedures. (21) In 1989, just prior to the introduction of new and stringent regulations to the United States, similar rates to our findings (3-16%) were found on surgical glove testing by visualization and water fill by the US Food and Drug Administration. (22) As lower rates of pre-use perforations represent a proxy for increasing quality, this study raises significant quality questions for gloves in circulation within the country.

The brands with highest perforation rates in our study had significantly higher rates of perforation relative to other brands. On the lower end of the spectrum, Brand 4 gloves had no pre-use perforations. These results suggest that rates of glove perforation vary significantly with glove brand and manufacturer. Even though lot to lot variability within brands may exist, this quality variability reveals a standardization challenge in the Ethiopian surgical safety and medical importation regulatory space which needs to be addressed at governmental and institutional levels. Ethiopia can contextualize some HIC federal regulations which require random inspection of gloves using the Water Load Test. (16)

All gloves tested in this study were imported. The number of gloves imported into Ethiopia has steadily increased over the years, with an annual growth in quantity of imports of 137% per annum between 2015 and 2019. (23)

At around the time of the study, Ethiopia's import ranking for surgical gloves was 34th in the world, representing 0.5% of world imports for gloves. (23) The imported value of surgical gloves into the country in 2019 alone was US $10,457,000. (23) In Ethiopia, surgical gloves have a limited number of supplying markets, led by China, followed by India, Malaysia, Austria, the United Kingdom, Belgium and Germany. (23) Brands represented in this study reflected the bulk of the supplying market. Investing in the importation of gloves that are shown to have a lower rate of perforation prior to use is a potential solution to low quality market brands, but, better still, local production of surgical gloves to regulatory standards may represent a more feasible solution. It can be argued that these defective glove brands portend danger on the basis of handedness, surface and digits of perforation. Our findings with regards to the handedness of the perforations suggest no statistically significant differences overall ($p=0.149$), however in one of the precarious brands, right-handed perforations were significantly higher than left-handed perforations ($p=0.005$). Handedness of Ethiopian surgical staff has not yet been explored, but a wider review suggests that majority of surgeons are right-handed. (24)

Although the "holding" or non-dominant hand is at risk of intra-operative perforations (owing to a lower degree of dexterity and greater exposure to needle puncture), (12,13,20,21,25,26) our findings may suggest a subtle increase in danger to the patient and surgeon, as right handed surgeons who utilize these defective gloves on their dominant hands additionally have a higher risk of intra-operative perforations on their non-dominant hands. With regards to perforated glove surfaces, the palmar aspect was perforated at a significantly higher rate (4.5%, CI=3.3%-5.7%) than the dorsal aspect (0.5%, CI=0.1%-0.9%)($p=0.001$) overall. This finding was also specific to the most perforated brands (1 and 5). Palmar perforations arguably portend a greater danger than dorsal perforations with regards to the major surface of surgical contact. These pervasive perforations involved all digits, however, of the total single digit perforations, the highest rates of perforation were found on the thumb (39.6%). The thumb is the most important digit for grasping and fine surgical hand motions. The non-dominant thumb in combination with the non-dominant index finger have been established by research consensus as the most common sites of intra-operative glove perforation. (12,13,20,21,25,26) This trifecta of handedness, surface and digit elevates the danger of utilizing the defective brands.

In view of our findings of a large proportion of glove perforations prior to use, we recommend, at minimum, that surgeons visually inspect gloves before and after donning. The use of a double glove perforation indicator system may serve as an early warning system for pre-perforated gloves. For Ethiopian surgical teams who do not routinely use double glove for resource constraint reasons, results of our study strongly suggest right-sided double-gloving to mitigate risks associated with the demonstrated laterality of these pre-existing perforations. Widespread testing and Hepatitis B vaccination of surgical staff should still be encouraged, and Ethiopian authorities should intervene to protect surgeons and patients, to maximize investments in the surgical sector, and to drive down surgical site infections which now stand at a pooled prevalence of 12.2%. (27)

More importantly, possible facilitators of the entry of low-quality gloves into Ethiopia, like loose legislation, irregular public procurement, and substandard quality control need to be creatively addressed. Brands not meeting up to standards should be banned from the Ethiopian space and high-quality brands should be rewarded. Brand 4 has demonstrated that conforming to quality standards are possible, as is often the case in strictly controlled HIC environments. (20) All health systems are vulnerable to corruption. (28) Ethiopia seems to be taking corruption in the health sector seriously, however, some authors have referenced poorly functioning reporting systems around hospital procurement and distribution processes. (28)

Officials must ensure that there is no interference with the set standards for glove approval, compliance certification, and licensing. The present findings could also serve as a call to strengthen transparency and accountability and increase performance measurement, monitoring, and enforcement in existing quality enforcement agencies.

Limitations of this study include our inability to test all glove brands and all sizes in use. However, we assessed the brands and size most commonly used during operations in Ethiopia. Furthermore, despite the fact that this study assessed for perforations using the standard methods utilized by quality control agencies, some studies suggest that newer testing methods like electrical conductance tests, may have revealed higher perforation rates (29). Furthermore, the contribution of additional characteristics (including thickness and elasticity) of the gloves to perforation rates was not measured. Finally, following conclusion of this study, progress has been made by international regulators to raise quality standards for surgical gloves by reducing the AQL to 0.65. (18) Further studies should be carried out in Ethiopia to determine conformity to this new benchmark. (18)

Conclusion

Various brands of gloves manufactured in different countries are routinely imported for surgical procedures in Ethiopia, with high variability in quality between brands. Our study results show unacceptably high rates of perforation for 2 glove brands, in which at least 1 out of every 10 gloves were defective.

The implications of this are staggering for surgical staff. In Ethiopia, choice of surgical glove brand may be a determinant of surgical safety. These findings also indicate that unrecognized pre-operative perforations may be a contributing factor to the high post-operative glove perforations identified in our previous study. Further studies are needed to understand how the intrinsic characteristics of gloves contribute to these rates of perforation. Relevant government institutions, contractors, importers, hospital administrators, and surgical teams must take collective responsibility for ensuring appropriate quality of gloves. Quality enforcement must be strengthened, and local production must be considered.

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Conflicts of interest

The authors report no conflicts of interest, financial or otherwise.

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REFERENCES

1. Green SE, Gompertz RH. Glove perforation during surgery: what are the risks? *Ann R Coll Surg Engl.* 1992;74(5):306-8. PMID: 1416698; PMCID: PMC2497644.
2. Harnoss JC, Partecke LI, Heidecke CD, Hübner NO, Kramer A, Assadian O. Concentration of bacteria passing through puncture holes in surgical gloves. *Am J Infect Control.* 2010;38(2):154-8. doi: 10.1016/j.ajic.2009.06.013. Epub 2009 Oct 12. PMID: 19822380.
3. Misteli H, Weber WP, Reck S, Rosenthal R, Zwahlen M, Fueglistaler P, Bolli MK, Oertli D, Widmer AF, Marti WR. Surgical glove perforation and the risk of surgical site infection. *Arch Surg.* 2009;144(6):553-8; discussion 558. doi: 10.1001/archsurg.2009.60. PMID: 19528389.
4. Esteban JI, Gómez J, Martell M, Cabot B, Quer J, Camps J, González A, Otero T, Moya A, Esteban R, Guardia J. Transmission of hepatitis C virus by a cardiac surgeon. *N Engl J Med.* 1996 Feb;334(9):555-60. doi: 10.1056/NEJM199602293340902. PMID: 8569822.
5. Harpaz R, Von Seidlein L, Averhoff FM, Tormey MP, Sinha SD, Kotsopoulou K, Lambert SB, Robertson BH, Cherry JD, Shapiro CN. Transmission of hepatitis B virus to multiple patients from a surgeon with out evidence of inadequate infection control. *N Engl J Med.* 1996;334(9):549-54. doi: 10.1056/NEJM199602293340901. PMID: 8569821.
6. Kobayashi M, Tsujimoto H, Takahata R, Einama T, Okamoto K, Kajiwara Y, Shinto E, Kishi Y, Hase K, Ueno H. Association Between the Frequency of Glove Change and the Risk of Blood and Body Fluid Exposure in Gastrointestinal Surgery. *World J Surg.* 2020;44(11):3695-3701. doi: 10.1007/s00268-020-05681-1. Epub 2020 Jul 13. PMID: 32661693.
7. McKinney WP, Young MJ. The cumulative probability of occupationally-acquired HIV infection: the risks of repeated exposures during a surgical career. *Infect Control Hosp Epidemiol.* 1990;11(5):243-7. doi: 10.1086/646161. PMID: 2351810.
8. Kiyosawa K, Sodeyama T, Tanaka E, Nakano Y, Furuta S, Nishioka K, Purcell RH, Alter HJ. Hepatitis C in hospital employees with needlestick injuries. *Ann Intern Med.* 1991;115(5):367-9. doi: 10.7326/0003-4819-115-5-367. PMID: 1907441.
9. Shapiro CN. Occupational risk of infection with hepatitis B and hepatitis C virus. Surg Clin North Am. 1995;75(6):1047-56. doi: 10.1016/s0039-6109(16)46776-9. PMID: 7482133.
10. Palmer JD, Rickett JW. The mechanisms and risks of surgical glove perforation. J *Hosp Infect.* 1992;22 (4):279-86. doi: 10.1016/0195-6701(92)90013-c. PMID: 1363107.
11. Tlili MA, Belgacem A, Sridi H, Akouri M, Aouicha W, Soussi S, Dabbebi F, Ben Dhiab M. Evaluation of surgical glove integrity and factors associated with glove defect. *Am J Infect Control.* 2018;46(1):30-33. doi: 10.1016/j.ajic.2017.07.016. Epub 2017 Sep 20. PMID: 28893444.
12. Thanni LO, Yinusa W. Incidence of glove failure during orthopedic operations and the protective effect of double gloves. *J Natl Med Assoc.* 2003;95(12):1184-8. PMID: 14717474; PMCID: PMC2594859.
13. Bekele A, Makonnen N, Tesfaye L, Taye M. Incidence and patterns of surgical glove perforations: experi ence from Addis Ababa, Ethiopia. *BMC Surg*. 2017;17(1):26. doi: 10.1186/s12893-017-0228-8. PMID: 28320370; PMCID: PMC5359816.
14. Zaatreh S, Enz A, Klinder A, König T, Mittelmeier L, Kundt G, Mittelmeier W. Prospective data collec tion and analysis of perforations and tears of latex surgical gloves during primary endoprosthetic surger ies. *GMS Hyg Infect Control*. 2016;11:Doc25. doi: 10.3205/dgkh000285. PMID: 28066701; PMCID: PMC5175006.
15. Tanner J, Parkinson H. Double gloving to reduce surgical cross-infection. *Cochrane Database Syst Rev.* 2006;2006(3):CD003087. doi: 10.1002/14651858.CD003087.pub2. PMID: 16855997; PMCID: PMC7173754.
16. Food and Drug Administration, HHS. Medical devices; patient examination and surgeons' gloves; test procedures and acceptance criteria. Final rule. Fed Regist. 2006;71(243):75865-79. PMID: 17294550.
17. CEN 455–1, European Committee for Standardization. Medical gloves for single use—Part 1: Require ments and testing for freedom from holes. 2001.
18. CEN 455-1, European Committee for Standardization. Medical gloves for single use. Part 1, Require ments and testing for freedom from holes. Berlin: Beuth Verlag GmbH; 2020.
19. Medhioub F, Jaber E, Hamrouni A, Gharbi L. Unnoticed surgical gloves intraoperative perforation: A multicentric study of the leading factors. *Jr Med Res.* 2020; 3(3):9-12. https://doi.org/10.32512/jmr .3.3.2020/9.12
20. Hwang KL, Kou SJ, Lu YM, Yang NC. Evaluation of the quality of surgical gloves among four different manufactures. *Ann Occup Hyg.* 1999;43(4):275-81. PMID: 10432871.

21. Albin MS, Bunegin L, Duke ES, Ritter RR, Page CP. Anatomy of a defective barrier: sequential glove l eak detection in a surgical and dental environment. *Crit Care Med*. 1992;20(2):170-84. PMID: 1737454. doi:10.1097/00003246-199202000-00006
22. Medical devices; patient examination and surgeons' gloves; adulteration--FDA. Proposed rule. Depart ment of Health and Human Services. *Fed Regist*. 1989; 54(223): 48218.
23. International Trade Centre. Trade statistics for international business development [Internet]. Trade Map - Trade statistics for international business development. 2021 [cited 2021Mar10]. Available from: https:// www.trademap.org/Index.aspx
24. Tchantchaleishvili V, Myers PO. Left-handedness--a handicap for training in surgery? *J Surg Educ*. 2010;67(4):233-6. doi: 10.1016/j.jsurg.2010.06.001. PMID: 20816359.
25. Malhotra M, Sharma JB, Wadhwa L, Arora R. Prospective study of glove perforation in obstetrical and gynecological operations: are we safe enough? *J Obstet Gynaecol Res*. 2004;30(4):319-22. doi: 10.1111/ j.1447-0756.2004.00201.x. PMID: 15238110.
26 Yinusa W, Li YH, Chow W, Ho WY, Leong JC. Glove punctures in orthopaedic surgery. *Int Orthop*. 2004;28(1):36-39. doi:10.1007/s00264-003-0510-5
27. Shiferaw WS, Aynalem YA, Akalu TY, Petrucka PM. Surgical site infection and its associated factors in Ethiopia: a systematic review and meta-analysis. *BMC Surg*. 2020;20(1):107. doi: 10.1186/s12893-020-00764-1. PMID: 32423397; PMCID: PMC7236319.
28. Plummer J. Diagnosing corruption in Ethiopia: perceptions, realities, and the way forward for key sectors. Washington, D.C.: World Bank; 2012.
29. McLaughlin R, McNicholl B, Barton J. Intraoperative glove perforation. *Postgrad Med J*. 2002;78 (915):62. doi: 10.1136/pmj.78.915.62. PMID: 11796890; P

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ORIGINAL ARTICLE

RADIOLOGY RESIDENTS' PERCEPTION OF WORKING AND TRAINING FROM HOME DURING COVID-19 PANDEMIC

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ABSTRACT

Introduction: *The spread of coronavirus disease 2019 (COVID-19) pandemic disrupted the personal and professional lives of many throughout the world. To mitigate the spread of the virus, Addis Ababa University introduced an online teaching/learning method which minimized the physical engagement of faculty members and residents. Online teaching is a major shift in the history of the country's oldest and largest university.*

Objectives: *This study aimed to investigate how trainees managed to cope up with the sudden changes in the teaching/learning system, and assess the ensuing satisfaction with the new method of teaching/learning.*

Methods: *Descriptive research design was implemented and analysis of variance (ANOVA) and T-tests were used to test hypotheses. Analysis of data collected from 58 radiology residents found that, the residents appreciated the participatory nature of the newly introduced online learning method.*

Results: The results showed that residents have accepted the new teaching/learning method and are satisfied with it. Furthermore, tests of hypotheses revealed that there is no significant difference in level of satisfaction between female and male residents as well as throughout the three years of radiology residency training.

Conclusion: *The new method of teaching/learning has a positive acceptance among trainees and there was high level of satisfaction with the new method. Poor internet network, reduced in-person mentoring, failure to make engaging discussions due to large number of participants were the common challenges to online teaching in the setting.*

Key words:*COVID-19 Pandemic, Radiology Residents', teach and work from home*

INTRODUCTION

Since its discovery in Wuhan Province of China in December, 2019, it took COVID-19 only few months to become the number one global health issue. Slow reaction from political and health sector regulators immensely contributed to the virus' fast spread in different parts of the globe infecting nearly more than 35 million people and claiming the lives of millions of people(1, 2). As we are in the middle of the pandemic, no authoritative source could predict the exact impact of the pandemic and remains as subject for future research. One thing for sure is the life of human beings surviving the pandemic will never be the same.

Most importantly, despite various efforts to cure the virus, both modern/scientific and indigenous/ traditional knowledge-based(3-5), neither of them brought fruit. The basic recommendations from prominent scientists and international health organizations such as WHO and health sector regulators are keeping physical distance and staying at home as much as possible.

The demand for primary care physicians and medical specialists in the developed world was among the outstanding research inquiries over the last several decades (6-9). Hospital-based physicians such as radiologists and anesthesiologists, who once were at the higher level of job insecurity are now among the physicians at the greatest demand (10).

The issue of shortage of medical professionals, primary care physicians as well as medical specialists, needs no scientific enquiry when it comes to the developing world. Over those long years, regulators and hospital administrators throughout the world have endeavored to bridge the gap through various mechanisms including working extra hours and working from home.

The advent of technological innovations beginning from late 20th century has made working from home easier and comparative studies have also shown that working from home is as effective as medical center based services (11).

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Despite its contribution in alleviating the shortage of radiologists (12, 13), working from home has also adversely affected their health, social life, and professional productivity (14) resulting in stress (15) . The ever increasing need for real-time imaging interpretation has forced radiologists to even work extra hours beyond their regular working hours (14).

Global and national health sector organizations such as WHO and National Health Ministries promoted 'staying at home' among the first line preventive mechanisms to survive the pandemic. As a result, the pandemic compelled professionals around the world to stay at home and work from home. Working from home has become the 'new normal' for medical and non-medical professionals. For radiologists, though, working from home is not a phenomenon triggered by the COVID-19.

Unlike the practices in other parts of the world, 'working and teaching/learning from home' is a new phenomenon for developing countries like Ethiopia. Although the change in learning modality will definitely have an impact on trainees, discerning whether this impact (positive or otherwise) is worth investigating. The current study aimed to investigate how trainees managed to cope up with the sudden changes in the teaching learning process, assess the ensuing satisfaction with the new method of learning, and draw important lessons that must be either sustained or treated in the aftermath of the pandemic.

METHODOLOGY

Research Approach and Design

The study followed a mixed research approach whereby quantitative data were used to measure satisfaction and its association with respondent's attributes (specific objectives 1 & 2) and qualitative data using open ended questions were also used to identify the challenges of the new teaching and learning method introduced due to coronavirus pandemic. The study also followed descriptive research design for the level of satisfaction of radiology residents and to identify the challenges and opportunities of working and teaching from home in pandemic situation.

The Research Setting

The current research was conducted at Addis Ababa University, College of Health Sciences, Department of Radiology where a total of 25 academic staffs are working in the facilities of Tikur Anbessa Specialized Hospital. The Department has a Radiology Residency Teaching Program involves direct patient contact while performing radiological procedures such as ultrasound, contrast studies of the gastrointestinal systems and interventional radiology.

At undergraduate level, radiology course is given as a short course, as a result, graduate medical doctors have limited exposure as to the discipline. The residency, on the other hand, includes doing radiological procedures like Ultrasound (US), intervention, fluorography procedures and interpretation of the findings as well as interpreting other cross-sectional imaging like Computerized Tomography (CT) and Magnetic Resonance Imaging (MRI). This is also the practice in all radiological services throughout Ethiopia (16).

In Tikur Anbesa Specialized Hospital about 200 radiographs (X-rays) are taken and more than 120 patients are scanned with US in four exam rooms on each day. More than 60 patients are scanned with CT and 20-30 patients have MRI performed daily. In addition, about 20-25 US and/or CT-guided interventions are done by the department weekly. As part of the residency training program, all cases except ultrasound studies are also discussed daily in groups in each departmental unit which constitute 10-12 trainees including the consultants. Therefore, before the interruption following COVID-19 pandemic, in one reporting room with an area of 57.6 square meter, there will be 50-60 people discussing and reporting at a time.

Besides the consultation sessions, as part of the teaching learning process, trainees have daily afternoon teaching sessions from 1:30pm–3:00pm where all residents and staffs meet together to discuss on imaging of patients. The other activity of the department is daily interdepartmental joint conferences which take about 60-75 minutes to discuss cases which need collaborative discussions for clinical management. In the department conference room which is 57 sqm there will be more than 120 people. Following the pandemic beginning from March 2020, most of the residency program's activities went online to allow faculty members and trainees to work, teach and learn from home except for minimum possible physical gathering to sustain the departmental daily routines.

Data Source and Collection Methods

The research subjects were trainees of a three-year residency program at Department of Radiology in College of Health Sciences, Addis Ababa University during the academic year 2019/2020. The trainees were at first, second or third year of the residency program. In order to attain the objectives of the study, the researchers used primary source of data collected using a self-administered questionnaire. Therefore, the questionnaires were administered both in print and online versions.

While participants were encouraged (through email and text message reminders) to fill the questionnaires online to avoid physical contact; the principal means of the virus' spread, some willing participants preferred to complete the printout version of the instrument.

Since the face-to-face learning system was aborted in the middle of the academic year and was immediately replaced by the online learning system due to the surge of the global pandemic in Ethiopia, the study participants had the chance to recall their past experiences and provide feedback by comparing the two alternative systems of learning. Hence, in the survey, the residents were asked to compare the participatory nature of the newly introduced teaching learning method and to rate their satisfaction with it. They were also requested to list the challenges they face and the opportunities they explored due to the change in methods of instruction following measures to mitigate the impact of the pandemic. In order to avoid potential bias from power balance (Venaktesh et al., 2019); a bias that may happen if the survey is conducted by the trainer researcher (the first author) who is a faculty member of Department of Radiology, the survey was administered by the student researcher (the second author).

Hypotheses

In line with the second specific objective of the study, the researchers posit that satisfaction with the new method of learning might be affected by the participant's gender and her/his level of residency study (whether the trainee is from Year-I, Year-II or Year-III). Accordingly, the following two research hypotheses are formulated.

H_1: There is a significant difference in the level of satisfaction between female and male radiology residency program trainees.

H_2: There is a significant difference in the level of satisfaction among trainees from the three levels of radiology residency program.

Method of Data Analysis

The quantitative data collected was analyzed using descriptive statistics tools. Besides the descriptive statistics analysis, T-test and ANNOVA were used to test the two hypotheses; i.e. whether there is a difference in the level of satisfaction among gender groups and levels/years of residency study. Furthermore, the open-ended responses of participants were coded to extract common themes using qualitative data analysis tools.

Ethical Considerations

The authors obtained ethical approval from the Research and Ethics Committee of the department of radiology of the College of Health Sciences at Addis Ababa University and informed consent was obtained from the study participants.

RESULT

The following sub-sections provide analysis of data collected from radiology residency trainees pursuing their study in a developing country that introduced online-based learning in response to mitigating the spread of COVID-19.

A total of 58 respondents participated in this research among which 74% were male and 26% were female respondents. Forty-one percent of the respondents were in their first year of training, and those in second and third years of training accounted for 33% and 26% respectively.

Satisfaction with the New Learning System

Satisfaction with online learning system was measured by 10 items adapted from Sun et al., 2008(12). Some of the ten items were modified by the authors to fit the residency training situations in the University. The 10 items measuring students' satisfaction with the new online method of learning try to capture satisfaction from three different perspectives: (1) whether they support the decision (at department and at university levels) to resume the training program despite the pandemic situation, (2) whether they want to take online courses in the future or recommend the new method of teaching continued to be applied after the end of the current crisis, and (3) the nature of the courses and the way they were delivered. (Table 1)

All of the ten items measuring satisfaction have above average results. Besides, the minimum average satisfaction level per item was item number 10 where the average satisfaction rating was 6.15 out of 7 (Std. Dev. 1.15) (Table 2). This finding clearly indicates that on average, the new method of teaching/learning has a positive acceptance among radiology residents at Department of Radiology, Addis Ababa University.

Table 1: Descriptive statistics of Radiology residents' satisfactions with presentations and case discussions at TASH, 2020

Items	Mean	Std. Deviation
The Department's decision to continue residency teaching via the Internet was a wise one	6.67	0.57
If I had an opportunity to take another course via the Internet, I would gladly do so	6.52	0.71
I am satisfied with the University's decision to resume residency classes via the online teaching modality	6.45	0.98
I was disappointed with the way the on-line courses are worked out(R)	6.24	1.08
I would recommend my Department to continue teaching my junior fellows on-line	6.19	1.13
I was very satisfied with the on-line courses delivered by my Department	6.19	1.05
I will take as many courses via the Internet as I can in the future	6.11	1.16
Conducting the course via the Internet made it more difficult than other courses I have taken (R)	5.79	1.37
I feel that this e-learning served my needs well	5.69	0.94
If I had it to do over, I would not take the courses I am currently taking via the Internet(R)	5.68	1.68
Overall	6.15	1.15

* Questions Marked with (R) mark were reverse coded

Table 2: Descriptive statistics of *Radiology residents' perception of* Participatory nature of case discussions and seminar presentations at TASH, 2020

Items	Mean	Std. Deviation
I received prompt comments from instructors during my presentations	6.00	1.06
My instructors consider web-based online learning using different technologies useful	5.93	1.08
I received prompt comments on case consultations I seek online	5.17	1.48
I received prompt comments from classmates during my presentations	4.86	1.66
Overall	5.50	1.41

Participatory nature of the presentations and case discussions

We measured the participatory nature of case and seminar presentations using four questions. The first three questions evaluated the trainer to trainee dimension of the relationship while the fourth question focused on another important element of the relationship-the trainee-to-trainee relationship.

In the current study, participants had a higher average rating (5.50) for the participatory nature of presentations (Table 2) Further investigation of the individual components of the participation revealed that the trainer-to-trainee relation was a significant contributor of the observed higher satisfaction level. However, the trainee-to-trainee relationship has been impaired due to the introduction of the online learning system (4.86 out of 7).

Based on this finding we recommend that to increase students' satisfaction (17), trainers in Department of Radiology shall make consideration and facilitate student-to-student interactions in future online lectures and case presentations.

The effect of Respondents' Attributes on Level of Satisfaction

Besides the higher level of satisfaction with the new online based learning method observed from the descriptive data, in line with the second research objective, we wanted to further investigate whether there was a significant difference between different trainee attributes: the gender groups and level of residency training, by testing the two research hypotheses. The hypotheses in null and alternate/research forms are:
The subsequent two subsections present the test results and their interpretations.

Test of Difference in Satisfaction among Gender Groups

To test first hypothesis that *'there is no significant difference in the level of satisfaction between female and male radiology residency program trainees'* the two tailed test results were used. P value of 10.08% is well above 5% level of significance implying failure to reject the null hypothesis (Table 3).

Therefore, we concluded that there is no significant difference in the level of satisfaction with online learning system introduced by the Department of Radiology; the new teaching learning method served the needs of both female and male radiology trainees.

Table 3: Two-Sample t-Test showing the difference between male and female residents' satisfaction with online learning system at TASH, 2020

	Female	**Male**
Mean	6.29	6.11
Variance	0.12	0.49
Observations	15	43
Hypothesized Mean Difference	0	
Df	48	
t Stat	1.295	
P(T<=t) one-tail	0.1008	
t Critical one-tail	1.677	
P(T<=t) two-tail	0.2016	
t Critical two-tail	2.011	

Test of Difference in Satisfaction among Different Years of Residency Study

Due to the difference in the level of rigor, nature of courses, level of supervision, and learning objective in the different years of radiology residency training, the researchers were also interested in knowing whether there is a difference in the level of satisfaction with the new online system of learning among first, second and third year radiology residency trainees. This was done by testing the null hypothesis that '*There is no significant difference in the level of satisfaction among trainees from the three levels of radiology residency program.'*

In testing the difference in levels of satisfaction among the different levels of study, we had a single factor (satisfaction with online learning method) and three levels of study (first, second and third year radiology residency training). Therefore, we run a single factor analysis of variance (ANOVA) test and found the result (Table 4) that there was no evidence to reject the null hypothesis that '*there is no significant difference in the level of satisfaction among trainees from the three levels of the radiology residency program*'. This result indicated that students at all levels of the radiology residency program were equally satisfied. The evidence also implied that the university's decision to resume classes was able to bring a positive fruit in terms of keeping students satisfied even in the middle of an international health crisis.

Similar to the tests of difference in the level of satisfaction among different groups of trainees, we have conducted t-tests for test of difference in perception about the participatory nature of presentation between female and male trainees. In addition, we performed ANOVA test to check whether the participation levels were the same among the different years of residency training. While the t-test confirmed that there was a significant difference in perception about the participatory nature of the presentations among the gender groups, ANOVA results indicated that there was no difference among the three levels of residency study in trainees' perception of the participatory nature of online presentation (both results not reported).

Table 4: Single Factor ANOVA showing the difference in levels of satisfaction among the different levels of residency (Resident I – Resident III) at TASH, 2020

Groups	Count	Sum	Average	Variance
R-I	15	89.04	5.94	0.4712
R-II	19	116.60	6.14	0.5836
R-III	24	151.38	6.31	0.1780

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1.28	2	0.6402	1.6612	0.1993	3.1650

Results of Qualitative Data Analysis

This section presents analysis of qualitative information collected using two open ended questions in the data collection instrument. The first question requested respondents if they recommend the new system be sustained as part of the teaching learning system after the end of the pandemics. The second question on its part encouraged participants to list out the major challenges they had faced because of the introduction of the remote teaching learning system. The actual responses obtained are summarized as follows.

Analysis of open-ended responses on participants' view of whether they recommend the sustained use of the online teaching/learning system in the aftermath of the pandemic found that most trainees (72%) recommended continued use of the online learning system anticipating that the online teaching/learning system will ensure quality of training by (1) saving money, energy and time, (2) creating one-stop access to (audio, video and documentary) resources, (3) fostering experience sharing among specialists from in-country and abroad thereby building capacity of training institutions, (4) enhancing knowledge sharing between trainees and trainers in and out of the university, and (5) adding flexibility to the existing traditional face-to-face system. However the number of good reasons for recommending the online modality's use in the future, some of the participants doubted to recommend the online learning system for its disregard of in-person mentoring, failure to make engaging discussions, and neglect of practical aspects of most medical school trainings.

Finally, respondents were asked to express the major challenges they faced as a result of the introduction of online teaching/learning modality. Systematic coding and analysis of responses identified that poor internet network access, compromises practicality of trainings and difficulty of assessing trainees' engagement as the three major bottlenecks from obtaining the best out of the online teaching/learning system.

In addition, although the findings from statistical tests reveal no difference in level of satisfaction among the different levels of study, first year trainees spotted that the 'one size fits all' nature of presentations makes it difficult for them to identify and grasp the major focus areas of the discussions pertinent to their level.

DISCUSSIONS

'Working and Training from home' is a new concept introduced after the finding of coronavirus victims in Ethiopia. In many of the postgraduate specialty training programs in Addis Ababa University, teaching and learning activity was unthinkable without physical gathering of faculty and trainees before COVID-19. However, due to the spread of the virus in the country, especially in the capital city Addis Ababa (where the University is placed) students in the College of Health Sciences are obliged to continue studying amid increased spread of the pandemic by changing the mode of learning to online technology systems. Besides the health consequences (death and illness) of the pandemic, studies focusing on the psychological, socioeconomic and political consequences are beginning to emerge *(18, 19).* Education, including radiology training, is one of the sectors worst affected by the pandemic (16, 20)

Analysis of data collected from 58 radiology residency program trainees (of which 25% were female) found that, the residents appreciated the participatory nature of the newly introduced online learning method. The trainer-trainee dimension of the participatory nature of case presentations showed a higher rating. The result from measurement of the student-student dimension, however, provided an important feedback that Department of Radiology should take as potential area of improvement.

Furthermore, the result from analysis of trainees' satisfaction with the new online based teaching/learning method which requires the trainers to work from home indicates that the residents have on average higher levels of satisfaction which was also the case in other radiology institutions where virtual learning introduced during COVID-19 pandemic resulted in a high trainee satisfaction.(21) This finding implies that the trainees accepted the new method and are satisfied with it.

Hypotheses tests using t-test and analysis of variance were used to test whether there was significant difference between gender groups and the levels of years of study. The results confirmed that the satisfaction levels are the same both among gender groups and levels of residency training. Taking trainees' higher level of satisfaction as a wake-up call from the COVID-19 pandemic, the University shall use this opportunity to consider designing a teaching-learning system that blends form of the traditional face-to-face and the online learning system which was also shown to improve performance, satisfaction and engagement in medical education.(22, 23)

In addition, analysis of open-ended responses on whether participants recommend the continued use of the online teaching/learning system in the future found that the online teaching/learning system is recommended as it is believed to ensure quality of education by saving money, energy and time, ease sharing of knowledge and (audio, video and documentary) resources, and add flexibility to the existing traditional face-to-face system(22).

However, some participants expressed their view that the new teaching/learning system might disregard in-person mentoring, may not engage all attendants into discussions, and also huge reliance on the online system neglects the practical aspects of residency trainings.

The aforementioned points can take as potential areas of improvement for the radiology residency training program and thus would be a sufficient impetus for evaluating the weaknesses of the teaching learning system and start working towards a high-quality residency training program that could tap the benefits of using online teaching/ learning technologies.

Finally, when asked about the major challenges they encounter with the new modality, trainees spotted that poor internet network access, compromise of practical trainings, difficulty of assessing trainees' level of engagement and the *'one size fits all'* nature of presentations were the major bottlenecks of the online teaching/learning system.
Besides, this study has several limitations; among which are being single institution study involving a single department and didn't include faculty perceptions.

It can thus be concluded that although the coronavirus pandemic disrupted the radiology residency training program at Department of Radiology in Addis Ababa University like any other training institution, it has also given to the existing training system a timely wake-up call by bringing into light the demerits of the face-to-face that could be supplemented by introduction of online learning in the aftermath of the pandemic.

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REFERENCES

1. Djalante R, Lassa J, Setiamarga D, Sudjatma A, Indrawan M, Haryanto B, et al. Review and analysis of current responses to COVID-19 in Indonesia: Period of January to March 2020. Progress in Disaster Sci ence. 2020;6:100091.
2. Haeder SF, Gollust SE. From Poor to Worse: Health Policy and Politics Scholars' Assessment of the U.S. COVID-19 Response and Its Implications. 2020;12(4):454-81.
3. Lu Z-H, Yang C-L, Yang G-G, Pan W-X, Tian L-G, Zheng J-X, et al. Efficacy of the combination of modern medicine and traditional Chinese medicine in pulmonary fibrosis arising as a sequelae in conva lescent COVID-19 patients: a randomized multicenter trial. Infectious Diseases of Poverty. 2021;10 (1):31.
4. Nugraha RV, Ridwansyah H, Ghozali M, Khairani AF, Atik N. Traditional Herbal Medicine Candidates as Complementary Treatments for COVID-19: A Review of Their Mechanisms, Pros and Cons. Evidence -Based Complementary and Alternative Medicine. 2020;2020:2560645.
5. Zhao Z, Li Y, Zhou L, Zhou X, Xie B, Zhang W, et al. Prevention and treatment of COVID-19 using Tra ditional Chinese Medicine: A review. Phytomedicine. 2021;85:153308-.
6. Barber P, López-Valcárcel BG. Forecasting the need for medical specialists in Spain: application of a system dynamics model. Human Resources for Health. 2010;8(1):24.
7. Cooper RA. There's a shortage of specialists: is anyone listening? Academic medicine : journal of the Association of American Medical Colleges. 2002;77(8):761-6.

8. Bodenheimer TS, Smith MD. Primary Care: Proposed Solutions To The Physician Shortage Without Training More Physicians. Health Affairs. 2013;32(11):1881-6.
9. Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. Milbank Q. 2005;83(3):457-502.
10. Hawkins J. Addressing the Shortage of Radiologists. The journal of the Americal Health Care Radiology Administrators. 2001:4.
11. Steckel RJ, Batra P, Goldin JG, Zucker M, Sayre JW, Johnson SL. Supervision of residents by faculty radiologists using home workstations. Emerg Radiol. 2003;10(3):121-5.
12. Sunshine JH, Maynard CD. Update on the Diagnostic Radiology Employment Market: Findings Through 2007-2008. Journal of the American College of Radiology. 2008;5(7):827-33.
13. Meghea CI, Sunshine JH. Who's overworked and who's underworked among radiologists? An update on the radiologist shortage. Radiology. 2005;236(3):932-8.
14. Rohatgi S, Hanna TN, Sliker CW, Abbott RM, Nicola R. After-Hours Radiology: Challenges and Strate gies for the Radiologist. American Journal of Roentgenology. 2015;205(5):956-61.
15. Fishman MDC, Mehta TS, Siewert B, Bender CE, Kruskal JB. The Road to Wellness: Engagement Strate gies to Help Radiologists Achieve Joy at Work. RadioGraphics. 2018;38(6):1651-64.
16. Legesse T. Impact of CVID-19 pandemic in radiology residency training of Ethiopia. Ethiopian Medical Journal. 2020;58.
17. Croxton RA. The role of interactivity in student satisfaction and persistence in online learning. Journal of Online Learning and Teaching. 2014;10(2).
18. DW A. A Review on Psychological and Socio-Economic Impacts of Corona Virus Disease (Covid-19) the Case of Under Developing Countries. . Vol. 6 No. 4: 100. Med Clin Rev. 2020;6(4).
19. UNCT-Ethiopia. Socio-Economic Impact of COVID- 19 in Ethiopia. June 2020.
20. Alvin MD, George E, Deng F, Warhadpande S, Lee SI. The Impact of COVID-19 on Radiology Trainees. Radiology. 2020;296(2):246-8.
21. Larocque N, Shenoy-Bhangle A, Brook A, Eisenberg R, Chang Y-M, Mehta P. Resident Experiences With Virtual Radiology Learning During the COVID-19 Pandemic. Acad Radiol. 2021;28(5):704-10.
22. Vavasseur A, Muscari F, Meyrignac O, Nodot M, Dedouit F, Revel-Mouroz P, et al. Blended learning of radiology improves medical students' performance, satisfaction, and engagement. Insights into Imaging. 2020;11 (1):61.
23. Durán-Guerrero JA, Ulloa-Guerrero LH, Salazar-Díaz LC. Blended learning: An effective methodology for teaching radiology to medical students %J Revista de la Facultad de Medicina. 2019;67:273-7.

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ORIGINAL ARTICLE

FACTORS AFFECTING THE OUTCOME OF GUILLAIN-BARRE SYNDROME AMONG PEDIATRIC PATIENTS IN TIKUR ANBESSA SPECIALIZED HOSPITAL

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ABSTRACT

Introduction*: Guillain-Barré syndrome is an immune mediated acute illness featured by continual weakness and loss of deep tendon reflexes. The causes that govern the variant clinical presentations and outcome of this disease are not understood well. Neither are they studied in our setup.*

Objectives: *Assessed the factors affecting the outcomes of Guillain-Barré syndrome among children <15 years in Tikur Anbesa Specialized Hospital.*

Methods: *Institution based retrospective study was done among 91 patients with Guillain-Barré syndrome on follow-up identified by chart tracing and reviewed at Tikur Anbesa specialized hospital from October 1/2012 to January 30/2019. Required data was collected using a check list. The data was entered to computer using Ep-info and exported to Statistical Package for Social Sciences Version 23 for analysis.*

Results*: There were 91 patients with a male to female ratio of 1.1:1 and 80 % of them were between 2-10 years of age. Respiratory infections were the commonest preceding events in 27/91(29.7%). Cranial nerve involvement was found in 24/91(26.4 %) and 36/91(39.6%) patients had dysautonomia. The commonest sub-type was acute motor axonal neuropathy, 67/91 (73%). Functional independence was achieved by 47/91(52%) patients at 3 months and 80/91(88%) at 6 months. Poor functional outcome was significantly associated with the presence of sensory symptoms, dysautonomia, the need for mechanical ventilation, severity of weakness at nadir and longer hospital stay, P < 0.05.*

Conclusion: *The severity of motor weakness at nadir is associated with lower likely hood of functional independence signifying the requirement of longer time for self-efficient functionality.*

Key words: *Guillain-Barré syndrome, outcome, pediatric patients.*

INTRODUCTION

Guillain-Barré syndrome (GBS) is considered to be an autoimmune disease which is thought to mostly present post-infections. It affects the motor, sensory and autonomic nerves and it has a slight male preponderance with seasonal variation (1,2). Diagnosis of GBS is made by cerebro-spinal fluid (CSF) analysis and nerve conduction test (NCT). There are several treatment options like intravenous immunoglobulin (IVIg) and plasma exchange but outcomes of the disease are variable despite the uniform treatment modalities for unknown reason.

Furthermore, it has variable outcomes like decreased mobility, severe long-term fatigue syndrome and chronic pain(3–5). Since the elements that govern the different clinical and laboratory profiles of GBS and outcome are poorly understood, it creates an open ground for studies.

It has been shown in several studies that GBS is preceded by bacterial and viral infections and occasionally by vaccinations (6,7)but there hasn't been a strong evidence linking vaccination to GBS. Besides, it is a well-known fact that the benefits of vaccines outweigh the risk (8–10).

The nerve damage caused by GBS is histopathologically classified as demyelinating and axonal degenerating type. Acute inflammatory demyelinating polyradiculoneuropathy (AIDP) accounts for 80-90% of the cases in Europe and North America making it the commonest seconded by Acute motor axonal neuropathy (AMAN) accounting for 10-20% in the western countries and 50-60% in China and Japan (11–13).

There are various grading scales for prognostication of GBS based on which therapeutic strategies are planned.

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Some commonly used are Medical Research Council (MRC) score, the Erasmus GBS outcome score (EGOS), Erasmus GBS respiratory insufficiency score (EGRIS) and Hughes functional grading scale (HFGS) (12,14–16).Our study uses the HFGS which is an assessment of functionality of patients from their history since it is more practical for retrospective studies than the other modalities.

In a study done in South Africa, bulbar dysfunction, autonomic dysfunction and upper limb paralysis significantly predicted the need for mechanical ventilation (17,18). In a previous study done in our setup, the demographic and clinical characters were determined but outcome of patients on follow-up in clinic was not assessed. Furthermore, factors associated with poor outcome were not looked into (7).

Therefore, the main purpose of this study is to assess the 3rd and 6th month outcome of GBS patients in clinics with the available treatment modalities and to determine the factors affecting poor outcome. This is important in order to prepare one in anticipation of complications for better resource allocation, early intervention and better counseling of patients and care givers about the disease and future outcome.

MATERIALS AND METHODS

Study Area: the study was done in TASH which is the largest tertiary hospital and one of the few with pediatric intensive care units (ICU) in Ethiopia. It manages many patients that require ICU and hence, many of the national GBS cases.

Study design: The study was a hospital based retrospective study, conducted between May and July 2019 in TASH, Addis Ababa, Ethiopia.

Sample size: The calculated sample size using $N=Z^2P(1-p)/d^2$, where p was taken to be 15%, d=0.05 and Z=1.96 was 215, but only 94 patients with a diagnosis of GBS were identified from 0ctobor, 2012 to January 2019, from which one left against medical advice, one was referred out and the last one didn't fulfill the inclusion criteria making the total sample size 91. Those children who fulfilled the diagnostic criteria for GBS as per the operational definition were enrolled into the study.

Sampling procedure and data collection: A check list was prepared by using selected variables taken from patient health records and used as data collection tool. I, the principal investigator, collected the data. Consecutive sampling was used to collect medical record numbers of patients admitted with the assessment of GBS from the health management information system (HMIS) in all pediatric wards and cross referenced with the pediatric neurology clinic HMIS for follow-up. Data was extracted from the retrieved cards by the medical record keeping department and it was then checked, cleared and coded.

Data analysis and statistical methods: The data was entered to a computer using Ep-info and exported to Statistical Package for Social Sciences Version 23.0 for analysis. Univariate analysis was used for percentage and frequency distribution of the demographic and few other variables in the check list. Factors with significant association with the outcome on univariate analysis were selected for multivariate logistic regression which was used to identify independently associated factors with the outcome. Statistically significant association was taken to be a p -value of <0.05.

Operational definition

1. Pediatric patients- It is defined as children under the age of 14 years based on the hospital protocol.
2. Features Required for diagnosis of GBS based on NINDS diagnostic criteria(14).
    - A. Progressive motor weakness of more than one limb with hypore flexia or areflexia (loss of tendon jerks) and
    - B. Cerebrospinal fluid features strongly supportive of the diagnosis or
        - i. CSF cells Counts of 10 or fewer mononuclear leukocytes/mm3.
        - ii. Elevated protein levels more than 0.5g/L
    - C. Positive electro-diagnostic test as stated on the nerve conduction test.

Areflexia: Deep tendon reflex = 0/4
Hyporeflexia: deep tendon reflex= ¼
Albumin-cytological dissociation: It is defined as elevated protein levels more than 0.5g/L with normal cell counts; fewer or equal to 10 mononuclear cells in CSF.

Preceding event: It is defined as the presence of respiratory, gastrointestinal, febrile illness or vaccination in the preceded 4 weeks to the onset of illness.

Prolonged intubation**:** It is defined as intubation for more than two weeks requiring tracheostomy for ventilation.

Hughes scale (15,16).

1. Healthy
2. Minor symptoms/capable of running
3. Walk 5 meters without support /unable to run
4. Able to walk with an appliance
5. Confined to bed/chair
6. Requires assisted ventilation
7. Death

3. Outcome

A. Good – hughes score ≤ 2

B. Poor – hughes score ≥3

Ethical consideration: The research approval was made by the pediatric and child health department's research and publication committee (DRPC).

RESULTS

A total of 91 children were included in the final analysis. All demographic characters are well stated in Table 1. Around 62/91(68%) had a preceding event prior to the development of weakness while the remaining 29 (31.9 %) had no documented preceding event. Except 3 (3.3 %) children, all the remaining 88 (96.7%) had Hughes functional score above 2 at the time of nadir weakness.

Table1: Socio-demographic characteristics of GBS patients in TASH 2012-2019GC, AA, Ethiopia

Variables		F	Percent %,
Age (years)	<2	7	7.7
	2-5	40	44.0
	5-10	33	36.3
	>10	11	12.1
Sex	M	47	51.6
	F	44	48.4
Residence	AA	39	42.9
	Oromia	31	34.1
	Others	11	12.1
Seasonal variation	|Autumn	22	24.2
	Winter	19	20.9
	Spring	19	20.9
	Summer	31	34.1
Preceding event	Respiratory tract infections	27	29.7
	Acute gastroenteritis	22	24.2
	Vaccine	13	14.3
	None	29	31.9
Hughes score at nadir	≤2	3	3.3
	>2	88	96.7

The median duration of hospital stay is 13 days with inter-quartile range of 19 days. The maximum stay was 123 days. Patients in recovery phase were not admitted making the minimum days of stay zero. More than half of the patients, 50/91(55%) had a hospital stay of 2 weeks or less.

Another 22 patients had a hospital stay of 2-4 weeks making the hospital stay less than a month in 79 % of the patients. The median duration from the onset of the weakness to hospital admission was 5 days with inter-quartile range of 2 to 7 days.

The median duration from the onset of weakness to achieve maximum weakness was 3 days with inter-quartile range of 2 to 6 days. In most of the children, as depicted in the figure below, progression from onset to nadir weakness occurred on the 2nd and 3rd days of illness. More than a third of the children, 88% reached nadir weakness by one week, and progression was rare (2.2%) after 2 weeks.

The lower limb power was below 3 in 64/91 (70.4%) of the children at the time of presentation, with the remaining having a power of three to four. Lower limbs were areflexic in 47(51.5%) and hyporeflexic in 44 (48.4%) at presentation and 57 (62.7 %) had upper limb power 3-5.

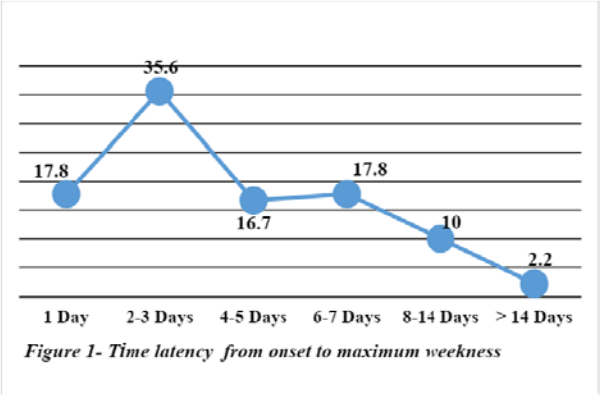

Figure 1- Time latency from onset to maximum weekness

Sensory symptoms of paresthesia and numbness were present in 40 (44 %), cranial nerve palsy in 24 (26.4 %), and features of dysautonomia in 36 (39.6 %) of the children. Of all patients with dysautonomia, 34/36 (94.4 %) had labile blood pressure and 15/36 (41.6 %) had arrhythmia but most (41.6%) had a combination of two or more.

Among the 73 patients with CSF analysis, 67/73 (91.8%) had albumino-cytologic dissociation (ACD). NCT was done for 59/91 (65%) of the children; accordingly, commonest subtype was AMAN-43/59 (73 %) followed by AIDP-14/59 (24 %), and the pattern of AMSAN was described only in 2/59 (3 %) children.

From all the patients admitted, 20/91 (22 %) required mechanical ventilation for respiratory failure, out of whom, 17/20 (85 %) had prolonged intubation. Children who received a total dose of 2 grams of intravenous immunoglobulin (IVIg) in five days accounted for 45/91 (50 %) of them.

Table 2: List of Investigations, treatment modalities and complications of patients with Guillain-Barre Syndrome (GBS) in TASH 2012-2019GC, AA, Ethiopia

Character		N	Percent
CSF analysis	No albumin-cytological Dissociation	12	13.2
	Albumin-cytological dissociation	61	67.0
	Not done	18	19.8
Nerve conduction test Sub-type	AMAN	43	47.3
	AIDP	14	15.4
	AMSAN	2	2.2
	No NCT	32	35.2
Mechanical ventilation	No	71	78.0
	Yes	20	22.0
Intravenous immunoglobulin	No	45	50.0
	Yes	45	50.0
Prolonged intubation	No	74	81.3
	Yes	17	18.7
Complications	No	64	70.3
	Yes	27	29.7

From a total of 91 patients, data at 3rd –month shows functional outcome of the first set of 50 patients only. Analysis of outcome at the 3rd month for these 50 cases showed that 26/50(52 %) children improved to Hughes score of ≤ 2. The second set of 50 patients from a total of 91 had their functional outcome analyzed at 6th month follow-up. By this time, only 6/50 (12 %) had Hughes functional score of > 2, only 4/50 (8 %) had lower limb power of below three, and only 2/50 (4 %) had absent Deep Tendon Reflex (DTR). None had upper limb power below 3 and absent DTR on 6th month.

On the analysis of bivariate association, different variables were significantly associated with functional outcome at three months. Poor functional outcome of GBS was significantly associated with the presence of sensory symptoms, dysautonomia and the need for mechanical ventilation $P < 0.05$, the severity of weakness at nadir, use of Intravenous Immunoglobulin IVIg, mean length of hospital stay and the presence of complications $P \leq 0.005$ and the duration to nadir weakness $P= 0.006$.

Table 3: Functional outcome of GBS patients in TASH 2012-2019GC, AA, Ethiopia

Follow up time		3 month N (%)	6 month N (%)
Hughes score	≤ 2	26 (52.0)	44 (88.0)
	> 2	24 (48.0)	6 (12.0)
LLP	<3	4 (8.0)	0
	3-5	46 (92)	50 (100)
LLR,	.00	2 (4.0)	0
DTR	1.00	28 (56.0)	13 (26.0)
	2.00	20 (40.0)	37 (74.0)
ULP	<3	1 (2.0)	0
	3-5	49 (98)	50 (100)
ULR	.00	2 (4.0)	0
	1.00	20 (40.0)	10 (20.0)
	2.00	28 (56.0)	40 (80.0)
Sensory	No	50 (100)	49 (98.0)
	Yes	0	1 (2.0)
Pain	No	47 (94.0)	48 (96.0)
	Yes	3 (6.0)	2 (4.0)

Table 4: Bivariate association of predictor variables with 3rd month functional outcome of GBS patients in TASH 2012-2019 GC, A.A, Ethiopia

Variables		Hugh's score at 3 months N (%) Good outcome ≤2	Poor outcome >2	P-value
Age in Years	<2	2 (7.7)	1 (4.2)	
	2-5	11 (42.3)	11 (45.8)	0.959
	5-10	10 (38.5)	9 (37.5)	
	>10	3 (11.5)	3 (12.5)	
Sex	Male	14 (53.8)	10 (41.7)	0.389
	Female	12 (46.2)	14 (58.3)	
Lower Limb power	0-2	9 (34.6)	23 (95.8)	0.000
	3-5	17 (65.4)	1 (4.2)	
Sensory symptoms	No	16 (61.5)	8 (33.3)	0.046
	Yes	10 (38.5)	16 (66.7)	
Cranial Nerve palsy	No	20 (76.9)	14 (58.3)	0.159
	Yes	6 (23.1)	10 (41.7)	
Dysautono-mia	No	20 (76.9)	11(45.8)	0.024
	Yes	6 (23.1)	13 (54.2)	
Nerve con-duction test Subtype	AMAN	16 (61.5)	12 (50.0)	0.690
	AIDP	3 (11.5)	3 (12.5)	
Mechanical ventilation	No	23 (88.5)	15 (62.5)	0.032
	Yes	3 (11.5)	9 (37.5)	
IV Immu-noglobulin	No	19 (73.1)	8 (33.3)	0.005
	Yes	7 (26.9)	16 (66.7)	
Prolonged intubation	No	23 (88.5)	16 (66.7)	0.063
	Yes	3 (11.5)	8 (33.3)	
Complica-tions	No	22 (84.6)	11 (45.8)	0.004
	Yes	4 (15.4)	13 (54.2)	
Time to Nadir	≤ 3day	9 (34.6)	17 (65.4)	0.006
	> 3 days	17 (73.9)	6 (26.1)	
Hospital Stay in days (mean± SD)		11.5 ± 12	35.5 ± 30	0.001

Those variables which were significantly associated with poor functional outcome were computed in multivariate analysis, only the severity of weakness at nadir was significantly associated with 3rd month poor functional outcome with AOR 30.115 (1.44- 628.7) at 95% CI.

Association of factors affecting outcome are only done on the 3rd month's follow-up to avoid bias secondary to inter-individual difference in genetic polymorphism since different sets of 50 patients had the 3rd and 6th months follow-up.

Table 5: Binary logistic regression of predictor variables with 3- month poor functional outcome of GBS patients in TASH 2012-2019GC, AA, Ethiopia

Variables		Hughes score at 3 months		P-value	AOR	95 % CI	
		≤2 N (%)	>2N (%)				
Lower Limb power	0-2	9 (34.6)	23 (95.8)	0.000	30.11	1.44	628.7
	3-5	17 (65.4)	1 (4.2)				
Sensory symptoms	No	16 (61.5)	8 (33.3)	0.046	.93	.13	6.61
	Yes	10 (38.5)	16 (66.7)				
Dysautono-mia	No	20 (76.9)	11(45.8)	0.024	.37	.05	2.74
	Yes	6 (23.1)	13 (54.2)				
Mechanical ventila-tion	No	23 (88.5)	15 (62.5)	0.032	.04	.00	1.28
	Yes	3 (11.5)	9 (37.5)				
IV immunoglo-bulin	No	19 (73.1)	8 (33.3)	0.005	4.98	.50	49.48
	Yes	7 (26.9)	16 (66.7)				
Complication	No	22 (84.6)	11 (45.8)	0.004	5.86	.23	150.4
	Yes	4 (15.4)	13 (54.2)				
Time to Nadir	≤ 3 D	9 (34.6)	17 (65.4)	0.006	1.20	.14	10.23
	> 3 D	17 (73.9)	6 (26.1)				
Hospital Stay in days	≤2wks	22(78.5)	6(21.4)	0.001	1.10	.99	1.21
	> 2wks	8(36.4)	14(63.6)				

DISCUSSION

In our study, acute motor axonal neuropathy (AMAN) and ascending weakness are the commonest variants. There are relevant numbers of patients requiring mechanical ventilation. Most of our patients showed a good functional out come with 88% functional independence at 6th month follow up. The severity of motor weakness at nadir is independently associated with poor functional outcome.

On the previous study in our setup, AMAN was the most common subtype accounting for 80% and AMSAN < 10% (7). In our study, the most common variant was AMAN which accounted for 73% of the cases followed by AIDP in 24% of the cases which is slightly higher than the previous study. This is in sharp contrast with western reports. AMSAN was the rarest variant which accounted for 3% of the cases strengthening the rarity of this variant in other reports (11–13).

In this study, 22% of children required mechanical ventilation for respiratory failure strengthening the general recommendation on meticulous follow up of respiratory status of GBS patients. There is an increase in use of the mechanical ventilation as compared with the previous study in our set up, 12.5% (7) which justifies the increased availability of the ICU setting.

In our study, 92.3% had ascending type of weakness which was in line with the research done by Saroj Kumar Bhagat et al in eastern Nepal showing 93.5% predominance(19). This pattern of motor weakness also accounted for 82.1 % of the 112 patients in the former study on GBS by Tigist et al. (7) in our setup.

It has been reported that, 85% of GBS patients will be functionally independent by one year, 10% will have functionally disabling weakness, and the rest 5% will die due to the GBS(15).

In our study, 14% became functionally independent (Hughes score ≤2) on discharge, 52% at three months and 88% at six months.

In contrast, the outcome on discharge in the study by Tigist et al. with mean duration of hospital stay being 18 days showed a 27.7 % good outcome and 36.6 % poor outcome with in-hospital GBS mortality of 8% and residual weakness frequency of 37 %(7). The in hospital mortality of GBS in our study was 2.2% comparable to that reported in the study by Alshekhlee A et al. (2.58%) in the United states of America (20) and in a study by Mahmoud Reza Ashrafi et al. (2.2%) in Iran(21). The lower mortality in our study compared to the previous study in TASH may indicate improvements achieved in health care quality in subsequent years, especially ICU care for respiratory failure. 38% of children did not improve completely in our study similar to the previous study (7). This observation is very similar with the general descriptions on the prognosis of GBS showing a relatively benign process compared to other neurologic conditions causing weakness (15,20,21).

Some clinical variables at presentation can indirectly suggest the poor likely hood of recovery and longer hospital stay; such as the severity of weakness at nadir, the rapidity of disease course and the presence of early cranial nerve palsies(21).

In our study, one variable which became independently associated with poor functional outcome on multivariate analysis was the severity of muscle weakness at nadir (p =0.028, AOR -30.115, 95%CI-1.44-628.7). The larger confidence interval shows the lesser power of the study due to the smaller sample size than calculated which signifies the requirement of a large size study for better assessment of predictive factors of outcomes of patients with GBS.

Conclusion

Most patients with GBS have good prognosis with highly improving functional independence in the first 6 months after initial presentation and the severity of motor weakness at nadir is associated with lower likely hood of functional independence.

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Conflict of interest

The authors have no conflict of interest to declare.

REFERENCES

1. Hughes RAC, Swan A V., Raphaël JC, Annane D, Van Koningsveld R, Van Doorn PA. Immunotherapy for Guillain-Barré syndrome: A systematic review. Brain. 2007;130(9):2245–57. https://**doi**.org/**10.1093**/**brain**/**awm004** .
2. Zhong M, Cai F-C. Current perspectives on Guillain-Barré syndrome. World J Pediatr. 2007;3(3):187–94. https://doi.org/10.1016/j.pediatrneurol.2011.06.007.
3. Pritchard J, Hughes RA, Hadden RD, Brassington R. Pharmacological treatment other than corticoster oids, intravenous immunoglobulin and plasma exchange for Guillain-Barré syndrome. Cochrane Database Syst Rev. 2016;2016(11). https://doi.org/10.1002/14651858.cd008630.pub4.
4. Witsch J, Galldiks N, Bender A, Kollmar R, Bösel J, Hobohm C, et al. Long-term outcome in patients with Guillain-Barré syndrome requiring mechanical ventilation. J Neurol. 2013;260(5):1367–74. https://doi.org/10.1007/s00415-012-6806-x.
5. Kuwabara S. Guillain-Barré syndrome: Epidemiology, pathophysiology and management. Drugs. 2004;64 (6):597–610. https://doi.org/10.2165/00003495-200464060-00003.
6. Sharma B, Paul M. Guillain-Barre Syndrome in 2016: The Centenary Advances. Int J Med Public Heal. 2016;6(3):111–2. http://dx.doi.org/10.5530/ijmedph.2016.3.2.
7. Heye TB. Guillain Barre Syndrome in Children at Tikur Anbessa Specialized Hospital. Res GATE. 2019;2009(April):18–25.
8. Schmidt-Ott R, Schmidt H, Feldmann S, Brass F, Krone B, Gross U. Improved serological diagnosis stresses the major role of Campylobacter jejuni in triggering Guillain-barré syndrome. Clin Vaccine Im munol. 2006;13(7):779–83. https://dx.doi.org/10.1128%2FCVI.00065-06.
9. Ang CW, Jacobs BC, Brandenburg AH, Laman JD, Van Der Meché FGA, Osterhaus ADME, et al. Cross-reactive antibodies against GM2 and CMV-infected fibroblasts in Guillain-Barre syndrome. Neurology. 2000;54(7):1453–8. https://doi.org/10.1212/wnl.54.7.1453.

10. Kieseier BC, Kiefer R, Gold R, Hemmer B, Willison HJ, Hartung H-P. Advances in understanding and treatment of immune-mediated disorders of the peripheral nervous system. Muscle Nerve [Internet]. 2004 Aug [cited 2021 Aug 13];30(2):131–56. Available from: https://pubmed.ncbi.nlm.nih.gov/15266629/ https://doi.org/10.1002/mus.20076
11. Zhang G, Li Q, Zhang R, Wei X, Wang J, Qin X. Subtypes and prognosis of Guillain-Barré syndrome in southwest China. PLoS One. 2015;10(7):1–8. https://doi.org/10.1371/journal.pone.0133520
12. Walgaard C, Lingsma HF, Ruts L, Van Doorn PA, Steyerberg EW, Jacobs BC. Early recognition of poor prognosis in Guillain-Barré syndrome. Neurology. 2011;76(11):968–75. https://doi.org/10.1212/wnl.0b013e3182104407
13. Akbayram S, Dogan M, Akgün C, Peker E, Sayin R, Aktar F, et al. Clinical features and prognosis with Guillain-Barr syndrome. Ann Indian Acad Neurol. 2011;14(2):98–102. https://doi.org/10.4103/0972-2327.82793
14. Jacobs BC, van den Berg B, Verboon C, Chavada G, Cornblath DR, Gorson KC, et al. International Guill ain-Barré Syndrome Outcome Study: protocol of a prospective observational cohort study on clinical and biological predictors of disease course and outcome in Guillain-Barré syndrome. J Peripher Nerv Syst. 2017;22(2):68–76. https://doi.org/10.1111/jns.12209
15. van Koningsveld R, Steyerberg EW, Hughes RA, Swan A V., van Doorn PA, Jacobs BC. A clinical prog nostic scoring system for Guillain-Barré syndrome. Lancet Neurol [Internet]. 2007 Jul [cited 2021 Aug 13];6(7):589–94. Available from: https://pubmed.ncbi.nlm.nih.gov/17537676/ https://doi.org/10.1016/s1474-4422(07)70130-8
16. Walgaard C, Lingsma HF, Ruts L, Drenthen J, Koningsveld R van, Garssen MJP, et al. Prediction of res piratory insufficiency in Guillain-Barré syndrome. Ann Neurol [Internet]. 2010 Jun [cited 2021 Aug 13];67(6):NA-NA. Available from: https://onlinelibrary.wiley.com/doi/10.1002/ana.21976 https://doi.org/10.1002/ana.21976.
17. van der Pijl J, Wilmshurst JM, van Dijk M, Argent A, Booth J, Zampoli M. Acute flaccid paralysis in South African children: Causes, respiratory complications and neurological outcome. J Paediatr Child Health [Internet]. 2018 Mar 1 [cited 2021 Aug 13];54(3):247–53. Available from: https:// p u b med.ncbi.nlm.nih.gov/28960591/ https://doi.org/10.1111/jpc.13709.
18. Ashrafi MR, Sagheb S, Mohammadi M, Vakili A, Nasirian A, Zamani GR. Clinical short term outcome of Guillain-Barré syndrome in children. Iran J Pediatr [Internet]. 2008 [cited 2021 Aug 13];18(1):11–9. Available from: https://www.researchgate.net/publication/26502512.
19. Alshekhlee A, Hussain Z, Sultan B, Katirji B. Guillain-Barré syndrome: incidence and mortality rates in US hospitals. Neurology [Internet]. 2008 Apr 29 [cited 2021 Aug 13];70(18):1608–13. Available from: http://www.neurology.org/cgi/doi/10.1212/01.wnl.0000310983.38724.d4, https://doi.org/10.1212/01.wnl.0000310983.38724.d4.
20. Asiri S, Altwaijri W, Ba-Armah D, Al Rumayyan A, Alrifai M, Salam M, et al. Prevalence and outcomes of Guillain-Barré syndrome among pediatrics in Saudi Arabia: a 10-year retrospective study. Neuropsy chiatr Dis Treat [Internet]. 2019 Mar [cited 2021 Aug 13];Volume 15(1):627–35. Available from: https://pubmed.ncbi.nlm.nih.gov/30880987/, https://doi.org/10.2147/NDT.S187994.
21. Bhagat SK, Sidhant S, Bhatta M, Ghimire A, Shah B. Clinical Profile, Functional Outcome, and Mortality of Guillain-Barre Syndrome: A Five-Year Tertiary Care Experience from Nepal. Neurol Res Int [Internet]. 2019 Jun 2 [cited 2021 Aug 13];2019(2):1–5. Available from: https://www.hindawi.com/journals/nri/2019/3867946/, https://doi.org/10.1155/2019/3867946.

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ORIGINAL ARTICLE

BURNOUT AND STRESS AMONG INTERNS IN AN ETHIOPIAN TEACHING HOSPITAL: PREVALENCE AND ASSOCIATED FACTORS

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ABSTRACT

Introduction: *Burnout is a psychological condition characterized by emotional and physical exhaustion, depersonalization, and low personal accomplishment. Workplace stress is a significant problem among physicians and is considered as a predecessor to burnout. Burnout negatively affects patient care and causes poor physician mental health. The objective of this study was to determine the level of burnout and stress among medical interns working at St. Paul's Hospital Millennium Medical College and associated factors.*

Methods: *A cross-sectional survey was conducted among 72 interns using a structured online survey. Burnout was assessed using Maslach Burnout Inventory. Burnout was considered when there is a high score on emotional exhaustion (> 26 points), depersonalization (> 9 points) or low score on personal accomplishment (< 34 points) subscale. Stress was evaluated using Perceived Stress Scale-10 questionnaire. Statistical package for social sciences version 23 was used for data analysis. Univariate and multivariate logistic regression analysis were used to determine association between variables. All variables with a p-value of < 0.05 in the multivariate regression model were considered to be statistically significant.*

Results: *High emotional exhaustion, high depersonalization, and highly reduced sense of personal accomplishment were seen in 69.4%, 41.7%, and 44.4% of participants respectively. High level of stress was seen in 37% of the participants. Logistic regression analysis showed that emotional exhaustion and depersonalization were independently associated with having plans to change profession, having financial worries, and high perceived stress, while depersonalization was associated with fear of medical errors. Reduced personal accomplishment was associated with high perceived stress. High level of perceived stress was associated with having plans to change profession.*

Conclusions: *The levels of burnout and stress among interns were found to be high. All concerned bodies must be aware of the findings of this study so they can help improve the mental wellbeing of interns. Support services for interns need to be enhanced.*

Key words: *Professional burnout, psychological stress, internship, teaching hospital*

INTRODUCTION

Internship is a critical point in medical students' journey reflecting transition to independently functioning physician and is an important experience in a physician's life (1,2). It is however faced with several challenges bringing a certain level of distress (1). These challenges include but not limited to long working hours, disturbances in sleep-wake cycles, excessive workload and having multiple responsibilities (1, 3, 4), which occur with significant lack of social support and uncertain future (1,5). These lead to high level of stress and dissatisfaction with 29 to 95% of interns and other physicians considering stress a significant problem (1, 4, 6).

High levels of workplace stress is considered precursor to burnout (1, 3, 4, 6).

The term 'burnout' was first described by the American psychologist Herbert Freudenberger in 1974 (7) and seen mainly in professions having significant contact with other individuals, specifically those that help people such as medicine (1, 7, 8).

Burnout syndrome is a psychological condition characterized by emotional and physical exhaustion, depersonalization, and low personal accomplishment (1, 3). The International Classification of Diseases 11th revision (ICD-11) now has coding for burnout and recognizes it as a syndrome conceptualized as resulting from chronic workplace stress and includes several elements in common with depression and neglect of physical health giving burnout a global recognition (9, 10).

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This will help further highlight the distinct nature of burnout, which traditionally had unclear distinction with other psychiatric diagnosis such as depression, adjustment disorder or chronic fatigue syndrome (11).

Burnout negatively affects patient care, desire to help, willingness to work and increases medical errors (1, 12, 13, 14). It reduces cognitive skills and affects patient and physician satisfaction contributing to brain drain and strains healthcare systems (1, 3, 13, 15, 16). It causes poor physician mental health contributing to depression, anxiety, and poor quality of life (1, 14, 15). It also affects physical wellbeing resulting in inadequate sleep, and adverse health outcomes (1, 9, 15).

The prevalence of burnout among physicians and medical students is reported to be high (15). Data from low and middle-income countries is scarce, but few studies in sub-Saharan Africa reported burnout as a major challenge (13, 16, 17). Prevalence of burnout in interns has also been studied showing levels from 16.7% in Jeddah to as high as 75% in Australia (1, 3, 5, 18).

Several factors affect occurrence of burnout including lack of support, dissatisfaction with education, undefined work roles, sleep deprivation and high work burden (1, 3, 15). Substance use such as smoking and excessive alcohol consumptions seems to increase the risk (15). Salary was also a major contributor in studies among physicians outside internship years (13).

Knowing the magnitude of stress and burnout and contributing factors will help recommend possible solutions. Burnout was studied among Ethiopian physicians and medical students. However, we are not aware of any previous studies that evaluated the level of stress and burnout among interns working in Ethiopia.

The aim of this study was to determine the level of burnout and stress and associated factors among medical interns working at St. Paul's Hospital Millennium Medical College (SPHMMC).

MATERIALS AND METHODS

Study setting and design

The study was conducted at SPHMMC in Addis Ababa, Ethiopia; a tertiary teaching hospital established in 2007 after a medical college was opened in a hospital built in 1968 (19). Interns have rotations of 12 weeks each in of the departments of internal medicine, pediatrics, surgery and obstetrics and gynecology and 6 week rotation in psychiatry and emergency medicine. A cross-sectional survey was conducted from August 24 to September 20, 2020 on interns that worked in the hospital for a minimum of 6 months.

Sample size was calculated using single population proportion formula. The value of P was taken as 22%, according to a study done in similar population in India (5). A desired confidence level of 95% and margin of error of 5% was used resulting in a sample size of 264. There were 106 interns actively working in the hospital. Since this number exceeded the total number of interns, it was planned to include all interns in the data collection.

Survey instrument

Data collection was made using structured electronic online questionnaire. All interns were invited to participate in the survey via social media platform used for a group communication. Filling out the survey proceeded after electronic consent was given.

The questionnaire had four parts. First part included sociodemographic data (age, gender, marital status, residence in college compound, and living with family or not). Second part included a group of structured questionnaires for assessing burnout using Maslach Burnout Inventory (MBI), and stress using Perceived Stress scale-10 (PSS-10) (8, 20). MBI was validated in South Africa for assessment of burnout and has been used in previous studies in Ethiopia (13, 21).

MBI is a 22-item questionnaire instrument assessing burnout (8). It has three components, each assessing emotional exhaustion (EE), depersonalization (DP) and personal accomplishment (PA). EE includes 9 items with a maximum score of 54 and is classified high for score > 26, moderate for scores 19-26 and low for scores below 19. DP has 5 items scored out of 30 and is classified as high if > 9 points, moderate for 6-9 points and low below 6 points. Finally, PA containing 8 items scored out of 48 is scored low for scores < 34, moderate for scores 34-39 and high for above 39.

Since PSS-10 is recommended as a tool to assess the level of stress over the last one month and not a diagnostic instrument, there is no cut off for classification of stress. Dividing the PSS-10 values in to tertiles was done (22, 23). The highest tertile (PSS≥18) was considered to be associated with a higher degree of perceived stress while intermediate score (PSS=18-22) and low score (≤17) was considered lower degree. PSS-10 is validated in Ethiopia (24).

The final parts assessed factors affecting burnout, including individual and work related factors.

Data analysis

Data were generated from the electronic questionnaire in Excel format and checked for completeness. It was then entered into Statistical Package for Social Sciences version 23 and analyzed. Data were summarized using percentages, mean, standard deviation (SD) and presented in tables and figures. Reliability of burnout and stress assessment tools were done. Logistic regression model was used to examine the independent association between burnout, stress and associated factors. Variables with P-value <0.2 in the univariate analysis were included in the multivariate logistic regression model. All variables with a p-value of < 0.05 in the multivariate model were considered statistically significant. Associations between variables were presented in odds ratios (OR) with 95% confidence interval (CI).

Ethical approval

The study was approved by the Institutional Review Board of SPHMMC (IRB code: PM 28/103). Written informed consent was obtained from all participants.

Each participant's information was collected using anonymous electronic questionnaire.

RESULTS

Socio-demographic characteristics

Out of the 106 interns actively working in the hospital, there were 72 responses giving a response rate of 68%. Out of the respondents, 59.7% were males and except for one married individual, all were single. The mean age (SD) was 24.57 (1.46) years and ranged from 23 to 34 years. Most of the participants (70.8 %) live inside the college compound in the dormitories. Over half (54.2%) said their families reside in the capital Addis Ababa and among them 61.5 % do not live with their families during work and reside in the dormitories (Table 1).

Table 1: Sociodemographic characteristics of interns, SPHMMC, Addis Ababa, 2020

Characteristic	Number	Percent
Age Group		
Up to 24 years	44	61.1
25 years and above	28	38.9
Gender		
Female	29	40.3
Male	43	59.7
Place of residence		
Inside college compound	51	70.8
Outside college compound	21	29.2
Family residence		
Addis Ababa	39	54.2
Outside of Addis Ababa	33	45.8
Current rotation		
Emergency medicine	10	13.9
Internal Medicine	17	23.6
Obstetrics/Gynecology	15	20.8
Pediatrics	13	18.1
Psychiatry	5	6.9
Surgery	12	16.7

Other co-morbid conditions

Several individual-related factors were assessed. Six participants reported as having been diagnosed with psychiatric conditions in a healthcare setting which included three individuals with major depressive disorder and two with generalized anxiety disorder. The average number of night duties per week ranged from 0 to 4 with 68% having 2 duty shifts while, 26% having 3 duties.

Two respondents said they smoke cigarettes or chew khat regularly and 6 individuals consumed alcohol regularly. A total of 8 (11.1%) individuals regularly used any of the mentioned substances. Eighty-three percent were not aware of any support service in the hospital. Finally, 69.4% of respondents had planned to leave the country and 43.1% had planned to change their profession (Table 2).

Table 2: Other co-morbid conditions of interns, SPHMMC, Addis Ababa, 2020

Factor assessed	Number	Percent
Regular physical activity		
No	61	84.7
Yes	11	15.3
Average number of duty per week		
<3	51	70.8
≥3	21	29.1
Excessively worried about COVID-19 pandemic		
No	43	59.7
Yes	29	40.3
Awareness of support services		
No	60	83.3
Yes	12	16.7
Plans to leave the country		
No	22	30.6
Yes	50	69.4
Plans to change profession		
No	41	56.9
Yes	31	43.1

COVID-19: Coronavirus Disease 2019

Reliability of survey questionnaire

Evaluation of the internal consistency (cronbach's alpha) of the instrument was done and α-values of 0.908, 0.801, and 0.694 were obtained for EE, PA, DP subscale respectively. All α-values were above 0.6 and were acceptable. Similarly, a good internal consistency of α = 0.879 was seen for PSS-10 questionnaire.

Burnout assessment

The burnout assessment of interns showed that 69.4%, 41.7%, and 44.4% of them reported high EE, high DP, and highly reduced sense of PA respectively. The mean scores of MBI components for EE was 33.4 (range: 4 to 54) reflecting a high level. In contrast, the mean scores for DP and PA respectively, were 9.4 (range: 0 to 25) and 34.1 (range: 16 to 48) reflecting moderate levels of DP and reduced PA (Figure 1).

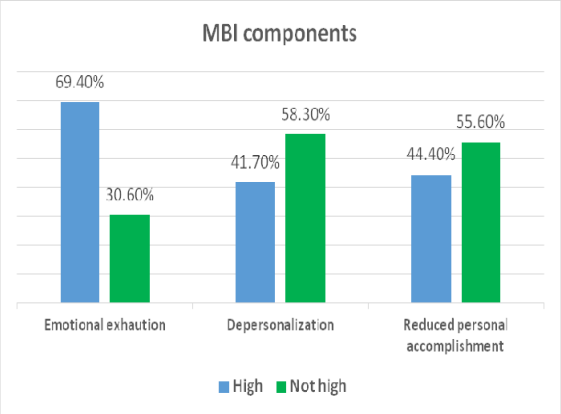

Figure 1: Burnout status of study participants, SPHMMC, Addis Ababa, 2020

Ten (13.9%) interns had high level of burnout in all three MBI components and 13 (18%) in two components.

Stress

The mean PSS-10 score was 21.03, which lied in the high tertile range and 37% of responses were in this range reflecting a high level of perceived stress. The rest 36.1% and 26.4% were in the moderate and low group respectively (Table 3).

Work related challenges faced during internship

The interns were asked to rate the challenges they faced on a 5-point likert scale. The biggest challenge identified from the responses was 'Poorly defined role as an intern' whereby 97.2% said that they 'agree' or 'strongly agree'. Ninety percent agree with having excessive work load and 92.7% complained of fatigue and sleep deprivation (Table 4).

Factors associated with burnout

The odds of having EE was five times higher in individuals having plans to change profession (AOR, 5.13; 95% CI, 1.31-21.11) and had excessive financial worries (AOR, 5.57; 95% CI, 1.23-25.15) and six times higher in individuals who reported high level of perceived stress (AOR, 6.17; 95% CI, 1.29- 29.59) after controlling for the other variables. Similarly, all the three factors were independently associated with high DP. Fear of medical errors increased the odds of DP (AOR, 4.56; 95% CI, 1.14-18.23). Participants who reported high level of perceived stress had three times increased odds of reporting low levels of PA (AOR, 3.09; 95% CI, 1.03-9.29). Having plans to change profession increased the odds of reporting high stress by five-fold (AOR, 5.16; 95% CI, 1.411-18.924) (Table 5).

Table 3: Characteristics of high perceived stress, SPHMMC, Addis Ababa, 2020

Variable	PSS-10 high	
	Number	Percent
Age group in years		
<25	16	36.4
≥25	11	39.3
Gender		
Female	15	51.7
Male	12	27.9
Place of residence		
Inside college compound	18	35.3
Outside college compound	9	42.9
Family residence		
Addis Ababa	18	46.2
Outside of Addis Ababa	9	27.3
Department		
Internal Medicine	10	58.8
Pediatrics	3	23.1
Obstetrics and gynecology	7	46.7
Emergency medicine	2	20
Psychiatry	0	0
Average number of duties in the last week		
<3	17	33.3
≥3	10	47.6
Regular physical activity		
No	22	36.1
Yes	5	45.5
Drink alcohol regularly		
No	23	34.8
Yes	4	66.7
Excessively stressed/ worried about COVID-19 pandemic		
No	17	39.5
Yes	10	52.6
Awareness of support services		
No	25	41.7
Yes	2	16.7
Plans to leave the country		
No	5	22.7
Yes	22	44
Plans to change profession		
No	10	24.4
Yes	17	54.8

Table 4: Work-related factors, SPHMMC, Addis Ababa, 2020

Challenges faced during work	Strongly agree or agree	Percent
Lack of support	44	61.1
Excess work overload	65	90.2
Difficulty integrating well with the team	5	6.9
Inadequacy of clinical skills	7	9.7
Inadequacy of clinical knowledge	5	6.9
Feeling inadequately prepared to work as a doctor	11	15.2
Difficulty balancing work with personal life	24	33.3
Difficulty interacting with senior staff	28	38.8
Having poorly defined role as an intern	70	97.2
Having financial worries	24	33.3
Having future and career uncertainty	64	88.8
Conflict with allied health professionals	49	68
Difficulty attaining education and practical skills needs	49	68
Fear of error leading to patient suffering	36	50
Fear of medico-legal consequences	30	41.6
Excess fatigue and sleep deprivation	66	91.7
Lack of recognition	64	88.9
Finding a comfortable place to sleep/rest while on duty	53	73.7

Table 5: Multivariate logistic regression analysis of factors associated with burnout and stress, SPHMMC, Addis Ababa, 2020

	Crude OR	95% CI	P-value	Adjusted OR	95% CI	P-value
Emotional exhaustion						
Plans to change profession	5.28	1.56 – 17.85	0.005	5.13	1.31 – 21.11	**0.019**
Financial worries	3.0	0.88 – 10.18	0.07	5.568	1.23 – 25.15	**0.026**
High perceived stress	5.85	1.53 – 22.2	0.006	6.17	1.29 – 29.6	**0.023**
Plans to leave country	2.64	0.91 – 7.62	0.069	0.7	0.16 – 3.11	0.639
Lack of support	2.55	0.91 – 7.13	0.071	2.3	0.63 – 8.67	0.206
Fear of medical error	2.23	0.79 – 6.26	0.125	2.4	0.65 – 8.9	0.189
Finding a place to sleep	2.77	0.93 – 8.29	0.064	2	0.47 – 8.4	0.346
Difficulty with staff interactions	2.87	0.93 – 9.07	0.062	2.5	0.562 – 10.96	0.23
Depersonalization						
Plans to change profession	5.64	2.02 – 15.7	0.001	5.09	1.79-14.45	**0.002**
Financial worries	2.8	1.02 – 7.68	0.043	3.98	1.19 – 13.33	**0.025**
High perceived stress	3.22	1.19 – 8.7	0.019	4.27	1.31-13.93	**0.016**
Number of duties per week	2.44	0.87 – 6.9	0.091	1.57	0.36 – 6.77	0.547
Difficulty with staff interactions	2.86	1.07 – 7.62	0.034	2.57	0.63 – 10.6	0.19
Fear of medical error	0.41	0.15 – 1.13	0.056	4.56	1.14 – 18.23	**0.032**
Difficulty attaining education	0.41	0.15 – 1.13	0.08	0.247	0.06 – 1.04	0.057
Personal accomplishment						
High perceived stress	3.4	1.25 – 9.22	0.014	3.09	1.03 – 9.29	**0.044**
Difficulty attaining education	0.37	0.14 – 1.03	0.055	0.378	0.13 – 1.14	0.084
Difficulty with staff interactions	3	1.12 – 7.98	0.027	0.75	0.96 – 7.83	0.059
Perceived stress						
Plans to change profession	3.76	1.38 – 10.28	0.01	5.16	1.41-18.92	**0.015**
Gender	2.77	1.03 – 7.43	0.043	3.43	0.94 – 12.52	0.62
Plans to leave country	2.61	0.85 – 8.38	0.092	1.75	0.46 – 6.61	0.409
Awareness of support service	0.28	0.56 – 1.39	0.12	0.263	0.04 – 1.71	0.163

OR - odds ratio

DISCUSSION

A high level of burnout was reported by the participants. High EE was reported in 69.4% of the participants in our study. This figure is much higher than previous reports from studies done in Ireland, Mexico, Saudi Arabia, India and Australia which showed high EE from 34% to the highest of 55% in an Irish study (1, 3, 5, 9, 18).

However, a study from United States of America exceeds this figure with 84% reporting high EE (12). The level of high DP (41.7%) was in the range of reports from the mentioned studies which ranged from 39% to 84.9 % (1, 3, 5, 9, 12, 18).

Highly reduced PA (44.4%) was comparable to most studies reporting figures from 41.6% to 75.5% (1, 3, 9, 12) but markedly different from an Indian study report of 77% (5) and an Australian one of 15% (18). These differences might be a reflection of the differences of settings the studies were done including the types of hospitals (public or private), the difference in workload, culture, socioeconomic status, type of patients seen and availability of treatments.

All of these studies reflect the significance of burnout and the importance of addressing it not only in medical students and higher level physicians but also in interns.

Financial issues have been found to be significant contributors to burnout in all physicians (1, 25). A Saudi Arabian study reasoned that living in a self-owned house provides financial security and subsequently leads to less burnout (9). Burnout has also been found to be more common in individuals contemplating changing their careers as it reflects the level of frustration with their life and career (9). An association between intern stress and medical errors has been reported (18). In addition, medical errors can be a source of burnout while burnout by itself can increase medical errors showing that it can also affect patients and potentially lead to litigation (11).

Not only were components of burnout high, but so was the level of perceived stress. Previous studies have shown that high level of stress poses a threat to increasing burnout (26, 27). This has also been reflected in interns whereby 43% in one study with high burnout reported mild to severe degrees of distress assessed by the 12-item general health questionnaire (1). Our study also supports this association by reflecting the significance of stress on all three components of burnout.

There was also significant difference with regards to gender and burnout. Previous studies show inconsistencies with which gender is more affected. Most studies in interns, however, reveal that gender might not be significant (1, 3, 5, 9). The same was true for dormitory residence and places of family residence. Similar to our findings, more than 80% of participants in a comparative study were not aware of support services which may hinder them from seeking help (1). A comparative percentage (around 70%) wish to leave their country in the future (1). This is an alarming number and contributes to the high physician attrition the country faces (28). The increasing saturation of many cities with physicians, particularly general practitioners, is leading to rising unemployment, which can further affect medical students and junior doctors (29). Contemplating to change profession can stem from lack of employment prospects, which was shown to be related to components of burnout on a study from Ethiopia (30).

It is critical to raise awareness about the significance of stress and burnout among interns. Interns are not provided with the concern given to other physicians, which is reflected by the paucity of previous studies on the subject on interns. Burnout is as common, if not more, compared to physicians who completed internships. Subsequently, the impact on mental and physical well-being can be mitigated (16). Healthy and satisfied physicians are essential for providing appropriate care for patients by minimizing medical errors, reducing physician fatigue, and improving patient satisfaction (3, 5, 18, 31).

Support services including psychological support that is designed to address their challenges must be made available and they should be aware of it as soon as they start internship. Mentorship by physicians that have passed their internship and have experience dealing with its challenges can help by addressing the issues they might have.

To our knowledge, this study is the first of its kind done to assess burnout among interns in Ethiopia. An internationally validated instrument was used to assess burnout and a locally validated one was used for evaluation of stress. It will serve as an important starting point for further research. However, it has some limitations. Response rate of 68% may not be representative of all interns, but is higher than 35% and 45% in other similar studies (1, 9). The number of participants is low and it is recommended that future large scale multi-center studies be done. This was a cross-sectional study and definitive conclusions about causality cannot be made. Initial baseline data collection and serial follow-up was not made.

Conclusions

In summary, levels of burnout and stress in was high among interns. The results underscore the need to raise awareness on the problem. Promoting mental well-being and optimizing preventative and psychosocial support services is essential. The college must make the mental wellbeing of its physicians a priority and act early.

Financial and job security must be safeguarded so that junior physicians can work in a more conducive work environment. Further studies on the subject with more detailed assessments on impacts of burnout on other components of mental health needs to be conducted.

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Conflict of interests

All authors declare that they have no conflict of interest regarding this manuscript.

REFERENCES

1. Hannan E, Breslin N, Doherty E, McGreal M, Moneley D, Offiah G. Burnout and stress amongst interns in Irish hospitals: contributing factors and potential solutions. Ir J Med Sci. 2018;187: 301-307
2. Swaid AI, Elhilu AH, Mahfouz MS. Medical internship training in Saudi Arabia: interns' views and perceptions. Adv Med Educ Pract. 2017;8:121-128
3. Miranda-Ackerman RC, Barbosa-Camacho FJ, Sander-Möller MJ, Buenrostro-Jiménez AD, Mares-Paíset R, Cortes-Flores AO, et al. Burnout syndrome prevalence during internship in public and private hospi tals: a survey study in Mexico. Med Educ Online. 2019; 24(1) :1593785
4. Lam TP, Wong JG, Ip MS, Lam KF, Pang SL. Psychological well-being of interns in Hong Kong: What causes them stress and what helps them. Med Teach. 2010;32(3):e120-e126
5. Niranjan V, Udey B, Razdan RG. Evaluation of burnout in medical interns: an institutional study. Int J Res Med Sci. 2017;5(5):2173-2175
6. Abdulghani HM, Irshad M, Zunitan MA, Sulihem AA, Dehaim MA, Esefir WA, et al. Prevalence of stress in junior doctors during their internship training: a cross-sectional study of three Saudi medical coll eges' hospitals. Neuropsychiatr Dis Treat. 2014;10:1879-1886
7. Freudenberger HJ. Staff burnout. J Soc Issues. 1974;30(1):159–165
8. Maslach C, Jackson SE. The measurement of experienced burnout. J Org Behav. 1981;2:99-113
9. Mufarrih SH, Naseer A, Qureshi NQ, Anwar Z, Zahid N, Lakdawala RH, et al. Burnout, Job Dissatisfac tion, and Mental Health Outcomes Among Medical Students and Health Care Professionals at a Tertiary Care Hospital in Pakistan: Protocol for a Multi-Center Cross-Sectional Study. Front Psychol. 2019; 10:2552
10. The lancet. ICD-11. Lancet. 2019 Jun 8;393(10188):2275
11. Kaschka WP, Korczak D, Broich K. Burnout: a fashionable diagnosis. Dtsch Arztebl Int. 2011;108 (46):781-787
12. Doolittle BR, Windish DM. Correlation of burnout syndrome with specific coping strategies, behaviors, and spiritual attitudes among interns at Yale University, New Haven, USA. J Educ Eval Health Prof. 2015;12:41
13. Lrago T, Asefa F, Yitbarek K. Physicians' Burnout and Factors in Southern Ethiopia Affecting It. Ethiop J Health Sci. 2018;28(5):589-598
14. Kim MH, Mazenga AC, Yu X, Simon K, Nyasulu P, Kazembe PN, et al. Factors associated with burnout amongst healthcare workers providing HIV care in Malawi. PLos One. 2019;14(9):e0222638
15. Haile Y.G, Senkute A.L, Alemu BT, Bedane DM, Kebede KB. Prevalence and associated factors of burnout among Debre Berhan University medical students: a cross-sectional study. BMC Med Educ. 2019;19(2):413
16. Dubale BW, Friedman LE, Chemali Z, Denninger JW, Mehta DH, Alem A, et al. Systematic review of burnout among healthcare providers in sub-Saharan Africa. BMC Public Health 2019; 19(1):1247
17. Selamu M, Thornicroft G, Fekadu A, Hanlon C. Conceptualisation of job-related wellbeing, stress and burnout among healthcare workers in rural Ethiopia: a qualitative study. BMC Health Serv Res. 2017; 17 (1):412.
18. Willcock SM, Daly MG, Tennant CC, Allard B. Burnout and psychiatric morbidity new medical gradu ates. MJA 2004;181(7):357-360
19. SPHMMC SPHMMC. About – Saint Paul's Millennium Medical College. Retrieved from: https:// sphmmc.edu.et/about/ (accessed: Aug 20)
20. Cohen S, Kamarck T, Mermelstein R, A global measure of perceived stress. J Health Soc Behav. 1983;24 (4):385-396.
21. Naude J.L, Rothmann S. The validation of the Maslach Burnout Inventory – Human Services Survey for emergency medical technicians in Gauteng. SA J Ind Psychol. 2004;30(3):21-28
22. Alosaimi FD, Alawad HS. Alamri AK, Saeed AI, Aljuaydi KA, Alotaibi AS, et al. Patterns and determi nants of stresss among consultant physicians working in Saudi Arabia. Adv Med Educ Pract. 2018;9:165-174
23. Pangtey R, Basu S, Meena GS, Banerjee B. Perceived Stress and its Epidemiological and Behavioral Cor relates in an Urban Area of Delhi, India: A Community-Based Cross-Sectional Study. Indian J Psychol Med. 2020;42(1):80-86
24. Manzar MD, Salahuddin M, Peter S, Alghadir A, Anwer S, Bahammam AS, et al. Psychometric proper ties of the perceived stress scale in Ethiopian university students. BMC public health. 2019;19(1):41.

25. Wiederhold BK, Cipresso P, Pizzioli D, Wiederhold M, Riva G. Intervention for physician burnout: A systematic Review. Open Med (Wars). 2018;13:253-263
26. Yates SW. Physician Stress and Burnout. Am J Med. 2020;133(2):160-164
27. Elit L, Trim K, Mand-Bains IH, Sussman J, Grunfeld E. Job satisfaction, stress, and burnout among Cana dian gynecologic oncologists. Gynecol Oncol. 2004;94(1):134-9
28. Berhan Y. Medical doctors profile in Ethiopia: In memory of 100-years Ethiopian modern medicine and t he new Ethiopian millennium. Ethiop Med J. 2008; 46 Suppl 1:1-77
29. Assefa T, Haile Mariam D, Mekonnen W, Derbew M. Health system's response for physician workforce shortages and the upcoming crisis in Ethiopia: a grounded theory research. Hum Resour Health. 2017;15 (1):86
30. Selamu M, Hanlon C, Medhin G, Thornicroft G, Fekadu A. Burnout among primary healthcare workers during implementation of integrated mental healthcare in rural Ethiopia: a cohort study. Hum Resour Health. 2019 Jul 18;17(1):58
31. Nason GJ, Liddy S, Murphy T, Doherty EM. A cross-sectional observation of burnout in a sample of Irish junior doctors. Ir J Med Sci. 2013;182(4):595-9

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ORIGINAL ARTICLE

AGE AT MENARCHE, FACTORS THAT INFLUENCE IT, AND MENSTRUAL PATTERN OF SECONDARY SCHOOL ADOLESCENTS IN ADDIS ABABA, ETHIOPIA

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ABSTRACT

Introduction: *Menarche is the first menstrual period of a girl. Age at menarche is a complex trait and has a strong genetic component. The mean age of menarche varies from population to population and is known to be a sensitive indicator of various characteristics of the population, including nutritional status, geographical location, environmental conditions, and magnitude of socioeconomic inequalities in society.*

Objectives: *To determine the mean age of menarche, and assess influencing factors and menstrual patterns of secondary school adolescent females in Addis Ababa, Ethiopia.*

Methods: *This is a cross-sectional study conducted from January to May 2017 in selected high schools in Addis Ababa, Ethiopia. Female adolescents in the selected schools who were in grades 9th and 10th and who fulfilled the eligibility criteria were included. A self-administered questionnaire tool was used to collect data. Data was cleaned, entered and analyzed using SPSS version 21.*

Results: *The mean and median ages at menarche in this study were 13.75* ***(±1.30)*** *and 13 years, respectively. The mean age at menarche was 0.96 years younger for private school girls (12.82 years) compared to government school girls (13.78 years). The private school girls had about 4 times higher odds of having menarche at an earlier age (AOR 4.12; 95% CI 2.44-6.95). The most common perimenstrual symptoms experienced by the students were dysmenorrhea (abdominal cramps) 303 (75.8 %), backache 188 (47.0 %), and headache 16%. In this study, abnormal menstrual cycle lengths occurred in 25.1 % of our respondents. Of the total study population, 77 (19.3%) adolescents had a menstrual cycle length shorter than 21 days.*

Conclusion: *The mean age at menarche in this study was 13.26 ±1.319 years. This age at menarche was earlier than prior reports from Ethiopia. Socioeconomic status was identified as a factor significantly associated with the age at menarche. Dysmenorrhea was the commonest perimenstrual symptom.*

Key words: *Age at menarche, adolescents, perimenstrual symptom.*

INTRODUCTION

Menarche is the first menstrual bleeding and represents a major landmark event in the reproductive life of an adolescent girl. (1) It is the most accurately recalled indicator of puberty. (2) Age at menarche (AAM), as a result, is one of the most significant traits, which is commonly used in retrospective epidemiological studies of female sexual maturation. (3)

Menarche is part of the complex process of growing up. Its onset is preceded by a complex cascade of hormonal changes during puberty which is susceptible to various factors from the very beginning of prenatal life. (4) The mean age at menarche varies from population to population and is known to be a sensitive indicator of various characteristics of the population including nutritional status, geographical location, environmental conditions, and socioeconomic status. (5-7)

Studies suggest that menarche tends to appear earlier in life as the sanitary, nutritional, and economic conditions of a society improve. (8)

Over time, the age at menarche has been found to show a steady decline of about two to three months per decade in developed countries (9), and about six months per decade in developing countries. (10) The mean age at menarche in the United States of America is 12.55 and 12.0 years among black and white girls, respectively. (5) The reported ages at menarche in India were 15.9 and 15.6 years for rural and urban girls respectively. (11) Two studies done in rural Ethiopia revealed the mean age at menarche to be 15.8 ± 1 and 13.9 ± 1.2 years. (3, 12)

The normal range for menstrual cycles is between 21 and 35 days while the duration of menstrual flow ranges from two to seven days.

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Menstrual abnormalities are more common among younger girls, becoming less frequent as they grow older, 3–5 years after menarche. (13-17) For the first few years after menarche, irregular and longer cycles are common. (15-18) Menstruation may also be associated with various symptoms occurring before or during menstrual flow. A significant number of young students complain of dysmenorrhea, and this is more common among older girls with longer bleeding periods. (18)

Knowledge on age at menarche and pattern in menstrual cycles is necessary for patient education and to guide individualized clinical care. To our knowledge there is no published study in our country comparing age at menarche and menstrual patterns between different socioeconomic groups. The purpose of this study, hence, was to determine the age at menarche and patterns of menstruation among secondary school girls of different socioeconomic status in Addis Ababa.

METHODS

Study design: This is a cross-sectional study conducted from January through May 2017 in selected high schools in Addis Ababa, Ethiopia. Study setting: Addis Ababa has 10 administrative districts and subcities. The total number of secondary schools in the city was 212. Study population: Secondary school adolescents who have started to menstruate and attending secondary schools in Addis Ababa, Ethiopia.

Sample size: The sample size was determined using a single proportion formula with a level of significance of 5%, Z = 1.96 (confidence level at 95%), and the absolute precision or margin of error d=0.05. The 50% proportion (P=0.5) was taken for the sake of having a larger sample size. Sampling procedure: A two-stage sampling was used. In the first stage, one administrative district was selected randomly. In the second stage, four high schools, two from government and two from non-governmental schools, were selected randomly from the selected district. The two study government schools were Tikur Anbessa and Atse Naod High schools. The two non-governmental schools were Lycée Guebre Mariam (an international school) and the Nativity Girls School (a missionary school). The study sites also presented a comparative advantage in that each group of schools represented children from low and high socioeconomic groups.

Operational definition: The age at menarche was determined by questioning the age of the girl at having her first menstruation.

Data collection: Data was collected using a self-administered pre-tested questionnaire during school hours. Grades 9 to 11 students who already had menarche were included in the study using quota sampling on convenience till the sample size is reached. Of the total sampled 422 adolescents, 400 (95%) had their menarche and were eligible for analysis.

Data compilation and analysis: The collected data was coded, cleaned, and analyzed using SPSS version 21 statistical software. Descriptive statistics were used to present the results. Tables and different graphs were used to assist data presentation. The chi-square test of independence was done between the independent (socio-demographic variables) and dependent variables (age of menarche). The tested independent variables were the type of school, place of residence, religion, paternal and maternal educational levels, maternal and paternal occupation, and family size. The dependent variable was the age of menarche.

A stepwise analysis was conducted to explore the presence and strength of the association between the independent variables and age at menarche. Regression analysis was implemented between selected independent variables and age at menarche as a dichotomous variable (≤13 and >13 years). Earlier age at menarche was taken as age at menarche of below the identified mean age at menarche in the present study. Initially, bivariate regression analysis was conducted for each independent variable with a chi-square value of <0.2 on cross-tabulation for the test of independence. Multiple regression analysis was then employed for those with a significant association (P<0.05) on bivariate analysis to control for confounding effects among the variables. Odds ratios (ORs) with their 95% confidence intervals were computed to identify the presence and strength of association and P-values<0.05 were taken as statistically significant.

Ethical considerations: Ethical approval was obtained from the Institutional Review Board of the College of Medicine and Health Sciences of the AAU. Permission to conduct the study was also obtained from the principals of participating schools. Participation in the assessment was completely voluntary with ascent and written informed consent was acquired from every participant and their parents before participation. No names were recorded to keep the identity of respondents anonymous.

RESULTS

Data for the present study was collected from 400 eligible schoolgirl study participants. The current age of the study participants ranged from 14 to 18 years, while the mean age was 15.98 (±1.14) years.

Sociodemographic variables

As shown in table-1 below, 230 (57.5%) of the participants were from private schools. The majority of the study participants were from Addis Ababa and Orthodox in religion with proportions of 367 (91.8%) and 303 (75.8%), respectively. About two-thirds, 276 (69%) were grade 9 students. The paternal and maternal education level was higher education (above high school) for 184 (46%) and 148 (37%) of the participants, respectively.

Table 1: Socio-demographic characteristics of adolescents at selected high schools in Addis Ababa, Ethiopia, January - May 2017GC.

Characteristics	Frequency n (%)
Current age in years (n=400)	
14 years	35 (8.8)
15 years	115 (28.7)
16 years	117 (29.3)
17 years	89 (22.3)
18 years	44 (11.0)
Type of school (n=400)	
Private	230 (57.5)
Government	170 (42.5)
Residence (n=400)	
Addis Ababa	367 (91.8)
Outside Addis Ababa	33 (8.2)
Education level (Grade) (n=400)	
9	276 (69)
10	3 (0.8)
11	121 (30.2)
Religion (n=400)	
Catholic	12 (3.0)
Muslim	40 (10.0)
Orthodox	303 (75.8)
Protestant	41 (10.2)
Others	4 (1.0)
Paternal Education (n=389)	
Elementary or less	98 (24.5)
High school complete	107 (26.7)
Higher education	184 (46.0)
Unknown	11 (2.8)
Maternal Education (n=384)	
Elementary or less	118 (29.5)
High school complete	118 (29.5)
Higher education	148 (37.0)
Unknown	16 (4.0)
Family size (n=400)	
1-3	46 (11.5)
4-6	288 (72.0)
>6	66 (16.5)

Age at menarche

The mean and median ages at menarche in the present study were 13.75 (±1.30) and 13 (IQR 2) years, respectively. Demonstrated below in Figure 1 is the age at menarche of the study participants. The age at menarche ranged from 10 to 16 years. Nearly all, 392 (98%) had their menarche by 15 years.

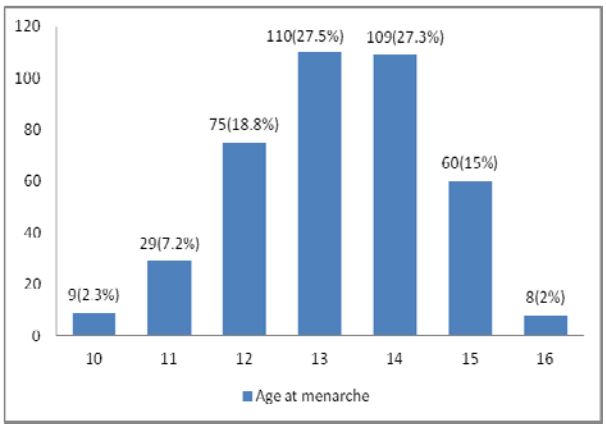

Figure 1: Age at menarche of schoolgirls at selected high schools in Addis Ababa, Ethiopia, January - May 2017GC. (n=400)

Regression analysis was implemented between selected independent variables and age at menarche as a dichotomous variable (≤13 and >13 years). Earlier age at menarche was taken as age at menarche of below the identified mean age at menarche in the present study.

A stepwise analysis was conducted to explore the presence and strength of the association between the independent variables and age at menarche. Initially, bivariate regression analysis was conducted for each independent variable with a chi-square value of <0.2 on cross-tabulation for the test of independence. Bivariate regression analysis implemented using age at menarche as a dichotomous variable above and below the mean age at menarche (≤13 years and >13 years) revealed associations between earlier age at menarche (≤13 years) and selected independent variables. On multivariate analysis, however, only type of school and religion remained to be significantly associated (P<0.05) with earlier age at menarche (≤13 years).

Table 2 shows the results of the logistic regression model of selected socio-demographic variables vs. earlier age at menarche for adolescents.

The mean age at menarche was 0.96 years younger for private school girls (12.82 years) compared to government school girls (13.78 years). The private school girls had about 4 times higher odds of having menarche at an earlier age (AOR 4.12; 95% CI 2.44-6.95).

The study subjects who were Catholic in religion had a mean age of 12.6 years, which is 1.15 years earlier than the overall mean age at menarche (13.75 years). The Catholics had about 10 times higher odds of having menarche at an earlier age compared to protestants (AOR 9.5; 95% CI 1.04-86.76).

As shown in the table, study participants whose paternal and maternal education levels were elementary and high school had a significant association with earlier age at menarche in the bivariate analysis (P<0.05), while the association was lost in multiple regression models.

Menstrual cycle pattern

Table 3 below demonstrates the menstrual cycle pattern of the study participants. Of the total study population, 77 (19.3%) adolescents had a menstrual cycle length shorter than 21 days. More than half, 211 (52.8%) had a cycle length between 21 and 28 days. In 23 of them (5.8%), the menstrual cycle interval was longer than 35 days. The majority, 282 (70.5%), had a menstrual duration of flow of 3-5 days, while only 4 (1.0%) had a duration of fewer than 3 days. The menstrual cycles were described as regular by half and 203 (50.7%) of the participants. Nearly half of the participants, 199 (49.7%), used 3-4 sanitary pads per day during menstruation. Only 22 (5.5%) used > 4 pads per day.

Peri-menstrual symptoms

Table 4 below demonstrates the perimenstrual symptoms reported by the study participants. Abdominal cramps and backaches were the shared reported symptoms experienced by 303 (75.8%) and 188 (47%) of the participants, respectively. A quarter of them, 102 (25, 5%), reported having been absent from school due to perimenstrual symptoms. The use of medication for the symptoms was practiced by 98 (24.5%) of the participant girls.

Table 2: Regression analysis of selected socio-demographic variables vs earlier age at menarche of Adolescents at selected high schools in Addis Ababa, Ethiopia, January - May 2017GC

Characteristics	Mean age at menarche	OR for earlier age at menarche (≤13 years) COR** P-value	95% CI	AOR*** P-value	95% CI
Type of school (n=400)					
Private	12.83	0.000	3.88 (2.55-5.90)	0.000	4.12 (2.44-6.95)*
Government	13.78		1		1
Religion (n=400)					
Catholic	12.67	0.031	10.48 (1.24-88.75)	0.046	9.50 (1.04-86.76)
Muslim	13.48	0.908	1.05 (0.44-2.52)	0.097	2.24 (0.86-5.79)
Orthodox	13.21	0.610	1.19 (0.62-2.28)	0.545	1.24 (0.62-2.50)
Others	13.37	0.963	0.95 (0.12-7.42)	0.779	0.73 (0.08-6.42)
Protestant	13.00		1		1
Paternal Education (n=389)					
Unknown	13.64	0.499	1.53 (0.45-5.19)	0.818	0.86 (0.23-3.15)
Elementary or less	13.48	0.002	2.24 (1.36-3.70)	0.836	0.93 (0.44-1.94)
High school complete	13.36	0.028	1.80 (1.11-2.92)	0`.341	0.74 (0.40-1.39)
Higher education	13.00		1		1
Maternal Education (n=384)					
Unknown	13.25	0.429	1.52 (0.54-4.33)	0.53	9.70 (0.24-2.11)
Elementary or less	13.53	0.000	2.49 (1.51-4.09)	0.97	8.99 (0.46-2.11)
High school complete	13.28	0.047	1.65 (1.01-2.72)	0.88	1.05 (0.56-1.97)
Higher education	12.96		1		1

Table 3: Menstrual cycle pattern of adolescents at selected high schools in Addis Ababa, Ethiopia, January - May 2017 GC (n=400)

Age (years)	Frequency	Percent	Cumulative Percent
Length of Menstrual cycle (days)			
< 21	77	19.3	19.3
21-28	211	52.8	72.0
29-35	89	22.3	94.3
>35	23	5.8	100.0
Duration of flow (days)			
< 3	4	1.0	1.0
3 – 5	282	70.5	71.5
6-8	114	28.5	100
Regularity of menstrual cycle			
Regular	203	50.7	50.7
Not regular	197	49.3	100.0
Number of sanitary pads used per day			
1-2	179	44.8	44.8
3-4	199	49.7	94.6
>4	22	5.5	100

Table 4: Peri-menstrual symptoms and related effects of adolescents at selected high schools in Addis Ababa, Ethiopia, January - May 2017GC. (n=400)

Age (years)	Frequency	Percent
Type of peri-menstrual symptom reported		
Abdominal cramp	303	75.8
Backache	188	47.0
Headache	64	16.0
Nausea	44	11.0
Vomiting	22	5.5
Diarrhea	2	0.5
Others	17	4.3
Absence from school due to symptoms		
Yes	102	25.5
No	298	74.5
Use of medications for symptoms		
Yes	98	24.5
No	302	75.5

Source of information about menstruation

Only 7 (1.8%) of the study participants had no information about menstruation before menarche. The most important source of information for the adolescents was mothers, reported by 270 (65.7%) of the participants. Sisters, friends, and teachers were other sources of information for 67 (16.8%), 56 (14%), and 44 (11%) of the participant's students, respectively. Other sources like books and magazines were reported as sources of information by 24 (6%) participants.

DISCUSSION

This study found that the majority of study participants experienced menarche between ages 13 and 15, with a mean recall age at menarche of 13.26 ±1.319 years. The mean age at menarche in the present study was earlier than previous reports from Ethiopia and some other developing countries (19-21), but later than that in developed countries like USA, Italy, and Canada (5, 17, 18, 22, 23)

Prior studies done in Ethiopia revealed age at menarche of 13.9 ± 1.2 years at Sawla town (3), 14.8 (13.9 -15.3) years at Dabat and Koladiba (12), 14 years in Tigray (24) and 13.72 ± 1.31 years in Addis Ababa (25) which were all above the present finding. This possibly is due to the fact that the current study was conducted in a capital city where social welfare is higher than in other parts of the country. And the second reason may be linked to the time effect: these studies were done nearly a decade ago between 2007 and 2013. This may also reflect a declining trend of age at menarche in Ethiopia as well, which may be a proxy indicator of the ongoing improvement in the socioeconomic status of the population in the country.

The age at menarche in our study, however, was higher than some in African countries, 12.5 years in South Africa (26), and 12.49 years in Egypt (27), 13.66, and Northern Ghana (28). The mean AAM was also higher than reports from developed countries, 12.54 years in the United States (29), 12.7 years in the UK (30), and 12.72 (±1.05) years in Canada (23). The higher AAM in the present study may be related to socioeconomic differences between the countries

Factors influencing age at menarche

The study showed that there were statistically significant differences in menarcheal ages based on the category/class of school they attend (aOR 4.12, 95%CI 2.44-6.). Seventy percent of students attending private schools had a menarche age of lower than 13 years compared to 37% of those from public schools. The difference here and compared to other countries may be explained by the economic disparity between the two natures of schools. (25)

The effect of socioeconomic circumstances on the age of menarche has been shown in several studies with girls in more deprived situations experiencing later menarche as they are unable to obtain the appropriate nutrition for proper growth and development (5, 28, 31). The proportion of students based on religion whose age at menarche was less than 13 years was Catholic (91.1%), Orthodox (54.4%), Muslim (52.5%), and Protestant (51.2%). The differences in menarche age based on religion were statistically significant (aOR 9.50, 95% CI 1.04-86.76). This may reflect the disparities in the standard of life among different religious followers.

Menstrual pattern

Menstruation may be associated with various kinds of symptoms occurring before and during menses. In this study, the most common symptoms experienced by the students were dysmenorhea (abdominal cramps) 75.8 %, backache 47.0 %, and headache 16%. This finding is comparable to studies done in Ethiopia (3), India (32) and Malasya (33). Dysmenorrhea was a major cause of school absenteeism 25.5%). The school absenteeism due to dysmenorhea in this study was higher than in Indian study (34), comparable to a Saudi Arabian study (35), but less than reports from Ethiopia (12)), Malaysia 33 and USA (36) It is important that school girls are given adequate counselling and offered proper guidance on dysmenorhea and other perimenstrual symptoms..

Menstrual cycle abnormalities (irregular and longer cycles) are more common among younger girls in the first few years after menarche. 12 = (10) In this study abnormal menstrual cycle lengths occurred in 25.1 % of our respondents, which is in the range of 13.2 % to 37.2 % noted in some studies. (33, 37)

Conclusion and implications

The mean age at menarche of the respondents in this study was 13.26 ±1.319 years. This age at menarche was earlier than prior reports from Ethiopia. Socioeconomic status was identified as a factor significantly associated with the age at menarche. Dysmenorrhea was the commonest perimenstrual symptom.

Sociodemographic attributes may be a marker for the age of menarche and symptoms. Prospective studies are needed to better understand the influence of biological markers and the age at which young girls begin their menstrual cycle and the symptoms they experience.

Limitation of the study

The study population is not representative of the population of the country. Thus outcomes of the study may not be generalizable to the general population.

Availability of Data

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Conflict of Interest

All authors declare that they have no competing interests.

Contribution of Authorship

EK designed and implemented the study. This included seeking IRB approval, collecting data, and cleaning data. EK reviewed the reference articles and wrote the initial manuscript. EM contributed to data analysis, constructed summary tables, and wrote the final manuscript. MS contributed to initial manuscript writing and data analysis.

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REFERENCES

1. Ersoy B, Balkan C, Gunay T, Egemen A. The factors affecting the relation between the menarcheal age of mother and daughter. Child: care, health and development. 2005 May 1; 31(3):303–8.
2. Cole TJ: The secular trend in human physical growth: a biological view. Economics and Human Biology 2003, 1:161-68.
3. Ayele E, Berhan Y. Age at menarche among in-school adolescents in Sawla Town, South Ethiopia. Ethiop J Health Sci. 2013;23(3):189-200.
4. Amir DJ, M. R.Bribiescas, R. G. A Longitudinal Assessment of Associations between Adolescent Environment, Adversity Perception, and Economic Status on Fertility and Age of Menarche. PLoS One. 2016;11(6).
5. Chumlea WC, Schubert CM, Roche AF, Kulin HE, Lee PA, Himes JH, et al. Age at menarche and racial comparisons in US girls. Pediatrics. 2003 Jan 1; 111(1):110–13. PMID: 12509562
6. Swenson I, Havens B. Menarche and menstruation: a review of the literature. J Community Health Nurs. 1987;4(4):199–210.
7. Thomas F, Renard F, Benefice E, de Meeüs T, Guegan JF. International variability of ages at menarche and menopause: patterns and main determinants. Hum Biol.2001;73(2):271–90.

8. P K. Pubertal development in girls: secular trends. Current Opinion in Obstetrics & Gynecology. 2006; 18 (5):487-491.
9. Wyshak G, Frisch RE. Evidence for a secular trend in age of menarche. N Engl J Med. 1982; 306:1033–5.
10. Bagga A, Kulkarni S. Age at menarche and secular trend in Maharashtrian (Indian) girls. Acta Biologica Szeged. 2000;44(1-4):53–7.
11. Ambade R, Sagdeo M. Age at menarche and the menstrual pattern of secondary school adolescents in central India. Int J Res Med Sci 2017; 5:3610-4.
12. Zegeye DT, Megabiaw B, Mulu A. Age at menarche and the menstrual pattern of secondary school adolescents in northwest Ethiopia. BMC women's health. 2009; 9(1):29.
13. Apter D, Viinikka L, Vihko R: Hormonal pattern of adolescent menstrual cycles. J Clin Endocrinol Metab 1978, 47(5):944–954.
14. Chan SS, Yiu KW, Yuen PM, Sahota DS, Chung TK: Menstrual problems and health-seeking behaviour in Hong Kong Chinese girls. Hong Kong Med J 2009, 15(1):18–23.
15. Treloar AE, Boynton RE, Behn BG, Brown BW: Variation of the human menstrual cycle through reproductive life. Int J Fertil 1967, 12(1 Pt 2):77–126.
16. Vollman RF: The menstrual cycle. Major Probl Obstet Gynecol 1977, 7:1–193.
17. Rigon F, Bianchin L, Bernasconi S, Bona G, Bozzola M, Buzi F, Cicognani A, De Sanctis C, De Sanctis V, Radetti G, Tatò L, Tonini G, Perissinotto E: Update on age at menarche in Italy: toward the leveling off of the secular trend. J Adolesc Health 2010, 46(3):238–244.
18. Rigon F, De Sanctis V, Bernasconi S, Bianchin L, Bona G, Bozzola M, et al. Menstrual pattern and menstrual disorders among adolescents: an update of the Italian data. Ital J Pediatr. 2012; 38-38.
19. Ameade EPK, Garti HA (2016) Age at Menarche and Factors that Influence It: A Study among Female University Students in Tamale, Northern Ghana. PLoS ONE 11(5): e0155310. doi:10.1371/journal.pone.0155310,
20. Tunau KA, Adamu AN, Hassan MA, Ahmed Y, Ekele BA. Age at menarche among school girls in Sokoto, Northern Nigeria. Annals of African medicine. 2012; 11(2):103–7. doi: 10.4103/1596-3519. 93533 PMID: 22406670.
21. Padez C. Age at menarche of schoolgirls in Maputo, Mozambique. Annals of human biology. 2003 Jan 1; 30 (4):487–95. PMID: 12881146
22. Carfagna M, Figurelli E, Matarese G, Matarese S. Menarcheal age of schoolgirls in the district of Naples, Italy, in 1969–70. Human Biology. 1972 Feb 1:117–25.
23. Al-Sahab B, Ardern CI, Hamadeh MJ, Tamim H. Age at menarche in Canada: results from the National Longitudinal Survey of Children & Youth. BMC Public Health. 2010 Nov 28; 10(1):736.
24. Bayray A. Assessment of Menstrual Perceptions and Preparation of Rural Adolescent Females, South Eastern Zone of Tigray, Ethiopia. Scholarly Journal of Medicine. 2011;1:12-21.
25. Abera Y. Menarche, Menstruation related Problems and Practices among Adolescent High School Girls in Addis Ababa. Medicine. 2003;Corpus ID: 78417016.
26. Laura L, Jones PLG, Shane A Norris, John M Pettifor, Noël Cameron Age at Menarche and the Evidence for a Positive Secular Trend in Urban South Africa. Am J Hum Biol. 2009; 21(1):130-2.
27. Hatem I. Abdelmoty MY, corresponding author Shimaa abdallah, Khaled Abdel-Malak, Nawara M. Hashish, Dalia Samir, Moutafa Abdelbar, Ahmed Naguib Hosni, Mohamed Abd-El Ghafar, Yasser Khamis, and Mostafa Seleem. Menstrual patterns and disorders among secondary school adolescents in Egypt. A cross-sectional survey. BMC women's health. 2015; 15: 70.
28. Evans Paul Kwame AG, Helene Akpene. Age at Menarche and Factors that Influence It: A Study among Female University Students in Tamale, Northern Ghana. PLoS ONE 2016; 11(5).
29. Demerath EW, Towne B, Chumlea WC, Sun SS, Czerwinski SA, Remsberg KE, et al. Recent decline in age at menarche: The Fels Longitudinal Study. American Journal of Human Biology. 2004; 16(4): 453-7.
30. Morris DH, Jones ME, Schoemaker MJ, Ashworth A, Swerdlow AJ. Determinants of age at menarche in the UK: analyses from the Breakthrough Generations Study. Br J Cancer. 2010; 103 (11): 1760-4.
31. KarapanouO PA. Determinants of menarche. Reprod Biol Endocrinol. 2010;30;8 (115):20920296.
32. Singh A, Kiran D, Singh H, Nel B, Singh P, Tiwari P: Prevalence and severity of dysmenorrhea: a problem related to menstruation, among first and second year female medical students. Indian J Physiol Pharmacol 2008, 52(4): 389–397.)
33. Lee LK CP, Le KK, Kaur J. Menstruation among adolescent girls in Malaysia: a cross sectional survey. Singapore Med J. 2006; 47(10):869-74.
34. Dharampal G. D., Sanjay V. W., Jayesh Y. D. Age at Menarche and Menstrual Cycle Pattern among School Adolescent Girls in Central India. Global Journal of Health Science Vol. 4, No. 1; January 2012. doi:10.5539/gjhs.v4n1p105 URL: http://dx.doi.org/10.5539/gjhs.v4n1p105).

35. Ibrahim N AM, Al-Shaibani A, AlAmri F, Alharbi H, Al-Jadani A, Alfaidi R. Dysmenorrhea among female medical students in king Abdulaziz University: prevalence, predictors and outcome. Pak J Med Sci. 2015; 31 (6): 1312-7.
36. Banikarim C, Chacko MR, Kelder SH: Prevalence and Impact of Dysmenorrhea on Hispanic Female Adolescents. Arch Pediatr Adolesc Med 2000, 154(12):1226-1229.
37. Houston AM AA, Huang Z, D'Angelo LJ. Knowledge, attitudes, and consequences of menstrual health in urban adolescent females. Pediatr Adolesc Gynecol. 2006;19(4):271-5.

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ORIGINAL ARTICLE

INTESTINAL PARASITES AND RISK AWARENESS OF PEOPLE LIVING WITH HIV/AIDS IN DEBRE BREHAN REFERRAL HOSPITAL, DEBRE BREHAN, ETHIOPIA

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ABSTRACT

Introduction*: Intestinal parasites are a significant cause of morbidity and mortality in most developing countries which affected more than 3.5 billion people throughout the world. The prevalence of intestinal parasites is relatively high in people living with HIV/AIDS. However, data on the prevalence of intestinal parasites among people living with HIV/ AIDS are insufficient in the study area. Hence, this study aimed to determine the prevalence of intestinal parasites and associated risk factors among people living with HIV/AIDS at Debre Brehan Referral Hospital, Central Ethiopia.*

Methods*: A cross-sectional study was conducted among 350 people living with HIV/AIDS from March to August 2019. Stool samples were collected with clean screw cupped containers and processed using direct microscopy, formol-ether concentration and modified acid-fast staining laboratory techniques.*

Results: *The overall prevalence of intestinal parasites among HIV/AIDS patients was 20.3% (71/350). Among these, Entamoeba histolytica/dispar takes the highest rank (13.4%) followed by Gardia lamblia (2.9%). Lack of latrine, high viral load count, and bad health practice of the participants were significantly associated with intestinal parasitosis.*

Conclusion*: The prevalence of intestinal parasites in this study was high. Thus to reduce the disease burden; government officials and stakeholders should work on reducing risk factors and increase awareness how to prevent and control of acquiring the disease.*

Key words*: Intestinal parasites, HIV/AIDS, Prevalence, Debre Brehan, Ethiopia.*

INTRODUCTION

Intestinal parasitosis (IPs) is a gastrointestinal infection caused by helminthes (multicellular) and protozoa (unicellular) (1, 2). Epidemiological studies indicate that both helminthes and protozoa are prevalent in developing countries whereas protozoan parasites are more dominant in developed countries (3, 4). More than 3.5 billion people are affected with intestinal parasites (IP) in the world, among which 450 million are in sub-Saharan Africa, affected by associated morbidities (5-7). Parasitic co-infection with Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS) is the major public health crisis of the world, mainly in Sub-Saharan Africa (8).

The most common type of helminthes that are strongly associated with morbidity and mortality of HIV/AIDS patients are: *Ascaris lumbricoides*, *Trichuris trichiuria*, Hookworm and *Strongyloid stercoralis* that occupy the human intestine (9-11), whereas *Entamoeba histolytica/dispar* and *Giardia lambellia* are the dominant species among protozoans (1).

Protozoan parasites are also the foremost prevalent in tropical and subtropical regions of the developing world where water and sanitation facilities are insufficient (12-16). The main transmission mode of IPs is feco-oral route due to poor personal hygiene and environmental contaminations (17). More importantly, improper disposal of human excreta in Sub-Saharan countries like Ethiopia is the major contributing factor for the increased distribution of IPs (18). HIV/AIDS patients with poor knowledge, and bad health practices for IP infection prevention and control are more susceptible to opportunistic and non-opportunistic parasitic infections (19, 20).

There are about 36.9 million people infected with HIV/AIDS globally; among these Sub-Saharan Africa accounts for more than half (22.4 million) (14, 21), and where Ethiopia had a prevalence of 2.4% (8, 22). Moreover, HIV infection results in weakening of the human immune system which leads to the occurrence of opportunistic infections (OIs) (21-25).

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Almost 80% of AIDS patients die from AIDS-related infections like intestinal parasites rather than HIV infection itself (4). Opportunistic parasites, such as, *Cryptosporidia*, *Isospora,* and *Microsporidia* have been strongly linked to cause diarrhea among HIV/AIDS patients (12, 26). These parasites enhance the progression of HIV infections to AIDS unless such co-infections are diagnosed and treated properly (4, 26-28). Diarrhea is the most common clinical symptom of the intestinal parasitic infections. Reports designated that 30-60%, and 90% of AIDS patients can develop diarrhea in developed and developing countries respectively (4, 6, 29-31).

The utilization of anti-retroviral therapy (ART) can reestablish immunity by increasing the number of CD4 cells able to protect against opportunistic infections, and reduced the incidence of diarrhea (32). Most of the previous studies suggest that patients with CD4 counts <200 cells/µl are more vulnerable to opportunistic infections than patients with CD4 counts > 200 cells/µl (33).

Although there's an improvement in the survival of people living with HIV/AIDS (PLWHA) in Ethiopia, there are still a considerable number of deaths related to AIDS across the country (26). Intestinal parasitosis is one among the foremost common causes of morbidity and mortality due to the depletion of host immunity (3). Furthermore, little is known about the prevalence of both pathogenic and opportunistic intestinal parasites, KAP as well as associated risk factors among PLWHA in Debre Brehan, Ethiopia. Hence, this study aimed to work out the prevalence of intestinal parasites, KAP and associated risk factors among PLWHA attending at ART clinic in Debre Brehan Referral Hospital, Ethiopia.

MATERIALS AND METHODS

Study design and setting

A cross-sectional study was conducted from March 01, 2019 to August 30, 2019 among PLWHA at Debre Brehan Referral Hospital, Central Ethiopia. Debre Brehan is 130 Km north of the capital city of the country, Addis Ababa. During the study period, there were 2950 people living with HIV/AIDS registered for ART care and treatment service in the Hospital.

Debre Brehan is situated at an altitude of 2840 meter above sea level with a mean annual rainfall of 964 mm. Few months from March to September had precipitation ranges from 40% to 75% and the mean annual temperature ranges from 10 to 16 °C (34). The town is totally highland and has relatively cold, dry, and windy weather conditions with two distinctive seasons, summer and winter.

All people living with HIV/AIDS attending at the ART clinic in Debre Brehan Referral Hospital during the study period, which fulfills the inclusion criteria, were recruited for the study.

Sample size determination and Sampling method

The required sample size was calculated using single population proportion formula by referring a similar study conducted in Gondar, 29.1% prevalence of intestinal parasites among HIV/AIDS clients in University of Gondar Hospital (26), 5% desired precision and 95% confidence interval (CI) was considered.

$$n = \frac{(Z^2_{\alpha/2})p(1-p)}{d^2}$$

$$n = \frac{(1.96)^2 0.291(1-0.291)}{(0.05)^2}$$

$$n = 317 + (317x\ 10\%\ non-respondents) = 349 \approx 350$$

Where, n = sample size, Z = statistic for a level of confidence, p = expected prevalence or proportion, d = degree of precision.

So based on the standard sample size calculation, 10% non-respondent rate added, and the total of 350 samples were collected during the study period.

The study participants were selected conveniently among HIV/AIDS patients visiting ART department for regular follow up service during the study period. The study participants were evaluated for inclusion criteria and invited for the study.

After a written consent was obtained from the study participants, they were interviewed using questionnaire about their socio-demographic characteristics, and their exposure to risk factors of intestinal parasitosis. In addition, viral load counts were taken from their medical records of the most recent data within six months.

We also assessed KAP towards intestinal parasitosis by using yes or no questions targeting on the cause and transmission of the infection. The questionnaire was prepared in English and translated to the local language (Amharic). The questionnaire was checked for consistencies and completeness on thirty-five study participants in the same study population before the study period.

Inclusion and exclusion criteria

All HIV/AIDS patients registered for ART follow up program and volunteer to participate in the study were included, while those who were on anti-parasitic therapy within the last two weeks, those who registered for ART service with less than six months and didn't have viral load count within the last six (6) months were excluded from the study.

Laboratory Diagnosis Methods for Stool Sample

Stool sample collection

Instruction was given to each study participant not to contaminate the stool with urine, water and soil. In addition, they are also informed to collect forty gram of fresh stool sample or 10 ml of diarrheic sample with clean, wide mouthed, grease free and screw cupped plastic containers. Moreover, emphasis was given to diarrhea stool samples by giving priority due to its less time stability of trophozoites in the diarrheal stool sample. Besides, formed and semi-formed stool samples were preserved by 10% formalin for further examination by microscope and concentration techniques in case of unavoidable delay. Direct wet mount, Formol-ether concentration and smear for modified acid-fast staining techniques were performed as per the standard operating procedures (SOP) of each method soon after collection within 30 minutes (35) (*see supporting information for detail of SOP*).

Direct microscopy

A stool sample was collected in a labeled cup from all study participants and a direct saline wet mount of each sample was done immediately at the laboratory for motile trophozoites, ova, cyst, and larvae stage of intestinal parasites. The wet mounts were examined under a light microscope at 10X eye pieces and 40X objective (36).

Formol- Ether concentration technique

Formol-ether sedimentation technique, in which parasites are concentrated by centrifugal force, was applied to concentrate the parasite. Briefly, one gram of stool sample was placed in a clean 15ml volume capacity conical centrifuge tube containing 7ml 10% formalin and stirred with an applicator stick. The resulting suspension was filtered through a sieve into another conical centrifuge tube. After adding 3ml of diethyl ether to the stool containing formalin suspension, it was centrifuged at 3200 rpm for 3 minutes. The supernatant was poured away and the tube was being placed in its rack. Finally, the smear was prepared on clean grease-free microscope slide from the sediment, covered with cover slide and observed under a microscope with a magnification of 10x eyepieces and 40x objective (12, 35).

Modified Ziehl Nelson method

A small portion of the fresh stool sample was processed for the detection of opportunistic parasites using the modified Ziehl Nielsen method. Briefly, the thin smear was prepared directly from the sediment of concentrated stool and allowed to air dry. Then the slides were fixed with methanol for 5 minutes and it was stained with 1% carbol fuchsine for 30 minutes. After washing the slides with tap water, slides were being decolorized with 1% acid alcohol for 1–3 minutes and stained with 0.5% methylene blue for 1 minute. The slides were then washed with tap water and observed under a light microscope with a total magnification of 1000X (12). Slides were rechecked by senior experts at the Ethiopian public health institute (EPHI).

Data Analysis

The data were entered and analyzed using SPSS version-20 software. Descriptive and logistic regression statistics were used for data analysis. The mean, percentage, and frequency were used to see the distribution. The relative contribution of independent variables for the outcome variables was assessed using logistic regression. A P-value of less than 0.05 was considered as a statistically significant association between the presence of intestinal parasites and each contributing factor. The results of our findings were presented in text, graphs, and tables.

Quality Assurance

The questionnaires were checked for their consistencies and completeness on thirty-five study participants in the same study population before the study period. Internal quality control was also performed for each of laboratory techniques based on the quality control policy of Debre Brehan Referral Hospital Laboratory.

Operational Definition

Good knowledge: Individuals who answered ≥50% of the knowledge questions in the questionnaire.

Poor knowledge: Individuals who answered <50% of the knowledge questions.

Positive attitude: Individuals who answered ≥50% of the attitude questions.

Negative attitude: Individuals who answered <50% of the attitude questions.

Good practice: Individuals who answered ≥50% of the practice questions that supports IP prevention activities.

Bad practice: Individuals who answered <50% of the practice questions.

Intestinal parasitosis: A gastrointestinal infection caused by intestinal parasites

Ethical consideration

Ethical approval was obtained from ethical review committee of the Department of Medical Laboratory Sciences, College of Health Sciences, Addis Ababa University with a reference number MLS/02/2019. Permission letter was obtained from the institutional review board of Debre Brehan Referral Hospital. Written informed consent was taken from each study participants, and for children between 12 and 18 years old, both consent and assent were taken from their parents / guardians and children themselves respectively. The study participants were informed about their right to refuse or participate in the study, and withdraw at any time during the study period without affecting their right to access other health services. All personal information was kept confidential, and those who were positive for intestinal parasite were linked to the attending physician for further clinical management.

RESULTS

Socio-demographic characteristics of the study population

A total of 350 study participants living with HIV/AIDS were enrolled in the study. Of which 46.6% were males and 77.7% were urban residents. The mean ± SD age of study participants' was 37.04 ±12.99 years, ranged from 6-80 years (Table 1).

Prevalence of intestinal parasites

The overall prevalence of IP among people living with HIV/AIDS attending at the ART clinic in Debre Brehan Referral Hospital was 20.3% (71/350). Among these, *E. histolytica/dispar* accounted for the highest rank 47 (13.4%) followed by *G. lamblia* 10 (2.9%). Hookworm, *Ascaris lumburcoids*, *Hymenolepis nana*, *Tanea species* and *Strongyloid stercoralis* accounted the least frequency of infection having proportion of 3 (0.8%), 3 (0.8%), 2 (0.6%), 2 (0.6%) and 1 (0.3%) respectively.

Distribution of helminthes was dominated by protozoan parasites which accounted for protozoa 61 (82.4%) and helminthes 13 (17.6%). Most of the intestinal parasitic infections were single infections 68 (95.8%). On the other hand, multiple infections were seen in 3 (4.2%) of the study participants. Two of the co-infections were *E. histolytica/dispar* with Hookworm and one was *E. histolytica/dispar* with *G. lamblia*. In this study, no opportunistic parasite was identified (Fig. 1).

Table 1: Socio-demographic characteristics of PLWHA at Debre Brehan, Ethiopia, 2019.

Variables		Frequency	Percent
Gender	Male	163	46.6
	Female	187	53.4
Residence	Urban	272	77.7
	Rural	78	22.3
Age group	<= 15	8	2.3
	16-30	123	35.1
	31-45	138	39.4
	46-60	67	19.1
	>= 60	14	4.0
Marital status	Married	220	62.9
	Single	91	26
	Divorced	31	8.9
	Widowed	8	2.3
Educational status	No reading and writing	34	9.7
	Reading and writing	41	11.7
	Grade 1 - 8 complete	110	31.4
	Grade 9 - 12 complete	96	27.4
	College and above complete	69	19.7
Occupation	Agriculture	52	14.9
	Merchant	59	16.9
	Office work	58	16.6
	Daily wage laborer	49	14
	Student	44	12.6
	Driver	29	8.3
	House wife	47	13.4

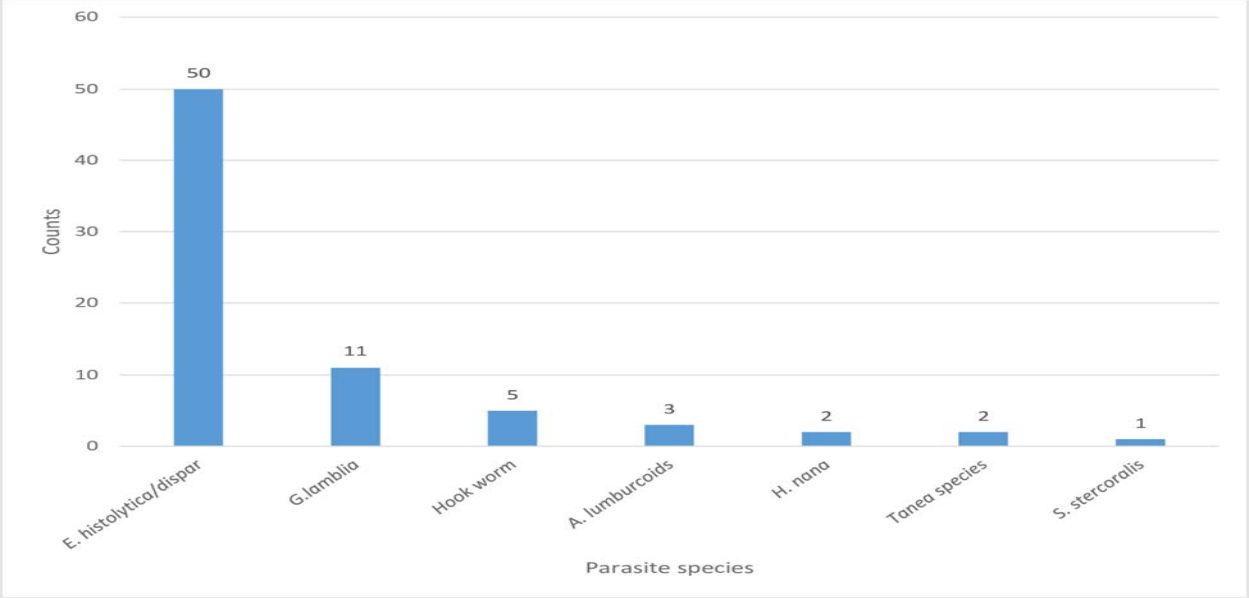

Figure 1. Intestinal parasite species distribution among people living with HIV/AIDS in Debre Brehan Referral Hospital, Ethiopia from March 01 to August 30, 2019.

Association of intestinal parasite infection with socio -demographic and other risk factors

As shown in the socio-demographic characteristics features of our study participants (Table 1) most of the study participants were urban residents (77.7%) and had the occupational status of trade and office work, 16.9% and 16.6% respectively.

From all study participants, 334 (97.7%) had regular hand washing habit with soap before and after the meal, and 323 (94.6%) of them had latrine. Among all participants, 319 (93.4%) had regular water supply and washed their hands after the toilet frequently. Most of the study participants had pure/tape water supply (88.8%), vegetable feeding habits (68.9%), raw meat eating habits (58.3%), and animal contacts in their living settings (60%) (Table 2).

Multivariate analysis was done to know the association of the potential confounding factors such as place of residence, type of occupation, presence of latrine/ toilet, source of water supply, and viral load levels with intestinal parasitosis. As a result, only the viral load level and availability of latrine showed a significant association. People living with HIV/AIDS who had viral load count >1000 cps/ml were almost four times more likely to develop parasitic infection than those who had viral load count results TND (target not detected) (AOR = 4.2, 95% CI: 1.4, 12.4) and those who did not have latrine were four times more likely to acquire intestinal parasite infection than those who had latrine in their home (AOR = 3.97, 95% CI: 1.3, 11.84) (Table 2).

Knowledge, attitude and practice of study participants towards intestinal parasitosis

Among all study participants, those whose age was greater than 15 years were interviewed for their knowledge, attitude, and practice towards intestinal parasitosis, N= 342 (97.7%). In general from these interviewed participants; 182 (53.2) had good knowledge about intestinal parasitosis, its transmission, and prevention mechanisms. Only 66 (19.3%) of the study participant understood the relationship between intestinal parasitosis and HIV/AIDS that all responded as HIV/AIDS increases the morbidity due to intestinal parasitosis (table 3).

Among 342 study participants, 260 (76%) considered IP infection as a communicable disease. The majority of them, 255 (72.9%) agreed on the transmission from person to person. From all respondents, 199 (58.2%) believed that HIV/AIDS increases the risk of acquiring intestinal parasite infection, and 147 (43%) believed that using antiretroviral treatment prevents intestinal parasite infection (table 4).

From study participants who responded for practice questions, 337 (98.5%) had regular hand washing habit with soap before and after the meal. The participants who had latrine were 323 (94.4%). Among all respondents, 303 (88.6%) had pure/tape water supply for drinking and sanitary use. The proportion of vegetable feeding habits of the study participant were about 237 (68.9%); of them, 211 (89%) ate vegetable by cooking (table 5).

Table 2: Prevalence of Intestinal parasitic infections with regards to socio-demographic information and other associated risk factors among PLWHA, Debre Brehan, Ethiopia, 2019.

Characteristics		Intestinal parasite		COR (95% CI)	P-value	AOR (95% CI)	P- value
		Positive (%)	Negative (%)				
Sex	Male	36 (22.1)	127 (77.9)	1			
	Female	35 (18.7)	152 (81.3)	0.81(0.48, 1.37)	0.43		
Age group	≤15	2 (25)	6 (75)	1.24(0.24, 6.53)	0.79		
	16-30	26 (21.1)	97 (78.9)	1			
	31-45	25 (18.1)	113 (81.9)	0.83(0.45, 1.5)	0.54		
	46-60	14 (20.9)	53 (79.1)	0.98(0.47, .05)	0.97		
	≥60	4 (28.6)	10 (71.4)	1.49(0.43, 5.1)	0.53		
Residence	Urban	46 (16.9)	226 (83.1)	1		1	
	Rural	25 (32.1)	53 (67.9)	2.3(1.3, 4.1)	0.004	1.45 (0.55,3.86)	0.45
Educational status	Unable to read and write	8 (23.5)	26 (76.5)	1.21(0.45, 3.24)	0.71		
	Read and write	9 (22)	32 (78)	1.1(0.43, 2.84)	0.83		
	Grade 1-8	22 (20)	88 (80)	0.98(0.46, 2.1)	0.96		
	Grade 9-12	18 (18.8)	78 (81.2)	0.9(0.42, 1.97)	0.8		
	College and above	14 (20.3)	55 (79.7)	1			
Occupational status	Farmer	19 (36.5)	33 (63.5)	3.13(1.3, 7.8)	0.014	1.5(0.45, 5.1)	0.5
	Merchant	13 (22)	46 (78)	1.54(0.6, 3.94)	0.37	1.33(0.5, 3.6)	0.57
	Daily worker	5 (10.2)	44 (89.8)	0.62(0.19, 1.99)	0.42	0.5(0.15, 1.6)	0.25
	Student	10 (22.7)	34 (77.3)	1.6(0.59, 4.36)	0.357	1.37(0.48, 4.0)	0.56
	Driver	6 (20.7)	23 (79.3)	1.42(0.45, 4.47)	0.55	1.5(0.48, 4.99)	0.47
	House wife	9 (19.1)	38 (80.9)	1.29(0.47, 3.56)	0.62	0.85(0.28, 2.58)	0.78
	Office work	9 (15.5)	49 (84.5)	1		1	
Availability of latrine	Yes	58 (18)	265 (82)	1		1	
	No	11 (57.9)	8 (42.1)	6.21(2.4, 16.1)	<0.001	3.97(1.33, 11.84)	0.013*
Source of water supply	Pipe	55(18.3)	248(81.7)	1		1	
	Pond	11(35.5)	20(64.5)	2.45(1.11,5.4)	0.026	1.1(0.4, 3.24)	0.83
	Spring	3(37.5)	5(62.5)	2.67 (0.62,11.5)	0.19	1.1(0.18, 6.1)	0.95
Viral load	TND	44(17.7)	205(82.3)	1		1	
	<20 cps/ml	10(19.2)	42(80.8)	1.1(0.52, 2.4)	0.79	1.0(0.45, 2.27)	0.99
	20-1000 cps/ml	9(30)	21(70)	1.99(0.86, 4.65)	0.11	2.4(0.94, 6.1)	0.07
	>1000 cps/ml	8(42.1)	11(57.9)	3.4(1.3, 8.9)	0.013	4.2(1.4, 12.4)	0.009*

TND: Target not detected, **cps/ml**: copies/milliliter, **COR**: Crude odd ratio, **AOR**: Adjusted odd ratio, **CI**: confidence interval, ***** statistically significant

Table 3: Knowledge of PLWHA about transmission and prevention of intestinal parasitosis, Debre Brehan, Ethiopia, 2019.

Knowledge variables (Total no N)	**Yes number (%)**	**No number (%)**
Knowledge about intestinal parasitosis (342)	200 (58)	142 (42)
Knowledge about the relationship between intestinal parasitosis and HIV/ AIDS (342)	66 (19.3)	276 (80.7)
Knowledge about the transmission ways of intestinal parasitosis (342)	189 (55.3)	153 (44.7)
Source of information about intestinal parasitosis (200):		
Parent	20 (10)	
Friends	44 (22)	
Reading books and journals	95 (47.5)	
Mass media	41 (20.5)	
Response for the most common transmission ways of IP (189):		
By eating contaminated food	172 (91)	
By drinking contaminated water	16 (8.5)	
By lack of personal hygiene	1 (0.5)	
Knowledge about the best treatment for intestinal parasitosis (342):		
Medicine prescribed by Doctors	326 (95.3)	
Traditional medicine	13 (3.8)	
No treatment required	3 (0.9)	
Overall knowledge level		
Good knowledge(N=342)	182 (53.2)	
Poor knowledge (N=342)	160 (46.8)	

Table 4: Attitude of PLWHA about transmission and prevention ways of IP infection, Debre Brehan, Ethiopia, 2019.

Attitude variables (N=342)	**Agree (No (%))**	**Disagree (No (%))**	**No idea (No (%))**
IP infection is communicable disease.	260 (76)	9 (2.6)	73 (21.3)
IP infection can be transmitted from person to person	255 (72.9)	8 (2.3)	79 (22.6)
HIV/AIDS increases the risk of IP infection	199 (58.2)	15 (4.4)	128 (37.4)
IPI can cause severe complications and death if not treated	264 (77.2)	25 (7.3)	53 (15.5)
Use of antiretroviral treatment prevents IP infection	147 (43)	36 (10.5)	159 (46.5)
Use of toilet and good personal hygiene practice protects from IP infection	317 (92.7)	4 (1.2)	21 (6.1)
If not protected well, water can be a potential source of IPI	312 (91.2)	7 (2)	23 (6.8)
Raw meat should not be eaten, since it can transmit IPI	226 (66.1)	54 (15.8)	62 (18.1)
Without cooking, washing vegetables is enough to prevent IPI	63 (18.4)	240 (70.2)	39 (11.4)
IP infection can be acquired from animal and animal products	266 (77.8)	4 (1.2)	72 (21)
Overall attitude level			
Positive attitude (N=342)	289 (84.5)		
Negative attitude (N=342)	53 (15.5)		

Table 5: Practices of PLWHA related to prevention and control of IP infections, Debre Brehan, Ethiopia, 2019.

Practice variables (342)	Yes (no(%)	No (no(%)
Hand washing before and after meal (342)	337 (98.5)	5 (1.5)
Availability of latrine (342)	323 (94.4)	19 (5.6)
Type of latrine (323)		
Private	282 (87.3)	
Public	41 (12.7)	
Source of water supply (342)		
Pipe water	303 (88.6)	
Pond	31 (9.0)	
Spring	8 (2.4)	
Vegetable eating habit (342)	237 (69.3)	105 (30.7)
Vegetable feeding methods (237)		
Raw vegetable without washing.	3 (1.3)	
By washing	23 (9.7)	
By cooking	211 (89)	
Raw meat eating habit (342)	145 (42.4)	197 (57.6)
Animals living with humans (342)	206 (60.2)	136 39.8)
Overall practice level		
Good practice (N=342)	314 (91.8)	
Bad practice (N=342)	28 (8.2)	

This study showed that 182 (53.2%) of the study participants had good knowledge and 160 (46.8%) of the participants had poor knowledge, 289 (84.5%) had a positive attitude while 53 (15.5%) had a negative attitude and study participants also had good practice 314 (89.7%) and poor practice 28 (10.3%) about transmission, prevention and control of intestinal parasites. Although the knowledge and attitude of study participants didn't show an association, the overall performance of health practices was significantly associated with intestinal parasitosis. Persons who had poor health practices towards intestinal parasitosis were almost three times more likely to develop intestinal parasitosis than persons with good health practices related to transmission and prevention of IPI (AOR = 2.88, 95% CI: 1.2, 6.88).

DISCUSSION

This study determined the prevalence of intestinal parasites, assessed potential associated risk factors and awareness of the study participants about the transmission, prevention, and control of the disease in Debre Brehan, Central Ethiopia. In the present study, the overall prevalence of IP among PLWHA following ART treatment and care programs in the study area was 20.3% (71/350). This was relatively consistent with studies performed in Dessie Hospital on ART patients, Ethiopia (17.6%) (12), in Abuja, Nigeria (24.7%) (14), and Hospital of Kathmandu, Nepal (19.17%) (4). On the other hand, our finding was much lower compared to studies conducted in different parts of Ethiopia; Arbaminch Hospital, (45.4%), East Gojjam, (36.8%), Butajira, (35.9%) and Gondar Hospital, (28%) (3, 18, 26, 37).

Our findings were higher when it also compared with previous studies among non-HIV persons, revealed as IP infection in Kobo Health Center, 10%, 2014 (38), Debre Brehan Referral Hospital, 17.4%, 2014 (34) and Debre Brehan, 9.8%, 2016 (39) in Ethiopia. This variation in the magnitude of parasitic infection might be due to the difference in the geographical location of the study site, endemicity of parasite, HIV status of the study participants, methodology, time gaps of the studies, and climatic conditions at different study sites. Also, the lower IP prevalence in our findings might be due to increment in awareness of PLWHA and improvements in the clinical management system.

The parasite distribution of single infections was observed in which *E. histolytica/dispar (*69.1%*)* showed higher proportion when compared to other studies in Dessie, Ethiopia (45.5%), East Gojjam, Ethiopia (24%), and Arbaminch, Ethiopia (7.4%) (3, 12, 18). However, the other parasite's frequency in our study *G. lamblia* (14.7%), *A.lumburcoids* (4.4%), and *S. stercoralis* (1.5%) were lower than a study conducted in Dessie, East Gojjam, and Arbaminch(3, 12, 18). There was no opportunistic parasite in this study similar with the study conducted in Dessie (12), but studies in Arbaminch, East Gojjam, and Butajira revealed the highest number of opportunistic parasitic infections observed as 20%, 4.9%, and 8.7% respectively (3, 12, 18).

The difference in frequency of individual parasites might be due to the difference in geographical location, altitude, the climatic condition of study areas, and hygiene and sanitation practice of study population. Furthermore, the decrement of opportunistic infections especially *Cryptosporidium species* and *I. belli* suggested an increase in the health-seeking behavior of the community.

Intern resulted in good adherence of HIV/AIDS clients to ART treatment and care programs. An improvement in the immunologic conditions of the patients and better response to infections also might be the reason. Opportunistic parasites were known to be resolved spontaneously with immune restoration among HIV/AIDS patients on ART (1).

Study participants who had a viral load count >1000 cps/ml had higher IP infections when compared to patients with <1000 cps/ml viral load counts. In this study, study participants who had viral load count of > 1000 cps/ml were about four times more likely to be infected with intestinal parasites than those who had a viral load counts Target not detected (AOR = 4.2, 95% CI: 1.4, 12.4). This showed that increased viral load counts of the study participants contributed to the acquisition of intestinal parasite infections.

The other association was with the availability of latrine, where our study indicated that 323 (94.6%) of the study participants had latrine in their home. This study revealed that participants who did not have latrine were four times more likely to be infected with intestinal parasite than those having latrine (AOR = 3.97, 95% CI: 1.33, 11.84). This result was in line with a study in Gondar, Ethiopia that study participants didn't have latrine were six times more likely infected with IP than those having latrine (AOR = 6.2, 95% CI: 1.75, 22.06) and also supported by a similar study in Dessie, Ethiopia that patients who did not have latrine had IP infections almost 8 times more likely than those having latrine (AOR = 7.56, 95% CI: 1.3, 44.2) (12). These relative comparable results suggested the similarities in accessibility and using habit of the toilet in those study sites.

In this study, knowledge, attitude, and practice of the individual participants towards intestinal parasitosis were assessed using a structured questionnaire. As a result, 53.2% of study participants had good knowledge about transmission, distribution, and prevention of intestinal parasitosis and its association with HIV/AIDS whereas the remaining 46.8% had poor knowledge. About 189 (55.3%) of study participants knew the transmission ways of intestinal parasitosis. Of which, 172 (91%) understood that it was through eating contaminated foods.

This result was slightly higher than the study conducted in Addis Ababa, Ethiopia in which 49.4% understood the transmission ways and 63.5% of them believed transmission was through contaminated foods (40). This variation might be due to the socio-demographic difference of study participants and the time gap of studies. About 92.7% of study participants agreed that the use of toilets contributes to protecting individuals from intestinal parasitic infections or failure to use toilet exposes for the infection. This result was higher compared to the study in Asmara, Eritrea provided that 60.3% of study participants agreed that defecating in the open air or fail to use toilet contributes to intestinal parasitic infections (20). The difference might be due to the difference in the pathological outcome of the endemic intestinal parasite species in the study sites.

The current study revealed that 98.5% (337/342) of study participants had practiced hand washing before a meal and 94.4% (323/342) of study participants had a latrine. Of latrine users, 87.3% (282/323) had private latrine while 12.7% (41/323) had a public latrine. This result was higher compared to another study among street dwellers conducted in Addis Ababa, Ethiopia shown that 15.6% of the study participants practiced regular hand washing before a meal and 95% had a latrine. Of these latrine users, 56.5% had private latrine and 38.5% had public latrine (40). The difference might be due to variation in the economic and educational level of the study participants.

Health practices of the study participants were significantly associated with intestinal parasitosis. Persons who had poor health practices towards intestinal parasitosis were almost three times more likely to develop intestinal parasitosis than persons with good health practices related to transmission and prevention of IPI (AOR = 2.88, 95% CI: 1.2, 6.88).

Limitation of the study

- According to the current national treatment protocol every person tested for HIV and results become positive needs to start treatments immediately. Due to this reason, it was difficult to get any ART naïve PLWHA during the study period and unable to analyze the outcomes comparatively for both groups of ART status.
- There was no CD4 count data available during the study period instead only viral load count had been used and analyzed.
- Advanced molecular diagnostic methods were not implemented that would increase the detection of opportunistic parasites.
- Non-probability sampling method has been used in this study that limits the chance of getting equal opportunity of the participants to involve in the study.

Conclusion

This study updated the prevalence of intestinal parasites and associated risk factors among people living with HIV/AIDS following ART treatment in the study area. In the study *E. histolytica/dispar* and *G. lamblia* showed greater proportion of parasite distribution. The absence of latrine and increased viral load count for PLWHA were identified as the potential risk factors for the acquisition of intestinal parasitic infections. The study showed that most of the study participants had positive attitude, good practices and poor knowledge related to the transmission and prevention activities of intestinal parasitosis. Health practices of the study participants related to transmission and prevention showed significant association with intestinal parasitosis. Thus to reduce the disease burden, the community health workers, other government officials, and related stakeholder give attention on increase awareness of latrine use, importance of strict follow up of clinician advice which help to reduce viral load count, and avoid bad health practice, as well as encourage frequent diagnosis of patients to decrease the burden of intestinal parasites among PLWHA.

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Supplementary Materials

All supplementary materials used during the study are archived with this manuscript. These are: information sheet that enables the study participants to be introduced about the study, questionnaires that used to gather information from study participants, informed consent/assents that guarantees the permission of the participants to use their information/ sample for the study and SOPs are the short descriptions of the procedures and principles of the laboratory methods.

Conflict of interest:

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REFERENCES

1. Cerveja BZ, Tucuzo RM, Madureira A, et al. Prevalence of Intestinal Parasites Among HIV Infected and HIV Uninfected Patients Treated at the 1 De Maio Health Centre in Maputo, Mozambique. EC Microbiol. 2017;9(6):231-40.
2. Norhayati M, Fatmah M, Yusof S, Edariah A. Intestinal parasitic infections in man: a review. Med J Ma laysia. 2003;58(2):296-305.
3. Tadesse A, Worku A, Girma A. Prevalence of intestinal parasites and associated factors among adult pre-ART and ART patients in Goncha Siso Enesie Woreda, East Gojjam, Northwest Ethiopia, 2014. J AIDS Clin Res. 2017;8(10):1-8.
4. Sharma HN, Chalise BS, Rai G, Adhikari N, Bastola A, Singh A. Prevalence of intestinal parasitic infec tions among people living with HIV/AIDS visiting a central hospital of Kathmandu Nepal. Asian J Med Sci. 2017;8(5):87-92.
5. Hailegebriel T. Prevalence of intestinal parasitic infections and associated risk factors among students at Dona Berber primary school, Bahir Dar, Ethiopia. BMC Infect Dis. 2017;17(1):362.
6. Jaiswal S, Sharma S, Bhat SR, Pokhrel T, Chaudhary N, Sharma I. Distribution of intestinal parasite in people living with HIV/AIDS of different care centre of Pokhara Valley, Nepal. Scholars J Appl Med Sci. 2014;2(6G):3366-9.
7. Wegayehu T, Tsalla T, Seifu B, Teklu T. Prevalence of intestinal parasitic infections among highland and owland dwellers in Gamo area, South Ethiopia. BMC Public Health. 2013;13(1):151.
8. Fekadu S, Taye K, Teshome W, Asnake S. Prevalence of parasitic infections in HIV-positive patients in southern Ethiopia: a cross-sectional study. J Infect Dev Ctries. 2013;7(11):868-72.
9. Haque R. Human intestinal parasites. J Health Popul Nutr. 2007;25:387-91.
10. Bar-Yoseph H, Zohar Y, Lorber M. Strongyloidiasis-Related IRIS: A Case Report and Literature Review. J Inter Assoc prov AIDS Care (JIAPAC). 2017;16(1):8-10.

11. Marami D, Hailu K, Tolera M. Prevalence and associated factors of intestinal parasitic infections among asymptomatic food handlers working at Haramaya University cafeterias, eastern Ethiopia. Ann Occup Environ Med. 2018;30(1):53.
12. Missaye A, Dagnew M, Alemu A, Alemu A. Prevalence of intestinal parasites and associated risk factors among HIV/AIDS patients with pre-ART and on-ART attending dessie hospital ART clinic, Northeast Ethiopia. AIDS Res Ther. 2013;10(1):7.
13. Tandukar S, Ansari S, Adhikari N, et al. Intestinal parasitosis in school children of Lalitpur district of Nepal. BMC Res Notes. 2013;6(1):1-6.
14. Abaver D, Nwobegahay J, Goon D, Iweriebor B, Anye D. Prevalence of intestinal parasitic infections among HIV/AIDS patients from two health institutions in Abuja, Nigeria. Afr Health Sci. 2011;11(3):24-7.
15. Abossie A, Seid M. Assessment of the prevalence of intestinal parasitosis and associated risk factors among primary school children in Chencha town, Southern Ethiopia. BMC Public Health. 2014;14 (1):166.
16. Ramos JM, Rodríguez-Valero N, Tisiano G, et al. Research Note Different profile of intestinal protozoa and helminthic infections among patients with diarrhoea according to age attending a rural hospital in southern Ethiopia. Trop Bio. 2014;31(2):392-7.
17. Kipyegen CK, Shivairo RS, Odhiambo RO. Prevalence of intestinal parasites among HIV patients in Bari ngo, Kenya. Pan African Medical Journal. 2012;13(1).
18. Gerzmu T, Fantahun E, Hailu E, Kibe H, Fesseha O, Godana W. Prevalence of intestinal parasitosis among HIV/AIDS patients attending ART clinic of Arbaminch Hospital. Afr J Sci Res. 2015;4(5):13-7.
19. Barcelos NB, Dias RFG, Menezes Filho HRd, Rodrigues RM. Opportunistic and non-opportunistic intes tinal parasites in HIV/AIDS patients in relation to their clinical and epidemiological status in a specialized medical service in Goiás, Brazil. Rev Inst Med Trop Sao Paulo. 2018;60:1-9.
20. Ahmed KS, Siraj NM, Fitsumberhan H, et al. Knowledge, Attitude and Practice (KAP) Assessment of Intestinal Parasitic Infection among School Children in Asmara, Eritrea. Health. 2016;9(1):57-68.
21. Solomon FB, Angore BN, Koyra HC, Tufa EG, Berheto TM, Admasu M. Spectrum of opportunistic in fections and associated factors among people living with HIV/AIDS in the era of highly active anti-retroviral treatment in Dawro Zone hospital: a retrospective study. BMC Res Notes. 2018;11(1):604.
22. Adeleke OA, Yogeswaran P, Wright G. Intestinal helminth infections amongst HIV-infected adults in Mthatha General Hospital, South Africa. Afr J Prim Health Care Fam Med. 2015;7(1):1-7.
23. Nissapatorn V, Sawangjaroen N. Parasitic infections in HIV infected individuals: diagnostic & therapeutic challenges. Indian J Med Res. 2011;134(6):878.
24. Kulkarni S, Kairon R, Sane S, et al. Opportunistic parasitic infections in HIV/AIDS patients presenting with diarrhoea by the level of immunesuppression. Indian J Med Res. 2009;130(1):63.
25. Amoo JK, Akindele AA, Amoo AOJ, et al. Prevalence of enteric parasitic infections among people living with HIV in Abeokuta, Nigeria. Pan Afr Med J. 2018;30:1-9.
26. Eshetu T, Sibhatu G, Megiso M, et al. Intestinal parasitosis and their associated factors among people living with HIV at University of Gondar Hospital, Northwest-Ethiopia. Ethiop J Health Sci. 2017;27 (4):411-20.
27. Wolday D, Mayaan S, Mariam ZG, et al. Treatment of intestinal worms is associated with decreased HIV plasma viral load. J Acquir Immune Defic Syndr 2002;31(1):56-62.
28. Tian L-G, Chen J-X, Wang T-P, et al. Co-infection of HIV and intestinal parasites in rural area of China. Parasit Vectors. 2012;5(1):36.
29. Cimerman S, Cimerman B, Lewi DS. Prevalence of intestinal parasitic infections in patients with acquired immunodeficiency syndrome in Brazil. Int J Infect Dis. 1999;3(4):203-6.
30. Paboriboune P, Phoumindr N, Borel E, et al. Intestinal parasitic infections in HIV-infected patients, Lao People's Democratic Republic. PLoS One. 2014;9(3):e91452.
31. Kiros H, Nibret E, Munshea A, Kerisew B, Adal M. Prevalence of intestinal protozoan infections among I ndividuals living with HIV/AIDS at Felegehiwot Referral Hospital, Bahir Dar, Ethiopia. Int J Infect Dis. 2015;35:80-6.
32. Khalil S, Mirdha BR, Sinha S, et al. Intestinal parasitosis in relation to anti-retroviral therapy, CD4+ T-cell count and diarrhea in HIV patients. The Korean journal of parasitology. 2015;53(6):705.

33. Gebretsadik D, Haileslasie H, Feleke DG. Intestinal parasitosis among HIV/AIDS patients who are on anti-retroviral therapy in Kombolcha, North Central, Ethiopia: a cross-sectional study. BMC research notes. 2018;11(1):613.
34. Zemene T, Shiferaw MB. Prevalence of intestinal parasitic infections in children under the age of 5 years attending the Debre Birhan referral hospital, North Shoa, Ethiopia. BMC Res Notes. 2018;11(1):58.
35. Cheesbrough M. District laboratory practice in tropical countries. 2nd ed. New York: Cambridge univer sity press; 2006.
36. Anteneh T, Giday A, Alano A, Awoke A. Intestinal Parasitosis. Hawassa University, Ethiopian Health Center Team; 2008.
37. Gedle D, Kumera G, Eshete T, Ketema K, Adugna H, Feyera F. Intestinal parasitic infections and its asso ciation with undernutrition and CD4 T cell levels among HIV/AIDS patients on HAART in Butajira, Ethiopia. J Health Popul Nutr. 2017;36(1):15.
38. Bugssa G DB, Tarekegn H, Kassaw M, Tafete A. The Prevalence of Intestinal Parasites in HIV Positive and HIV Negative Individuals in Kobo Health Center,
Northeastern Ethiopia: Comparative Cross Sectional. BRITISH BIOMEDICAL BULLETIN. 2014;2 (3):569-76.
39. Zelelie TZ, Gebreyes DS, Tilahun AT, Craddock HA, Gishen NZ. Enteropathogens in Under-Five Chil dren with Diarrhea in Health Facilities of Debre Berhan Town, North Shoa, Ethiopia. Ethiopian journal of health sciences. 2019;29(2).
40. Mekonnen B, Erko B, Legesse M. Prevalence of intestinal parasitic infections and related risk factors among Street Dwellers in Addis Ababa, Ethiopia. J Trop Dis 2014;2(2):1-7.

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ORIGINAL ARTICLE

DEMOGRAPHIC CHARACTERISTICS AND THE CLINICAL PROFILE OF VULVAR CANCER PATIENTS TREATED ATTIKURANBESSA SPECIALIZED HOSPITAL, A FIVE YEARS RETROSPECTIVE STUDY

Esayas Berhanu, MD[1], Carolyn M. Johnston, MD[2]

ABSTRACT

Introduction: *Vulvar cancer is a rare disease that occurs most often in older women; however, this is not seen in clinical practice at TikurAnbessa Specialized Hospital (TASH). Overall there is limited information regarding vulvar cancer in Ethiopia.*
Aim: *The aim of this study was to describe demographic characteristics and the clinical profile of Vulvar Cancer patients treated at TASH.*
Methods: *This is a retrospective study. Data on primary vulvar cancer patients were collected from patients' chart between August 2012 and July 2017 and analyzed.*
Results: *A total of 118 study participants' charts were reviewed. The median/mean age was 39/43.17 ranging from 22 to 85 years. The patients presented with more than one symptom. The mean duration of the symptoms was about 2 years. Labium majus(91.5%), labium minus (89%) were mainly affected. In most (79.7%) patients the disease was locally advanced. Sixty six percent of the cases were positive for HIV.The mean/ median duration of HIV infection was 72.14/72 months. All of them were taking HAART. The majority 38 (32.2%) were treated with chemoradiation followed by surgery alone (16.9%). A Surgical procedure was done for 22 patients. Few patients developed complications.*
Conclusions*: In this study the burden of VC is higher among young and HIV positive women. Most women present in late stage of the disease despite visiting a health care facility for HIV care/HAART and long standing symptoms.*
Recommendations: *Creating awareness of patirnts on vulvar cancer, particularly HIV positive ones, and health care providers may ameliorate the disease burden in Ethiopia.*
Key words: *Cancer, vulva cancer, demographic aspect, clinical profile, HIV*

INTRODUCTION

Vulvar cancer is a rare gynecological cancer, accounting for 3 to 5 % of gynecological cancers(1, 2). The disease occurs mainly among women in the age of 50s or 60s(3-5). About 15% of vulva cancers occur in women <40 years and could be due to human papilloma virus infection (HPV)(6). Unlike in developed nations, it is diagnosed in late stage in less developed countries(5, 7). The main presenting symptoms of patients are genital mass, genital or vulvar pruritis, genital ulceration, vulvar pain; of which genital tumor and genital itching are most common, accounting for 70.59% and 56.47% (8-10), respectively.

The occurrence of Vulvar cancer in younger women is increasing all over the world due to High Risk-HPV (HR-HPV) infection. Human immunodeficiency virus (HIV)-positive women are at increased risk for persistent HPV infection.

In the advent of highly active antiretroviral therapy (HAART) in the recent decades, HIV positive patients live long and acquire HPV related cancers including vulvar cancer(11).To the best of our knowledge, there has been no specific study about vulvar cancer in Ethiopia. This study was done to describe the demographic characteristics and clinical profile of vulvar cancer.

METHODOLOGY

Study design: Is a retrospective case-series study.
Study area and period
The study was done over the period of August 2012 to July 2017. It was conducted in Tikur Anbessa Specialized Hospital, a teaching University Hospital found in the capital city of Ethiopia. It has different departments and specialized units including gynecology oncology, and radiation and medical oncology units.

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The radiation unit is the only center for the country.

Study Population
All patients with a diagnosis of primary vulvar cancer managed at either the gynecology oncology unit or the radiotherapy unit at TASH during the study period.

Inclusion and Exclusion Criteria
All the patients who had histologically confirmed primary vulvar cancers were included in the study. Those with secondary vulvar carcinoma were excluded.

Data collection tools and procedures
Data were collected using a self-prepared and anonymous questionnaire to gather relevant data from the patients' files. The questionnaire had two parts, namely, the sociodemographic characteristics and the clinical profiles of the patients. The tool was pretested at Zewditu Memorial Hospital. Data were collected by Interns, who were trained for a half-day on the objective of the study and the data collection tool. At each step, the principal investigator checked for the completeness of data. Data were cleaned, coded, and entered using SPSS. Results were presented using proportions and percentages.

RESULTS

Socio-demographic profiles
One hundred eighteen charts of primary vulvar cancer patients were able to be retrieved.
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Table1 shows the socio-demographic characteristics of the 118 VC cases. The median/mean age was 39/43.17 ranging from 22 to 85 years.

Presenting symptomsand HIV Status
As shown in table 2, the patients often presented with more than one symptom, the commonest being vulvar mass (76.3%) followed by ulcer (47.5%). In most (79.7%) patients, the disease extended to the adjacent involved organs beyond the vulva, including vagina (46.6%), anus (29.7%), urethra (22.9%) and inguinal lymph nodes (45.8%). The mean diameter of the lesion was 5.89cm (range 1 to 20cm). The mean duration of the interval between the onset of the symptoms and first medical consultation was 25.43 months (range 1 month to 168 month).

Seventy eight (66.1%) patients were HIV positive. Most (83%) of the HIV positive patients were lying between the age of 22 and 40 years. The duration of HIV infection ranged between 5 and 204 months. Of note, 52.5% of patients had HIV infection for 1-24 months. All(78) of them were on HAART.

Table 1: Socio-demographic characteristics of the patients (n=118)

Variable	Frequency	Percent
Age (years)		
Mean	43.17	
Median	39.00	
22-29	18	15.3
30-39	42	35.6
40-49	23	19.5
50-59	16	13.6
60-69	11	9.3
70+	8	6.8
Total	118	100
Residence (Regions)		
Addis Ababa (Capital city)	44	37.3
Oromia	34	28.8
Amahara	26	22
Tigray	8	6.8
Others	6	5.1
Marital Status		
Single	4	3.4
Married	101	85.6
Divorced	8	6.8
Widowed	1	.8
Unknown	4	3.4
Parity		
Mean No of children	2.66	
Nullipsrous	19	16.1
1-4	81	68.6
5+	18	15.3

Treatment modalities and complications
Of 118 patients, shown in table 3, 30 (25.4%) were scheduled for treatments that were not provided, including 12.7% scheduled for radiotherapy, 10.2% for chemo-radiation and 2.5% for surgery.

A surgical procedure was done for 18.6 % of the patients, consisting of Local vulvectomy and bilateral inguinofemoral lymphadenectomy 12(54.5%), radical vulvectomy and bilateral inguinofemoral lymphadenectomy 9(41%) and excisional vulvectomy1(4.5%). Five (23.7%) of the women developed complications including wound infection. Of this women, 2(9%) patients, vaginal stenosis 2(9%) and 1(4.5%) developed wound break down, delayed healing, lymphocyst and altered skin pigmentation.

Table 2: Clinical characteristics and HIV status of the patients (n=118)

Variable	Frequency	percent
Symptoms		
Vulvar mass	90	76.3
Ulcer	56	47.5
Pruritus	50	42.4
Pain	40	33.9
Discharge	54	45.8
Bleeding	32	27.1
Others	7	5.9
Mean duration (months)	25.43	
Sites of lesion		
Confined to vulva	24	20.3
Extension to adjacent organs	94	79.7
Mean largest diameter (cm)	5.89	
HIV status		
Negative	38	32.2
Positive	78	66.1
Unknown	2	1.7
HIV Pos age category		
22-30	16	20
31-40	49	63
41+	13	17
HIV duration (months)		
Mean duration	72.14	
1 month - 24 month	62	52.5
25month – 48 month	4	3.4
49 month – 72 month	19	16.1
73 month – 96 month	10	8.5
97+	23	19.5

Table 3: Types of Treatment (N=118)

Variable	Frequency	percent
Type of treatment		
Surgery scheduled that were not done	3	2.5
Radiotherapy scheduled that were not given	15	12.7
Chemoradiation scheduled that were not given	12	10.2
Chemoradiation given	38	32.2
Radiation alone given	17	14.4
Chemotherapy alone	11	9.3
Surgery done	20	16.9
Surgery followed by chemoradiation	2	1.7

DISCUSSION

Vulvar cancer is typically a disease of elderly women. The median age in some developed countries were between 65 to 70 years(3,5, 7). Studies in two West African countries showed a higher incidence of the disease in older women; in Burkina Faso the mean age was 57, and it was 56.3 in Ghana (5).

The median/mean age was 39/43.17 in our patients. Similarly, other authors in both hemispheres have noted a lower age of onset(12, 13, 15). In this study, as most of the women are HIV positive and most (91%) of those women are in the younger age group (less than 50); this probably explains the difference in the age distribution with other studies. The age distribution of vulvar cancer in this study is also similar with that of cervical cancer in this country (24), and may have similar etiologic factors.

The young age at presentation of our population, and the stage at presentation lend a huge challenge to the management and subsequent adverse outcomes for these women with respect to familial, sexuality, fertility and psychosocial outcomes. The high rate of HIV positivity in our vulvar cancer population is not surprising given their young age, and Ethiopia's high adult HIV infection prevalence (30) as compared to that of developed countries and West Africa. It is, however, surprising that those women are doing well on HAART and are receiving long term facilities care at HIV/HAART health. We propose that a first steps towards awareness and potential of earlier diagnosis would be the education of Health care workers at these facilities and the inclusion of an assessment of gynecologic symptoms at each visit with direct referral to a gynecologist as indicated.

HIV positive patients have been shown to be at increased risk of persistent HPV infection. Persistent high risk-HPV infection is associated with essentially all squamous cell carcinoma of the cervix, 80% to 90% of anal cancers, a higher proportion of vaginal and vulvar cancers and with oropharyngeal-cancer(23).

In the review of the literature assessing the relationship between HR-HPV and vulvar cancer, Smith *et al* (27), noted 40.1 % prevalence in vulvar cancer. Faber *et al* also noted a similar pooled prevalence of HPV at 39.7% (CI: 35-44.4%) (28) in their updated review of 64 papers with 5015 cases of vulvar cancer. Siriaunksul *et al* noted a 40% prevalence of vulvar cancer in Thailand(29).

Our study could not assess HPV prevalence, but we showed that most of the patients were younger and HIV positive. As in other studies (90%-95%) squamous histology was the most common type of vulvar carcinoma in this study(5, 7, 13, 19).

This study indicates that most patients were from Addis Ababa, the capital city of Ethiopia, where this hospital is located. This is again similar to the pattern noted with cervical cancer(24). A number of factors could account for this including the ability to travel for care, poor knowledge of VC in outlying areas and misidentification of the actual place of residence at the time of registration due to staying with family who reside in Addis Ababa. In literature pruritis is the most common and long lasting reported symptom of vulvar cancer, followed by vulvar bleeding, discharge, dysuria and pain(25). In our patients genital mass is the most common presenting symptom (76.3%) followed by ulcer (47.5%). Pruritus is still the significant presenting symptom.

The difference may be due to the associated lichen sclerosis in older patients in the other studies. In Burkina Faso, pain and ulceration are also the main presenting symptoms(5) while in Ghana(7) swelling and ulceration are most common.

The larger size, mean diameter of the largest ulcer and mass is 5.89 cm (range 1 cm to 20 cm), the multiple lesion and bilateral involvement of the vulva are strikingly important finding in these patients which would be consistent with HPV related cancers. It also contributes to the challenge of an adequate primary surgical resection even if not metastatic which is why most of the patients were not treated with surgical resection.

In the USA, 90% of cases of vulvar cancer are diagnosed with *in situ* or early invasive stage(22). However, this study is consistent with the findings of studies in Burkina Faso and Ghana in which most of the patients presented with locally advanced stage (4,5,7). This has a deleterious effect on the outcome of the disease. Most of our patients sought medical care after several months of the onset of the symptoms. Similarly the Ghana women consulted professionals after failure of improvement following consultations of other alternatives that led to advanced stage.

We plan to determine the primary factors that contribute to late presentation and to make recommendations to address them. Surgical removal of the primary tumor and inginal lymph nodes remains the corner stone of the treatment of vulvar cancer with strong trends towards a less radical more conservative, and more individualized approach in early stage disease.

Radical partial vulvectomy in localized lesion with SLN biopsy is suggested with favorable outcomes but not an option in Ethiopia. Chemoradiation is indicated for advanced cases(7, 13, 19, 22). In our study, 9 out of 22 patients underwent radical vulvectomy and bilateral inguinofemoral lymphadenectomy due to large tumor size and multiple localities while 12 underwent a smaller vulvectomy and bilateral inguinal lymphadenectomy. Post operative surgical complication rate and severity were relatively low, 5 out of 22 patients. This could be due to the retrospective nature of the study and post operative follow up is not always consistent in our population.

Conclusions

In this study, the burden of vulvar cancer is higher among young and HIV positive women. Most of them present at a late stage of the disease despite visiting health care facilities for HIV care/HAART and long standing multiple symptoms.

Recommendations

Creation of awareness of patients onvulvar cancer, particularly those who are HIV positive and health care providers and the inclusion of a gynecologic assessment of symptoms at each visit with direct referral to a gynecologist as indicated would allow earlier diagnosis, either at premalignant or early stage of the disease, and may ameliorate the disease burden in Ethiopia. HPV serotype study and HPV vaccination, which has been provened to be highly effective against ano-genital disease, could make an important contribution to the reduction of the risk of VC in these young women.

Ethics Considerations

The study was approved by the Department of Obstetrics and Gynecology Research and Publication Committee and Institutional Review Board (IRB) of College of Health Sciences, Addis Ababa University for ethical clearance (Protocol number AAUMF 03-008). All procedures were followed in accordance with the ethical standards. Permission was obtained from the department of medical and radiation oncology, and an outpatient department to access the patient medical records.

Competing Interests

There is no conflict of interests to declare.

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REFERENCES

1. de Martel C, Ferlay J, Franceschi S, al. e. Global burden of cancers attributable to infections in 2008: a review and synthetic analysis. Lancet Oncol. 2012;13(6):607-15.
2. Hacker NF,et al. Cancer of the vulva. Int J Gynaecol Obstet. 2015;131 76-8.
3. Hampl M, al. e. New aspects of vulvar cancer: changes in localization and age of onset. Vulvar cancer in women less than fifty in United States, 1980-2005. Gynecol Oncol. 2009.
4. Mary Ann Dadzie, al. e. Vulva cancer in Ghana - Review of a hospital based data. Gynecologic Oncology Reports. 2017; 108-111.
5. Zongo, et al. Cancer of the vulva in Burkina Faso: a hospital-based case series. Infect Agents and Cancer 2016;11:33.
6. Siddiqui N. The management of vulval cancer. Obstet Gynaecol. 2002;12 (2): 97-103.
7. Mary Ann Dadzie et al. Vulva cancer in Ghana – Review of a hospital based data. Gynecologic Oncology Reports 2017;108-111.
8. Thakur, et al. Clinical analysis of vulvar carcinoma. . Gynecology 2013. 2013.
9. Singh DK, Anastos K, Hoover DR, ;. ea. Human papillomavirus infection and cervical cytology in HIV-infected and HIV-uninfected Rwandan women. J Infect Dis. 2009;199:1851-61.
10. Denny L, Boa R, Williamson AL, al. e. Human papillomavirus infection and cervical disease in human immunodeficiency virus-1-infected women. Obstet Gynecol. 2008;111:1380-7.
11. Brickman C, JM P. Human papillomavirus in the HIV-infected host: epidemiology and pathogenesis in the antiretroviral era. 2015.
12. Hampl M, Deckers-Figiel S, Hampl JA, et al. aspects of vulvar cancer: changes in localization and age of onset. Gynecol Oncol. 2009.
13. Singh, et al. A cohort study of vulvar cancer. Indian Journal of Cancer 2016;53 (3).
14. Hacker NF, Eifel PJ, J vdV. FIGO cancer report 2012. Cancer of the vulva. Int J Gynecol Obstet. 2012;119 90-6.
15. Okolo CA, Odubanjo MO, Awolude OA, et al. A review of vulvar and vaginal cancers in Ibadan, Nigeria. . Am J Med Sci 2013;6:76-81.
16. Madeleine MM, Daling JR, Carter JJ, Wipf GC, Schwartz SM, McKnight B, et al. Cofactors with human papillomavirus in a population-based study of vulvar cancer. J Natl Cancer Inst. 1997;89:1516- 23.
17. Canavan TP, D. C. Vulvar cancer. Am Fam Physician. 2002;66:1269-74.
18. Al-Ghamdi A et al. Vulvar squamous cell carcinoma in young women: a clinicopathologic study of 21 cases. . Gynecol Oncol. 2002 84(1):94-101.
19. Alkatout, et al. Vulvar cancer: epidemiology, clinical presentation, and management options International Journal of Women's Health. 2015;7.
20. Ahizechukwu C Eke et al. Management options for vulvar carcinoma in a low resource setting. World J Surg Oncol. 2010;8:94.
21. Nkyekyer, K. Pattern of gynaecological cancers in Ghana. . East Afr Med J. 2000;77 10.
22. Stroup AM et al. Demographic, Clinical, and Treatment Trends among Women Diagnosed with Vulvar Cancer in the U.S. Gynecol Oncol. 2008 108(3):577-83.
23. Clemente et al. Multiple preinvasive and invasive HPV-related lesions of the anogenital tract in a female patient with HIV infection:A case report Medicine (2017) 96:4 Cervical Cancer, an open access journal.
24. Sefinew Migbaru Abate https://www.omicsonline.org/open-access/trends-of-cervical-cancer in Ethiopia for the years 1997-2012.
25. Alkatout et al. Vulvar cancer: epidemiology, clinical presentation, and management options International Journal of Women's Health 2015:7.
26. Stoup AM et, al. Demographic, Clinical, and Treatment Trends Among Women Diagnosed with Vulvar Cancer in the U.S. *Gynecol Oncol*. 2008 March; 108(3): 577–583.
27. Smith et al. Human Papillomavirus Type-Distribution in Vulvar and Vaginal Cancers and Their Associated Precursors.
28. Faberetal. Prevalence and type distribution of human papillomavirus in squamous cell carcinoma and in traepithelial neoplasia of the vulva.Int J Cancer. 2017 Sep 15; 141(6):1161-1169.
29. Siriaunkgul et al. HPV Detection and Genotyping in Vulvar Squamous Cell Carcinoma in Northern Thai land. Asianpacific Journal of Cancer Prevention. *2014,* 15 (8), 3773-3778.
30. Ethiopia HIV country profile. WHO 2016.

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ORIGINAL ARTICLE

CULTIVATING COMPETENT LEADERS WHO CAN MANAGE AND GOVERN THE HEALTH DELIVERY SYSTEM IN NORTHWEST ETHIOPIAN: QUASI-EXPERIMENTAL STUDY

Yeshambel Agumas Ambelie, PhD[*1], Getu Degu Alene, PhD[1], Damen Hailemariam Gebrekiros, MD, PhD[2]

ABSTRACT

Introduction: *Nurturing leadership and governance is salient to strengthen health systems. However, literature that reports the effect of programs related to this, particularly in low and middle-income countries' health systems is limited.*

Aim: *To examine the effect of integrated health system leadership, management, and governance capacity-building program on institutional delivery performance.*

Methods: *A prospective quasi-experimental study, on one-hundred-thirty-four health facility teams,was conducted in northwest Ethiopia. Teams were allocated to intervention and control groups in a 1:1 ratio, non-randomly. Integrated leadership, management, and governance capacity-building program was employed in teams of the intervention group over six months. Using a challenge model, they implemented a six-month project on institutional delivery performance. The outcome of interest was mean institutional delivery performance. Data from each group were collected at baseline and end line. Data were analyzed using analysis of covariance. Statistical significance was determined at p-value<0.05. The program's effect size was reported using partial eta squared.*

Results: *Integrated leadership, management, and governance capacity-building program had a statistically significant effect on mean institutional delivery performance (p-value<0.001). The program's effect size was 65%.*

Conclusions: *Integrated leadership, management, and governance capacity-building program is a plausible cause of improved mean institutional delivery performance. The current findings could make the program sustainable across time and scalable across similar settings. To identify the program's true causation, further research could be done using a randomized control trial.*

Keywords: *Effect, Integrated, Leadership, Management, Governance, Institutional delivery*

INTROCUDCTION

A strong health system is required to address universal health coverage (1, 2). Leadership and governance is identified as the health system building block that directly impact the health outcomes (3, 4). However, it remains challenging to implement and measure, particularly in low and middle-income countries' health systems (4, 5). Yet, nurturing this building block is salient to improve the health system performance and health outcomes.

This has enforced the development of integrated Leadership, Management, and Governance (LMG) capacity-building program (4, 6). Contemporarily, this program centers the integrated leadership, management, and governance for results framework (**Figure 1**).

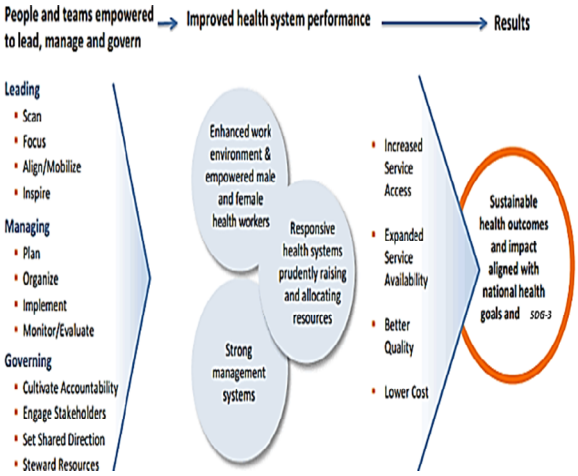

Figure 1: Integrated leadership, management and governance for results framework (Source: MSH, 2017)

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The practices of the three paths indicated in **figure 1** are highly interdependent and mutually reinforcing constructs in the context of health (5, 7). Thus, interacting with each of the practices in a balanced way is important to achieve better results.

Integrated LMG capacity-building program has been deployed in a considerable number of low and middle -income countries' health systems including Ethiopia (3). Despite this enormous expansion, there is limited empirical literature on how the program improves the health system performance and thereby health outcomes (8-11).

The studies done in Kenya (9), Egypt (10) and Mozambique (11) reported that applying the leadership development program increased selected health-service delivery indicators by average coverage rate of 10%, 41%, and 10%, respectively. On the contrary, a study done in Afghanistan reported that the program had no statistically significant effect on health system performance, rather, many indicators worsened in the intervention group (8).

These studies examines the program that only centers either the leading and managing practices (9, 10) or the governing practices (8, 11). All of these studies used an average coverage rate of two and more health services as an outcome of interest. Most of them used a retrospective approach and lacked to use control groups (9-11). None of them did control the plausible confounding factors (8-11). Other studies showed that leadership is a requirement for effective governance and effective management (5, 6). Moreover, there is a recommendation to further researching the program's effect using a single outcome of interest (9). Therefore, the current study aimed at examining the effect of integrated health system leadership, management, and governance capacity-building program on institutional delivery performance.

METHODS

Theoretical Approach

The theory of change is the theoretical foundation of this study (12, 13). Theory of change refers to a systematic and cumulative study of the links between inputs, activities, outputs, outcomes, and context of any initiative (12). There are three identified attributes to achieve the potential of this theory: plausibility, doability, and testability (13). Plausibility refers to whether activities implemented should lead to desired outcomes. Doability reflects about availability of all resources to carry out the initiative. Testability explains the presence of specific and complete theory of change to track its progress in incredible and useful ways.

Linking between inputs, activities, outputs, outcomes, and context of the initiative is influenced by the competence of the people and teams to lead, manage and govern the health delivery system (6). As noted earlier, studies indicate that people and teams empowered to lead,manage and govern the health delivery system improved performance and thereby increased health outcomes (5, 9, 10). This shows that how developing one's competence to lead, manage, and govern the service delivery system is critical to achieve improved results. Anyone can further imagine the value of the integrated LMG capacity-building program when it is firmly grounded in the target population.

Study design and teams

This study was designed to be a prospective team-based (14) quasi-experiment, aimed at examining the effect of the integrated LMG capacity-building program on institutional delivery among health facility teams. Quasi-experiment is an empirical study design used to estimate the plausible causal impact of an intervention on its target population without random assignment (15, 16). The study was conducted among one hundred thirty-four health facility teams in northwest Ethiopia. Teams were allocated to intervention and control groups in a 1:1 ratio, non-randomly. Each team had three members. The team members in both the groups were intact and worked together over the intervention period. In all the 134 study teams, there were a total of 402 participants. **Table 1** indicates sex, age, residence, and service year of the study team members.

Table 1: Sex, age, residence, and service year of the study team members, Northwest Ethiopia, 2018 (n = 402)

Variable	Category	Frequency	Percent
Sex	Male	184	45.8
	Female	218	54.2
Age in years (mean = 32.6, SD = 5.5)	<25	4	1.0
	25-29	145	36.1
	30-34	135	33.6
	>34	118	29.4
Residence	Rural	239	59.5
	Urban	163	40.5
Service year in years (Mean = 8.6, SD = 4.8)	<2	15	3.7
	2-4	59	14.7
	5-8	150	37.3
	>8	178	44.3

Intervention

The integrated LMG capacity-building program was the intervention. This is a capacity-building program that has been endorsed by the Ethiopian ministry of health to empower health facility teams to lead people, manage tasks and govern organizations. It comprised of five modules: (I) Overview and context of the health system in Ethiopia, (II) Introduction to LMG, (III) Improving performance through enhanced LMG, (IV) Health facility resources management, and (V) Health service delivery management. The integrated LMG capacity-building program was deployed over six months in the intervention group.

Basic concepts that enable the teams to face challenges and achieve results were transferred with two consecutive off-site three-day workshops. Only nine to ten teams (twenty-seven to thirty participants) were recruited to a single workshop. Based on this, seven workshop cohorts were established to address all the intervention teams. The main task that the teams carried out in the first workshop was developing the six-month project on institutional delivery performance using a challenge model (6, 10) (**Figure 2**).

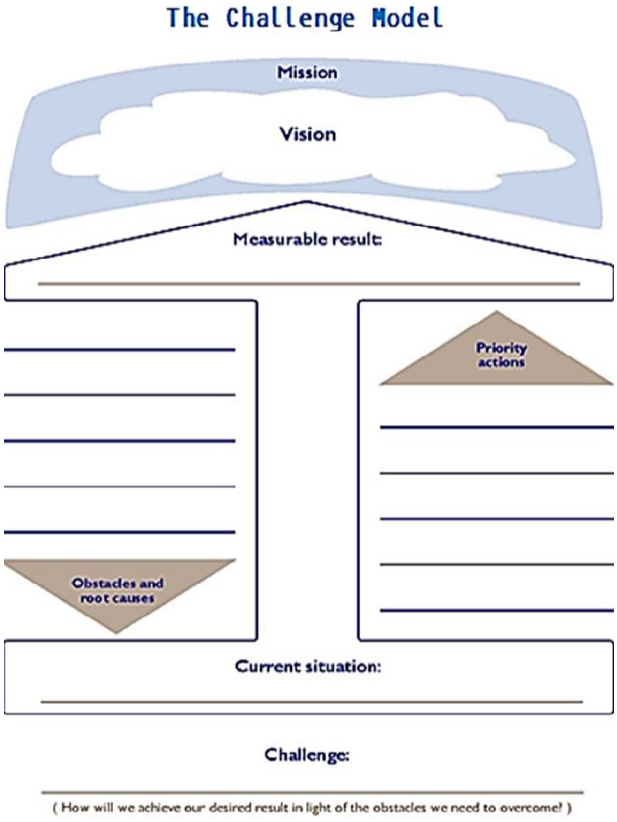

Figure 2: The challenge model (Source, MSH, 2017)

In line with the integrated leadership, management and governance for results framework (**Figure 1**), the challenge model was the key tool to track the plausibility, doability, and testability of the integrated LMG capacity-building program. Elements of this model that the teams worked out step-by-step were: reviewing facility mission, setting a shared vision, developing six-month measurable result on institutional delivery, assembling current institutional delivery performance (baseline), identifying obstacles and root causes, developing inspirational challenge statement, and designing priority actions to eliminate obstacles. In the meantime, each team identified key stakeholders to align and mobilize resources.

With all the above activities done, the teams went back to their working place, taking an assignment of validating the project with other staff and key stakeholders. For example, one of the major issues to be validated was the specificity, measurability, achievability, realisticity and time boundedness of the desired measurable result.

After an average period of one month, ensuring that the teams carried out their workplace assignments, they were called back for the second workshop. It began with presentations and discussions on the validated projects. Furthermore, the teams facilitated development of an action plan and monitoring and evaluation plan to implement the six-month project. Moreover, concepts of coaching, communication, managing facility resources, and health services delivery were discussed. In the end, they went back to their working place for the actual implementation of the projects.

In the next month, the facilitators' made an on-site coaching visit to each team using a structured coaching guide. They addressed issues like challenges faced, solutions taken and lessons learned. Facilitators were certified experts for integrated LMG in-service capacity building trainer of trainees from the Ethiopian federal ministry of health. Participatory, inquiry-based and practice-oriented facilitation approaches were employed.

Note that the control group was followed using the standard procedure.

Variables and measurements

Mean end line institutional delivery was the dependent variable, while the baseline institutional delivery was a covariate. Institutional delivery perfomance referred to the percentage of women who gave birth at a health facility.

It was a continuous scale variable measured by percentage. The expected pregnant women were denominators, while the women who gave birth at the facility were nominators. The main independent variable was the group. Note that any statement of mean institutional delivery performance in this study refers to the end line mean institutional delivery performance.

Data collection and analysis

Data were collected at baseline and end line using a checklist. Analysis of covariance was unlocked to analyze the data. Before the final analysis, five stages of analyses were conducted using the statistical package for the social sciences version 20. First, descriptive analysis was carried out to characterize the study teams and the ordinary mean institutional delivery performance. Second, assumptions of no presence of significant outliers, and approximately normally distributed data for each group were assessed by boxplot and Shapiro-Wilk test ($p<0.05$), respectively. Third, in the absence of the covariate, the effect of the group on the mean institutional delivery (dependent variable) was tested using analysis of variance. It gave significant result: partial eta squared (η^2) = 0.37, and p-value<0.001.

The η^2 measured the proportion of the total variance (effect size) on the dependent variable that was associated with the membership of different groups defined by a group (17). Fourth, the group-covariate interaction effect was checked using a custom model of analysis of covariance. This analysis technique tested differences between the group means when we knew that an extraneous variable affected the dependent variable (18, 19). It provided non-significant output: $\eta^2 = 0.01$ and p-value = 0.21. The other important output displayed from this analysis was the result of Levene's test: p-value<0.001. This result indicated that the group variances were not equal and hence the assumption of homogeneity of variance was violated. This further showed that we failed to reject the null hypothesis in that there was no group by covariate effect on the dependent variable (19). Last, the effect of the group on the covariate was also tested using analysis of variance and gave non-significant result: $\eta^2 = 0.02$ and p-value = 0.09.

Considering the above outlooks, analysis of covariance with the full factorial model was unlocked to evaluate the effect of the group on the dependent variable. This analysis technique is developed to increase the power of the test of the predictor variable, by removing error variance in the dependent variable that is associated with the covariate (18). Statistical significance was determined at p-value<0.05. The group's effect size on the dependent variable was measured using η^2.

Ethical considerations

The study was registered at Clinicaltrials.gov, NCT03639961 on 27 May 2017. Ethical clearance was secured from the corresponding author's institute with a protocol record 090/18-04. Written consent was obtained from each member of the study teams, and data were protected. This work is an extension of our previous work (20).

RESULTS

Ordinary means

Table 2 displays the ordinary mean and standard deviation of institutional delivery performances with 95% CI. The ordinary mean (±SD) difference between the baseline and end line institutional delivery performances were 14.6±7.2 and 1.1±2.2 in the intervention group and the control group, respectively.

Table 2: Ordinary mean and Standard Deviation (SD) institutional delivery performances, Northwest Ethiopia, 2018 (n= 134)

		Ordinary mean and SD institutional delivery performance							
		Baseline			**End line**				
	Measure	Statistic	95% CI		Statistic	95% CI			
			Lower	Upper		Lower	Upper		
Group									
Intervention	Mean	34.2	30.7	37.5	48.8	46.2	51.9		
	SD	12.8	10.6	14.8	12.6	10.4	14.4		
Control	Mean	30.9	28.6	33.2	32.0	29.5	34.6		
	SD	9.5	7.1	11.5	9.1	6.9	11.2		

Estimated means

Table 3 presents the adjusted mean institutional delivery performances that were the original means adjusted for the covariate. The means had changed compared to those found in the ordinary means.

Table 3: Adjusted mean institutional delivery performances, Northwest Ethiopia, 2018 (n= 134)

Group	Mean	Std. Error	95% CI	
			Lower Bound	Upper Bound
Intervention	47.4	0.627	46.2	48.6
Control	33.4	0.627	32.2	34.6

Note: The covariate appearing in the model was evaluated at the following value: baseline institutional delivery performance = 32.6.

Effect of integrated LMG capacity-building program

Table 4 shows that there was an overall statistically significant difference in the mean institutional delivery performance between the groups once their means had been adjusted for the covariate (p-value<0.001).

The output also displayed a 65% ($\eta^2 = 0.65$) effect size of the group on the mean institutional delivery performance. This showed that including the covariate in the analysis increased the group's (intervention's) effect size from 37% (noted in the methods part) to 65%.

Table 4: Outputs of between-subjects effects on adjusted means, Northwest Ethiopia, 2018 (n = 134)

Source	Type III Sum of Squares	Df	Mean Square	Sig.	Partial Eta Squared
Corrected Model	21955.8	2	10977.9	0.000	0.87
Intercept	2169.6	1	2169.6	0.000	0.39
Covariate	12460.4	1	12460.4	0.000	0.79
Group	6435.3	1	6435.3	0.000	0.65
Error	3410.4	131	26.0		
Total	244108.0	134			
Corrected Total	25366.2	133			

Note: R Squared = 0.87, Adjusted R Squared = 0.86

DISCUSSION

The current study findings inform that the integrated LMG capacity-building program intervention causes a statistically significant difference in the mean institutional delivery performance between the groups. The intervention is led by the theory of change to signify the expected relationships between inputs, activities, outputs, and outcomes in a given context (12). This theory has three important attributes: plausibility, doability, and testability that support achievement of the expected outcome of any initiative (13). In the current case, this could be comprehended as a reasonable narrative of the interactions between the various components of the integrated LMG capacity-building program and the plausible pathways through which they have related with the elements of the health facility system to achieve the expected outcome.

The current and few previous studies (9, 10) use the challenge model, in common, to show the logical relationships between facility mission, shared vision, measurable result, current situation, obstacles and root causes, challenge statement, and priority actions. Alongside these relationships, the teams identify key stakeholders to align and mobilize resources and develop an action plan and monitoring and evaluation plan to achieve better results. These pathways can support to track the scientific reliability and empirical scalability of the program.

Differently, the current study examined the integrated LMG capacity-building program that centers the integrated leadership, management, and governance for results model (5). In resource-limited settings including Ethiopia, empowering people and teams using such a model is crucial.

This is comparable with stabilizing a three-legged stool to get a balanced sit on a rough ground (21, 22).

The other unique characteristics of the current study are adjusting the original means for the covariate, and including the control group. These have five-fold benefits (19): (I) it reduces the within-group error variance; (II) it eliminates potential confounders; (III) it provides additional evidence of causality; (IV) it identifies assumption attributes in trends between the groups; and (V) it determines the effect size of the program.

In the current study, the adjusted mean institutional delivery performance (**Table 3**) compared with the ordinary mean institutional delivery performance (**Table 2**) is less in the intervention group, but greater in the control group. This shows that adjusting the mean by removing error variance in the dependent variable that associates with the covariate provides unbiased or uncontaminated mean. Additionally, the adjusted mean institutional delivery performances in both the groups are greater compared with the 2016 Ethiopian demographic health survey institutional delivery performance report (26%). Whereas, compared with the 2019 survey report (48%), the result in the intervention group is comparable, but the result in the control group is less. This finding is supported by a recently published field action report from Ethiopia that reported a 40% institutional delivery performance increase (23). These magnifies the importance of implementing the integrated LMG capacity-building program in improving performances and health outcomes.

The current ordinary mean achievement increased in the intervention group, 14.6%, is slightly greater compared to the average achievement increase reported in the studies done in Kenya, 10% (9) and Mozambique,10% (11). Whereas, it is lower compared with the average achievement increase reported in the study done in Egypt, 41% (10). These increments in general, and the differences, in particular, might be due to that people and teams more empowered to lead, manage, and govern improves the workgroup environment, management system, and responsiveness of the health system (24, 25).

Generally, the current study has important implications for policymaking, planning, implementing and researching in the context of the low and middle-income countries' health systems. Health authorities who lead and manage and govern in these countries and who wish to achieve better results could consider a contextualized integrated LMG capacity-building program(5, 26).

Away from the implications, there were potential limitations in conducting this study. The first drawback was absence of randomization pocedure (15) leading to the second limitation of whether analysis of covariance is used in alike data. Nonetheless, this was applied since there was no preexisted group affecting the covariate (19, 22). The third limitation was use of the statistical principle of regression to the mean in establishing causality (18).

This widespread statistical phenomenon can result in wrong conclusion that an effect is due to the intervention when in reality it is due to chance. The degree of this caution was diminished by implementing the intervention in a real-world setting. The last limitation was the short duration of the intervention in which six months may not be enough to overcome barriers and achieve a significant result.

Conclusions

The integrated LMG capacity-building program is a plausible cause of improved institutional delivery. The program brings a statistically significant difference in the mean institutional delivery between the groups once their means adjusted for the covariate. The program's effect size is 65%. The findings provided from this study might make the program sustainable across time and scalable across similar countries' health systems. To identify the program's true causation, further research could be done considering a randomized control trial.

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Conflict of interest

All the authors declare that they have no both financial and non-financial competing interests.

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REFERENCES

1. Murray CJ, Frenk J. A framework for assessing the performance of health systems. Bulletin of the world Health Organization. 2000;78:717-31.
2. Peters DH, El-Saharty S, Siadat B, Janovsky K, Vujicic M. Improving health service delivery in develop ing countries: from evidence to action: The World Bank; 2009.
3. Daire J, Gilson L, Cleary S. Developing leadership and management competencies in low and middle-income country health systems: a review of the literature. Cape Town: Resilient and Responsive Health Systems (RESYST). 2014.
4. Rauscher M, Walkowiak H, Djara MB. Leadership, Management, and Governance Evidence Compen dium. 2018.
5. Rice JA. Synthesis paper on effective governance for health. 2012.
6. Management Sciences for Health. Rice JA, Shukla, Mahesh, Johnson Lassner, Karen et al. Leaders Who Govern. 2015.
7. Vriesendorp S, De La Peza L, Perry C, Seltzer J, ONeil M. Health systems in action: an ehandbook for leaders and managers. 2010.
8. Anwari Z, Shukla M, Maseed BA, Wardak GFM, Sardar S, Matin J, et al. Implementing people-centred health systems governance in 3 provinces and 11 districts of Afghanistan: a case study. Conflict and health. 2015;9(1):2.
9. La Rue KS, Alegre JC, Murei L, Bragar J, Thatte N, Kibunga P, et al. Strengthening management and leadership practices to increase health-service delivery in Kenya: an evidence-based approach. Human resources for health. 2012;10(1):25.
10. Mansour M, Mansour JB, El Swesy AH. Scaling up proven public health interventions through a locally owned and sustained leadership development programme in rural Upper Egypt. Human Resources for Health. 2010;8(1):1.
11. Perry C. Empowering primary care workers to improve health services: results from Mozambique's lead ership and management development program. Human resources for health. 2008;6(1):14.
12. Connell JP. New Approaches to Evaluating Community Initiatives. Concepts, Methods, and Contexts. Roundtable on Comperhensive Community Initiatives for Children and Families: ERIC; 1995.
13. Connell JP, Kubisch AC. Applying a theory of change approach to the evaluation of comprehensive com munity initiatives: progress, prospects, and problems. New approaches to evaluating community initia tives. 1998;2(15-44):1-16.
14. Salas E, DiazGranados D, Klein C, Burke CS, Stagl KC, Goodwin GF, et al. Does team training improve team performance? A meta-analysis. Human factors. 2008;50(6):903-33.
15. Harris AD, McGregor JC, Perencevich EN, Furuno JP, Zhu J, Peterson DE, et al. The use and interpreta tion of quasi-experimental studies in medical informatics. Journal of the American Medical Informatics Association. 2006;13(1):16-23.
16. DiNardo J. Natural experiments and quasi-natural experiments. Microeconometrics: Springer; 2010. p. 139-53.
17. Richardson JT. Eta squared and partial eta squared as measures of effect size in educational research. Educational Research Review. 2011;6(2):135-47.
18. Cochran WG. Analysis of covariance: its nature and uses. Biometrics. 1957;13(3):261-81.
19. Miller GA, Chapman JP. Misunderstanding analysis of covariance. Journal of abnormal psychology. 2001;110(1):40.
20. Ambelie YA, Alene GD, Gebrekiros DH. Effect of integrated health system leading-managing-and-governing for results model on institutional delivery: Team-based quasi-experiment. bioRxiv. 2019:775858.
21. Johnson RL. CEO must have authority to coordinate governance, management, medical staff. Hospital progress. 1984;65(4):49-53.
22. Levey S, Vaughn T, Koepke M, Moore D, Lehrman W, Sinha S. Hospital leadership and quality improve ment: rhetoric versus reality. Journal of Patient Safety. 2007;3(1):9-15.
23. Bayou B, Hailu T, Jenberie A, Minalu Y, Tesfamichael T. Transforming primary health care unit service delivery through leadership, management and governance (LMG) training: A field action report from Ethiopia. The Ethiopian Journal of Health Development (EJHD). 2020;34(2).
24. Rajkumar AS, Swaroop V. Public spending and outcomes: Does governance matter? Journal of develop ment economics. 2008;86(1):96-111.
25. Delavallade C. Corruption and distribution of public spending in developing countries. Journal of eco nomics and finance. 2006;30(2):222-39.
26. Ambelie Y, Alene G, Gebrekiros D. Modeling a reliable and valid framework for building and measuring the health system workforce's competence to lead, manage and govern in Ethiopia: Factor analysis ap proach. 2020.

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ORIGINAL ARTICLE

ORAL PARACETAMOL VERSUS ORAL DICLOFENAC IN THE CONTROL OF UTERINE CRAMPING PAIN AFTER VAGINAL BIRTH

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ABSTRACT

Introduction: *Uterine cramping pain is a documented morbidity in the immediate postpartum period but there is no protocol for its management. The study aims to compare the effectiveness of multiple doses of oral paracetamol and diclofenac in the control of uterine cramping pain in women that had spontaneous vaginal delivery*
Methods: *It is a randomized controlled study among 291 women that had spontaneous vaginal delivery at LAUTECH Teaching Hospital Ogbomoso. They were recruited in the labour ward and randomized into Paracetamol, Diclofenac or Placebo groups. Initial pain intensity was assessed followed by administration of the drugs within 1hour of delivery and then 8 hourly until 24 hours. The instrument of survey was a proforma, and data were analyzed using SPSS 22. Primary outcomes were adequacy of pain relief, onset of breastfeeding and maternal satisfaction. Secondary outcome was potential maternal side effects of the drugs.*
Results: *The incidence of after-pain was found to be 100% with a large proportion (97.9%) being severe. Respondents' age, gestational age, duration of labour and oxytocin augmentation of labour correlated significantly with severity of pain. Diclofenac was significantly better than paracetamol which in turn was better than placebo in relieving the pain, mean SPID- 8.71 (SD-1.17; CI-8.48-8.95), 6.78 (SD-2.25; CI-6.33-7.24) and 1.54(SD-1.35, CI-1.26-1.31), F-487.31; p< 0.001 for diclofenac, paracetamol and placebo, respectively. Side effects were seen only in diclofenac group.*
Conclusion: *Multiple doses of oral Diclofenac and Paracetamol were effective in relieving uterine cramping after-pain although pain relief was more with diclofenac.*
Key words: *uterine cramp, after-pain, postpartum analgesia, Diclofenac and Paracetamol*

INTRODUCTION

Child birth is known to be a pain-associated event which gives considerable physical and psychological distress to the parturient and her care giver and if improperly managed could jeopardise the woman's reproductive career. (1-3) Apart from the pain experienced during labour and delivery, new mothers may experience pain following child birth from incision of caesarean delivery, perineal lacerations including episiotomy, the nipple while breastfeeding and uterine contractions associated with uterine involution. (3,4) Shift of attention from the mother to her newborn makes the management of after birth pains to be less researched unlike the management of labour pains. (5, 6)

A significant event of the puerperium is uterine involution which is the physiological process by which the uterus returns to the pre-pregnancy state after delivery through cytoplasmic autolysis aided by uterine contraction. (6, 7) This uterine contraction is what is perceived as uterine cramping after pain and has been found to be more in multipara than primipara. (2,7,8) Although this pain is subjective and can be confusing to new mothers, it has invariably been described as being similar to menstrual pain, felt in the lower abdomen and back with severity likened to that of labour pain. (7,8) This pain has been described as being severe enough to require the most potent analgesia.(7-9,10,11)

The justification for this study is based on the fact that uterine cramping pain can impair successful breastfeeding, the mother's ability to care for her newborn and the establishment of good-quality mother-baby interaction. (11-13) it can also result in maternal neuro-hormonal stress responses, sleep and emotional disorders, anxiety, depression and mother's inability to perform her daily routine. (3,12,14,15) Hence, the goals of safe motherhood cannot be achieved without effective management of after-pain from uterine cramps. (16,17)

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The study aimed to determine the incidence, pattern and determinants of after pain and to compare the efficacy of multiple doses of oral paracetamol 1000mg, diclofenac potassium 50mg and that of placebo in relieving it.

MATERIALS AND METHODS

It was a randomized controlled study among consenting women that had spontaneous vaginal delivery in the labour ward of LAUTECH Teaching Hospital Ogbomoso, South-Western Nigeria. Exclusion criteria were women that had postpartum haemorrhage, women on drugs with known or possible analgesic or anxiolytic effects including women who had epidural analgesia in labour, women with history of peptic ulcer disease or bleeding disorders, significant renal or liver impairment, preeclampsia, asthma, women with intrauterine fetal death or stillbirth and women on anticoagulants.

Approval was obtained from the ethical committee of the hospital with protocol number LTH/OGB/EC/2016/118. Consenting participants were randomized into intervention (diclofenac or paracetamol) or control (placebo) groups using simple random sampling. The interventional group was either diclofenac potassium tablets (Cataflam® by Novartis pharmaceuticals) administered at the dose of 50mg 8hourly or paracetamol tablets (Easadol® by May & Baker pharmaceuticals) administered at the dose of 1000mg 8hourly. The control group had placebo administered in two tablets 8 hourly.

Sample size for the study was 291 (n=97 in each group) calculated using formula for multiple arm randomized control trial for continuous variable.(18) The social class of the patients was determined by the patient's level of education and her husband's occupation using Olusanya and co-workers classification system. (19)

The mean Summed Pain Intensity Difference employed was obtained from a pilot study assuming effect size of 0.54, power of 90% at 95% confidence level and attrition rate of 10%. Women attending antenatal clinic were informed about the study but recruitment was done when they presented in labour. The management of labour, delivery and postpartum period was done according to the departmental protocol. This included active management of labour, partho-graphic monitoring of labour and administration of intramuscular pethidine 100mg 4hourly until cervical dilatation was 6cm.

Immediately after vaginal delivery, (within 1 hour of initiating breastfeeding or within 1hour post-delivery, for parturients that could not breastfeed), all the women that met the inclusion criteria were counselled and written consent was obtained followed by baseline pain evaluation and then randomisation into the study groups. The chosen drug was then administered. Thus Easadol® 1000mg or Cataflam® 50mg or Placebo was administered orally, after food, to the assigned group. Subsequently, at 8th, 16th and 24thhour or at discharge, whichever came first, administration of drug was repeated and other aspects of the proforma were appropriately administered. The study was discontinued in any respondent who developed known side effects associated with any of the drugs. Any participant that expressed uncontrolled pain in between the stipulated hours of drug administration was given tramadol tablet 50mg, per oris, statim for the break through pain.

The baseline pain intensity within 1 hour post-delivery and at each of 8th, 16th and 24th hour was assessed using 11-point numeric pain intensity scale with zero indicating no pain and 10 the worst pain. For the extent of pain relief, the difference between two consecutive pain intensity measurements was calculated. The resultant pain intensity difference at each time was summed to give one numerical value, the Summed Pain Intensity Difference (SPID), for each subject. The higher the SPID the greater is the pain relief. Maternal satisfaction about pain relief was also assessed using Pain Relief Satisfaction Scale.

Primary outcomes were adequacy of pain relief, onset of breastfeeding and maternal satisfaction. Secondary outcome was potential side effects of the study drugs.

IBM SPSS version 22(20) was used for data entry and analysis. To determine significance, chi square test was used for categorical variables while ANOVA test was used when comparing difference in more than two means. Post Hoc test was performed to confirm any difference that occurred between two groups whenever ANOVA test showed overall statistical difference in the group means. Correlation analysis (Spearman rho and Pearson) were used to test relationships. Logistic regression analysis was also performed to check the effect of the need for additional analgesia among the groups. Level of significance was set at p value ≤ 0.05.

RESULTS

The study was carried out between 25th July 2017 and 12th May 2018. Table 1 depicts the baseline profile of the participants.

The participants were evenly distributed across the study groups as the observed difference in the distribution was not statistically significant.

Table 1: Characteristics of participants

Variables	Study Group			Total N(%)	Test statistics	p-value
	Diclofenac n(%)	Paracetamol n (%)	Placebo n(%)			
Age (in years)					**χ^2=7.859**	0.447
<25	20 (34.5)	19 (32.8)	19 (32.8)	58(100)		
25 – 29	23 (34.8)	20 (30.3)	23 (34.8)	66(100)		
30 – 34	23 (27.1)	32 (37.6)	30 (35.8)	85(100)		
35 – 39	24 (43.6)	13 (23.6)	18 (32.7)	55(100)		
40 and above	7 (25.9)	13 (48.1)	7 (25.9)	27(100)		
Total	97	97	97	291		
Mean Age ±SD	30.43±6.4	30.92±6.6	30.20±6.4	30.51±6.4	**F= 0.322**	0.725
Religion					**χ^2= 7.293**	0.065
Christians	52 (28.7)	62 (34.3)	67 (37.0)	181(100)		
Muslims	45 (41.3)	35 (32.1)	29 (26.6)	109(100)		
Others	0 (0.0)	0 (0.0)	1 (100.0)	1(100)		
Total	97	97	97	291		
Ethnicity					**χ^2=4.259**	0.802
Hausa	4 (26.7)	5 (33.3)	6 (40.0)	15(100)		
Igbo	10 (41.7)	8 (33.3)	6 (25.0)	24(100)		
Yoruba	74(31.9)	78(33.6)	80 (34.5)	232(100)		
Others	9 (42.1)	6 (31.6)	5(26.3)	20(100)		
Total	97	97	97	291		
Marital Status					**χ^2= 1.373**	0.616
Single	5 (50.0)	2 (20.0)	3 (30.0)	10(100)		
Married	92 (32.7)	95 (33.8)	94 (33.5)	281(100)		
Total	97	97	97	291		
Socio-economic class						
High	0 (0)	0 (0)	0 (0)	0(0)		
Middle	97 (33.3)	97 (33.3)	97 (33.3)	291(100)		
Low	0 (0)	0 (0)	0 (0)	0(0)		
Total	97	97	97	291		
Parity					**χ^2= 4.626**	0.328
Primiparous	23 (41.8)	15 (27.3)	17 (30.9)	55(100)		
Multiparous	66 (30.7)	73 (34.0)	76 (35.3)	215(100)		
Grand multiparous	8 (38.1)	9 (42.9)	4 (19.0)	21(100)		
Total	97	97	97	291		
Gestation age at delivery					**χ^2=3.141**	0.222
Preterm	9 (50)	6 (33.3)	3 (16.7)	18(100)		
Term	88 (32.2)	91 (33.3)	94 (34.4)	273(100)		
Total	97	97	97	291		
Types of Gestation					**χ^2=3.655**	0.169
Single	94 (33.5)	91 (32.4)	96 (34.2)	281(100)		
Multiple	3 (30.0)	6 (60.0)	1 (10.0)	10(100)		
Total	97	97	97	291		
Duration of Labour					**χ^2=24.08**	**<0.001**
≤8hours	22 (73.3)	4 (13.3)	4 (13.3)	30(100)		
>8hours	75 (28.7)	93 (35.6)	93 (35.6)	261(100)		
Total	97	97	97	291		
Augumentation of Labour	38 (45.8)	22 (26.5)	23 (27.7)	83(100)	**χ^2=8.125**	**0.020**
Yes	59 (28.4)	75 (36.1)	74 (35.6)	208(100)		
No	97	97	97	291		
Total						
Commenced Breastfeeding within 1 hour of delivery	86 (31.9)	92 (34.1)	92 (34.1)	270(100)	**χ^2=3.695**	0.207
Yes	11 (52.4)	5 (23.8)	5 (23.8)	21(100)		
No	97	97	97	291		
Total	11 (52.4)	5 (23.8)	5 (23.8)	21(100)		
Reason for not commencing BF	8.77± 1.19	8.91± 1.00	8.78± 0.97	8.82±1.06	**F 0.480**	0.619
Baby is in SCBU						
Baseline Pain Intensity						
Mean ±SD						

A total of 291 women who gave informed consent were enrolled for the study and randomised equally into intervention groups; diclofenac (n – 97), placebo (n – 97) and control (placebo) group (n – 97).

Table 2: Incidence and pattern of after pain intensity among the study participants

Pain Intensity	Frequency	Percentage
No pain	0	0.0
Mild pain	0	0.0
Moderate pain	6	2.1
Severe pain	285	97.9

All participants completed the study and were analysed.

Table 2 shows the incidence and pattern of uterine cramping after pain among the participants. The incidence of uterine cramping after pain was 100%.

No respondent reported no or mild pain intensity. Most (97.9%) of the respondents reported severe pain while only 2.1% reported moderate pain intensity.

Table 3: Factors affecting severity of pain among the respondents

Factors	Pain Severity				Total	χ^2	p-values
	Moderate		Severe				
	n	(%)	n	%			
Marital Status							
Married	5	1.8	276	98.2	281(100)		
Single	1	10.0	9	90.0	10(100)	3.232	0.072
Number of gestation							
Single	6	2.1	275	97.9	281(100)		
Multiple	0	0.0	10	100.0	10(100)	0.218	0.641
Augumentation							
Yes	4	4.8	79	95.2	83(100)		
No	2	1.0	206	99.0	208(100)	4.372	0.037
Religion							
Islam	2	1.8	107	98.2	109(100)		
Christianity	4	2.2	177	97.8	181(100)	0.069	0.966
Others	0	0	1	100	1(100)		
	Pain intensity						
			Pearson Correlation Coefficient (r)				p-value
Age			0.225				<0.001
Parity			0.083				0.158
Gestational age			0.177				0.002
Duration of labour (in minutes)			0.190				0.001

Table 3 shows the relationship between the respondents' socio-demographic profile and severity of pain. Oxytocin augmentation of labour, respondents' age, gestational age and duration of labour were positively correlated with the pain intensity.

Table 4: Efficacy of Analgesic on After Pain Relief: using SPID, maternal satisfaction, need for additional analgesia and maternal side effects

		Mean	SD	95% Confidence Interval for Mean Lower Bound	Upper Bound	Min	Max	F	p-value
Maternal satisfaction	Diclofenac	9.51	1.12	9.28	9.73	2.00	10.00	515.18	<0.001
	Paracetamol	6.87	2.46	6.37	7.36	.00	10.00		
	Placebo	1.60	1.35	1.33	1.87	.00	8.00		
	Total	5.99	3.72	5.56	6.42	.00	10.00		
Summed Pain Intensity Difference	Diclofenac	8.71	1.17	8.48	8.95	6.00	10.00	487.32	<0.001
	Paracetamol	6.78	2.25	6.33	7.24	.00	10.00		
	Placebo	1.54	1.35	1.26	1.81	.00	8.00		
	Total	5.68	3.46	5.28	6.08	.00	10.00		

Need for additional analgesia/maternal side effects

Variables	Study Group Diclofenac n (%)	Paracetamol n (%)	Placebo n (%)	Test statistics	p value
Need for additional analgesia					
Yes	3 (2.8)	19 (17.9)	84 (78.2)	X2= 163.86	<0.00
No	94 (50.8)	78 (42.2)	13 (7.0)		1
Total	97	97	97		
Reason for additional analgesia					
Abdominal pain	1 (100)	0 (0.0)	0 (0.0)	X2= 204.18	<0.00
Uterine Contraction pain	2 (1.92)	16 (15.38)	86 (82.70)		1
Side effect*					
Dyspepsia	2 (100)	0 (0.0)	0 (0.0)	X2=2.65	0.331
Epigastric pain	6 (100)	0 (0.0)	0 (0.0)	X2=9.47	0.004
Others					

Post Hoc test of Maternal Satisfaction and SPID

Dependent Variable	(I) identification	(J) identification	Mean Difference (I-J)	Sig.	95% Confidence Interval Lower Bound	Upper Bound
Maternal satisfaction	Diclofenac	Paracetamol	2.63918*	<0.001	2.0482	3.2301
		Placebo	7.90722*	<0.001	7.3163	8.4982
	Paracetamol	Diclofenac	-2.63918*	<0.001	-3.2301	-2.0482
		Placebo	5.26804*	<0.001	4.6771	5.8590
	Placebo	Diclofenac	-7.90722*	<0.001	-8.4982	-7.3163
		Paracetamol	-5.26804*	<0.001	-5.8590	-4.6771
Summed Pain Intensity Difference	Diclofenac	Paracetamol	1.92784*	<0.001	1.3674	2.4883
		Placebo	7.17526*	<0.001	6.6148	7.7357
	Paracetamol	Diclofenac	-1.92784*	<0.001	-2.4883	-1.3674
		Placebo	5.24742*	<0.001	4.6870	5.8079
	Placebo	Diclofenac	-7.17526*	<0.001	-7.7357	-6.6148
		Paracetamol	-5.24742*	<0.001	-5.8079	-4.6870

Table 4, the mean SPID was most in diclofenac group: 8.71 [SD-1.17; 95% CI- 8.48-8.95] and least in placebo group: 1.54 [SD-1.35; CI-1.26-1.81].

The test of association was significant (F-487.31; p-<0.001) in all the groups.

DISCUSSION

The participants were evenly distributed across the study groups. The mean age of the respondents was 30.6 ± 6.5years which is similar to the mean age (30.4 ± 4.8years) of the women in Imarengiaye and co-workers' study. (10) This could be due to similar geographical location, Nigeria. However, this mean age is higher than the mean age (27.9 ± 4.2 years) obtained by Mahin and co –workers in Iran.21 This could be due to lower age of marriage among Arab women. (21) Yoruba ethnic group constituted majority (80%) of the study population, this is because of the geographical location of the study setting, Ogbomoso south-western Nigeria, which is a Yoruba land. Although all the women in this study belonged to the middle socioeconomic class, majority of them (57%) had tertiary level of education, 30% of them had secondary level of education and only 13% of them had primary level or no formal education. This is similar to the finding of Olayemi and co-workers which showed that the Yoruba ethnic group has high educational status. (22)

The incidence of uterine cramping after-pain was 100%, similar to the finding of Holdcroft and co-workers in which 96% of the respondents reported after - pain. (11) Also, Imarengiaye and co-workers found a large percentage (82.8%) of their respondents reporting after-pain. (10) In the present study, the mean baseline pain intensity was 8.82 [SD- 1.06; 95% CI-8.69-8.94; F -0.480; p-0.619] which is similar to the baseline pain intensity obtained in the pilot study, 8.24. This could be due to similar geographical region and hence, similar population study. In this study, a larger proportion (97.9%) reported severe pain, while only 2.1% reported mild pain, and no respondent reported mild or no pain. This could be because majority of the study population were of high educational status in similarity to the finding of other studies in which high educational status was shown to correlate positively with increased westernization and hence increased perception and desire for pain relief.(22,23) This is also similar to Thompson and co-workers' finding of larger proportion (52.1%) of their respondents reporting severe pain. (24) However, Declercq and co-workers found more respondents (50-80%) reporting moderate pain and less (10-18%) reporting severe pain; this could be due to difference in the study population as the participants were mostly of low parity and the study was limited to women who gave birth to single baby and could participate in English. (25)

In this study, correlation analysis shows that increasing parity correlated positively with pain intensity which agrees to the findings of Holdcroft and Eshkevari, Declerq and co-workers in which parity correlated positively with severity of pain intensity. (11,25,26)

Moreover, respondents' age, gestational age, duration of labour and oxytocin augmentation of labour were found to correlate significantly with severity of pain intensity. This is similar to previous documentations in literature that longer duration of labour and delivery cause more stress and fatigue for mothers and this correlated positively with need for additional narcotics after delivery. (11-13)

However, Taffazoli and co-workers found no significant association between socioeconomic factor, oxytocin augmentation, duration of labour and severity of after-pain. This could be due to difference in sampling method and study population. (21) Taffazoli and co-workers used convenience sampling and the study group was composed, mainly, of younger age group and housewives. Also, breastfeeding was an exclusion criterion. In this study, test of significance could not be applied to socioeconomic class as all the respondents were of middle class; this could be due to the study setting (tertiary health facility).

In this study, analysis of post intervention pain intensity, using ANOVA, showed significance in the three groups at each of 8^{th}, 16^{th} and 24^{th} hour post-delivery ($p = 0.000$). Post Hoc analysis of these variables revealed that placebo and paracetamol groups were responsible for the difference in pain intensities. Placebo group had higher pain intensity than paracetamol group, the pain intensity of which in turn was more than that of diclofenac group. This is similar to the finding of Skovlund and co-workers, (27) in which placebo group had higher pain intensity compared to paracetamol group at 2 hour post intervention. Moreover, ANOVA showed statistical significance in pain relief evaluation among the three study groups. The Post Hoc analysis revealed that the significance was in the diclofenac and paracetamol group ($p<0.001$). Diclofenac was significantly better than paracetamol which in turn was better than placebo in relieving uterine cramping after-pain. This is similar to the conclusion in the study by Huang *et al* and the Cochrane review which stated that NSAIDS were significantly better than placebo in the control of uterine cramping after pain.(28,29) It is also similar to Skovlund and co-workers' finding of oral paracetamol 1000mg being significantly better than placebo in the control of uterine involution pain. (27)

Majority (92.7%) of the respondents in this study commenced breastfeeding within one hour of delivery, while only 7.3% did not.

The reason reported for not commencing breastfeeding was that baby was admitted into the special care baby unit. Uterine cramping after pain was not associated with breastfeeding in this study, unlike the finding in a survey of childbearing experiences in USA in which 71% of the women reported difficulty in breastfeeding mainly due to uterine cramping pain. This could be because the latter study was an observational study which enabled unmodified assessment of the effect of breastfeeding on uterine cramping after-pain.(17)

Side effects were significantly higher in diclofenac when compared to the paracetamol and placebo groups but similar in paracetamol and placebo groups. The side effect was mainly epigastric pain which was ameliorated with the administration of antacid. None of the respondents with side effects expressed concern to necessitate the need to discontinue the study on account of the side effects.

This is in keeping with the conclusion of the Cochrane review in which paracetamol 1000mg had similar maternal side effects as placebo. (29)

Conclusion

Multiple doses of either oral Diclofenac or oral Paracetamol were effective in significantly relieving uterine cramping after-pain, although more with diclofenac at the risk of more maternal side effect compared to paracetamol or placebo.

Conflict of interest: All authors declare that they have no competing interests.

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REFERENCES

1. Pirdel M, Pirdel L. Perceived environmental stressors and pain perception during labor among primiparous and multiparous women.J Reprod Infertil. 2009;10:217-23.
2. Fawole AO, Adesina OA. Complaints in the puerperium. In: Ebeigbe PN. editor. Foundations of clinical obstetrics in the tropics.Benin: Fodah Global Ultimate Limited; 2012. p. 232-6.
3. Onasoga OA, Opiah MM, Osaji TA, Iwolisi A. Perceived effects of midwives attitude towards women in labour in Bayelsa State, Nigeria. Arch. Appl. Sci. Res. 2012;4:960-4.
4. James J, Prakash K, Ponniah M. Awareness and attitudes towards labour pain and labour pain relief of urban women attending a private antenatal clinic in Chennai, India. Indian J Anesth. 2012;56:195.
5. Al-hakim NH, Alidreesi ZM. The effect of local anaesthetic wound infiltration on postoperative pain after caesarean section. J Surg Pakistan. 2010;15:131-4.
6. Ebirim LN, Buowari OY, Ghosh S, editors. Physical and psychological aspects of pain in obstetrics. [Internet]. INTECH: Open Access Publisher; 2012 [cited 2016 April 26]. Available from: http:// www.intechopen.com./…/pain.
7. Anne EM. The effect of pain and its management on mother and foetus. Clin Obstet Gynaecol. 1998;12:423.
8. Jacob A. A comprehensive textbook of midwifery. 3rded. New Delhi: Jaypee Brothers Publications; 2012. p.208-16.
9. Iliadou M. Labour pain and pharmacological pain relief practice points. Health Sci J. 2009;3:197-201.
10. Imarengiaye CO, Akhideno I, Omoifo EC. Characteristics of postpartum pain associated with vaginal and caesarean births. West Afr J Med. 2013;33:3-6.
11. Holdcroft A, Snidvongs S, Cason A, Doré CJ, Berkley KJ. Pain and uterine contractions during breast feeding in the immediate post-partum period increase with parity. J Pain. 2003;104:589-96.
12. McKinney ES, James SR. Maternal child health nursing. 3rd ed. London: Elsevier Publishers; 2009. p.474-95.
13. Sleep J. Perineal care: A series of five randomised controlled trials. In: Robinson S. Thompson A, editors. Midwives, Research and Childbirth. London: Chapman and Hall; 1991. p.199-251.
14. Loubert C, Hinova A, Fernando R. Update on modern neuraxial analgesia in labour: a review of the literature of the last 5 years. Br J Anaesth. 2011;66:191-212.
15. Audu B, Yahaya U, Bukar M, El-Nafaty A, Abdullahi H, Kyari O. Desire for pain relief in labour in Northeastern Nigeria. J Public Health Epid. 2009;1:053-7.
16. Bloomfield SS, Mitchell J, Cissell G, Barden TP. Analgesic sensitivity of two post-partum pain models. J Pain. 1986;27:171-9.

17. Windle ML, Booker LA, Rayburn WF. Postpartum pain after vaginal delivery. A review of comparative analgesic trials. J Reprod Med. 1989;34:891-5.
18. Chow S, Shao J, Wang H. Sample Size Calculations in Clinical Research. In: CRC Biostatistics Series. London: Chapman & Hall; 2008. p. 58.
19. Olusanya O, Okpere E, Ezinmokhai M. The importance of social class in voluntary fertility control in a developing country. West Afr J Med 1985; 4:205-212.
20. IBM Corp. IBM SPSS statistics for windows, version 22.0. Armonk, NY: IBM Corp;2013.
21. Taffazoli M, Khadem Ahmadabadi M. Assessment of factors affecting afterpain in multiparous women delivered in Mashhad 17-Shahrivar Hospital, Mashhad, Iran. J midwifery reproductive health. 2013;2:60-5.
22. Olayemi O, Aimakhu CO, Akinyemi OA. The influence of westernisation on pain perception in labour among parturients at the University College Hospital, Ibadan. J Obstet Gynaecol. 2006; 26: 329–31.
23. Faponle AF, Kuti O. Perception of labour pain by pregnant women in Southwestern Nigeria. Trop. J. Ob stet. Gynaecol. 2004; 21:153-5.
24. Thompson JF, Roberts CL, Currie M, Ellwood DA. Prevalence and persistence of health problems after childbirth: associations with parity and method of birth. Birth. 2002;29:83-94.
25. Declercq ER, Sakala C, Corry MP, Applebaum S, Herrlich A. Major Survey Findings of Listening to Mothers III: New Mothers Speak Out. J Perinat Educ. 2014;23:17.
26. Eshkevari L, Trout KK, Damore J. Management of postpartum pain. J Midwifery Womens Health. 2013;58:622-31.
27. Skovlund E, Fyllingen G, Landre H, Nesheim BI. Comparison of postpartum pain treatments using a se quential trial design. I. Paracetamol versus placebo. Eur J Clin Pharmacol. 1991;40:343-7.
28. Huang YC, Tsai SK, Huang CH, Wang MH, Lin PL, Chen LK, et al. Intravenous tenoxicam reduces uter ine cramps after Cesarean delivery. Can J Anesth.2002;49:384-7.
29. Deussen AR, Ashwood P, Martis R. Analgesia for relief of pain due to uterine cramping/involution af ter birth. The Cochrane Library. 2011.

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BRIEF COMMUNICATIONS

BUILDING A COVID-19 REPOSITORY WEBSITE FOR HEALTHCARE PROFESSIONALS IN ETHIOPIA

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ABSTRACT

Health professionals dealing with the COVID-19, both in clinical care and in the public health domain, require up-to-date and relevant scientific information. The Diaspora and Ethiopian Advisory Councils on the COVID-19 pandemic in Ethiopia joined forces with the Ethiopian Medical Association to create a local repository of comprehensive peer-screened information on COVID-19. We describe the motivating factors for such a repository, the process of creating the website, and the utilization of this information resource for Ethiopian healthcare professionals.

INTRODUCTION

The international medical community has had minimal experience with the fast-evolving COVID-19 pandemic (1). For medical professionals in low-resource countries such as Ethiopia, the learning curve is even steeper due to the lack of an authoritative, comprehensive COVID-19 information resource specifically targeted for the country. In response to this deficit, the Children's Hospital of Philadelphia (CHOP) Department of Radiology's Global Radiology Outreach and Education team collaborated with the Ethiopian Diaspora High-Level Advisory Council on the COVID-19 Pandemic in Ethiopia, the Ethiopian Health Professionals Advisory Council on the COVID-19 Pandemic in Ethiopia, People to People (P2P), and the Ethiopian Medical Association (EMA) to establish a comprehensive COVID-19 medical information website (2).

Ethiopian healthcare professionals can access and navigate this repository to find up-to-date COVID-19 resources that will inform clinical and public health practices. Each publication, guideline, or webinar on the website is peer-screened to ensure its relevance for medical and public health practice in the country. The project was initiated in April 2020 and the webpage was launched on June 19, 2020. In this paper, we describe the background for initiating this project, the process of creating it, and the outcome of our effort.

Lack of a local comprehensive COVID-19 information resource for Ethiopian healthcare professionals : The volume of information on COVID-19 on the internet is staggering (3, 4, 5). In a Google search on April 19, 2020, the term "COVID-19" generated 2.3 billion entries (6). In comparison, the word "Ebola" garnered only 59.9 million entries (6). On the same day, the central resource for scientific medical publications, PubMed, showed 5,279 publications on COVID-19 since January 2020, i.e., published within fewer than 4 months (7). In contrast, on PubMed there are only 9,045 publications on Ebola spanning the past 43 years. These numbers illustrate how daunting it can be for busy healthcare professionals to navigate through the myriad of scientific and non-scientific information on COVID-19.

In a matter of weeks, the COVID-19 pandemic became a worldwide crisis (8). The dearth of knowledge has spurred a flurry of research activities leading to publications in unprecedented numbers and at a breakneck pace (9). For the first time, publications are bypassing formal online or print processes and being circulated in early formats in order to accelerate the sharing of new scientific information (10). Furthermore, most journals have made COVID-19 publications available as free downloads. In addition to the scientific publications, epidemiological reports from a multitude of sources are appearing in real time (11). Healthcare institutions and government agencies are quickly generating COVID-19 guidelines and recommendations, which are frequently revised as our understanding of the virus develops.

In Ethiopia there was no authoritative local resource of comprehensive information on COVID-19 that had been designed specifically to support healthcare professionals. In the early months of the pandemic, as medical knowledge about the new virus rapidly evolved, it was imperative to provide a central, well-organized,

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easily accessible source of information with peer-selected clinical, research, and educational materials that would support Ethiopian healthcare professionals in combatting the spread of COVID-19. The Ethiopian Ministry of Health (MOH) was providing information primarily targeted to the public. On accessing its website on April 19, 2020, we found 19 posters, 2 brochures, 2 videos, 2 documents, and 3 online courses that required login access (12). Only the latter two resources were meant for healthcare professionals. Similarly, EMA had on the front page of its website some information about "Do's and Don'ts regarding COVID-19" and a resource tab with a COVID-19 page.

On April 19, 2020, this page contained 19 COVID-19 protocols, which were mostly local resources (13). EMA and the Diaspora COVID-19 Advisory Councils collaborated to address the discrepancy between the abundance of COVID-19 information worldwide and what was easily accessible to Ethiopian healthcare professionals. In response, we developed an organized, comprehensive medical information resource targeting healthcare professionals.

The development of the COVID-19 repository website: The development of the website was a collaboration between CHOP's Department of Radiology's Global Radiology Outreach and Education team and EMA. The repository lives on the main website (www.ethiopianmedicalass.org) of EMA (Figure 1). This publicly accessible site serves as a local and centralized resource center with a repository for comprehensive and peer-screened information on COVID-19 which is available as full pdf files or videos. It also houses COVID-19 oriented diagnostic and treatment protocols selected for local healthcare professionals. Other professional societies and agencies, including those of all ancillary health services, are encouraged to establish links on their websites that would direct users to this central EMA COVID-19 repository.

The first task in developing the repository was to designate a coordinator. The person in this role communicated with peer screeners, facilitated selection of documents, and sent documents to the EMA webmaster. A webmaster was necessary to create and maintain the webpage, organize documents into pre-determined categories, and provide webpage access data. In order to ensure that the repository did not become an indiscriminate "dumping place" of COVID-19 information, 49 medical specialists and sub-specialists served as peer-screeners to share publications they deemed important for their specialty and to review the documents in their category for suitability.

Most relevant subspecialties related to COVID-19 were represented from both the clinical and public health aspects. Included in the clinical subspecialties were the following: Anesthesiology, Cardiology, Emergency Medicine, Hematology, Intensive Care Medicine, Internal Medicine, Neurology, Obstetrics, Palliative Medicine, Pulmonology, Pathology, Pediatrics, Radiology, Primary Health Care/ Family Medicine, Surgery, and Treatment. The public health sector encompassed Epidemiology, Infection Prevention & Control, Mental Health, Modelling, Pharmaceuticals, Personal Protective Equipment, Testing, and Vaccination. Nursing was incorporated as well. The peer screeners were from Ethiopia (28) and the diaspora (21). Most of the peer screeners from Ethiopia and the diaspora were paired in their respective subspecialties to ensure a smooth transition when the website is eventually taken over by EMA.

The management of the COVID-19 repository website: Management of the website includes the following components: the coordinator contacts peer-screeners bi-weekly for any publications needed to be uploaded to the webpage, requests peer screeners to review entries in their designated category, searches for new scientific literature, and sends new publications to the webmaster to upload to the site. The coordinator ensures documents are saved using a uniform naming system and keeps track of submitted documents.

The website contains a wide range of clinical content under the most important subspecialties regarding COVID-19, encompassing important public health sub-categories, nursing, and a section for recorded webinars on various clinical and public health topics. It also provides clearly visible sections for guidelines and recommendations from the Ethiopian Diaspora and Local High-Level Advisory Council on the COVID-19 Pandemic in Ethiopia, the MOH, and the World Health Organization (WHO) COVID-19 websites.

The repository website was not meant to replace PubMed or other similar resources. Instead, the unique offerings of this website are the disease focus, the fact that the documents have been peer-screened and are relevant specifically for clinical care and public health practice in Ethiopia, that its PDFs are directly available for fast resource download, and its easy webpage navigation and search function. Finally, a key feature is that this is a locally maintained website easily accessible to Ethiopian healthcare professionals.

COVID-19 repository website traffic outcome and sustainability: A webinar launch was held on June 19, 2020 to inaugurate the COVID-19 repository webpage. The leadership of all the medical and public health professional societies in Ethiopia were invited to attend this virtual meeting. The webinar was also livestreamed on the EMA's Facebook page to reach a broader audience. By April 2021, 584 documents were uploaded on the website and over 31,000 people accessed it. On average, documents have been downloaded 2,856 times monthly by site visitors (Figure 2). Since the release of the website, site visitors from Ethiopia have downloaded documents 20,230 times. In fact, the publications have also been downloaded from other countries, including the USA, India, and China (Figure 3).

The goal is for the repository website to be sustained by local stakeholders. The collaboration between CHOP and the EMA is meant to initiate the first phase of this repository. Soon, there will be a transition of the coordination from CHOP to EMA, and EMA will take on the responsibility of maintaining the site and curating up-to-date resources.

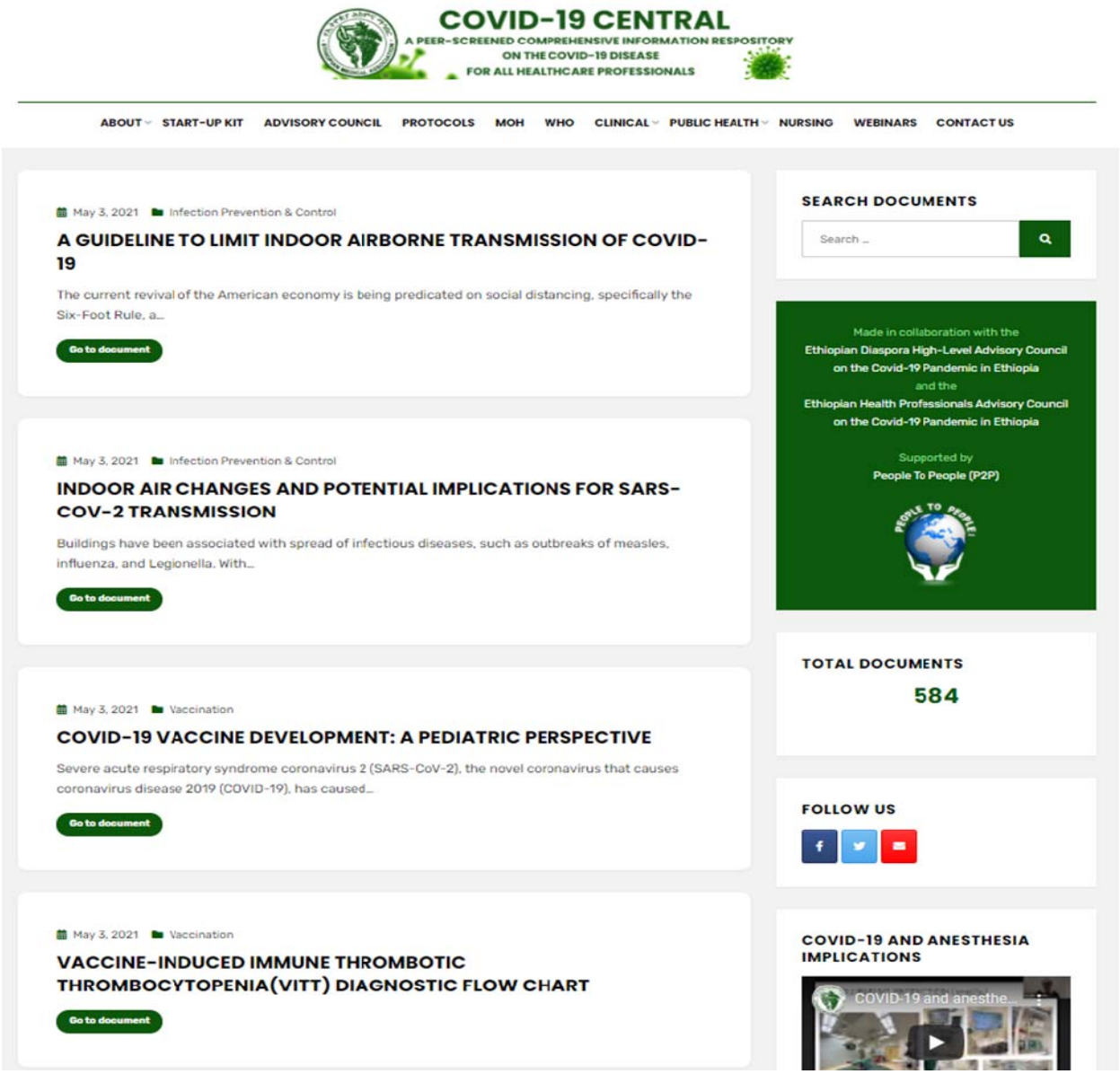


Figure 1: The front webpage of COVID-19 Central on the website of the Ethiopian Medical Association (EMA).

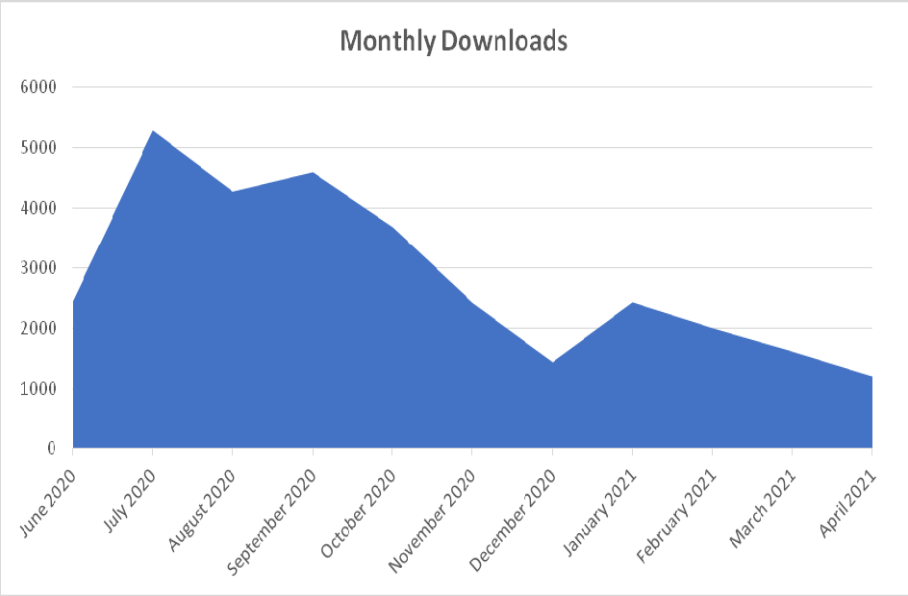
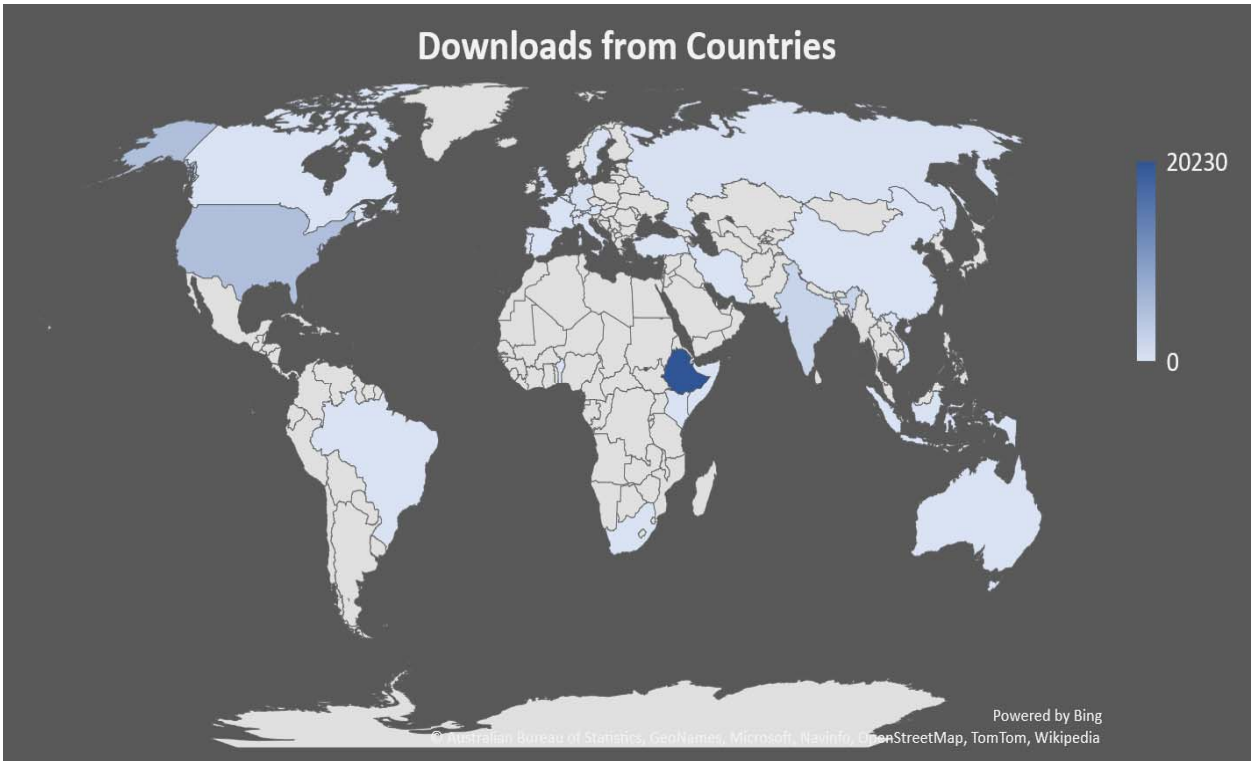


Figure 2: The number of monthly downloads from the COVID-19 Central webpage on the Website of the Ethiopian Medical Association (EMA).

Figure 3: Geographic distribution of downloads from the COVID-19 Central webpage on the website of the Ethiopian Medical Association (EMA).



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REFERENCES

1. Kupferschmidt K. Preprints bring 'firehose' of outbreak data. Science. 2020 Feb 28;367(6481):963-964. doi: 10.1126/science.367.6481.963.
2. Ethiopian Medical Association (Internet). (cited 2020 Jun 19). Available from: www.emacovid19resourcecenter.org.
3. Teixeira da Silva JA, Tsigaris P, Erfanmanesh M. Publishing volumes in major databases related to Covid -19. Scientometrics. 2020 Aug 28:1-12. doi: 10.1007/s11192-020-03675-3.
4. Chen, Q., Allot, A., & Lu, Z. (2020). Keep up with the latest coronavirus research. Nature, 579(7798), 193. doi: 10.1038/d4158 6-020-00694 -1.
5. Fry, C. V., Cai, X., Zhang, Y., & Wagner, C. S. (2020). Consolidation in a crisis: Patterns of international collaboration in early COVID-19 research. PLoS ONE, 15(7), e0236307.
6. Google (Internet). (cited 2020 Apr 19). Available from: www.google.com
7. PubMed (Internet). (cited 2020 Apr 19). Available from: www.pubmed.ncbi.nlm.nih.gov
8. Nowakowska J, Sobocińska J, Lewicki M, Lemańska Ż, Rzymski P. When science goes viral: The re search response during three months of the COVID-19 outbreak. Biomed Pharmacother. 2020 Sep; 129:110451. doi: 10.1016/j.biopha.2020.110451.
9. Else H. How a torrent of COVID science changed research publishing - in seven charts. Nature. 2020 Dec;588(7839):553. doi: 10.1038/d41586-020-03564-y.
10. Aviv-Reuven, S., & Rosenfeld, A. (2020). Publication patterns' changes due to the COVID-19 pandemic: A longitudinal and short-term scientometric analysis. arXiv preprint arXiv:2010.02594.
11. Prieto-Alhambra D, et al. Unraveling COVID-19: a large-scale characterization of 4.5 million COVID-19 cases using CHARYBDIS. Res Sq (Preprint). 2021 Mar 1s44. doi: 10.21203/rs.3.rs-279400/v1.
12. The Ethiopian Ministry of Health (Internet). (cited 2020 Apr 19). Available from: www.moh.gov.et/ejcc/.
13. Ethiopian Medical Association (Internet). (cited 2020 Apr 19). Available from: www.ethiopianmedicalass.org.

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CASE REPORT

INABILITY TO SWALLOW TABLETS OFFERS AN OPPORTUNITY FOR DETECTION AND SUCCESSFUL TREATMENT FOR A RARE LIFETIME CAUSE OF DYSPHAGIA

Hailemichael Desalegn Mekonnen, MD, PhD[1*], Hari Conjeevaram, MD,[2]

ABSTRACT

Introduction: *This case presents an adult who was diagnosed with viral hepatitis C, and offering treatment for this potentially life-threatening illness provided an opportunity for diagnosis and therapy of a previously unrecognized long-standing cause of dysphagia.*

Case Presentation: *A 37-year-old female was diagnosed to have Hepatitis C virus (HCV) infection. Non-invasive assessment showed that she had moderate fibrosis and was recommended treatment with oral direct-acting antiviral (DAA) drugs. However, the patient was hesitant claiming that she had not been able to swallow any tablets for the last 30 years. Prior evaluation for her dysphagia was done with a barium swallow, which was reportedly normal. She was advised to have an upper endoscopy (EGD) evaluation, and it revealed a prominent proximal esophageal web. This was that treated endoscopically and resulted in resolution of her long-standing dysphagia.*

Conclusion: *Causes of dysphagia can be obscure and lead to significant compromise in quality of life and inability to take life saving drug treatment. Esophageal webs can present with a long history of dysphagia and due to the proximal nature, could be missed by routine investigations. High index of suspicion is important to persuade for an endoscopy procedure in undiagnosed long-standing cause of dysphagia.*

Keywords*: Esophageal web; Dysphagia; Barium swallow; Upper GI Endoscopy*

INTRODUCTION

This is a case of an adult patient with a long history of dysphagia whose diagnosis has been delayed due to a false reassurance by normal barium swallow study. The case was subsequently diagnosed as the patient was persuaded to undergo an upper gastrointestinal endoscopy (EGD) as she was unable to swallow tablet. The investigation revealed a proximal circumferential esophageal web.

CASE PRESENTATION

A 37-year-old female patient presented to our medical institution with a history of chronic fatigue and weight loss. The weight loss had been longstanding and she claimed that she has been basically consuming liquid diets and has trouble eating solid food including medications, for the last 30 years. The patient and her family believed the symptoms started since childhood, but the diagnosis was obscured for a long period. During her childhood, she has been evaluated at different centers, but to no avail, and the patients said that she started to 'live with it' being dependent on liquid and semisolid diets. General appearance showed a chronically ill-appearing woman with a BMI 0f 18kg/m^2.

On routine investigation, she was found to have a positive hepatitis C virus (HCV) antibody and subsequently was diagnosed to have ongoing viremia with a viral load of 582, 000 copies/ml. Further investigations revealed that she has HCV genotype 4 infections and an abdominal ultrasound showed no obvious signs of cirrhosis. Other laboratory parameters showed hemoglobin of 11 gm/dl: all other laboratory evaluations (Liver chemistry tests, renal function tests, electrolytes) were unremarkable. HBsAg and HIV antibody test were negative. Fibroscan (Echosens 402) was done as non-invasive marker of assessing fibrosis severity and it was 9.0 suggesting moderate/severe fibrosis.

The patient was advised to undergo an upper GI endoscopy (EGD), which she strongly refused. For this reason, she was investigated with a barium swallow which showed a normal finding. This gave a false reassurance that her condition might be related to a globus sensation or some type of psychological stress. On the other hand, because of concern that she has significant hepatic fibrosis, it was recommended to treat with oral direct-acting antiviral (DAA) agents for her chronic hepatitis C.

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The patient, however, was very reluctant and declined therapy repeatedly claiming that she could not swallow any medication pills. She was finally persuaded to have an upper GI endoscopy with anesthesia support. The endoscope was difficult to pass down beyond the upper esophageal sphincter as there was a circumferential web, which was causing lumen narrowing and even the scope with a surrounding diameter of 8 mm could not pass [Figure 1]. This led to the diagnosis of a proximal esophageal web.

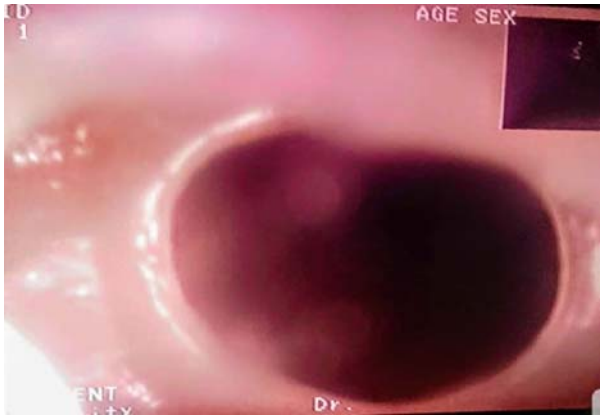

Figure 1: An upper esophageal web revealed on EGD in our 37-year old Ethiopian patient

The esophageal ring was then dilated with a pneumatic dilator cautiously to avoid aspiration and it was successful leading to rupture of the membranous ring (See Figure 2).

Figure 2: The image after an esophageal balloon dilatation has been done showing a rupture of the esophageal web

After the procedure, the patient was complaining of some discomfort while swallowing, which resolved slowly, but could not get herself to be convinced that she can swallow and be able to take her drugs. A subsequent pneumatic dilatation was performed after a week and at this time, the scope was able to pass and the remnant ring ruptured easily and the patient was given psychological support and reassurance. After this second therapy, the patient started eating solid food and she also started taking her drugs. She then showed marked improvement of her nutritional status. She successfully completed three months of DAA therapy (Velpatasvir + Sofosbuvir) and had a successful response with virological cure (sustained virological response/SVR) with undetectable virus at week 12 follow-up (SVR 12). She also slowly improved in her overall wellbeing with gratitude and has gained weight. It has been more than a year since she was put off follow up, and there are no complains of dysphagia.

DISCUSSION AND CONCLUSION

Esophageal web is an eccentric, thin < 2mm horizontal membrane and protrudes into the lumen of the esophagus. It is covered with stratified squamous epithelium and occurs anteriorly commonly in the cervical and middle esophagus. (1) It is associated with focal narrowing in the post-cricoid area and mainly affects middle-aged females (2). Patients are usually asymptomatic and the true prevalence is not clearly known. Patients may have dysphagia and regurgitation based on the site of the stenosis and especially when the stenosis is severe.

Hepatitis C Virus is one of the hepatotoxic viruses that could lead to chronic liver disease with liver failure, decompensation and lier cancer. It has affected 71 million of the world population and currently has effective therapies that can lead to cure within 2-3 months of treatment. (3) Hepatitis C has also an extrahepatic manifestations involving different organs of the body, but there was no reports of esophageal web in the literature. (4)

In patients undergoing barium esophagogram for dysphagia, 5 to 15 % of patients could have an esophageal web. In different literatures, it has been noted that patients usually do not become symptomatic until after 40 years of age (5). Our patient came to our attention at the age of 37 years, even though, she has had long standing intermittent symptoms. Her case could be explained as one of the postulated mechanisms, the developmental theory, where the webs are expected to occur when a pleat of mucosa is formed by in-folding of redundant esophageal mucosa due to shortening of the esophagus.

Esophageal webs are developmental anomalies with unknown pathogenesis. Unlike rings these anomalies rarely encircle the lumen but instead protrude from the anterior wall, extending laterally but not to the posterior wall (6). Webs are common in the cervical esophagus and are best demonstrated on an esophagogram with the lateral view. In up to 5% of cases, they are identified in an asymptomatic state, but when they are symptomatic they cause dysphagia for solids. Webs are fragile membranes and so respond well to esophageal bougienage with mercury weighted dilators (7). Symptomatic patients usually present with dysphagia to solids particularly hard ones (e.g., meat/ bread), often intermittent, and patients may modify how they eat (chewing more thoroughly, etc.). In our patient, she had been avoiding swallowing hard solid foods including tablets and she was taking longer to chew before attempting to swallow foods.

Esophageal webs are associated with Zenker's diverticulum, dermatologic and immunological disorders, and iron deficiency anemia. There has also been a case report of celiac disease in association with esophageal web (8). In this current case, the patient's evaluation did not reveal any of the above associations or findings, although she was incidentally noted to have presence of chronic Hepatitis C Virus infection.

Literatures have shown that most children are asymptomatic, and, thus, they are far less detected and could adjust their life style and dietary habits as found in this case. This has been described as esophageal webs can present as a congenital manifestation and can stay until fourth decade without being diagnosed.

The diagnosis of esophageal web can be made by barium swallow study, however, if the esophagus is not distended adequately, it will give the appearance of subtle narrowing and can easily be missed (1). In a study published in 1985, the investigators found that barium detection rate can be evident in only 17 to 49 when proper techniques are not followed (9). Our patient had a normal barium swallow and this is an important lesson to improve our techniques in detection of esophageal webs and rings. It also showed that a normal barium swallow should not rule out upper esophageal pathology and additional investigations such as an upper endoscopy (EGD) may need to be done, especially in patients with long-standing symptoms. EGD shows a smooth, thin membrane that is usually non-circumferential and caution should be taken due to proximity to the upper esophageal sphincter. Once the diagnosis is made, management is usually performed with esophageal dilation and small webs usually rupture during the endoscope traverses the web. The goals of management are relief of dysphagia and the prevention of recurrent symptoms and patients usually have an excellent improvement on follow-up (10).

Our patient required sequential sessions of pneumatic dilations after which she had marked improvement of her symptoms and was able to complete taking her oral DAA drugs for her chronic hepatitis C infection resulting in successful treatment and achieving sustained virological response (virological cure). She was also able to have improved sense of well-being and she was able to eat more sold diets and also gained weight. In conclusion, we would like to state that patients with long standing dysphagia should be investigated for rare causes that can be easily treated with an upper GI endoscopy resulting in symptomatic relief and improved quality of life. In the case of our patient who was only 37 years old, unless an upper GI endoscopy had been done, the patient would have likely gone undiagnosed with persistent symptoms of her dysphagia and poor quality of life and potentially continued progression of her underlying chronic Hepatitis C virus infection.

Abbreviations: GI-Gastrointestinal, DAA-Direct Acting Antiviral, EGD- EsophagoGastroduodenoscopy, SVR-Sustained Virological Response, HCV-Hepatitis C Virus

Informed Consent:- The patient gave an informed consent about the publication;

PATIENT PERSPECTIVE :- Patient feels marked improvement from the intervention and happy that persuasion for the HCV treatment helped the diagnosis which will otherwise never be attempted.

Ethics approval and consent to Participate
Waiver request was secured from the Institutional Review Board at St. Paul's Hospital Millennium Medical College.

Consent for Publication: A written informed consent to publish this information was obtained from study participant.
Availability of Data and material:- The data is available from the corresponding author upon a reasonable request.

Competing Interest:-None

Funding: The authors declare that no conflict of interests.

Authors' Contributions
HD is the primary treating physician and responsible for writing the primary draft. HC has been a consultant in the case, reviewed the draft and both have agreed to submit the manuscript.

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REFERENCES

1. Wanamaker R, Grimm I. Encyclopedia of Gastroenterology. Gastroenterology. 2004 Oct 1;127(4):1274-5.
2. Gouda MS, Al-lakani AI, Bedewy MM. Endoscopic findings in Egyptian patients with oesophageal dysphagia at different age groups. Am J Internal Med. 2015;3:224-30.
3. Mohamed AA, El-Toukhy NER, Said EM, et al. Hepatitis C Virus: Efficacy of New DAAs Regimens. Infect Disord Drug Targets. 2020;20(2):143-149).
4. Younossi Z, Park H, Henry L, Adeyemi A, Stepanova M. Extrahepatic Manifestations of Hepatitis C: A Meta-analysis of Prevalence, Quality of Life, and Economic Burden. Gastroenterology. 2016;150:1599-1608.)
5. Nosher JL, Campbell WL, Seaman WB. The clinical significance of cervical esophageal and hypopharyngeal webs. Radiology. 1975 Oct;117(1):45-7.
6. Feldman M, Friedman LS, Brandt LJ, editors. Sleisenger and Fordtran's Gastrointestinal and Liver Disease E-Book: Pathophysiology, Diagnosis, Management. Elsevier; 2020 Jun 9.
7. Atmatzidis K, Papaziogas B, Pavlidis T, Mirelis CH, Papaziogas T. Plummer–Vinson syndrome. Diseases of the Esophagus. 2003 Jun 1;16(2):154-7.
8. Sinha SK, Nain CK, Udawat HP, Prasad KK, Das R, Nagi B, Singh K. Cervical esophageal web and celiac disease. Journal of gastroenterology and hepatology. 2008 Jul;23(7pt1):1149-52.
9. Chen YM, Ott DJ, Gelfand DW, Munitz HA. Multiphasic examination of the esophagogastric region for strictures, rings, and hiatal hernia: evaluation of the individual techniques. Gastrointestinal radiology. 1985 Dec 1;10(1):311-6
10. Beyler AR, Yurdaydin C, Bahar K, Gören A, Soykan I, Uzunalimoğlu Ö. Dilation therapy of upper esophageal webs in two cases of Plummer-Vinson syndrome. Endoscopy. 1996 Feb;28(02):266-7.

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CASE REPORT

TRAUMATIC TENSION PNEUMOCEPHALUS IN A 16 MONTH OLD CHILD: CASE REPORT AND REVIEW OF THE LITERATURE

Alemayehu Ginbo Bedada, MD[1*], Imran Fizzah, MOI[2], Sesay Sheikha, MD[3], Georges Azzie, MD[4]

ABSTRACT

Traumatic Tension Pneumocephalus is a rare condition especially in children. It occurs most often as a result of temporal or basal skull fracture, and may cause neurological deterioration. CT scan findings are considered pathognomonic. A 16-month-old girl presented with unstable vital signs and a seizure episode after being struck by a reversing car. A day later she developed rhinorrhea and high grade fever. CT scan of the brain demonstrated a Mount Fuji sign. Her neurological status remained essentially normal. She was managed non-operatively and was discharged uneventfully eight days after the accident. In selected paediatric cases, traumatic tension pneumocephalus may be managed non-operatively.

Key words: *Child, Mount Fuji sign, Non-surgical treatment, Traumatic tension pneumocephalus*
Work done*: At Princess Marina Hospital, Department of Surgery, Gaborone, Botswana*

INTRODUCTION

Traumatic Pneumocephalus (TP) is characterized by the abnormal presence of air in the cranial cavity following traumatic injury (1-6). It has been reported in 3.9% 9.7% of head injuries (1-3). Trauma is incriminated in 67% - 74% of pneumocaphalus cases (4-7).

Tension traumatic pneumocephalus (TTP) is a clinical entity characterized by continued buildup of air within the cranial cavity, leading to abnormal pressure exerted on the brain and subsequent neurologic deterioration (2-4). TTP is classified as acute when it occurs within 72 hours of the traumatic event and as delayed when it occurs thereafter (1,2,4,5).

Two mechanisms are postulated TP: the 'inverted soda bottle effect', where CSF loss creates negative intracranial pressure, drawing air into the subarachnoid space (1-5,8), and the "ball-valve" theory where there is a unidirectional movement of air into the cranial cavity, most often the extradural space (1,2,4-7).

Clinical presentations of TP include nausea, vomiting, poor feeding in children, irritability, dizziness, headache, seizure, depressed mental status, cerebrospinal fluid rhinorrhea, pupillary abnormalities and hemodynamic changes (1,2,4,7). More serious presentations include cardiac arrest and blindness (4). Head CT remains the most accurate imaging study with the ability to detect as little as 0.5 cm^3 of air (1,2,4-8).

The CT finding of bilateral compression of the frontal lobes is called the peaking sign (5). When there is progression to TTP the increased pressure not only compresses, but separates the frontal lobes, thus creating the so-called "Mount Fuji" sign (1,2,4-7). This finding is considered virtually pathognomonic of TTP.

Uncomplicated TP tends to resolve spontaneously (2-5). Evidence of progression to TTP based on deteriorating neurological status or the Mount Fuji sign on CT scan usually mandates surgical intervention. Out team describes the rare case of traumatic tension pneumocephalus in a 16-month-old child (the "youngest" in literature), and reviewed and summarized the current knowledge on TTP.

Case Presentation

A 16-month-old girl presented to the hospital after being struck by a reversing car. The mother reported an episode of generalized seizure, however, There was no vomiting or loss of consciousness. On examination, she was alert, with a heart rate of 193 beats/min, respiratory rate 36 breaths/min, temperature 37.5 ^{0}C and oxygen saturation 99% on room air. Her Glasgow coma scale (GCS) score was 15/15 with no focal neurological deficits, and no other abnormalities. Her laboratory tests, chest, cervical and pelvic-rays were all normal. CT scan of the head demonstrated a right temporoparietal linear skull fracture, as well as cerebral edema and a right scalp hematoma.

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She received analgesics, antibiotics and seizure prophylaxis. On day two of admission, she was noted to have rhinorrhea. Her temperature rose to 39.4 ^{0}C, and her pulse rate increased to 210 beats/min. There was no hypotension, and her oxygen saturation was 98% on room air. A repeat CT scan of the head was done which demonstrated pneumocephalus, a Mount Fuji sign (**Figure 1**) and a basal skull fracture (not detected on the initial CT). A diagnosis of TTP was made. Despite this, her neurologic condition did not deteriorate. Cefotaxime (Claforan, Sanofi-Aventis) was increased to meningitis dose as there was no other explanation for the raised temperature. She was nursed in a Fowler's position (30 degrees head up). In spite of the Mount Fuji sign on CT head, we opted for a non-operative approach given her stable and otherwise normal neurological condition.

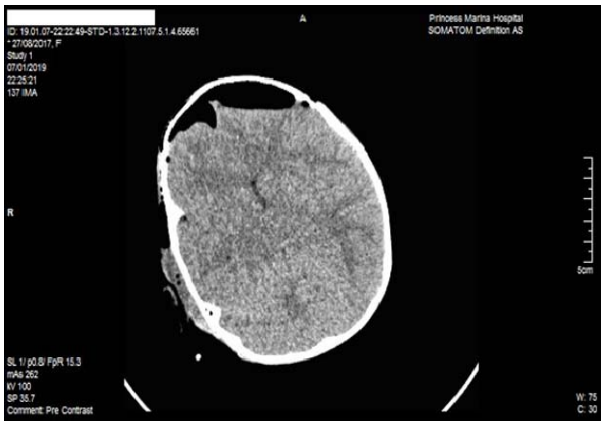

Figure 1: The second CT head demonstrating "Mount Fuji sign" (see arrow).

The patient improved: her heart rate and temperature normalized. Her rhinorrhea completely resolved by the 6th day of admission. She was discharged on the 8th day of admission. She was formally re-evaluated one and four months post discharge: she was asymptomatic and had a normal neurologic examination. The follow up CT brain at four months after discharge was within normal limits. (**Figure 2**)

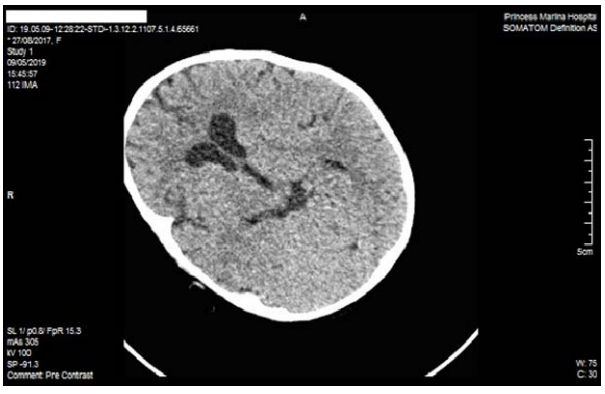

Figure 2:. The third CT head demonstrating a normal finding.

DISCUSSION

Our one year old patient is the youngest reported in the literature, and the second case reported in Africa. In the largest series reported, of 101 patients, the youngest was three and the oldest 91years (3).

The air in TP is commonly located in the subdural space (5,7) but can be found in the epidural, intraventricular and intracerebral spaces (3,5-7). The etiologic factors were motor vehicle collision in 30%, blunt assault in 25%, fall in 20% motorcycle accident in 15%, gunshot in 5%, and stabbing in 5% (4). Our patient was struck by a reversing car.

The most common symptom reported in the literature is headache (1,2,4,7). Given the age of our patient, we could not appreciate this with certainty. The predominant symptoms in our patient were agitation and feeding intolerance. The major sign was rhinorrhea. The pathognomonic finding on CT of the head was the Mount Fuji sign.

In the setting of trauma, the most common source of pneumocephalus is thought to be a temporal bone fracture (6,8). The second CT scan demonstrated a significant Mount Fuji sign, which is considered strongly suggestive of TTP. Of particular interest in this case, the alarming CT scan finding was not accompanied by any obvious deterioration in neurological status.

In the eyes of many, the finding of a Mount Fuji sign on the CT scan of a patient with a history of head trauma constitutes a neurosurgical emergency and mandates prompt operative management. There are, however, a few cases reported with Mount Fuji sign who did not require surgical intervention (1,2,5,6). Elements described in the non-operative management include adequate analgesia, Fowler position of 30^0, avoiding Valsalva maneuver, 100% oxygen, prophylactic antimicrobial therapy (especially in posttraumatic cases), frequent neurologic checks, and repeat CT scans (1,2,4). Because our patient did not have neurological deterioration, we opted for close observation and non-operative management. She was given antibiotics and pain medication, and she was placed in a Fowler position (30^0 head-up (5).

Surgical intervention is required when the air within the cranial vault causes increased pressure and deterioration in the level of consciousness (5). Surgical management targets removal of intracranial air. This may be accomplished through a burr hole, a craniotomy or a needle aspiration (3-5).

Outcomes seem best when the TP occurs solely in combination with a bony fracture of the vault (3).

This was the case in our patient. When TP occurs in combination with an acute subdural hematoma or is diagnosed in association with the presence of multiple air bubbles scattered over the basal cisterns and the posterior fossa, outcomes are less favorable (3).

Conclusion

Although vary rare, a diagnosis of TTP should be considered even in very young trauma patients. TTP may be treated non-surgically in selected patients, especially if there is no neurological deterioration. While many consider the presence of a Mount Fuji sign on CT head to be strongly suggestive of TTP, this finding in and of itself may not necessarily mandate surgical intervention.

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Funding: No fund involved.

Ethical consideration: The mother to the child consented to the publication of this report for the purpose of education without patient identifier.

Authors' contribution: All four authors did literature review. The first draft of the manuscript was prepared by AGB, and critically revised by AGB and GA. SS reported on all CT head films. AGB and IF followed the patient. All four authors reviewed the final version of the manuscript and agreed to submit to Ethiopian Medical Journal for publication.

REFERENCES

1. Solomiichuk VO, Lebed VO, Drizhdov KI. Posttraumatic delayed subdural tension pneumocephalus. Surgical neurology international. 2013;4.
2. Kankane VK, Jaiswal G, Gupta TK. Posttraumatic delayed tension pneumocephalus: Rare case with review of literature. Asian journal of neurosurgery. 2016;11(4):343.
3. Steudel WI, Hacker H. Acute intracranial pneumocephalus: Prognosis and management-a retrospective analysis of 101 cases. Neurosurgical review. 1989;12(1):125-36.
4. Pillai P, Sharma R, MacKenzie L, Reilly EF, Beery PR. Traumatic tension pneumocephalus–Two cases and comprehensive review of literature. International journal of critical illness and injury science. 2017;7(1):58.
5. Dabdoub CB, Salas G, Silveira ED, Dabdoub CF. Review of the management of pneumocephalus. Surgical neurology international. 2015;6.
6. Gill HS, van As AB. Tension pneumocranium in childhood trauma. World Journal of Pediatrics. 2008;4 (3):231-3.
7. Raza R, Shakil A, Anwar M. Tension Pneumocranium: The Largest Case Series. PJR. 2016;26(3).
8. Martin RJ, Holthouse DJ, Wayne TG. Localising the source of pneumocephalus: a diagnostic problem. Journal of clinical neuroscience. 2002;9(2):216-8.

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CASE REPORT

UNDIAGNOSED URETEROVAGINAL FISTULA IN CONGENITAL DUPLEX KIDNEY WITH ECTOPIC URETERIC INSERTION TO URETHRA; SOMETHING TO LOOK FOR?

Tan Shong Sheng, MD, MRCS[1,3], Mohamed Ashraf Mohamed Daud, MBBS, FEBU[3]*, Wan Mokhzani Wan Mokhter, MD, MMed[1,3]*, Rosnelifaizur Ramely, MD, MMed[1,3], Nik Mohd Nurhafizi Nik Anuar, MD, MMed[2,3]

ABSTRACT

Continuous urinary incontinence in young female with normal voiding pattern should prompt proper assessment for ectopic ureter.

We report a young female who presents with continuous urinary incontinence and malodourous urine. She was frequently treated as recurrent urinary tract infection and subsequently referred to our urology unit. Initial imaging revealed right duplex kidney with ectopic ureter, hence she had undergone right heminephrectomy. However her symptoms does not improve significantly. Further evaluation revealed uretero–urethral fistula and uretero–vaginal fistula. She then underwent urethroureteral and ureterovaginal fistula repair, which resolved her distressing urinary incontinence.

Keywords: *Ectopic ureter; urinary incontinence; female; urinary tract fistula*

INTRODUCTION

The term "ectopic ureter" denotes a ureter that inserts at or distal to the bladder neck. Ectopic ureters most commonly occur in females and often drain into upper moiety of a duplex kidney (1). In most females with an ectopic ureter, the ureter has its insertion either into genital tract or urethra (2). This leads to typical symptom of continuous urinary incontinence with an otherwise normal voiding pattern. Screening with ultrasonography and/or intravenous urography (IVU) could assist in confirming the affected system which likely to be upper pole moiety of a duplex collecting system (3,4). We report a case of young lady who presents with urinary incontinence since childhood and frequent urinary tract infection, then found out to have ectopic ureter with uretero–urethral fistula and uretero –vaginal fistula.

Case Presentation

We report a 31-year-old lady presented to us with a complaint of urinary incontinence since the age of 8, without any prior history of trauma or fall. She denied having bowel or neurological symptoms. She had frequent visits to the hospital and was treated as a recurrent urinary tract infection. Micturition cystourethrogram (MCUG) revealed right distal ureteric bulbous distension and right duplex kidney, with no demonstrable fistulous connection. Contrasted enhanced computed tomography (CT) of the abdomen/pelvis revealed complex right duplex kidney. Right upper moiety revealed hydronephrosis and hydroureter with possible ectopic ureteric insertion. Subsequently intravenous urography (IVU) revealed the poorly function of the right upper moiety with normal function of right lower moiety.

She had undergone right retrograde pyelogram with ureterorenoscope and right ureteric stenting, followed by right heminephrectomy and ureterectomy at the age of 24. Histopathological examination report revealed ureteritis in right upper moiety ureter and chronic pyelonephritis in right upper moiety nephrectomy.

Postoperatively she continued to complain of foul–smelling urine dribbling from the vagina that persisted for many years. Repeated MCUG revealed residual right ureteric stump with evidence of reflux from the urethra during micturition phase and likely urethrovaginal fistula (Figure 1).

Rigid cystoscopy and contrast study revealed urethrorectal fistula at 7 o'clock just distal to the bladder neck. There were 2 openings seen at 4 o'clock and 10 o'clock location in the ectopic ureter, contrast injection showed communication with the vagina (Figure 2A and 2B). On table retrograde urethrography done through the urethroureteral fistula revealed remaining right ectopic ureter up to mid part of ureter.

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At the age of 30-years, she was subjected to urethroureteral and ureterovaginal fistula repair by transvaginal approach.

Intraoperatively the opening of urethroureteral fistula was identified just below the bladder neck and separated from the normal urethra opening.

The fistula was ligated and closed with four layers followed by Martius Flap to prevent recurrence (Figure 3).

Postoperatively, she did not complain of urinary incontinence anymore during clinic follow up.

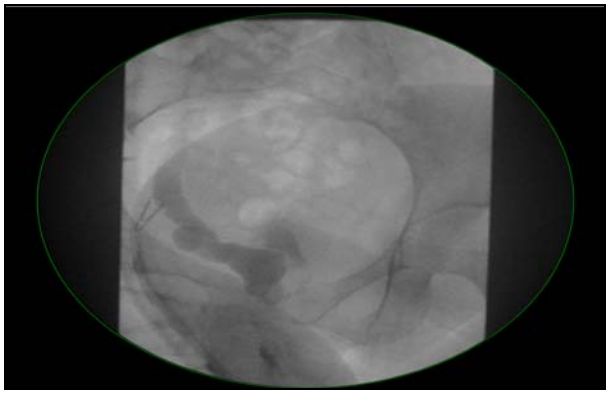

Figure 1: Repeated MCUG after initial surgery revealed reflux to the remnant of stump on the right side. The stump is seen arising from the urethra and extending superiorly into the lower border of sacral ala. Posteriorly, there is fistulous communication between the urethra and vagina with opacification of the vagina and uterine cavity.

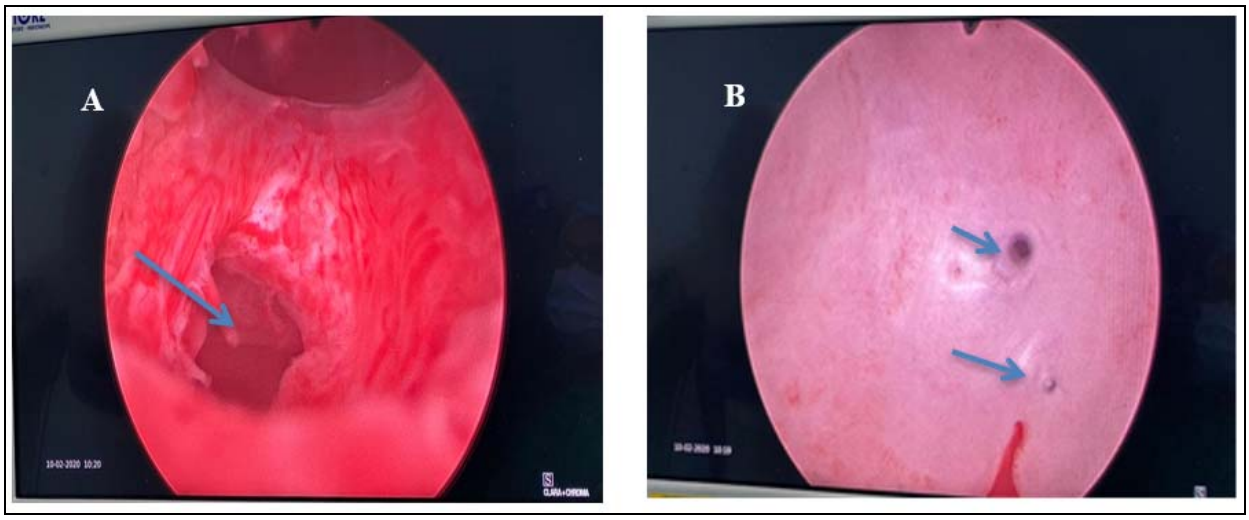

Figure 2 (A): Cystoscopy view showing (arrow) opening of right ectopic ureter below the bladder neck.

Figure 2 (B): Cystoscopy view showing image inside the right ectopic ureter, there is ureterovaginal fistula with 2 opening (arrow).

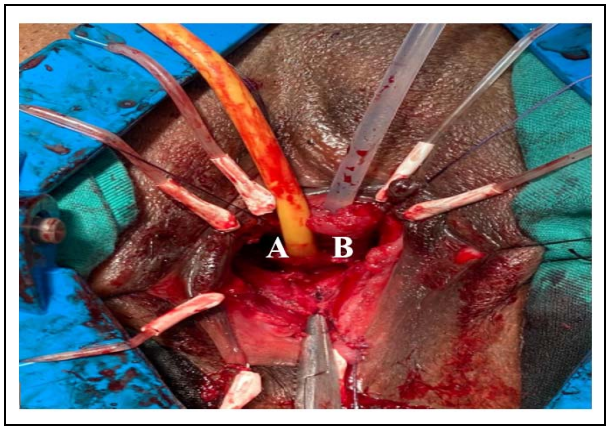

Figure 3: Intraoperative view: right ectopic ureter was separated from urethra and ligated, primary repair of urethra with Martius fat Flap done. (A)Ectopic ureter with urethroureteral fistula, (B)Normal urethra opening

DISCUSSION

An ectopic ureter is known as a ureter that abnormally place at or distal to the bladder neck, or outside of the urinary tract entirely. This is commonly due to embryological malformation, where the ureteric bud arises more cephalad than usual on the mesonephric duct, leading to distal ectopic ureteric insertion. The ureter remains attached to the mesonephric duct for longer, migrates more caudally than usual and inserts into either the urinary tract distal to the bladder or the genital tract (5).

The mesonephric duct remnant will turn into the epoophoron, oophoron and Gartner's duct in the female. When the ectopic ureteric bud included into the adjacent structures of paramesonephric duct origin, this will lead to urinary drainage into the female genital tract (1,5). Usual sites of ectopic ureter in the female include urethra (35%), vestibule (34%) and vagina (25%) (2), which is demonstrated in our case who was found to have urethra – ureter fistula and uretero vaginal fistula. She complained of continuous urinary incontinence due to the insertion of ectopic ureter distal to the urethral sphincter as well as into vagina.

The female with an ectopic ureter has continuous urinary incontinence with otherwise normal urinary pattern, often associated with abnormal urine odour which warrants a thorough assessment. They often suffer from wet and erythematous perineal rash due to persistent incontinence from an ectopic ureter. Detailed inspection may demonstrate urine leak from the vestibule and / or vaginal orifice (1).

The imaging studies should aim to recognize any additional poorly functioning renal parenchyma, particularly when initial imaging reported a "solitary" kidney. IVU is useful to demonstrate if duplex system is present, though occasionally required a delayed phase (6).

Studies had showed that laparoscopic nephroureterectomy is comparable to its open counterpart (6 – 8). Irrespective of the technique used, it is imperative to identify the ectopic / dysplastic kidney and / or ureter involved. Urinary incontinence can be cured with removal of poorly functioning ectopic kidney and its ectopic ureter.

Conclusions

An ectopic ureter assessment should be considered in females with continuous urinary incontinence with normal voiding patterns, irrespective of age. Imaging studies can be helpful, from initial ultrasonography and/or IVU, followed by detailed imaging such as CT or fluoroscopy.

Once the ectopic ureter and affected renal unit are identified, we can offer a cure for this disturbing symptom and provide a better quality of life in these affected patients.

Competing interests

There was no funding for the study and no conflicts of interest to disclose.

ACKNOWLEDGEMENT

We would like to thank Dr. Ahmad Amir Ismail, Department of Obstetrics and Gynaecology, Universiti Sains Malaysia for identification of patient's concern and referring her to us when she still complained of having urinary incontinence. We also like to extend our appreciation to Department of Pathology, Radiology and Surgery, Universiti Sains Malaysia for their administrative support, and the patient for her cooperation.

REFERENCES

1. J.G. Borer et al. A Single – system ectopic ureter draining an ectopic dysplastic kidney: delayed diagno sis in the young female with continuous urinary incontinence. British Journal of Urology. 1998; 81, 474–78.
2. Ellerker AG. The extravesical ectopic ureter. Br J Surg. 1958; 45, 344 – 53
3. Borer JG, Corgan FJ, Krantz R, Gordon DH, Maiman M, Glassberg K. Unilateral single vaginal ectopic ureter with ipsilateral hypoplastic pelvic kidney and bicornuate uterus. J Urol 1993; 149: 1124–7
4. Gharagozloo AM, Lebowitz RL. Detection of a poorly functioning malpositioned kidney with single ec topic ureter in girls with urinary dribbling: imaging evaluation in five patients. Am J Roentgen 1995; 164: 957–61.
5. Schlussel RN, Retik AB. Anomalies of the ureter. In Walsh PC, Retik AB, Vaughan ED Jr, Wein AJ, eds, Campbell's Urology, 7th edn, Vol. 2. Philadelphia: WB Saunders, 1997: 1820–9

6. Liu KKW, Yeung CK, Lee KH, Ku KW. Ectopic ureter as a cause of wetting: the role of laparoscopy in its management. Aust NZ J Surg 1996; 66: 325–6.
7. Suzuki K, Ihara H, Kurita Y et al. Laparoscopic nephrectomy for atrophic kidney associated with ectopic ureter in a child. Eur Urol 1993; 23: 463–5.
8. Moores D, Cohen R, Hayden L. Laparoscopic excision of pelvic kidney with single vaginal ectopic ureter. J Pediatr Surg 1997; 32: 634–5.

EDITORIAL POLICY

Overview

Ethiopia's oldest medical journal, *The Ethiopian Medical Journal (EMJ)* is the official organ of the Ethiopian Medical Association (EMA). The EMJ is devoted to the advancement and dissemination of knowledge pertaining to the broad field of medicine in Ethiopia and other developing countries. The journal first appeared in July 1962 and has been published quarterly (January, April, July, October) without fail since then. It has been published in both online (www.emjema.org) and hard copy (ISSN0014-1755) versions.

The EMJ continues to play an important role in documenting and disseminating the progress of scientific medicine, and in providing evidence base for health policy and clinical practice in Ethiopia and Africa at large.

Our online journal is open access. The hard copies are distributed to members of the Ethiopian Medical Association. Hard copies of the Journal are distributed to institutions and organizations (internal and external) based on subscription.

Reviewing procedure

Peer reviewers

The Ethiopian Medical Journal uses a double-blind review system for all manuscripts. Each manuscript is reviewed by at least two reviewers. The reviewers act independently, and they are not aware of each other's identities. The reviewers are selected solely based on their relevant expertise for evaluating a manuscript. They must not be from the same institution as the author(s) of the manuscript, nor be their co-authors in the recent past. The purpose of peer review is to assist the author in improving papers and the Editorial Board in making decision on whether to accept or reject a manuscript. Reviewers are requested to decline if they have a conflict of interest or if the work does not fall within their expertise.

Peer review process

Manuscripts are sent for review only if they pass the initial evaluation (pre-review by the Editorial Board) regarding their style, methodological accuracy, ethical review documentation and thematic scope. A special care is taken that the initial (pre-review) evaluation is done in 3-5 days.

The Journal policy is to minimize time from submission to publication without reducing peer review quality. Currently the total period from the submission of a manuscript until its publication takes an average of six months. Peer reviewers are requested to respond within four weeks. During the review process, the Editor-in-Chief may require authors to provide additional information (including raw data) if they are necessary for the evaluation of the manuscript. These materials shall be kept confidential and must not be used for any other purposes.

The entire review process takes place under the supervision of the Editor-in-Chief in an online environment, with the assistance of the Journal Secretariat. The online system also allows authors to track the manuscript review progress.

Resolving inconsistencies

In case that the authors have serious and reasonable objections to the reviews, the Editorial Board assesses whether a review is objective and whether it meets academic standards. If there is a doubt about the objectivity or quality of review, the Editor-in-Chief will assign additional reviewer(s).

Additional reviewers may also be assigned when reviewers' decisions (accept or reject) are contrary to each other or otherwise substantially incompatible. The final decision on the acceptance of the manuscript for publication rests solely with the Editor-in-Chief.

Responsibilities

Authors' responsibilities

This is provided in the '*Guidelines to Authors'* which appear in each issue of the Journal. Authors must guarantee that their manuscripts are their original work, that they have not been published before, and are not under consideration for publication elsewhere. Parallel submission of the same paper to another journal constitutes misconduct and eliminates the manuscript from further consideration. Work that has already been published elsewhere cannot be reprinted in the Ethiopian Medical Journal

Authors are exclusively responsible for the contents of their submissions and must make sure that the authors listed in the manuscript include all and only those authors who have significantly contributed to the submitted manuscript. If persons other than authors were involved in important aspects of the research project and the preparation of the manuscript, their contribution should be acknowledged in the Acknowledgments section.

It is the responsibility of the authors to specify the title and code label of the research project within which the work was created, as well as the full title of the funding institution. In case a submitted manuscript has been presented at a conference in the form of an oral presentation (under the same or similar title), detailed information about what was published in proceedings of the conference shall be provided to the Editor-in-Chief upon submission.

Authors are required to properly cite sources that have significantly influenced their research and their manuscript. Parts of the manuscript, including text, equations, pictures, tables and graphs that are taken verbatim from other works must be clearly marked, e.g. by quotation marks accompanied by their location in the original document (page number), or, if more extensive, given in a separate paragraph.

Full references of each quotation (in-text citation) must be listed in the separate reference section in a uniform manner, according to the citation style used by the journal. References section should list only quoted/cited, and not all sources used for the preparation of a manuscript.

When authors discover a significant error or inaccuracy in their own published work, it is their obligation to promptly notify the Editor-in-Chief and cooperate with him/her to retract or correct the paper.

Authors should disclose in their manuscript any financial or other substantive conflict of interest that might have influenced the presented results or their interpretation.

By submitting a manuscript, the authors agree to abide by the Editorial Policies of the Ethiopian Medical Journal

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The Editor-in-Chief is responsible for deciding which articles submitted to the journal will be published. The decisions are made based exclusively on the manuscript's merit. They must be free from any racial, gender, sexual, religious, ethnic, or political bias. When making decisions the Editor-in-Chief is also guided by the editorial policy and legal provisions relating to defamation, copyright infringement and plagiarism.

Members of the Editorial Board including the Editor-in-Chief must hold no conflict of interest about the articles they consider for publication. Members who feel they might be perceived as being involved in such a conflict do not participate in the decision process for a manuscript.

The information and ideas presented in submitted manuscripts shall be kept confidential.

Editors and the editorial staff shall take all reasonable measures to ensure that the authors/reviewers remain anonymous during and after the evaluation process in accordance with the type of reviewing in use.

The Editorial Board is obliged to assist reviewers with additional information on the manuscript, including the results of checking manuscript for plagiarism.

Reviewers' responsibilities

Reviewers are required to provide the qualified and timely assessment of the scholarly merits of the manuscript. The reviewer takes special care of the real contribution and originality of the manuscript. The review must be fully objective, and the judgment of the reviewers must be clear and substantiated by arguments.

The reviewers assess manuscript for the compliance with the profile of the journal, the relevance of the investigated topic and applied methods, the scientific relevance of information presented in the manuscript, and the pres-

entation style. The review has a standard format. It is submitted through the online journal management system where it is stored permanently.
The reviewer must not be in a conflict of interest with the authors or funders of research. If such a conflict exists, the reviewer is obliged to promptly notify the Editor-in-Chief. The reviewer shall not accept for reviewing papers beyond the field of his/her full competence.
Reviewers should alert the Editor-in-Chief to any well-founded suspicions or the knowledge of possible violations of ethical standards by the authors. Reviewers should recognize relevant published works that have not been considered in the manuscript. They may recommend specific references for citation but shall not require citing papers published in the Ethiopian Medical Journal, or their own papers, unless it is justified.
The reviewers are expected to improve the quality of the manuscript through their suggestions. If they recommend correction of the manuscript prior to publication, they are obliged to specify the way this can be achieved. Any manuscript received for review must be treated as confidential document.

Ethical Considerations
Dealing with unethical behavior
Anyone may inform the Editor-in-Chief at any time of suspected unethical behavior or any type of misconduct by giving the necessary credible information/evidence to start an investigation.

- Editor-in-Chief makes the decision regarding the initiation of an investigation.
- During an investigation, any evidence should be treated as confidential and only made available to those strictly involved in the process.
- The accused will always be given the chance to respond to any charges made against them.

If it is judged at the end of the investigation that misconduct has occurred, then it will be classified as either minor or serious.

Minor misconduct (with no influence on the integrity of the paper and the journal, for example, when it comes to misunderstanding or wrong application of publishing standards) will be dealt with directly with authors and reviewers without involving any other parties. Outcomes include:

- Sending a warning letter to authors and/or reviewers.
- Publishing correction of a paper, e.g. when sources properly quoted in the text are omitted from the reference list.

Publishing an erratum, e.g. if the error was made by editorial staff.

In the case of major misconduct, the Editor-in-Chief may adopt different measures:

- Publication of a formal announcement or editorial describing the misconduct.
- Informing officially the author's/reviewer's affiliating institution.

The formal, announced retraction of publications from the journal in accordance with the Retraction Policy.

- A ban on submissions from an individual for a defined period.

Referring a case to a professional organization or legal authority for further investigation and action.

The above actions may be taken separately or jointly. If necessary, in the process of resolving the case relevant expert organizations, bodies, or individuals may be consulted.

When dealing with unethical behavior, the Editorial Board will rely on the guidelines and recommendations provided by the Committee on Publication Ethics (COPE).

Plagiarism prevention

The Ethiopian Medical Journal does not publish plagiarized papers. The Editorial Board has adopted the stance that plagiarism, where someone assumes another's ideas, words, or other creative expression as one's own, is a clear violation of scientific ethics. Plagiarism may also involve a violation of copyright law, punishable by legal action.

Plagiarism includes the following:

- Self-plagiarism, which is using one's own previous work in another context without citing that it was used previously
- Verbatim (word for word), or almost verbatim copying, or purposely paraphrasing portions of another author's work without clearly indicating the source or marking the copied fragment (for example, using quotation marks) in a way described under Authors' responsibilities;
- Copying equations, figures or tables from someone else's paper without properly citing the source and/or without permission from the original author or the copyright holder.

Any manuscript which shows obvious signs of plagiarism will be automatically rejected. In case plagiarism is discovered in a paper that has already been published by the journal, it will be retracted in accordance with the procedure described under Retraction policy, including blacklisting the author(s) .

To prevent plagiarism, the manuscripts are submitted to a plagiarism detection process. The results obtained are verified by the Editorial Board in accordance with the guidelines and recommendations of the Committee on Publication Ethics (COPE).

Retraction policy

Legal limitations of the publisher, copyright holder or author(s), infringements of professional ethical codes, such as multiple submissions, bogus claims of authorship, plagiarism, fraudulent use of data or any major misconduct require retraction of an article.

Occasionally, a retraction can be used to correct numerous serious errors, which cannot be covered by publishing corrections. A retraction may be published by the Editor-in-Chief, the author(s), or both parties consensually.

The retraction takes the form of a separate item listed in the contents and labeled as "Retraction".
The original article is retained unchanged, except for a watermark on the PDF indicating on each page that it is "retracted".

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There are no hidden costs whatsoever.

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The *Ethiopian Medical Journal (EMJ)* is the official Journal of the Ethiopian Medical Association (EMA) devoted to the advancement and dissemination of knowledge pertaining to the broad field of medicine in Ethiopia and other developing countries. Prospective contributors to the Journal should take note of the instructions of Manuscript preparation and submission to EMJ as outlined below.

Article types acceptable by EMJ

Original Articles (*vide infra*) on experimental and observational studies with clinical relevance
Brief Communications
Case Series
Case Reports
Editorials, Review or Teaching Articles: by invitation of the Editorial Board.
Correspondences/Letters to the Editor
Monographs or set of articles on specific themes appearing in a Special Issues of the Journal
Book reviews
Perspectives,
Viewpoints
Hypothesis or discussion of an issue important to medical practice
Letter to the Editor
Commentaries
Advertisements
Obituaries

N.B. Articles are not acceptable if previously published or submitted elsewhere in print or electronic format, except in the form of abstracts in proceedings of conferences.

Content and format of articles:

Title: The title should be on a separate page. It should not have acronyms or abbreviations. The title should be descriptive and should `not exceed 20 words or 120 characters including space. The title page should include the name(s) and qualification of the author(s); the department or Institution to which the study/research is attributed and address of the corresponding Author. If the author has multiple affiliations only use the most preferred one.

1. Original Articles

2,500 words, excluding Abstracts, References, Figures and Tables. The manuscript of the Article, should appear under the following headings:

a) Abstract: The abstract of the Article is prepared on a separate paper, a maximum of 250 words; it should be structured under the titles: a) Background; b) Methods; c) Results; d) Conclusions. Briefly summarize the essential features of the article under above headings, respectively. Mention the problem being addressed in the study; how the study was conducted; the results and what the author(s) concluded from the results. Statistical method used can appear under Methods paragraph of the Abstract, but do not insert abbreviations or references in the Abstract section.

Keywords: Provide three to six key words, or short phrases at the end of abstract page. Use terms from medical subject heading of Index Medicus to assist in cross indexing the Article.

b) Introduction : Should provide a short background and context of the study and provide the rationale for doing the study. It should not be a detailed review of the subject and should not include conclusions from the paper.

c) **Patients or (Materials) and Methods:** should contain details to enable reproducibility of the study by others. This section must include a clear statement specifying that a free and informed consent of the subjects or their legal guardians was obtained. Corresponding author should submit a copy of institution review Board (IRB) clearance or letter of permission from the hospital or department (if IRB exempt) with the manuscript. For manuscripts on clinical trials, a copy of ethical approval letter from the concerned body should be submitted with the Manuscript. If confidential data is being used for publication (such as student grades, medical board data, or federal ethics board data), then appropriate support/ agreement letter should be included. Photos of patients should disguise the identity or must have obtained their written consent. Reference number for ethical approval given by ethics committee should be stated. In general, the section should include only information that was available at the time the plan or protocol for the study was being written; all information obtained during the study belongs in the Results section.

d) **Results:** This section should present the experimental or observational data in text, tables or figures. The data in Tables and Figures should not be described extensively in the text.

e) **Discussion:** The first paragraph should provide a summary of key finding that will then be discussed one by one in the paragraphs to follow. The discussion should focus on the interpretation and significance of the results of the study with comments that compare and describe their relation to the work of others (with references) to the topic. Do not repeat information of Results in this section. Make sure the limitations of the study are clearly stated.

f) **Tables and Figures:** These should not be more than six. Tables should be typed in triplicate on separate sheets and given serial Arabic numbers. Titles should be clearly place underneath Tables and above Figures. Unnecessary and lengthy tables and figures are discouraged. Same results should not be presented in more than one form (choose either figure or table). Units should appear in parentheses in captions but not in the body of the table. Statistical procedures, if not in common use, should be detailed in the METHODS section or supported by references. Legends for figures should be typed on separate sheets, not stapled to the figures. Three dimensional histograms are discouraged. Recognizable photographs of patients should be disguised. Authors should submit editable soft versions of the tables and figures.

g) **Acknowledgement:** Appropriate recognition of contributors to the research, not included under Authors should be mentioned here; also add a note about source of the financial support or research funding, when applicable.

h) **References**:

- The titles of journals should be abbreviated according to the style used for MEDLINE (www.ncbi.nlm.nih.gov/nlmcatalog/journals).
- References should be numbered consecutively in the order in which they are first mentioned in the text and identify references in text, tables, and legends by Arabic numerals in parentheses.
- Type the References on a separate sheet, double spaced and keyed to the text.
- Personal communications should be placed NOT in the list of references but in the text in parentheses, giving name, date and place where the information was gathered or the work carried out (e.g. personal communication, Alasebu Berhanu, MD, 1984, Gondar College of Medical Sciences). Unpublished data should also be referred to in the text.
- References with six or less authors should all be listed. If more than six names, list the first three, followed by et al.
- Listing of a reference to a journal should be according to the guidelines of the International Committee of Medical Journal Editors ("Vancouver Style') and should include authors' name(s) and initial(s) separated by commas, full title of the article, correctly abbreviated name of the journal, year, volume number and first and last page numbers.
- Reference to a book should contain author's or authors' name(s) and initials, title of chapter, names of editors, title or book, city and name of publisher, year, first and last page numbers.

The following examples demonstrate the acceptable reference styles.

Articles:

- Gilbert C, Foster A. Childhood blindness in the context of Vision 2020: the right to sight. *Bull World Health Org 2001;79:227-32*
- Teklu B. Disease patterns amongst civil servants in Addis Ababa: an analysis of outpatient visits to a Bank employee's clinic. *Ethiop Med J 1980;18:1-6*
- Tsega E, Mengesha B, Nordenfelt E, Hansen B-G; Lindberg J. Serological survey of human immuno-deficiency virus infection in Ethiopia. *Ethiop Med J 1988; 26(4): 179-84*
- Laird M, Deen M, Brooks S, et al. Telemedicine diagnosis of diabetic retinopathy and glaucoma by direct ophthalmoscopy (Abstract). *Invest Ophthalmol Vis Sci 1996; 37:104-5*

Books and chapters from books:

- Henderson JW. Orbital Tumors, 3rd ed. Raven Press New York, 1994. Pp 125-136.
- Clipard JP. Dry Eye disorders. In Albert DM, Jakobiec FA (Eds). Principles and Practice of Ophthal-mology. W.B Saunders: Philadelphia, PA 1994 pp257-76.

Website:

- David K Lynch; laser History: Masers and lasers. http://home.achilles.net/jtalbot/history/massers.htmAccessed 19/04/2001

2. **Brief Communication**

Short versions of Research and Applications articles, often describing focused approaches to solve a health problem, or prelnary evaluation of a novel system or methodology

- Word count: up to 2000 words
- Abstract up to 200 words; excluding: Abstract, Title, Tables/Figures and References
- Tables and Figures up to 5
- References (vide supra – Original Article)

3. **Case Series**

Minimum of three and maximum of 20 cases

- Up to 1,000 words; excluding: Abstract, Title, Tables/Figures and References
- Abstract of up to 200 words; structured; (vide supra)
- Statistical statements here are expressed as 5/8 (62.5%)
- Tables and Figures: no more than three
- References: maximum of 20

4. **Case Report**

Report on a rare case or uncommon manifestation of a disease of academic or practical significance

- Up to 750 words; excluding: Abstract, Title, Tables/Figures and References
- Abstract of up to 100 words; unstructured;
- Tables and Figures: no more than three
- References: maximum of 10

5. **Systematic review**

Review of the literature on topics of broad scientific interest and relevant to EMJ readers

- Abstract structured with headings as for an Original Article (*vide supra*)
- Text should follow the same format as what is required of an Original Article
- Word count: up to 8,000 words, excluding abstract, tables/Figures and references
- Structured abstract up to 250 words
- Tables and Figures up to 8

6. **Teaching Article**

A comprehensive treatise of a specific topic/subject, considered as relevant to clinical medicine and public health targeting EMJ readers

- By invitation of the Editorial Board; but an outline of proposal can be submitted
- Word limit of 8,000; excluding abstract, tables/Figures and references
- Unstructured Abstract up to 250 words

7. Editorial

- By invitation of the Editorial Board, but an editorial topic can be proposed and submitted
- Word limit of 1,000 words: excluding references and title; no Abstract
- References up to 15.

8. Perspectives

- By invitation of the Editorial board, but a topic can be proposed and submitted
- Word limit of 1,500
- References up to six

9. Obituaries

- By invitation of the Editorial board, but readers are welcome to suggest individuals (members of the EMA) to be featured.

Preparation of manuscripts

- Manuscripts must be prepared in English, the official language of the Journal.
- On a single separate sheet, there must be the title of the paper, with key words for indexing if required, and each author's full name and professional degrees, department where work was done, present address of any author if different from that where work was done, the name and full mailing address of the corresponding author, including email, and word count of the manuscript (excluding title page, abstract, references, figures and tables). Each table/figures/boxes or other illustrations, complete with title and footnotes, should be on a separate page.
- All pages should be numbered consecutively in the following order: Title page; Abstract and keywords page; main manuscript text pages; References pages; acknowledgment page; Figure-legends and Tables
- The Metric system of weights and measures must be used; temperature is indicated in degrees Centigrade.
- Generic names should be used for drugs, followed by propriety brand name; the manufacturer name in parenthesis, e.g. diazepam (Valium, Roche UK)
- Statistical estimates e.g. mean, median proportions and percentages should be given to one decimal place; standard deviations, odds ratios or relative risks and confidence intervals to two decimal places.
- Acronyms/Abbreviations should be used sparingly and must be given in full, at first mention in the text and at the head of Tables/foot of Figure, if used in tables/figures.eg. Blood Urea Nitrogen (BUN). Interstitial lung disease (ILD).
- Use the binomial nomenclature, reference to a bacterium must be given in full and underlined - underlining in typescript becomes italics in print (e.g. *Hemophilus influenzae)*, and later reference may show a capitalised initial for the genus (e.g. *H. influenzae)*
- In the text of an article, the first reference to any medical phrase must be given in full, with the initials following in parentheses, e.g., blood urea nitrogen (BUN); in later references, the initials may be used.
- Manuscripts for submission should be prepared in Microsoft Word document file format

Submission of manuscripts

- As part of the submission process, authors are required to check off their submission's compliance with journals requirements

- All manuscripts must be submitted to the Editor-in-Chief of the Journal with a statement signed by each author that the paper has not been published elsewhere in whole or in part and is not submitted elsewhere while offered to the *Ethiopian Medical Journal*. This does not refer to abstracts of oral communications at conferences/symposia or other proceedings.
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Conflict of interest

Authors should disclose at the time of submission of manuscripts any conflict of interest, which refers to situations in which financial or other personal considerations may compromise, or have the appearance of compromising their professional judgment in conducting or reporting the research results They should declare that there is no conflict of interest to declare if there is none,

Manuscripts review procedures

The procedures for manuscripts review include:

- Within one week of receipt of a manuscript, the Editorial Board will review it in reference to (i) conformity with the Journal's "guidelines to authors (revised version available in all issues starting January 2020)", (ii) relevance of the article to the objectives of the *EMJ*, (iii) clarity of presentation, and (iv) plagiarism by using appropriate software
- The Editorial Board has three options: accept manuscripts for external review, return it to author for revision, or reject it. A manuscript not accepted by a board member is blindly reviewed by another board member. If not accepted by both, the manuscript is rejected by the Editorial Board. Decision will be made by the suggestion of a third Editorial Board member if the decisions of first two do not concur.
- Once accepted for external review, the Editorial Board identifies one (for brief communication, case reports, and teaching articles) or two (for original articles) reviewers with appropriate expertise. The reviewers will be asked to review and return manuscripts with their comments online within two weeks of their receipt. Reviewers have four options; accept, accept with major revision, accept with minor revision, or reject.
- A Manuscript accepted subject revision as suggested by reviewers will be returned to the corresponding author. Author(s) will be given four weeks to respond to reviewers' comments, make necessary changes, and return the manuscript to the Editorial Board. A Manuscript not returned within the specified time will be considered withdrawn by the author(s).
- Manuscripts with minor revisions will be cleared by the Editorial Board and accepted for publication. Those with major revisions will be returned to external reviewers and follow the procedures as outlined for the initial review.

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