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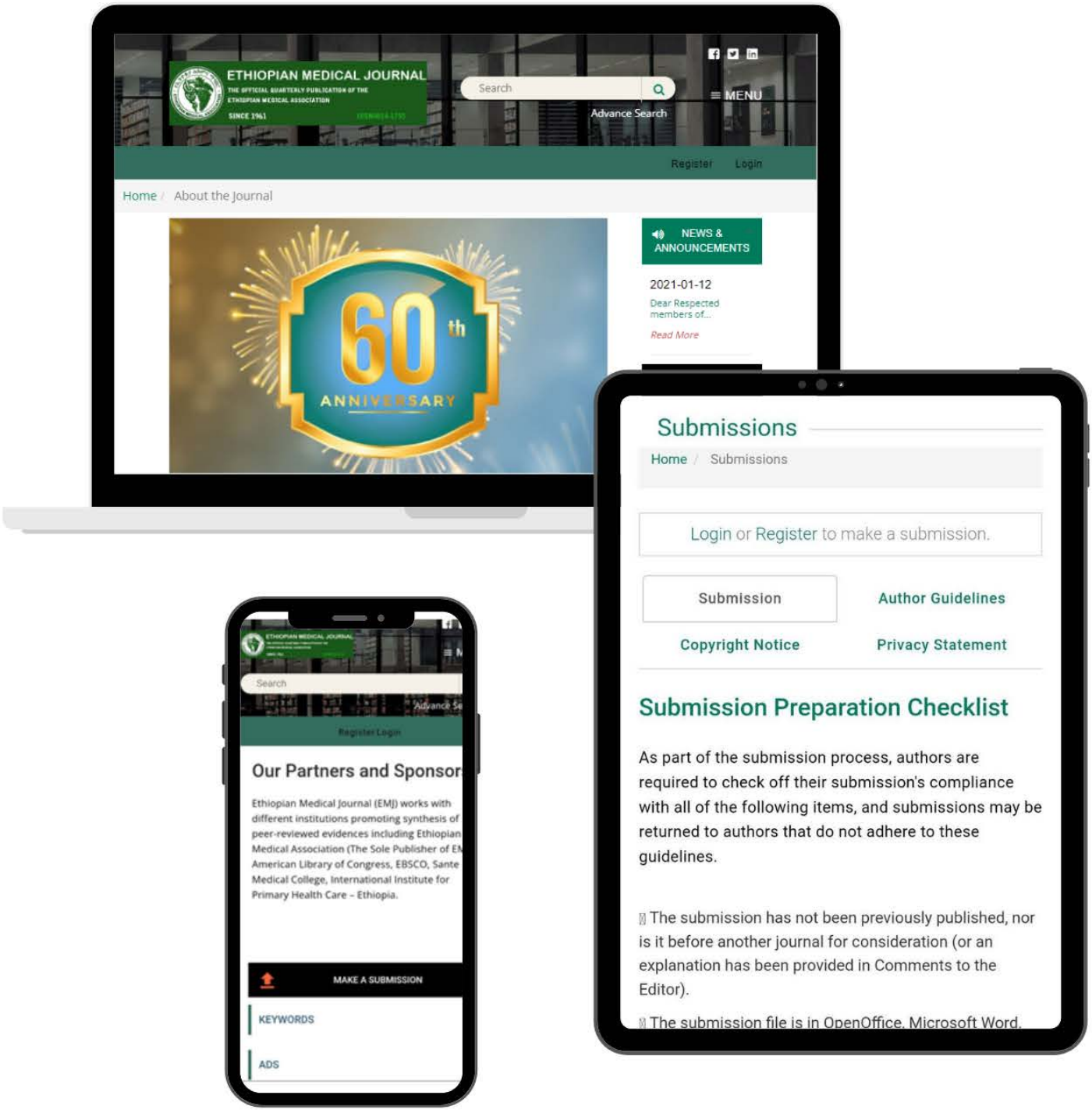

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(Haile Selassie I, Emperor)

Addis Ababa, 6th April 1962.

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The Ethiopian Medical Journal would like to dedicate this issue to all health workers that have lost their lives on the line of COVID care

Thank you for your service above self !

ETHIOPIAN MEDICAL JOURNAL
January 2022

EDITORIAL

ORIGINAL ARTICLES

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Mirkuzie Woldie , *Ethiop Med J, 2022, Vol. 60, No. 1*

EDITORIAL

ADDRESSING THE ROOT CAUSES: SOCIAL DETERMINANTS OF HEALTH AND DISEASE

Mirkuzie Woldie [1]M.D., M.P.H

The definition of health has heavily been contested in the literature. The medical view of defining health as the absence of illness has been challenged long time ago. The criticisms mainly relate to the fact that this definition limits determinants of health to the individual level (1). However, health of individuals is shaped by a multitude of factors including social, economic, and political events prevailing in the environment of the individual citizens of a country (1, 2). Health status of individuals in a population cannot be separated from the resources and potential available for them to lead healthy life styles.

The World Health Organization's (WHO) definition of health has been preferred by global health actors despite the popular reservations about its over ambitious intent. Recent publications by global health scholars have also reaffirmed the importance of such a broad approach to defining health. McCartney and colleagues suggested a similar approach when they defined health as "a structural, functional and emotional state that is compatible with effective life as an individual and as a member of society (2)."

Use of such a broadly oriented definition of health has several public health and health care related benefits. Firstly, such an approach will back-up focus on social determinants of health for health policy and systems development. This will enable addressing the root causes of ill-health related with the life style, living and working conditions, economic status, educational status and many other conditions impacting the health of individuals and populations. Consequently, the WHO's Commission on the Social Determinants of Health has defined social determinants of health as "the conditions in the environments where people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks (3)."

Secondly, such an orientation will make it clear that the development and effective delivery of medical care alone will not do the job of population health development adequately (4). While this is not to mean medical care does not influence population health status, it implies that the concerted effort of other essential sectors outside of the health care system are needed to attain optimal population health development. That is why population health development should be an integral part of policies crafted and implemented in sectors such as education, housing, and transportation.

Finally, a broad definition of health to address social determinants of health will also influence the design and delivery of health and medical sciences education in a manner that fits this notion (5). The proper orientation of the health workforce about the role of social determinants of health will enable proper execution of public health interventions by aligning the specific actions at points of health care and upstream actions at the level of policy design.

All of these will sum-up to addressing the root causes of ill-health, not just the manifestations of a wider social issue.

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TUBERCULOSIS CASE NOTIFICATION RATE MAPPING IN AMHARA REGIONAL STATE, ETHIOPIA: FOUR YEARS RETROSPECTIVE STUDY

Daniel Mekonnen[1,2], Abaineh Munshae[2,3], Endalkachew Nibret[2,3], Awoke Derbie[1,4], Andargachew Abeje[5], Berhanu Elfu Feleke[6], Yohannes Zenebe[1,2], Mengstie Taye[7], Dessie Kiber[8], Birhanu Taye Amogne[8], Taye Zeru[9], Endalamaw Gadisa[10], Kidist Bobosha[10], Adane Mihret[10,11], Liya Wassie[10], Yonas Kassahun[10], Abraham Aseffa[10]

ABSTRACT

Introduction: *Determining the tuberculosis (TB) case notification rate (CNR) at Zonal and Woreda level administration is very important for programmatic management.*
Methods: *Routine case notifications data archived between 1 July 2014 and 30 June 2018 were extracted from the regional health management information system (HMIS) database. The CNR of all forms of TB was calculated by dividing notified cases by the total population. The proportion of extra-pulmonary TB (EPTB) and TB/HIV co-infection were calculated by dividing the number of EPTB and TB/HIV against the total notified TB cases, respectively. The regional and zonal CNR of all forms of TB, TB types and TB/HIV co-infection were plotted using line and bar graphs. The Woreda TB, EPTB, and TB/HIV co-infection rate were mapped using ArcGIS 10.3.*
Results: *During the four-year period, 90,248 TB cases were registered in the database. The regional annual TB CNR was 113/100,000 population. Among the total notified cases, 47.5% were EPTB which have West-East belt characteristics. Proportionally, EPTB is higher among females than males; and in rural Woreda than urban Woreda. The proportion of regional TB/HIV co-infection rate was 8%. However, it was much higher in big towns such as Dessie (21%), Gondar (20%) and Bahir Dar (16%). Many Woredas found to be hotspots of TB and TB/HIV co-infection across the study period.*
Conclusion: *TB and TB/HIV co-infection showed heterogeneous variation among Zones and Woredas. To better understand driving factors for TB in Amhara Region, hotspot versus cold spot ecological study is desirable.*
Key words: *Tuberculosis, case notification rate, mapping, Amhara Regional State, Ethiopia.*

INTRODUCTION

Tuberculosis (TB) is an ancient disease that afflicted humankind for thousands of years(1). Based on 2019 world health organization (WHO) ann ual TB report, Ethiopia ranked 10th among the 20 high burden countries (HBC) and one of the top three in Africa with 114, 233 TB cases at a rate of 151/ 100,000 population (2). Over the last several years, 32 %, 30% and 38% of TB cases were extrapulmonary tu berculosis (EPTB), smear negative pulmonary TB (PT B-) and smear positive pulmonary (PTB+), respectively (3).

Enclosed in 2019 WHO global TB report to Ethiopia, TB/HIV co-infection rate was 5% (2). However, based on two systematic reviews conducted in 2018, much higher rates of TB/HIV coinfection, 22% (4) and 25.6% (5) were reported. Specifically, the TB/HIV co-infection rate was reached to plateau, 26.7% in Amhara Regional State (ARS) (5). Taken together, Ethiopia is one among the 14 TB, MDR-TB and TB/HIV co-infection HBC (6).

Tuberculosis in Ethiopia showed spatial clustering and heterogeneity at region, zone and district level (7, 8). It also showed temporal variation, with the highest CNR observed during April-June (the end of the dry season) and the lowest notification rate during October-December (the beginning of the dry season) (9, 10). The high rate of Mycobacterium tuberculosis (Mtb) transmission during the winter months might be due to indoor activities, seasonal change in immune function, delays in the diagnosis and treatment of TB and community food security (9). Additionally, several religious and cultural festivities are held during month of October-December which might lead to population gathering and hence TB transmission. This period is also considered as the vacation season for farmers in Ethiopia and is noted for increased health seeking behavior of farmers which may lead to detection of more TB cases.

Tuberculosis CNR mapping and delineation of areas in to TB hot and cold spots is documented by a few studies in Ethiopia (7, 9-11) and globally (12). However, any similar observations from a specific location are always of interest. Moreover, there are new insights in this study not addressed by previous studies. For instance, previous studies failed to address EPTB spatial distribution.

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Moreover, our finding described the correlation of EPTB with HIV and their urban-rural disparity. Thus, the aim of this study was to determine the CNR of all forms of TB, TB types (PTB and EPTB) and TB/HIV co-infection at regional and lower administrative levels (Zones and Woredas). Of these, Woreda level TB, EPTB and TB/HIV co-infection CNR mapping were done.

METHODS

Study design and period

The study was conducted using data collected and archived between July 2014 and June 2018 in Amhara Regional State (ARS).

Amhara National Regional State of Ethiopia was divided in to 13 Zones and 181 Woredas (Figure 1). The Republic of Ethiopia has five tier administrative structures.

These are Federal Government, regional governments, zones (intermediary or oversight bodies), district (commonly known as Woreda) and kebele (non-budgeted smallest administrative unit) (13).

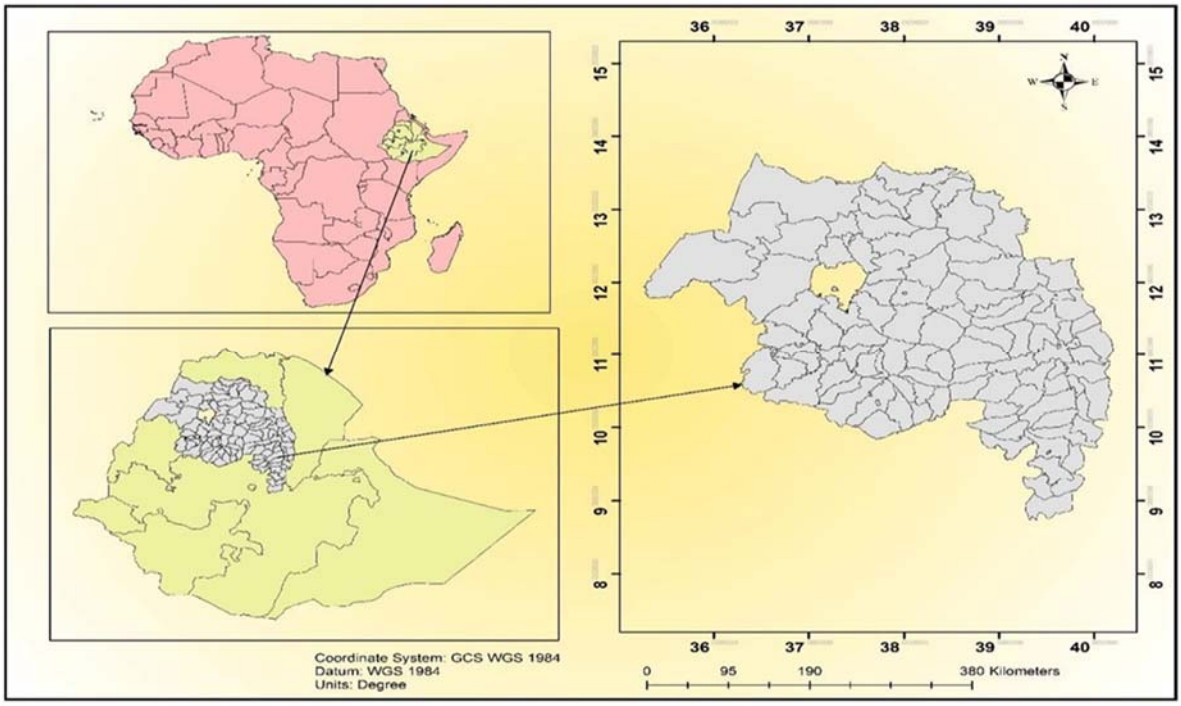

Figure 1: Study area map, Amhara Regional State divided in to Woredas, 2020

Participants and variables

All registered TB and TB/HIV co-infected cases between July 2014 and June 2018 were included in this study. TB patients were classified as PTB+, PTB- and EPTB. The PTB+ cases refer to a patient from whom at least one biological specimen is positive for Mtb by WHO recommended diagnostic technology. Clinically diagnosed TB (PTB-) case refers to a patient who does not fulfill the criteria for PTB+ case but has been diagnosed with active TB by an experienced clinician (14). EPTB refers to TB involving organs other than the lungs. Diagnosis of EPTB is based on bacteriological, histological or clinical evidences (14).

Data sources and measurement

The health management information system (HMIS) databases were the secondary source of the data and that of the TB unit register at Directly Observed Treatment, Short-Course (DOTs) clinic were the primary sources (14).

The absolute number of regional, zonal and Woreda TB (all forms of TB, PTB+, PTB-, and EPTB) and TB/HIV co-infection were documented across the four years. The CNR of all forms of TB was calculated by dividing all cases of TB by Woreda or zonal population and then reported as per 100,000 populations. By this calculation, the trends of all forms of TB were assessed over the four-year period. The proportion of EPTB and TB/HIV co-infection was computed by dividing the number of EPTB and TB/HIV co-infected cases by all forms of TB and then multiplied by 100. The total TB data were disaggregated by age and gender. The regional TB/HIV co-infection CNR was also determined.

All forms of TB and TB/HIV co-infection rates were assessed and compared among the included zones and Woredas over the four years to identify the most prevalent types of conditions.

Using the WHO annual TB report data of the 30 HBC (3), we roughly classified TBCNR of Woredas into: low (≤50 TB /10^5 population), moderate (50.1-114 TB /10^5 population), high (114.1-221 TB /10^5 population) and extremely high (>221 TB /10^5populations). Woreda EPTB proportions were classified as low (0-15%, globally acceptable range), moderate (15.1-31%, nationally acceptable range), high (31.1-48%, higher than national average) and extremely high (>48 %) (3, 15). In the same fashion, the proportion of TB/HIV co -infection was classified as extremely high (>20%), high (12.1-20%), moderate (7.1-12 %) and low (<7%).

Statistical Analysis

Using the excel spread sheet, the regional and zonal TB, TB types and TB/HIV co-infection data were summarized using frequency, percentage, mean, median and range. Regional and zonal TB CNRs were displayed using line graphs. The CNR of EPTB and TB/HIV co-infection were graphed using bar graphs. The Woreda TB, EPTB and TB/HIV co-infection CNR mapping were done using ArcGIS 10.3 (ArcGIS Desktop, ESRI 2011. Redlands, Canada).

The spatial data used for the maps were taken from Map library which is a public domain that can be accessed at www.maplibrary.org.

RESULTS

During the four-year period of 2014 to 2018, a total of 90,248 TB cases were notified and of these, 42, 911 (47.5%) were EPTB. Amhara regional state contributed for around 18.8% of annual national TB CNR. The identified TB cases were disaggregated by age and gender. As such, TBCNR was reached plateaus at 25-34 years of age followed by 15-24 years of age. Not only the highest TBCNR but also the most infectious cases were also documented in these age groups. The proportion of EPTB appears to be higher below 15 years of age and particularly among children under 5 years of age. Smear negative TB is proportionally more frequent than other forms in the age groups above 45 years. Smear positive TB appears to be proportionally higher in frequency than other forms among young adults (15-44 years of age) (Figure 2).

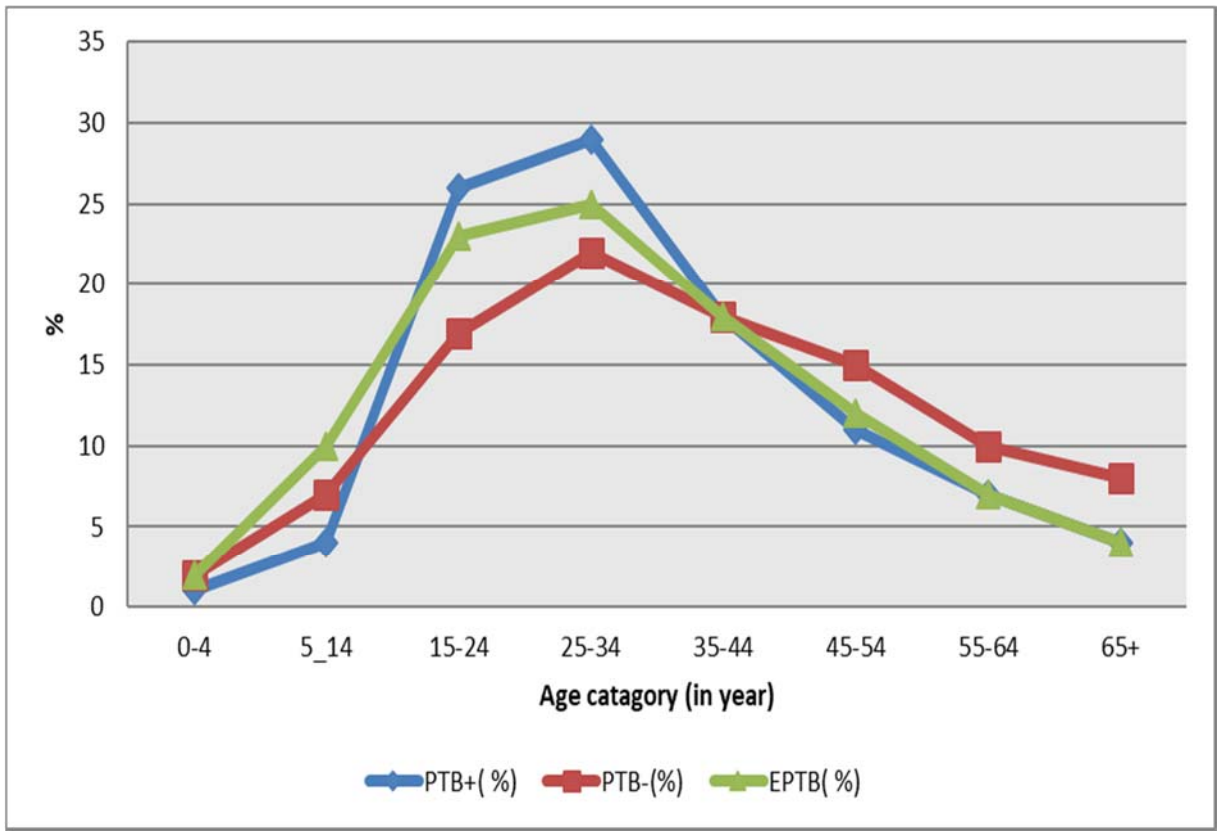

Figure 2: The TBCNR across age groups in Amhara Regional State, 2014-2018

TBCNR: Tuberculosis case notification rate, **PTB+:** Smear positive pulmonary tuberculosis, **PTB-:** Smear negative pulmonary tuberculosis; ***EPTB:*** *Extra pulmonary tuberculosis*

Of the total 90,248 new TB cases, 55% and 45% were males and females, respectively. Conversely, when we took female and male separately and disaggregated by types of TB, EPTB is much higher among females (51%) than males (45%).

Of the 13 zones in the region, North Gondar (recently divided in three administrative zones) was the highest TB reporting zone accounting for 16.64% of the cases across the four fiscal years followed by West Gojam 12.85% and South Wello 12.66% zones. It was evident that the absolute numbers of TB types) were related with the total population size. Extra-pulmonary TB was the highest notified clinical phenotype in all zones except in North Shewa Zone (Figure 3).

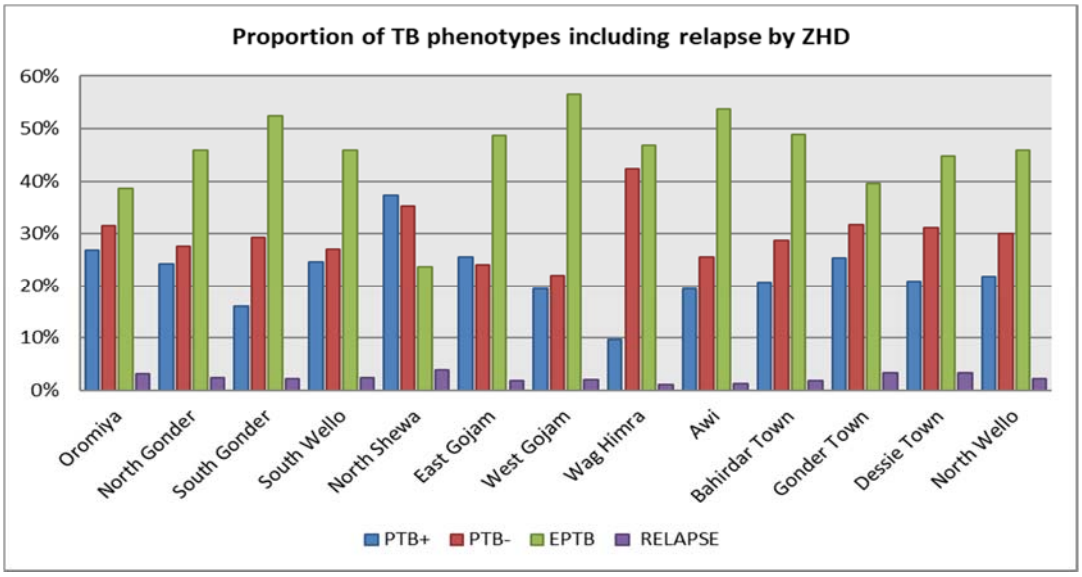

Figure 3: The CNR of TB types in 13 zones of ARS between 2014 and 2018

CNR: *Case notification rate,* ***ARN:*** *Amhara Regional State,* ***PTB+:*** *Smear positive pulmonary tuberculosis,* ***PTB-:*** *Smear negative pulmonary tuberculosis;* ***EPTB:*** *Extra pulmonary tuberculosis*

It was a good achievement that, 99% of the new TB cases have been screened for HIV. Of those screened, 8% of TB cases were co-infected with HIV.

Proportionally highest TB/HIV co-infection CNR was reported from big towns such as Dessie, Gondar, and Bahir Dar; 21%, 20% and 16%, respectively (Figure 4).

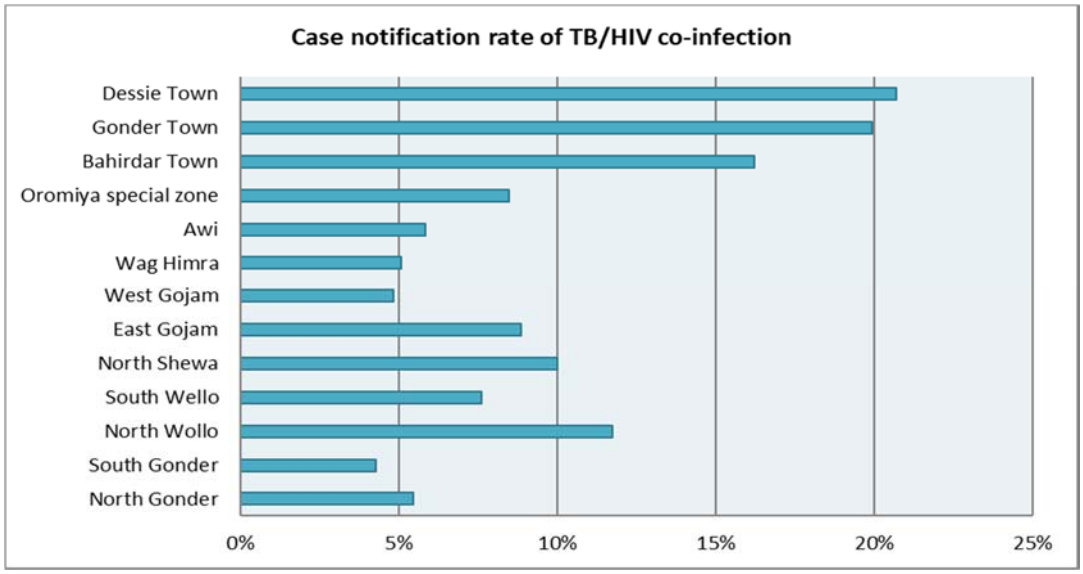

Figure 4: The CNR of TB/HIV co-infection in 13 zones ARS between 2014-2018

CNR: case notification rate, **TB/HIV:** Tuberculosis/Human Immune Deficiency Virus, **ARN:** Amhara Regional State,

Figure 5 below depicts the pattern of TBCNR over the four years period among106 Woredas. The TBCNR was >221/100000 population per year in Metema, Bahir Dar town and Dessie over the years. Kombolcha, Ankasha, Gondar, Kobo and Sanja were also among the highest TB reporting woredas (Figure 5). Surprisingly, high TBCNR was reported from urban woreda than corresponding rural woredas signaling the phenomena of hotspot and cold spot dichotomy.

For instance, Gendawuha, Kobo Town, Burie Town, Bati Town were hotspots for Metema, Raya Kobo, Burie Zuria and Bati Zuria Woredas, respectively. Taken together, Metema, Sanja, Bahir Dar, Gondar, Dessie, Chagni, Kemissie town, Kobo town, Bati, Woreta, Shewarobit, Dangla town, Jawi, Kombolcha, Injibara town, and Woldia were considered TB hotspot woredas across the study period (Figure 5).

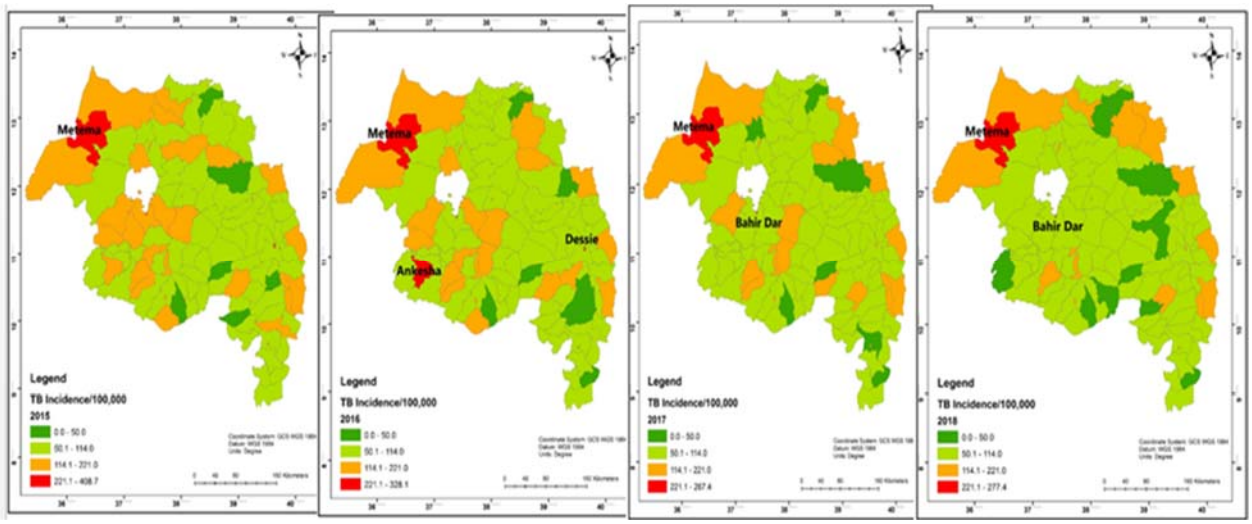

Figure 5: The TBCNR/100,000 populations in ARS between 2014- 2018
Low (green): ≤50 TB /10^5 population; Moderate (lime): 50.1-114 TB /10^5 population; High (Yellow): 114.1-221 TB /10^5 population; extremely high (Red): >221 TB /10^{5}populations. ***TBCNR:*** *tuberculosis case notification rate;* ***ANS****: Amhara Regional State*

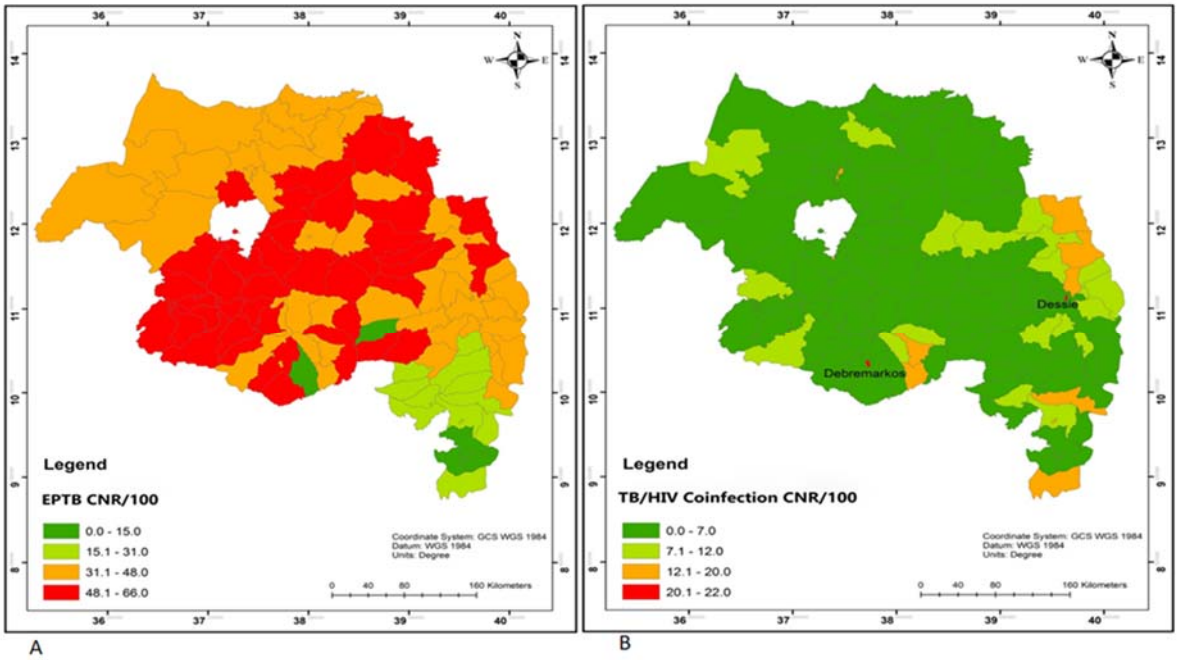

Figure 6: The proportion of EPTB (A) and TB/HIV co-infection (B) in ARS between 2014- 2018

Contrary to the CNR of all forms of TB, the proportion of EPTB was higher in majority of rural Woredas compared to urban Woredas. The EPTB CNR ranged between 49% and 66% in 63 Woredas. Most of these Woredas were from western Amhara but also extending to eastern Amhara, forming an "***EPTB belt of Amhara" or "EPTB hand of Amhara"*** (Figure 6A, Supplementary Material 1).

Closer look at figure 6b shows that the proportion of TB/HIV co-infection was ≥15% in 18 Woredas. Some of these include Lalibela (26%), Debre Markos (22%), Dessie (21%), Enemay, Gondar and Bati each (20%), Kobo town, Shewarobit and Tehuledere each 19% (Figure 6B).

EPTB proportions (Figure 6A): Low (Green): 0-15% (globally acceptable range); Moderate (Lime): 15.1-31% (nationally acceptable range); High (Yellow): 31.1-48% (higher than national average); Extremely high (Red): >48 %). The proportion of TB/HIV co-infection (Figure 6B): Low (Green): <7%; Moderate (Lime): 7.1-12 %; High (Yellow):12.1-20%; Extremely high (Red): >20%. ***EPTB:*** *Extra pulmonary tuberculosis;* ***ARN:*** *Amhara Regional State,* ***TB/HIV:*** *Tuberculosis/Human Immune Deficiency Virus*

Collectively, it can be concluded that, the CNR of TB was population dependent, higher in urban than rural Woredas. Moreover, the declining rate of TB is promising but very stagnant for infectious form of TB. In ARS, TB and TB/HIV co-infection CNR exhibited heterogeneous spatial pattern. Additionally, the proportion of EPTB is relatively higher in rural than urban Woredas but the reverse is true in case of TB/HIV co-infection rate.

DISCUSSION

A total of 92,379.00 TB cases including relapse were notified during the four-year period with a mean annual CNR of 23, 095 TB cases. The annual TB CNR in ARS was 113/100,000 which was lower than the 2019 annual WHO TB report of Ethiopia, 151/100000 (2). The TBCNR reached plateau at 25-34 years of age followed by 15-24 years of age. Not only the highest CNR of TB but also the most infectious cases were also documented at these similar age groups (Table 1, Figure 2). Why TBCNR is high at these age ranges is not well understood. It is known that, age range of 15-34 is the economically productive age group. On the other hand, poverty and TB are linked via malnutrition, immunity, poor housing and crowded housing (16, 17). Hence, crippling of these age range by *M. tuberculosis* might have long term evolutionary advantage for the bacteria. Overall, age range of 15 -44 is the most socially and physically interactive periods which might give the fitness advantage for the bacteria to transmit.

Furthermore, TBCNR is population size dependent; the high number of population at these age ranges might be another possible explanation. The high CNR of HIV at these age range might also be additional evolutionary pressure for progression to active TB.
The regional TB/HIV co-infection rate was gauged at 8% which was in line with the national estimate of 7% (3). Among zones, regional big towns such as Dessie, Gondar, and Bahir Dar were the highest TB/HIV co-infection reservoirs. Similar with our report, a study by Datiko et al (2008) found high TB/HIV co-infection CNR in urban than rural (18). This study concluded that, TB/HIV co-infection follows the HIV epidemiology rather than TB epidemiology.

For the first time, this study deciphers the direction and CNR map of EPTB in ANRS. Figure 6a shows EPTB West-East belting directions which have a wider (palm like) geographic coverage in the western Amhara and radiating towards Eastern Amhara. The high CNR of EPTB in Ethiopia and in particular, ANRS was the subject of intense research (19, 20). Kodaman *et al* asserted that, severe disease like EPTB is the outcome of a coevolutionary mismatch (21). Multiple reports support the higher prevalence of EPTB among females than males (22-24).

A study by Ganchua et al (2018) explained the role of lymph node (LN) as ecological niche for Mtb (25). This study determined that LNs are generally poor at killing Mtb compared with lung granuloma. This is because, granulomas that form in LNs lack B cell-rich tertiary lymphoid structures. With this, LNs are not only sites of antigen presentation and immune activation during infection, but also can serve as predator free niche for Mtb (25).
In general, a high rate of Mtb niche shift from pulmonary to LN in ARS, Ethiopia is the subject of further discussion. The high CNR of EPTB in rural than urban Woredas call for further study but might be related with delayed diagnosis (9, 26, 27) among other factors.

Our assessment identified high burden TB, EPTB and TB/HIV co-infection Woredas (Figs 5-6). Additionally, Figures 5-6 shows the presence of heterogeneous spatial distribution of all forms of TB (Figure5), EPTB (Figure 6a) and TB/HIV

co-infection (Figure 6b). Heterogeneous spatial distribution of all forms of TB was in line with Alene *et al* 2019. Based on spatial autocorrelation using Moran's I statistic, local indicators of spatial association (LISA) analysis and Bayesian models, a high-high cluster of CNR was found in northwest Ethiopia (7, 10). It showed that the incidence of notified TB was significantly associated with poor health care access and good knowledge about TB (7).

Rural/urban TBCNR dissimilarity might be due to population density, social mixing, delay in diagnosis, poverty, and access to health facility (28). In such dissimilarity and hot and cold spot scenario, transmission dynamic models suggested hotspot targeted screening and intervention is more effective at lowering community-wide TB incidence when TB spills over transmission is expected from hotspots towards TB cold spot area [29]. However, it should be certain that the difference is true and free from detection and other bias [29].

The current high TB and TB/HIV prevalent areas (hotspots) are characterized by high population movement, social mixing, congregation, urban type, and commercial corridors. Thus, hotspots might not be driven by local transmission event alone rather migration or aggregation of vulnerable hosts [29] might have significant share. Migration plays an important role not only to ignite the epidemic in areas previously cases free, but over the course of the entire epidemic [30].

In general, this study has several implication on policy related issues. For instance, the mapping is used for identification of predictors of diseases patterns and visualized the magnitude of TB across Zones and Woredas. Moreover, this TB CNR mapping study might be a footsstep for designing a model for coevolutionary study. This study pinpoints the most TB, EPTB and TB/HIV affected Woredas and Towns and this information would be an input on debate regarding alternative intervention measures. These current TB maps can also be used as baseline from which interventions success or failure can be monitored [31, 32].

This study described the correlation of EPTB with HIV and their urban-rural disparity. However, due to the retrospective nature of the study, spatial covariates were not considered in the analysis and only notification rate mapping was done. TB and TB/HIV co-infection CNR might depend on availability of nearby health service and socioeconomic status. Thus, this CNR might not mirror the true incidence and prevalence of the diseases in the respective administrative units.

CONCLUSION

The detailed information comprehended and enveloped in this study is the first in terms of giving a detail evaluation of TB and EPTB epidemiology in ANRS. In the four-year TBCNR study, 90,248 TB cases were notified and registered in regional HMIS database. Amhara Region contributed for around 18.8% of annual national TB CNR. Of the total notified cases, 47.5% were EPTB. The proportion of EPTB among notified cases was between 49% and 66% in 63 Woredas. Most of these Woredas are from western Amhara but also extending to eastern Amhara; ***'EPTB belt of Amhara"***. Contrary to the CNR of all forms of TB, the proportion of notified EPTB cases were higher in rural Woredas compared to urban Woredas.

The TB/HIV co-infection CNR was 8%. Proportionally highest TB/HIV co-infection rate was reported from regionally big towns such as Dessie, Gondar and Bahir Dar; 21%, 20% and 16%, respectively. Hence, TB/HIV co-infection CNR depended on the HIV epidemiology rather than TB. Hence, TB case finding can be best integrated with HIV programmatic management.

In General, like other chronic diseases (eg. Diabtes Mellitus), the epidemiology TB in Amhara region is somehow exceptional compared with other region/country. Hence, pathogen, host and environmental factor must be integrated to better understand TB in the region and in Ethiopia at large. Additionally, to better understand the driving factors for TB in Amhara Region, hotspot versus cold spot ecological study is desirable.

ABBREVIATIONS

ANRS: Amhara National Regional State; **BCG:** Bacillus Calmette–Guérin; **CNR**: Case notification rate; **DOTs:** Directly Observed Treatment, Short-Course ; **EPTB:** Extrapulmonary tuberculosis; **HBC:** High burden countries; **HIV:** Human immunedeficency virus; **HMIS:** Health Information Management System; **LISA:** local indicators of spatial association; **LN**: Lymph node; **MDR -TB:** Multidrug resistance TB;; **Mtb:** *M. tuberculosis*; ***MTBC:*** *Mycobacterium tuberculosis complex;* **PTB+:** smear positive pulmonary PTB; **RR:** Rifanmpicine resistance; **TB:** Tuberculosis; **TBCNR:**TB case notification rate; **WHO:** World Health Organization.

DECLARATIONS

Ethics approval and consent to participate
The study was approved by Amhara Regional Ethical Review Committee (RERC). The HMIS archived database contains institutional level data and did not contain any patient identifier. The data were kept confidentially and used for the purpose of the study only.

Consent for publication
Not applicable

Availability of data and material
The datasets supporting the conclusions of this article are included within the article and its additional files. Any additional material can be obtained upon reasonable request.

Competing interests
The authors declare that they have no competing interests.

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Supplementary Material
Table S1: Full Woreda TB, EPTB and TB/HIV data used for mapping figure 5 and 6

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ORIGINAL ARTICLE

SEROPREVALENCE OF SYPHILIS AMONG FEMALE COMMERCIAL SEX WORKERS IN HAWASSA, ETHIOPIA: A CROSSECTIONAL STUDY

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ABSTRACT

Introduction: *Syphilis is an important public health problem worldwide. Female commercial sex workers are disproportionately affected by syphilis. There is scarce data on the prevalence of syphilis among female sex workers in Ethiopia. The objective of this study was to identify the seroprevalence of syphilis and associated factors among female commercial sex workers.*

Methods: *Institution-based cross-sectional study was conducted in Hawassa city among 381 female Commercial sex workers from July 5 to November 25, 2018. Background data were collected using a structured questionnaire. Blood samples were collected from participants; plasma was prepared and tested for the antibody produced against T. pallidum using the syphilis test strip. Data were analyzed using SPSS version 21. A logistic regression model was used to assess factors associated with seroprevalence of syphilis.*

Results: *Most of the participants belong to the age group 20–24 years; most of them were single and reside in an urban area, Seroprevalence of syphilis among female commercial sex workers was 4.2% (95% CI: 2.4-6.3). None of the factors assessed were significantly associated with the seroprevalence of syphilis.*

Conclusions: *Relatively low seroprevalence of syphilis was found in the present study requiring large-scale study to identify whether the low rate is a reflection of the global trend or program-related success involving this marginalized segment of society.*

Keywords: *Syphilis, Female commercial Sex workers, Seroprevalence Ethiopia*

INTRODUCTION

Syphilis, caused by spirochete *Treponema pallidum,* is an important public health problem worldwide. Syphilis is transmitted through close contact such as sexual contact and from a mother to fetus during pregnancy or birth and result in stillbirth and infant death in about 40% of cases [1]. Syphilis causes significant morbidity and mortality among adults, infants, and young children. The infection is usually asymptomatic but can cause ulceration in the genital area that could enhance the transmission of sexually transmitted diseases [2].

Even though the burden of syphilis is declining, the prevalence of syphilis remains high in most African countries with an estimated prevalence of 3.24 [3]. The prevalence of syphilis varies based on the study period, study population, and across different countries. Most importantly, all segments of society are not equally affected by syphilis. Some groups such as female commercial sex workers (FCSW), pregnant women, and Human Immuno Deficiency Virus/ Acquired Immuno Deficiency Syndrome (HIV/AIDS) patients are disproportionately affected by syphilis as compared to the general population [4, 5].

According to the report of the World Health Organization (WHO), the prevalence of syphilis among FCSWs was >5% in ten countries [6]. Whereas, countries such as Somaliland (3.1%) [7] and Kenya (3.3%) [8] reported a prevalence of less than 10%. A high prevalence of syphilis among FSWs from Uganda (21%) [9] and Addis Ababa, Ethiopia (52.4 [10] was reposted.

In Ethiopia, antenatal-based surveillance of HIV and syphilis is carried out by Ethiopian Public Health Institute (EPHI). EPHI reported inconsistent prevalence of syphilis over different years: the prevalence of syphilis was 2.7% and 2.3% in 2007 and 2009 respectively [11]. The prevalence increased from 1% in 2012 to 1.2% in 2014 [12]. The participants of the survey were only pregnant women who visited the antenatal care clinics.

There are several studies that attempted to measure the prevalence of syphilis among blood donors [13, 14] and pregnant women in Ethiopia [15, 16]. According to Kebede *et al.* (17), syphilis is considered as one of the public health important diseases in Ethiopia; however, there are few published data indicating the burden of syphilis among FCSWs in Ethiopia [10].

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As to the Authors knowledge, there is no study that addressed this issue in the Southern parts of Ethiopia. Having data on the prevalence of syphilis among FCSWs will help to strengthen existing prevention methods or design other suitable mechanisms to prevent and control the dissemination of syphilis. The aim of this study was to investigate the seroprevalence of syphilis and associated factors among FCSWs in Hawassa City, Ethiopia.

METHODS

Study design and period

An Institution-based cross-sectional study was conducted from July 5 to November 25, 2018.

Study area

This study was conducted in Hawassa City, Ethiopia at an integrated service on health and development organization (ISHDO) private clinic. Hawassa is found 275 Km from Addis Ababa, the capital of Ethiopia. The total population of the city is 328,283. ISHDO is one of the non-governmental clinics which is dedicated in providing health-related services for FCSWs residing in Hawassa area.

Variables of the study

Dependent variable: *T. pallidum* antibody test result.
Independent Variables: Marital status, educational status, place of residence, use of condom, frequency of condom use, use of stimulant, history of genital ulcer, place of sex.

Study population

Female Commercial sex workers who work in Hawassa area and obtain health and social-related services from the ISHDO clinic.

Operational definition

Female sex worker: Women who receive money or goods in exchange for sexual services.

Sample size determination and sampling technique

The sample size was determined using single proportion formula by considering 50% prevalence of syphilis, with a 95% confidence interval, 5% margin of error, and using correction formula (since the number of FSWs was less than 10,000). Based on the above assumptions, the total sample size was 381. To recruit participants, a systematic random sampling technique was used. Assuming a five-month study period, a total of 620 FCSWs were expected to visit ISHDO clinic according to the clinic plan and the past five month's performance report. To determine the sample interval, the estimated value (n=640) was divided by the sample size (n=381), which would be 1.7 (K~2). The first participant was selected by using lottery methods. Then onwards, every second participant was included until the sample size is reached. The participants were approached at the ISHDO clinic.

The blood sample was collected and transported to the Microbiology laboratory of Hawassa University Comprehensive Specialized Hospital.

Eligibility criteria

Female Commercial Sex Workers aged greater than 16yrs and who were willing to participate were included in the study. FCSWs that were not voluntary were excluded from the study.

Data collection

Before data collection, study participants were informed about the study: procedures to be carried out, benefits, risks, rights, and confidentiality. The background data were collected from FSWs after obtaining written informed consent using a structured questionnaire. From all study participants, 5 ml of blood was collected in test tubes with an anticoagulant. The whole blood was centrifuged at 5000 revolutions/minute for 10 minutes to prepare plasma. Antibodies to *T. pallidum* were confirmed by using a syphilis test strip (Gaungzhou wondfo biotech China). The sensitivity and specificity of the test strip were 100% and 98% respectively. In brief, three drops of plasma were added to the sample pad of the strip; the result was read and recorded after 10 minutes. The distinct red line on the control and test regions indicated a positive test result.

As part of quality control, the questionnaire was translated from English to Amharic and then translated back to English to check the consistency. The questionnaire was pretested on 5% of the total sample size. During the study, data were checked daily for completeness. For laboratory work, the manufacturer's manual was followed carefully. The test kit was checked by using known positive and negative controls before using for the study.

Data analysis

SPSS version 21 software was used for data analysis; results were summarized and presented in tables and text. The logistic regression model was used to determine predictors of syphilis infection. A *p*-value of less than 0.05 was considered statistically significant.

Ethics approval and consent to participate

Ethical clearance was obtained from Hawassa University College of Medicine and Health Sciences institutional review board (IRB) with the reference number IRB026/10. Permission was requested and obtained from the study site (ISHDO clinics). Study participants were recruited after informed written consent was obtained. They were informed not to participate or might leave the study at any time. Confidentiality was kept by using codes instead of names that could relate to the participants

Results

In this study, 381 FSWs participated with a 100% response rate. Most of the participants were single, reside in an urban area, use condoms, and have no history of a genital ulcer (Table **1 & 2**). The mean age and SD of participants was 22.6 ± 3 years.

Table 1. Sociodemographic and behavioral characteristic of Female Sex worker at Hawassa, Ethiopia, July 5 to November 25, 2018 (N=381).

Variables		**Frequency, n (%)**
Age in year	15-19	91 (23.9)
	20-24	174 (45.6)
	25-29	90 (23.6)
	30-34	17 (4.5)
	35-40	9 (2.4)
Marital status	Married	11 (2.9)
	Single	289 (75.9)
	Widowed	37 (9.7)
	Divorce	44 (11.5)
Educational status	No formal education	75 (19.7)
	Formal education	306 (80.3)
Residence	Rural	139 (36.5)
	Urban	242 (63.5)

Table 2. Sexual behaviors and clinical features of Female Sex worker at Hawassa, Ethiopia, July 5 to November 25, 2018 (N=381).

Variables		**Frequency, n (%)**
Condom use during sex	Yes	367 (96.3)
	No	14 (3.7)
Frequency of condom use	Always	303 (82.6)
	Sometimes	53 (14.4)
	Rarely	11 (2.9)
Reason for not using condom	Satisfy customer	4 (28.6)
	To get more money	8 (57.1)
	Negligence	2 (14.3)
History of genital ulcer	Yes	99 (26.0)
	No	282 (74.0)
Steady partner	Yes	103 (27.0)
	No	278 (73.0)
Place of work(sex)	Hotel	172 (45.1)
	Street	160 (42’0)
	Home	48 (12.6)
	Any place	1 (0.3)

Seroprevalence of syphilis

Out of 381 FSWs tested, 16(4.2%) 95% CI: (2.4, 6.3) were positive for *T. pallidum* antibody. None of the factors assessed were significantly associated with of seroprevalence of syphilis (p>0.05) (Table **3**).

Table 3. Factors associated with seroprevalence of syphilis among Female Sex Workers at Hawassa, Ethiopia, July 5 to November

Variables		T. pallidum antibody test result		COR (95% CI)	p-value
		Positive n (%)	Negative n (%)		
Marital status	Married	1 (9.1)	10 (90.9)	1	1
	Single	11 (3.8)	278 (96.2)	2.5(0.29-21.6)	0.39
	Widowed	1 (2.7)	36 (97.3)	3.6(0.21-62.7)	0.38
	Divorced	3 (6.8)	41 (93.2)	1.4(0.13-14.6)	0.79
Educational status	No formal education	2 (2.7)	73 (97.3)	1.8(0.39-7.89)	0.47
	Formal education	14 (4.6)	292 (95.4)	1	
Place of residence	Rural	6 (4.3)	133 (95.7)	0.9(0.34-2.7)	0.9
	Urban	10 (4.1)	232 (95.9)	1	1
Do you use condom	Yes	15 (4.1)	352 (95.9)	1	1
	No	1 (7.1)	13 (92.9)	0.5(0.07-4.52)	0.51
How often do you use condom	Always	12 (3.8)	303 (96.2)	1	1
	Sometimes	3 (5.5)	52 (94.5)	0.69(0.19-2.52)	0.57
	Rarely	1 (9.1)	10 (90.9)	0.39(0.05-3.35)	0.39
Reason for not using condom regularly	To satisfy customer	2 (10.5)	17 (89.5)		
	To get more money	2 (4.8)	40 (95.2)		
	Negligence	-	8 (100)		
Use of stimulant	Yes	11 (4.6)	230 (95.4)	1.24(0.42-3.66)	0.69
	No	5 (3.7)	130 (96.3)	1	1
History of genital ulcer	Yes	5 (5.1)	94 (94.9)	1.3(0.44-3.87)	0.63
	No	11 (3.9)	271 (96.1)	1	1
Steady partner	Yes	5 (4.9)	98 (95.1)	1	1
	No	11 (4)	267 (96)	0.81(0.27-2.38)	0.69
Place of sex	Hotel	9 (5.2)	163 (94.8)		
	Street	5 (3.1)	155 (96.9)		
	Home	2 (4.2)	46 (95.8)		
	Any place	-	1 (100)		

DISCUSSION

Female Sex workers are prone to syphilis, one of the sexually transmitted diseases, as compared to the general population because of the nature of their work. The seroprevalence of syphilis among FSW identified in this study was 4.2% which is in line with a report from Burkina Faso (5.6%) [18]. In contrast to our study, high prevalence of syphilis among FSWs was reported from several countries such as Addis Ababa Ethiopia (52.4%) [10], Argentina (45.7%) [19], Rwanda (51.1%) [20], Brazil (14%) [21], China (7.5-8.8%) [22]. The finding of the current study is higher than the study conducted in Togo (2.2%, 0.8%) [23, 24]. The difference observed could be due to the study design, laboratory methods used and period with an earlier study reporting higher prevalence than recent studies. [25]. The other reasons are laboratory methods used and sample size used.

Relatively, the prevalence of syphilis is well studied among blood donors and pregnant women in Ethiopia. The prevalence of syphilis detected in this study is in line with the prevalence of syphilis reported among blood donors [13, 14] and HIV/AIDS patients [15, 16] reported from Ethiopia. Our finding is low compared to the previous reports of syphilis among FSWs from Ethiopia [10]; however, it is difficult to make a substantial comment on the status of our finding whether it is high or low since there are no similar studies from Ethiopia. We noted the importance of addressing the magnitude of syphilis among FSWs at a large scale in Ethiopia. Even though none of the factors assessed were significantly associated with the prevalence of syphilis, the high prevalence was noted among those who place sexual activity was a hotel, those who had a genital ulcer, and those who did not use condoms. The absence of association could be due to a small sample or a limitation of quantitative study. Future qualitative studies will possibly identify the protective and/ or exposing risk factors to the high-risk population like FCSW to Syphilis.

Limitations of the study*:* There are limited studies to compare our findings with others. the study carries a risk to recall bias and some sensitive information may not be revealed by participants. the design of the study and. The low power of the study was additional limitation of the study.

Strength of the study*:* In this study, we tried to assess the magnitude of syphilis among segments of the population who are prone to sexually transmitted diseases

Conclusions

Syphilis is one of the public health important diseases in Ethiopia. In this study, a relatively low seroprevalence of syphilis was found among FSWs in Hawassa. None of the factors were significantly associated with the seroprevalence of syphilis. Large-scale studies incorporating mixed methods will yield not only the prevalence but the determinants for the low prevalence in High- risk populations.

Abbreviations

FSW: Female Sex Worker, HIV/AIDS: Human Immuno Deficiency Virus/Acquired Immuno Deficiency Syndrome, WHO: World Health Organization, RPR: Rapid Plasma Reagin, ISHDO: integrated service on health and development organization

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Competing interests

The authors declare that this manuscript was approved by all authors in its current form and that no competing interest exists.

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PATTERNS OF CARDIOVASCULAR DISEASES AMONG CARDIAC DISEASE SUSPECTED PATIENTS IN BAHIR DAR CITY, ETHIOPIA

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ABSTRACT

Background: *Rheumatic heart disease (RHD) has remained a substantial public health challenge in low and middle-income countries. We aimed to determine the prevalence and associated factors of RHD among patients who received echocardiographic examinations.*

Methods: *A total of 849 patients who underwent echocardiography examinations were included in the study. Descriptive statistics and logistic regression analysis were performed. The odds ratio with 95% confidence interval, and p-values were used to determine the presence of associations.*

Results*: A total of 849 cardiac disease suspected cases were included in the analysis, of which 406 (47.8%) had a definite cardiac disorder. RHD is responsible for 76(18.2%) of the total cardiovascular disorders. The prevalence of RHD was 76(9.0%) among the total study population. The sex and age of the patients showed associations with rheumatic heart disease. The odds of having RHD among females was nearly three times that of male counterparts (AOR= 2.9, 95%CI: 1.6-5.4). Besides, the odds of having RHD among younger than 24, and from 25 to 35 was seventeen times that of respondents older than 50 years of age (AOR=17.2, 95%CI: 7.2-41.5, & AOR= 17.1, 95%CI: 7.3-40.0) respectively.*

Conclusions*: One-half of the cardiac disease suspected individuals had a definite cardiac disease, and RHD accounted for 18.2% of the total cardiac diseases. Younger age and female in gender were associated with greater likelihood of having RHD. Therefore, interventions should be tailored to the magnitude of the problem; females and younger age groups should be the focus of concern.*

Keywords*: Cardiac disease, Rheumatic heart disease, Echocardiography, Ethiopia*

INTRODUCTION

Cardiovascular diseases (CVDs) are a group of disorders of the heart and blood vessels. Rheumatic heart disease(RHD) is one of the CVDs that result in damage to the heart muscle and valves from rheumatic fever caused by streptococcal bacteria(1). Cardiovascular diseases (CVDs) are the leading cause of death globally; evidence shows that more people die annually from CVDs than from any other cause. Nearly, 17.9 million people died from CVDs in 2016, representing 31% of all global deaths. Over three-quarters of CVD deaths take place in low- and middle-income countries (1, 2).

RHD remains an important public health challenge across the globe; it accounts for more than 15.6 million cases worldwide each year, however, low and middle-income countries are disproportionately affected (3, 4). The disease persists in all countries of WHO regions, however, the African, South-East Asia, and Western Pacific regions are the worst affected, accounting for 84% of all prevalent cases and 80% of all estimated deaths due to RHD(5).

According to health institution level studies conducted in Africa, RHD is the main cause of heart failure and is responsible for more than 34.0% of cardiovascular disease-related hospital admissions (6, 7). RHD mostly affects the population in low and middle-income countries, particularly; where poverty is widespread. RHD commonly affects children and can result in life-long disability or death. Effective early intervention can prevent premature mortality from RHD(4, 8).

A country like Ethiopia, whose economy is very weak, and the population living standard is very low, and more than 30% of the population living below the national poverty line bears the highest potential risk of communicable diseases including RHD (9). In addition, as RHD is more common in

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young age, and Ethiopia is a country of young population with over 70 percent of the total population is below the age of 30, and about 45 percent of the population is below 15 years of age, as a consequence, the country pertains highest potential risk of RHD, and other cardiovascular diseases (10, 11). However, studies conducted on cardiovascular disease including RHD are very scarce.

Therefore, this study aimed to determine the pattern of RHD among patients suspected of heart disease and who underwent echocardiography examinations. Furthermore, our study aims to produce hypotheses for future study directions and to have some insight into the contributing factors for RHD.

METHOD AND MATERIALS

Study design and setting: a cross-sectional study design was used among patients visiting cardiac clinics from October 1, 2019 to October 1, 2020. The study was conducted in two hospitals (Felege Hiwot Referral and Addinas General) hospitals. The hospitals are found in Bahir Dar City, located at 560 km distance from Addis Ababa, the capital city of Ethiopia. These hospitals are a few of the health institutions that provide cardiovascular disease examinations and interventions in the city. Patients suspected of a cardiac problem from different health institutions and nearby regions are commonly referred to these hospitals for diagnosis and intervention.

Echocardiographic examination was performed in the parasternal long axis, short axis, apical four chambers, and occasionally in the subcostal and suprasternal views using GE and Sonoscape echocardiography machines at Adinas & Felege Hiwot hospitals. Indices were analyzed and presented in the left ventricle systolic diameter (LVIDS), left ventricle diastolic diameter (LVIDD), and the ejection fraction (EF). All the echocardiographic diagnoses were based the American Society of Echocardiogram and World Heart Federation guidelines (12, 13).

Study period: we included patients who received echocardiographic examinations from October 1, 2019, to October 1, 2020) and the data was collected from June 15, to May 10, 2021.

Sample size and sampling technique

All patients for whom echocardiography diagnostic tests were carried out in the two hospitals during the selected one-year period were included in this study. A total of 849 cardiac disease suspected patients were included in our final analysis. As eligibility criteria, our analysis considered only the first echocardiographic examination reports of each patient in the study.

Study variables

Both hospitals use cardiac disease examination tools consisting of age, the gender of the patients, and the echocardiographic diagnosis.

Rheumatic heart disease, is the outcome variable of interest for this study, and age, and gender were independent factors available on the charts and used for this study.

Other cardiac disorders: ischemic heart disease, hypertensive heart disease, Pericardial Effusion, Dilated Cardiomyopathy (DCMP), Degenerative valvular heart diseases (DVHD), Cor-plumonale, pulmonary hypertension, etc

Operational definitions

RHD: According to the World Heart Federation (WHF) criteria for echocardiographic diagnosis of ***RHD*** as defined by the presence of any evidence of mitral or aortic regurgitation seen in two planes associated with at least two of the following morphologic abnormalities of the regurgitating valve: restricted leaflet motility, focal or generalized valvular thickening, and abnormal sub-valvular thickening (13).

Ischemic heart disease: were documented by detection of regional wall motion abnormality on a different region of the heart (such as loss systolic thickening, hypokinesia, akinesia dyskinesia) and associated with LV systolic dysfunction(14).

Hypertensive heart disease: was diagnosed in the presence of any or combination of the following abnormalities: left ventricular diastolic dysfunction (e.g. altered E: A ratio), left ventricular hypertrophy, left ventricular systolic dysfunction, and dilated left atrium, a surrogate of impaired LV filling in the presence of hypertension(15).

Pericardial Effusion: This was diagnosed when there is echo-free space between the visceral and parietal pericardium(16).

Dilated Cardiomyopathy (DCMP),: was diagnosed when there are dilated heart chambers with normal or decreased wall chambers as well as impaired LV systolic function(17).

Cor-plumonale: was present when there is dilated and hypertrophied right ventricle (RV), evidence of increased RV systolic pressure D-shaped LV in diastole (diastolic flattening of the LV septum) (18).

Data management and analysis

The data received from the hospitals were entered into SPSS software version 26 for analysis. Data cleaning was performed to make it ready for analysis. Then after descriptive statistics such as frequency distributions, percentages for categorical variables, and median, and interquartile range for the continuous variable were performed. Logistic regression analysis between rheumatic heart disease, and demographic factors (sex and age) were performed to see the crude effect of these factors on rheumatic heart disease. The results were presented in tables, and figures for the descriptive study, and odds ratio with its 95% confidence level and p-values were used for the logistic regression analysis.

Ethical approval

Ethical clearance was obtained from the research and the ethical review committee of Bahir Dar University. Permissions were received from Felege Hiwot Referral Hospital and Addinas General Hospital to use the echocardiography data from the cardiac unit. The data were anonymous; there are no names or any personal identifier in the data.

RESULTS

Demographic characteristics of patients visiting cardiac clinics in Bahir Dar city

This study analyzed a total of 849 patients suspected of having cardiac disorder for which echocardiography examinations were done. About 55% of the study participants were males, and 44% were younger than 49 years of age. The ages of the respondents were varied between 6 and 103 years, the median and interquartile range for the ages was 52, and 34.6 years respectively. This study was conducted in two hospitals, 490 (57.7%) of the cases were from Addinas hospital, and the remainings were from FelgeHiwot hospital (table 1).

Table 1: Demographic characteristics of patients suspected of cardiac disease in Bahir Dar city

Variable	Categories	frequency	Percent	Chi-square
Sex	Male	377	44.4	20.6
	Female	472	55.6	
Age in years	<24	113	13.3	85.6
	25-35	137	16.1	
	36-49	125	14.7	
	>49	474	55.8	
Hospital	Addinas	490	57.7	0.2
	Felege Hiwot	359	42.3	

Cardiac diseases distribution among patients underwent echocardiography examinations in Bahir Dar city

Out of 849 individuals with health problems that underwent echocardiography diagnosis 406 (47.2%) had a definite cardiac disease. The prevalence of RHD was 76 (9.0%); it accounts for 18.2% of the total cases of revealed that the prevalence of hypertensive heart disease (HHD) was 80(9.4%), ischemic heart disease (IHD) was 59(6.9%), degenerative valvular heart disease (DVHD) was 63(7.4%), and dilated cardiomyopathy (DCMP) was, 56(6.6%) (Table 2).

Table 2: Diagnostic classifications of cardiac patients using Transthoracic Echocardiography Examinations in Bahir Dar city

Cardiac diseases	Frequency	Percentage
Hypertensive Heart Disease (HHD)		
Yes	80	9.4
No	769	90.6
Rheumatic Heart Disease (RHD)		
Yes	76	9
NO	773	91
Degenerative Valvular Heart diseases (DVHD)	63	7.4
Yes	786	92.6
No		
Ischemic Heart Disease (IHD)		
Yes	59	6.9
No	790	93.1
Dilated Cardiomyopathy (DCMP)		
Yes	56	6.6
No	793	93.4
Pericardial Effusion (PE)		
Yes	43	5.1
No	806	94.9
Co-pulumonale		
Yes	36	4.2
No	813	95.8
Restrictive cardiomyopathy (RCM)		
Yes	14	98.4
No	835	1.6
Congenital heart disease (CHD)		
Yes	6	0.7
No	843	99.3
Overall Cardiac disease		
Yes	406	47.8
No	443	52.2

Echocardiographic diagnostic classifications by gender among cardiac patients in Bahir Dar city

Gender distributions of cardiac diseases indicated that rheumatic heart disease was much higher among females compared to males of the total confirmed cardiac cases (61 vs. 15) p-value (<0.001), ischemic heart disease is higher for males than females (36, vs. 23) p-value (<0.008), and similarly dilated cardiomyopathy was higher for males compared to females (33 vs. 23) p-value (0.02) (table 3).

Table 3: Echocardiographic diagnostic classifications by gender in cardiac patients in Bahir Dar City

Disease	Male, n	Female, n	Total (%)	Chi square	P-value
HHD	42	38	80(19.7)	2.3	0.12
RHD	15	61	76(18.7)	20.6	<0.001
DVHD	30	33	63(15.5)	0.7	0.4
IHD	36	23	59(14.5)	7.1	0.008
DCMP	33	23	56(13.8)	5.1	0.02
PE	22	21	43(10.6)	0.84	0.36
Co-pulumonale	13	23	36(8.9)	1.1	0.31
RCM	6	8	14(3.5)	0.01	0.9
CHD	1	5	6(1.5)	1.9	0.2
Any cardiac disease	183	223	406(47.8%)	0.5	0.7

Valvular lesions among RHD patients in Bahir Dar city

Our study showed that 58 (7.5%) and 199 (23.4%) of the study participants had mitral stenosis and regurgitations respectively. In addition, 29(3.4%) and 104(12.2%) of the study participants had aortic stenosis and regurgitations respectively. About 56(96.6%) of the total patients with mitral stenosis and 54(27.1%) of mitral regurgitations were positive for RHD. Besides, one out of four patients with aortic stenosis and one in three patients with aortic regurgitations were positive for RHD.

The findings of this study also indicated that some cardiac patients reported having more than one valvular lesion. More specifically, the distribution of RHD among cardiac patients with more than one lesion varies based on the kind of valvular lesion combined; 38(86.4%) cases with MS and MR, 7(35%) with AS and AR were positive for RHD (Table 4).

Table 5: The frequency distributions & percentages of Valvular lesions based on severity among patients who underwent echocardiographic examinations in Bahir Dar city

Valvular lesions	Severity			RHD (N=76)
	Mild	Moderate	Severe	
Mitral stenosis (n=58)	17(26.6%)	11(17.2%)	30(56.3%)	58(76.3%)
Mitral regurgitation (n=199)	123(61.8%)	53(26.6%)	23(11.6%)	54(71.7%)
Aortic stenosis (n=29)	15(51.7%)	10(34.5%)	4(13.7%)	8(10.5%)
Aortic regurgitation (n=104)	79(75.2%)	21(20%)	4(3.8%)	34(44.7%)

Regression analysis of rheumatic heart disease by sex and age among patients underwent echocardiography examinations

This study is based on echocardiographic diagnostic tests in patients suspected of cardiac disease. Our data contain only sex and age as potential confounding factors that entered both in bivariate and multivariate regression analysis. Both the sex and age of the patients showed associations with RHD. The study revealed that females were more likely to be positive for RHD, where the odds of having a positive diagnosis for RHD among females was nearly three times that for male patients (AOR= 2.9, 95%CI: 1.6-5.4). Similarly, the age of the respondents was showed strong associations with RHD; the odds of disease were significantly higher among the young age group than older ones. The odds of RHD among respondents whose age was 35 years or younger was seventeen times that of respondents older than 50 years of age (table 6).

Table 6: Regression analysis of rheumatic heart disease for sex and age among patients who underwent echocardiography examinations in Bahir Dar city

Variable	Classifications	RHD		OR (95% CI for OR)		P-value
		Yes	No	Crude	Adjusted	
Sex	Male Female	15 61	362 411	1.00 3.58(2.01-6.41	1.00 2.9(1.6-5.4)	0.001
Age in years	<24 25-35 36-49 >49	24 31 14 7	89 106 111 467	18(7.5-43.0) 19.5(8.4-45.5) 8.4(3.3-21.3) 1.00	17.2(7.2-41.5) 17.1(7.3-40.0) 7.5(3.0-19.2) 1.00	<0.001

Discussions

Current evidence shows that CVDs are the leading causes of death globally. Low and middle-income countries are disproportionately affected by the disease, where over 80% of these deaths take place (2, 19). However, there is a limited number of studies available to show the burden, distribution, and determinant factors for CVDs including RHD in low-income countries. Therefore, this study was aimed to determine the prevalence and the associated factors of RHD among cardiac disease suspected patients.
Accordingly, 406 (47.8%) of patients who underwent echocardiographic examinations reported having a definite cardiac disease. Our finding is supported by a study conducted in Buea, South West Region of Cameroon, where 45.2% of patients who had undergone echocardiographic tests had a definite CVS (20). In the current study, nearly one in ten patients (9.0%) of the study participants that received echocardiographic tests were positive for RHD. This finding is in accordance with a study conducted by Nigerian savannah, where 9.8% of the study subjects with abnormal results had an echocardiographic diagnosis of RHD (21). However, the magnitude of RHD in the current study is much higher than other studies, where the proportion of RHD lies in the ranges of 3.1% to 6.5% (20, 22, 23). The difference may be attributed to several reasons such as variations in socioeconomic status, gender ratio, and age composition in the study population. In addition, our study domain was patients suspected of cardiac disease and who visited cardiac treatment centers seeking interventions; this might increase the magnitude of RHD in our study population unlike similar studies conducted among apparently healthy individuals.

In this study, of the cardiac patients with mitral stenosis, 56(96.6%) were positive for RHD. This is supported by the evidence that most mitral stenosis cases among cardiac patients are caused by RHD (24). Likewise, studies conducted so far revealed that in most of the cases, cardiac patients with mitral stenosis were positive for RHD (25, 26). Our findings also showed that nearly, 30% of patients who reported having mitral regurgitations were positive for RHD. This finding is in line with similar other study findings where the RHD manifests as congestive heart failure due to valvular involvement including mitral valve regurgitations (27, 28). In this study, the prevalence of RHD was significantly higher among females compared to males, 61(80%) vs. 15(20%) respectively. Furthermore, the odds of having RHD among the female was about three times more likely as compared to their male counterparts in patients suspected of cardiac diseases. This finding is supported by several

pieces of evidence, where the female sex is at higher risk of acquiring RHD compared to males. A review study conducted on the impacts of gender on RHD, all review articles included were showed that a female predominance for RHD (29).
Similarly, a study conducted in India showed that the prevalence of RHD was more than two-fold higher in females than males (71.4% vs. 29.6%) (30). Besides, several studies across the globe indicated that the risk of RHD varies for women and men (31-33).
The age of the respondents showed a strong association with RHD; the disease was significantly higher among the young age group than older ones. The odds of RHD among respondents younger than 35 years of age was more than seventeen times that of older than 50 years of age. Evidence showed that virtually anyone at any age can get RHD; however, the risk is highest among children and young adults (34-36). Our finding is supported by the evidence from other studies that RHD is more prevalent among young age than older ones; a study conducted in Fiji Oceania among participants between the ages of 5 to 65 years, almost half of RHD cases occurred before age 40 years (37). Similarly, several studies conducted across the globe indicated that the risks of RHD inversely correlated with age, showing that as the age of study participants increases the risk of RHD decreases (8, 36, 38).

This study was conducted merely based on echocardiographic examinations done for cardiac disease suspected patients. The data was primarily collected for the purpose of diagnosis and intervention. Our study has drawbacks in terms of controlling confounding factors for RHD, because the data composed of only sex and age as confounding factors; the remaining data is all about clinical information such as sign, symptom, specific diagnosis of cardiac diseases, and intervention plan.

Conclusion

In this study, one in ten cardiac suspected cases were positive for RHD. Males and females with the cardiac disorder have different risk profiles for rheumatic heart disease that might have a substantial impact on the prognosis and treatment outcomes. The odds of RHD among the females is three times that of males. In addition, the odds of RHD inversely decreases with age, the young age groups were at a higher risk of getting the disease compared to older ones. In general, RHD is substantially higher in this study compared to several studies available, indicating that it is an important public health challenge to our community. Therefore, interventions should be tailor the magnitude of the problem, and should also target females and young age groups.

Competing interests

The authors declare that they have no competing interests.

Authors' contribution

HB and ZAA- conceptualized the study, designed the study, performed data analysis, interpreted the findings, and drafted the manuscript.
MA, YK, AG, YA…and GTW - critically reviewed the report and manuscript.
All authors read and approved the final version of the manuscript.

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PREVALENCE AND ETIOLOGY OF AMBLYOPIA AMONG PRIMARY SCHOOL CHILDREN IN WOLLISO TOWN: SOUTH WEST SHEWA ZONE, ETHIOPIA.

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ABSTRACT

Background: *Amblyopia is a unilateral or bilateral condition which results in visual reduction whilst the eye seems to be healthy. The main purpose of this study was to determine the prevalence and etiology of amblyopia in school children.*
Methods*: A school based prospective cross-sectional study design was employed. A total of 1,226 school children aged between 7 and 15 years were screened. Best corrected visual acuity and detailed ophthalmic evaluation were performed in all participants. A diagnosis of amblyopia was based on a best-corrected visual acuity of 6/12 or less in one or both eyes, or a bilateral difference of at least two best- corrected visual acuity lines.*
Results: *Prevalence of amblyopia was 5.14 % (95% CI: 3.9%-6.4%) and the majority of them were from public schools (82.5%). There was statistical association between students from public school and amblyopia (p=0.003). A total of 44 (41.9%) children had severe amblyopia. Underlying amblyogenic causes were anisometropia (49.2%), isometropia (36.5%), sensory deprivation (11.1%) and strabismus (3.2%).*
Conclusion*: In this study, the prevalence of amblyopia among school children was 5.14%.*
Refractive error is a major risk factor for amblyopia. We found significant statistical difference in amblyopia prevalence between public and private school children.
Key words: *Amblyopia, cross-sectional study, prevalence, refractive error, school children*

INTRODUCTION

Amblyopia is a unilateral or, less commonly, bilateral reduction in corrected visual acuity in the absence of visible organic abnormalities and is due to misdirected, blurred, or absent retinal images during development of the visual system (1). It is the second leading cause of bilateral visual impairment in children after refractive errors, and has been reported as the leading cause of unilateral visual impairment in pediatric patients (2,3).
Anisometropia, constant unilateral strabismus, bilateral isoametropia, amblyogenic unilateral or bilateral astigmatism and ocular media opacities are causes of Amblyopia (4).
The overall prevalence of amblyopia varies between 1.6 to 3.6% for preschool and school population and from 3.25% to 5.3% in clinical population in different regions of the world (5).
Amblyopia, being unilateral, commonly even severe cases may not be detected by parents or care givers (6). And failure to detect and treat amblyopia at young age, when the prognosis for successful treatment is best, leads to permanent visual impairment, adverse effects on school performance, poor fine motor skills, weak social interactions, and self –image (7). An amblyopic individual is at a significantly higher risk of becoming blind compared to an individual with normal visual acuity and individuals with childhood-onset unilateral amblyopia have a greater lifetime risk of eventual bilateral visual impairment and age-related macular degeneration (8).
There are very few studies focused on amblyopia from sub-Saharan Africa countries. The prevalence of amblyopia among school children in Ghana and Nigeria were 9.9%, and 0.3% respectively. And anisometropia was the major amblyogenic factor in these studies (9, 10).
Understanding the prevalence, burden and pattern of Amblyopia is important for adequate healthcare planning in an effort to establish a routine school eye screening. In Ethiopia there is paucity of published data on prevalence and pattern of amblyopia. Hence, this study was conducted to estimate the prevalence and determine the causes of amblyopia among children aged 7-15 years in Wolliso town, Southwest Ethiopia.

SUBJECTS AND METHODS

This school based cross- sectional study was carried out in May 2018 in Wolliso town, Southwest Ethiopia. For this research purpose public schools were defined as schools supported by either public or government funds and whereas private schools were defined as schools run and supported by private individuals or a corporation.
The department of Ophthalmology of Addis Ababa University's Institutional Review Boards gave approval for the research and informed written consent was obtained from parents and/or legally authorized representatives of the study participants.

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Requisition letters were sent to all the selected schools seeking permission from the respective school heads. All study procedures adhered to the principles outlined in the Declaration of Helsinki for human subject research. Those children with visual impairment were referred to the nearby hospital and managed accordingly.

Using Leslie-Kish formula a sample size of 1226 was calculated (11) and 4 schools (2 publics and 2 private) were selected using a random cluster sampling method. A multistage random sampling technique was used in recruiting the students, aged range from 7-15 years, in each grade level/class using the class registers as the sampling frame.

Pre –survey trainings were conducted to the research team to familiarize themselves with the standard operating procedures involved in the study. The first step of the study was screening of the students within the school compound. A large room inside the school premises was selected for the screening program. Monocular distance visual acuity was tested using a logarithm of minimum angle of resolution (logMAR) chart. Step 2 was conducted at the nearby hospital. The parents/guardians of students whose Best Corrected Visual Acuity (BCVA) worse than or equal to 6/12 (or ≤ 6/12) in at least one eye, in absence of any organic lesion according to Amblyopia Treatment Studies (12), were requested to bring their children to the nearby, Saint Lukas hospital, for further evaluation. In the outpatient department, a detailed history about past and present ocular problems and treatments was obtained from the parents by the principal investigator of the study. Distance visual acuity was re-checked using the Snellen's chart. Assessment of ocular alignment, ocular motility and associated deviation, and slit lamp examination for the assessment of any anterior segment pathology was performed. A detailed fundus examination was done with 90D lens to rule out any posterior segment pathology.

Cycloplegic refraction by streak retinoscope was performed after pupillary dilation using 1% cyclopentolate eye drops.

Operational DefinitionFor the purpose of this study , amblyopia was defined as BCVA ≤ 6/12 the affected eye without any underlying structural abnormality of the visual pathway, a 2-line difference between the two eyes, and the presence of an amblyogenic factor. The severity of amblyopia was further graded into mild (BCVA 6/12-6/18), moderate (BCVA 6/18–6/36) and severe (BCVA <6/36) (12). Standard definitions for various types of amblyopia were used for diagnosis (12). Bilateral amblyopia was defined as best VA in both eyes ≤ 6/12.

Anisometropic amblyopia includes patients who had amblyopia in the presence of anisometropia that is 1.5 D or greater in spherical equivalent, or a 1.5 D or greater difference in astigmatism between the eyes in the absence of any measurable heterotropia at distance or near.

Strabismic amblyopia included that due to conflicting visual inputs between the eyes due to squint. Combined amblyopia includes either patients with a heterotropia at distance or near along with anisometropia of 1.5D or more in spherical equivalent or a 1.5 D or more difference in astigmatism in any meridian between the eyes. (5, 12)

Data generated were collected using a structured data collection form, and statistical analysis was done using SPSS 21.0 version (SAS Institute, Cary, NC 2010) software. Statistical association between categorical variables was computed using Fisher's exact test and Pearson chi-square ($\chi 2$) test. P < 0. 05 was considered statistically significant.

RESULTS

In total, we screened 1,226 children of which 63 (5.14 %; 95% CI: 3.9%-6.4%) were found to have amblyopia. No student was reported to have been treated for amblyopia previously. The mean age of children with amblyopia was 10.45± 2.09 years with age range between 7 to 15 years. Almost half amblyopic children 30 (47.6 %) were between 10-12 years old (Table 1).

TABLES AND FIGURES

Table 1: Age at presentation and gender distribution of amblyopia among school children at Wolliso town, Southwest Ethiopia, May 2018.

	Sex		
	Male N (%)	Female N (%)	Total N (%)
Age			
7-9	5 (7.9)	9 (14.3)	14 (22.2)
10-12	11(17.5)	19 (30.1)	30 (47.6)
13-15	8 (12.7)	11(17.5)	19(30.2)
School			
Public	20 (31.7)	32 (50.8)	52 (82.5)
Private	4 (6.4)	7 (11.1)	11 (17.5)
Total	24 (38.1)	39 (61.9)	63 (100%)

Thirty-nine of the subjects, 61.9% were female. There was no significant difference in amblyopia prevalence between males and females (P = 0.367).

Fifty-two (82.5%) subjects with amblyopia were from public schools (Table 1). There was statistical association between students from public school and amblyopia. (p=0.003).

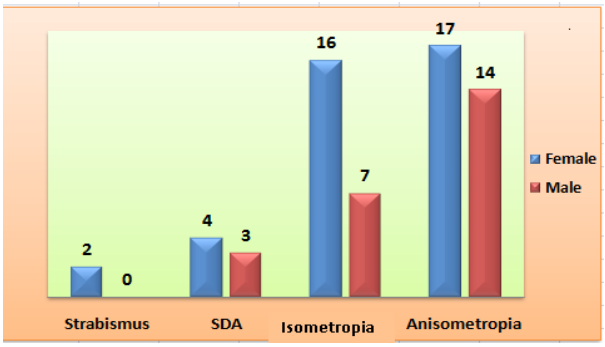
From 63 children identified as amblyopic, 42(66.67 %) had bilateral and 21 (33.33 %) had unilateral amblyopia. Hence a total number of 105 amblyopic eyes of 63 children were studied. Among unilateral amblyopic children 9 had in the right and 12 had in the left eye as shown in table 2.

Table 2: Laterality and causes of amblyopia among school children at Wolliso town, Southwest Ethiopia, May 2018.

FIGURE 1: Distribution of amblyogenic factors with gender among school children , May 2018, Wolliso Town, Southwest Ethiopia.

Anisometropic amblyopia and isometropic amblyopia were the commonest types of amblyopia accounting 31 (49.2%) and 23(36.5%) of the subjects respectively

	Sex		Total N (%)
	Male N (%)	Female N (%)	
Laterality			
Right Eye	2 (3.2)	7 (11.1)	9 (14.3)
Left Eye	6 (9.5)	6 (9.5)	12 (19)
Both Eyes	16 (25.4)	26 (41.3)	42 (66.7)
Cause			
Anisometropic	14 (22.2)	17 (27)	31 (49.2)
Isometropic	16 (25.4)	7 (11.1)	23 (36.5)
Sensory Derivational	3 (4.8)	4 (6.3)	7 (11.1)
Strabismus	2 (3.2)	0 (0)	2 (3.2)



(Fig 1). For both anisometropic and isometropic amblyopia, myopia was the commonest type of refractive error, contributing 43 (80%) of the subjects.

From seven sensory derivational amblyopia five had unilateral, one had bilateral corneal opacity and one had ptosis. Both Strabismic cases were exotropia.

As far as the severity of amblyopia is concerned, mild amblyopia was seen in 39(37.14 %), moderate amblyopia in 22(20.95%), and severe in 44(41.90%). Relatively severe amblyopia was higher than mild and moderate as shown in table 3. Majority of severe amblyopia patients had sensory derivational amblyopia. Severity of amblyopia was statistically associated with derivational amblyopia (p= 0.013). All the types of amblyopia were significantly more common in the public school students (P = 0.016).

DISCUSSION:

Amblyopia is the most common cause of monocular vision loss in children with an estimated prevalence of 1.6 to 3.6% (1). Early diagnosis and treatment of amblyopia result in better outcomes (13). In this population-based study, we reported the prevalence and pattern of amblyopia among school children aged 7–15 years at Wolliso town, Southwest Ethiopia.

Prevalence of amblyopia varies due to different age-group of studied populations and different factors prevailing in that region, like literacy rate, frequency of visual screening programmes and geographical factors. Accordingly, the prevalence of amblyopia worldwide varies. In a multi-ethnic pediatric eye disease study (MEPEDS) conducted on African-Americans and Hispanics, amblyopia was detected in 2.6% of Hispanic/Latino children and 1.5% of African-American children (14). A study from Iran (2010) reported the prevalence of amblyopia was 2.32 in boys and 2.26% in girls (8). The criteria for diagnosis of amblyopia are almost the same in these studies. Prevalence of amblyopia among African countries varies from 0.3 to 9.1% (9, 10, 15).

The sampled population, study design (clinical/ population based), the criteria used to define amblyopia and location could account for the difference in these studies. With similar study design with ours, a cross-sectional study in Indian school children aged between 5 and 15 years showed that the prevalence of amblyopia was 1.1% (16). The results of these studies is very low compared to our study. The higher prevalence of amblyopia in the Ethiopian studies might be due to poor awareness amongst general population on importance of visual assessment and lack of regular school screening programs nation wide and limited knowledge on the conditions by guardians.

We found no significant difference in the prevalence of amblyopia between different age groups. These finding is comparable with many other studies in children and adults, where these studies have shown no increase or decrease in the prevalence of amblyopia with age (17,18). Most studies, like ours, have reported that the difference in the prevalence of amblyopia is not significant for sex and the difference mostly results from sampling errors or differences in the response rate and participation of women and men in screening programs (6,19).

Our findings showed a higher prevalence of amblyopia in females than males which is also in line with studies from other countries (20, 21). Gender biases in eye health service delivery might be a reason for such difference in female students.

Two third of the cases in this study had bilateral amblyopia, which is quite different from other studies made by Fu et al (5), (66.7%) and Chia et al. (3) (69.7%) . Bilateral amblyopia is predominant because isometropic amblyopia is common causes of amblyopia in our study.

The results of our study showed that the prevalence of amblyopia was 4 times higher in public school participants as compared with those with private school children. It is obvious parents with better socioeconomic status send their children to private schools. And higher socioeconomic status in parents/ guardians have a direct positive effect on use of effective health care services, leading to a decrease in the prevalence of visual disorders, including amblyopia (22).

The main cause of amblyopia varies between studies, depending on how the amblyopia is defined and the characteristics of the study sample. The type of amblyopia seen in different aspect countries also varies. Our findings showed nearly half, 49.2%, of the amblyopic cases had anisometropic amblyopia and 36.5% had isometropic amblyopia. Hence, in this study the amblyopia caused by the refractive error was 85.7 %, which was comparable with a report from china , (85.2%), (18)' and India (86.9%) (23). In the present study, the prevalence of strabismus was 3.17%, similar to other studies (24, 25). It is possible that Strabismic amblyopia is detected early due to the obvious deviation of eyes and therefore can be managed in a timely manner compared to other forms of amblyopia which may go undetected for a long time.

And besides lack of a school screening programs can be the reason for higher number of refractive error as a cause for amblyopia.

Limitation

Our study has some limitations. Small-angle strabismus and intermittent strabismus may have been missed given the nature of both conditions. This could have underestimated the prevalence of strabismus. The other limitation of the study is that we used a Snellen chart to measure visual acuity rather than an Early Treatment Diabetic Retinopathy Study chart, so the impact of ''the crowding effect'' could not be measured. Consequently, some children with mild amblyopia may have been missed, while others with more severe amblyopia may have been misclassified as having moderate amblyopia.

Conclusions

The result of this study showed that the prevalence of amblyopia among school children in Wolliso town, Southwest Ethiopia was higher than other Sub Saharan African countries. The lack of a regular vision screening program in the study area could be considered as the main causes for late diagnosis of amblyopia. Therefore, a regular school based vision screening initiatives program is recommended.

Competing *interest*

The authors declare that this manuscript was approved in its form and that no competing interest exists.

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Ezeala-Adikaibe Birinus A, Onodugo Obinna D, Oti Bibiana, Ekochin Fintan, Nwazor Ernest, Okoye Innocent, Mbadiwe Nkeiruka C, Orah-Chidimma Okpala, Onodugo Pascaline *Ethiop Med J, 2022, Vol. 60 No. 1*

ORIGINAL ARTICLE

CAREGIVER REPORTED INCIDENCE OF STATUS EPILEPTICUS IN PERSONS WITH EPILEPSY IN ENUGU, SOUTHEAST NIGERIA.

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ABSTRACT

Background: *Status epilepticus is a neurological emergency which may occur in people with epilepsy. Ascertaining the incidence of status epilepticus in the community is wrought with many challenges and few reports exist in sub–Saharan Africa, a region with a high burden of epilepsy.*
Objective: *The aim of this study was to describe reported incidence of status epilepticus among epilepsy patients attending neurology outpatient clinic in Enugu.*
Methods: *This was cross-sectional study carried out in the medical out-patient clinics in Enugu Nigeria. Data were collected using a semi-structured questionnaire. Informants were patients and their caregivers. Status epilepticus defined as seizures based on International League Against Epilepsy criteria.*
Results: *Data of 154 patients were reviewed and analysed. A total of 56(36.4%) confirmed that they had experienced seizures that could be described as status epilepticus (males (36.3%) and females (36.5%)). P=0.98. About 54.5% of those with stroke and 47.9% of patients who had cluster seizures reported a history of status epilepticus. Factors that correlated with having status epilepticus were history of cluster seizures, family history of epilepsy and having no past history of seizure related admissions.*
Conclusions: *The reported incidence of status epilepticus among epilepsy patients attending tertiary hospital clinics in Enugu is high. Factors that may account for this includes, non-adherence, or greater seizure severity. Careful patient education will improve emergency management of epilepsy to reduce the morbidity related to epilepsy in the community.*
Keywords*: Status Epilepticus, Cluster seizures, Epilepsy, Nigeria.*

INTRODUCTION

Status epilepticus (SE) is a neurological emergency which may occur in people with epilepsy (PWE) as well as in those without epilepsy. It is associated with high morbidity, mortality and low quality of life thus in PWE episodes of SE have added clinical relevance (1,2). In 2015, the International League Against Epilepsy defined SE as a bilateral tonic–clonic activity lasting longer than 5 minutes, and absence SE and as focal SE as exceeding 10 minutes (3). Because of the time-locked definition of SE ascertaining the incidence of SE in the community is wrought with many challenges (4) thus most available studies are hospital based. In a review of population-based studies, Sanchez et all (4) reported an overall incidence of SE 9.9 to 41 per 100,000/year ranging from 3.5 to 41 per 100 000 per year. Recent studies from Europe have reported incidence rate of 36.1 to 81.1 per 100 000 per year based on the new ILAE 2015 definition of SE(5,6).

Few studies have reported on SE in Africa(7,8). Bhalla et al (7) in 2014 reported an incidence of 10.8 per 100 000 population and Kariuki et al (8) reported a prevalence rate of 2.3 per 1000. Apart from using different definitions for SE, these studies included people without epilepsy and children. Based on few available studies in SSA, SE in Africa is reported to be high in Children, hospital-based studies and PWE who are not on antiepileptic drugs (9,10). Most cases of documented SE are likely to be seizures with predominantly motor features. In Austria, the age and sex adjusted incidence of a first episode of non-convulsive SE and SE with prominent motor phenomena was 12.1 and 24 per 100 000 adults per year, respectively (5).

In Sub-Saharan Africa (SSA), risk factors for SE include infections and non-adherence to medication. In Kenya, for example, documented risk factors for SE were neurologic impairments, acute encephalopathy, previous hospitalization, and presence of antibody titers to falciparum malaria and HIV (8). Risk factors for SE and seizure clusters seizure (SC) have been reported to be similar (11,12). SE is a strong determinant of quality of life in PWE/their caregivers and the cost of treating epilepsy (1,13,14) . In SSA, SE may be treated at home and possibly in unorthodox way which may result in high morbidity and mortality.

Despite the potential for poor outcomes of SE in PWE, there is little, or no research related to the subject in Nigeria. Recognizing incidence and patterns of SE is helpful in preventing untoward consequences of SE. The aim of this study was to describe the caregiver reported frequency and pattern of SE in PWE attending neurology outpatient clinic in Enugu.

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METHODS

This was a cross-sectional descriptive study carried out in 3 major hospitals in the city of Enugu, Enugu State Nigeria. The Hospitals were the University of Nigeria Teaching Hospital, Enugu State University Teaching Hospital, and the Memfys Hospital for Neurosurgery. These three tertiary hospitals offer both secondary and tertiary epilepsy care in the city and receive patients from all parts of southeast Nigeria and beyond.

Study participants **:**The plan was to collect the data of all consecutive consenting epilepsy patients who attend the neurology clinic of these hospitals. All consecutive consenting patients accompanied by caregivers in which case the caregiver must have been an eyewitness of the seizure were included in the study. We excluded patients with possible psychogenic non-epileptic seizures and single epileptic seizures. Cases where seizure duration could not be truly determined with some level of certainty were excluded from the present analysis. Cases of incomplete data or illegible lasting less than 5 minutes were also excluded. The study period was 9 months.

Data collection tools and procedures: Data was collected using a semi-structured questionnaire. The questionnaire contained open ended and as well as multiple choice questions and consisted of three principal sections. The first section was on general information about the respondents such as age and sex and related characteristics. The second section contained questions on the age on onset of epilepsy, age of first treatment and family history. The third section was focused on clinical characteristics of seizures such as prediction of seizures, seizure triggers, duration of seizures in minutes or recurrent seizures during which the patients did not recover consciousness. The questionnaire was constructed in simple English to match the expected reading level of most persons that completed primary school (6 years of basic education). Cues to remember seizure duration were given to informants. Such cues include questions like (1) do you think that seizures lasted as long as the time you have been in this clinic? (2) did seizures last as long as it took you to get to a hospital or call for help? The study questionnaire was designed by the principal investigator and reviewed by the other authors and senior colleagues in neurology both in Enugu and outside. The mean time for filling out the questionnaire was 5 minutes. All questionnaires were filled in the English language either by the caregiver (self-administered) and sometimes with help from the investigators. Data were collected by neurology registrars, senior registrars and consultants.

Completed questionnaires were retrieved the same day. In cases where the respondent did not understand English, a translation in the local language was used. In such cases, the items on the questionnaire were read out to the respondents, and their endorsed options were ticked by the investigator. The study protocol was reviewed by the ethics committee of the Teaching Hospitals. All participants gave their informed consent after reading or having the consent form read for them.

Operational definitions: SE was defined as seizures lasting more than 5 minutes for generalized seizures and 10 minutes for focal seizures3. CS was defined as series of seizures closely grouped in time with shorter than normal inter ictal periods or as an increase over the patient's typical seizure frequency in a day or week (15). Epilepsy was defined based on the International League Against Epilepsy criteria.

Data analysis: The SPSS version 22 (IBM Corporation, New York, USA) was used for data management and statistical analysis. Data were presented in tables. The statistical methods included Mann-Whitney U test for unpaired observations and Chi-squared test for comparison of categorical data. Distribution of types of seizures was calculated as the percentage of participants. Mean and median were calculated, and values were presented as tables where applicable. In all, $p < 0.05$ was regarded as statistically significant. Conclusions were drawn at this level of significance at 95% confidence level.

RESULTS

Description of participants: Data of 154 PWE were reviewed and analysed. Males were 80(51.9%) and 74(48.1%) were females. The male to female ratio was 0.9:1. Most participants were aged 20-29 years (42.9%) with a mean age of 32.4(17.3) years. Males were older than females by almost 7 years ($p<0.0$). Other characteristics of the patients are shown in Table 1. Before presenting to the hospital 40(26%) used traditional herbal drugs while 36(23.4%) resorted to prayer as a sole means of treatment.

Seizure characteristics: Reported seizures characteristics are shown in Table 2. The mean age of onset of epilepsy in the cohort was 20.9 years (with a median of 17 years); earlier in females (14.4 years) than males 26.3 years) ($p <0.01$). The peak age of onset of epilepsy in SE was 0 to 9 years. The mean time taken from the age of onset to the age of going to the hospital was similar in both males and females. P=0.2. The 6-month seizure freedom was 9.7%. More males reported a family history of epilepsy. P=0.03. About 45.5% reported a clinical history of generalized seizures. Among those that had focal seizures clinically, 38(45.2%) could always predict the onset of seizures while the rest did so sometimes. Clinically seizures were reported to be similar every time by 107 (69.5%).

Table 1. Age and gender distribution Patients' demographic and clinical characteristics.

Gender	**Male (%)**	**Female (%)**	**Total (%)**	**p-value**
N (%)	80(51.9)	74(48.1)	154(100)	0.63
Age (years)				
Mean age (sd)	35.8(18.9)	28.7(14.5)	32.4(17.3)	0.01
Median age	29.5	28.7	26	
Age group				
< 20	11(13.8)	14(18.9)	25(16.2)	
20-29	29(36.3)	37(50)	66(42.9)	
30-39	15(18.8)	13(17.6)	28(18.2)	
40-49	8(10)	3(4.1)	11(7.1)	
≥50	17(21.3)	7(9.5)	24(15.6)	0.1
Level of education				
No education	15(18.8)	4(5.4)	19(12.3)	
Primary	13(16.3)	9(12.2)	22(14.3)	
Junior secondary	6(7.5)	14(18.9)	20(13)	
Senior secondary	30(40.7)	32(43.2)	62(40.3)	
Tertiary	16(20)	15(20.3)	31(20.1)	0.04
Occupation				
Students	17(21.3)	28(37.8)	45(29.2)	
Employed	37(46.3)	31(41.9)	68(44.2)	
Unemployed	17(21.3)	13(17.6)	30(19.5)	
Retired	9(11.3)	2(2.7)	11(7.1)	0.05
Substance use				
Alcohol use	22(27.5)	6(8.1)	28(18.2)	<0.01
Tobacco	11(13.8%)	3(4.1)	14(9.1)	0.04
Marijuana	5(6.3)	-	5(3.2)	0.03
Glue	-	1(1.4)	1(0.6)	0.3
Alternative treatment				
Herbal	25(31.3)	15(20.3)	40(26)	0.12
Prayer house	16(20)	20(27)	36(23.4)	0.3
Drug store	7(8.8)	3(4.1)	10(6.5)	0.24

Table 2. Gender distribution of seizure characteristics

Gender	Male (%)	Female (%)	Total (%)	p-value
Age of onset				
Mean age (sd)	26.3(21.7)	14.4(14.9)	20.9(15.3)	<0.01
Median age	18	12	17	
Time taken before first hospital visit (years)				
Mean age (sd)	1.6(4.5)	2.7(5.3)	2.1(0.4)	0.2
Median (range)	0(0-28)	0(0-21)	0(0-28)	
Last seizure episode				
< 24 hours	18(22.5)	20(27)	38(24.7)	
1-7 days	18(22.5)	16(21.6)	34(22.1)	
1-4 weeks	16(20)	12(16.2)	28(18.2)	
1-6 months	21(26.3)	18(24.3)	39(25.3)	
>6 months	7(8.8)	8(10.8)	15(9.7)	0.97
Family History	16(19.8)	5(7.2)	21(14)	0.03
Prediction of seizures				
Always	21(26.3)	17(23)	38(24.7)	
Sometimes	17(21.3)	29(39.2)	46(29.9)	
Never	42(52.5)	28(37.8)	70(45.5)	0.05
Seizures are similar	54(67.5)	53(71.6)	107(69.5)	0.58
History of status epilepticus	29(36.3)	27(36.5)	56(36.4)	0.98
Seizure related admissions	3(3.8)	11(14.9)	14(9.1)	0.02*
Total	80(51.9)	74(48.1)	154(100)	

*Mann-Whitney U Test.

A total of 56(36.4%) confirmed that they had experienced prolonged seizures that lasted more than 5 minutes for generalized seizures and 10 minutes for focal seizures in the past. Sex distribution SE showed that males (36.3%) and females (36.5%) reported a history of status in the past. P=0.98. Seizure related admissions were reported in 14(9.1%) of PWE more in females 11(14.9%) than males 3(3.8%). See Table 3. Figure 1, showed that history of SE appears to be bimodal; 40% below the age of 20 years and 50% after the after of 50 years.

Table 3 shows the proportion of PWE with various risk factors who had SE. About 54.5% of those with stroke, 47.9% of patients who had CS reported a history of SE. A large proportion of dementia cases also had CS and SE although the overall number was small. Factors that correlated with past history of SE were: history of CS, family history of epilepsy and having no past history of seizure related admissions.

Table 3. Distribution of status epilepticus by various documented risk factors

Risk factor	N(%)	Status N(%)#
No risk factor	84(54.5)	28 (33.3)
Cluster seizures	73(47.4)	35(47.9)
Traumatic brain injury	34(22.1)	12(35.3)
Stroke	11(7.1)	6(54.5)
Alcohol abuse	5(1.9)	1(20)
Mental retardation	4(1.9)	-
Dementia	4(2.6)	3(75)
Meningitis	3(1.3)	2(66.7)
Migraine	3(1.9)	1(33.3)
AIDS	3(0.6)	-
Brain surgery	2(2.6)	-
Down's syndrome	1(3.2)	1(100)
Psychosis	1(0.6)	-
Hypertension	20(13.3)	10(18.5)
Diabetes	5(3.2)	1(20)
Heart failure	1(0.6)	-
Total	154(100)*	54(36)

*Multiple risk factor was recorded.
#Percentage of risk factors.

Table 4. Correlates of status epilepticus. Table 4. Correlates of status epilepticus.

	Status Epilepticus r (p-value)
Gender	
Status epilepticus	-
Seizure cluster	23(<0.01)
Age	-0.02(0.84)
Gender (1 male, 2 female)	-0.00(0.98)
Family history	0.17(0.03)
Age of onset of epilepsy	0.12(0.15)
Seizure type (1 generalized, 0 focal)	0.01(0.74)
History injuries (1 yes, 2 No)	0.12(0.15)
Seizure related admissions (1 yes, 0 No)	-0.23(<0.01)
First point of care (0 hospital, 1 other places)	0.04(0.59)
Seizure semiology (1 similar, 0 varies)	-0.03(0.74)
Last seizure (1 less than 24 hours to 6 greater than 6 months)	0.09(0.29)

DISCUSSION

Seizure frequency and pattern are strong determinants of quality of life in epilepsy as well as the burden of epilepsy. Although in PWE, seizures are generally sporadic or even infrequent, however, they may experience prolonged seizures (status epilepticus) and even cluster seizures. Identification of SE in the community is very important because of the associated high morbidity, mortality as well as the associated high direct and indirect health costs in epilepsy(13,14).

In the index study, the male to female ratio of PWE with a history of SE was 0.9:1. SE was reported by 36.4%: males (36.3%) and females 36.5%). P=0.98. About 54.5% of PWE who had stroke experienced SE. A large proportion of dementia cases also had SE although the numbers were small. Furthermore, the age distribution of SE was bimodal (before 20 years and after 50 years), and a large proportion of PWE with SE also had experienced SC. Factors that correlated with SE were history of SC, family history of epilepsy and no history of seizure related admissions.

The seizure related characteristics in the index study were similar to other published works from Nigeria (16,17). The age distribution of the patients in the index study may suggest a changing pattern of epilepsy risk factors or increasing awareness of epilepsy in the country. Younger mean-age-of-onset in females may be attributed to a better health seeking behaviour among females. Another factor responsible for this may be relatively large proportion of individuals with hypertension, diabetes and stroke. These disorders are generally commoner in older males. Clinically, 54.5% had focal seizures, a finding which may be explained by the high rates of risk factors for focal seizures in the study. This is similar to previous studies (18). Six-month seizure freedom in the index study was a mere 9.7% while 24.7% reported within 24 hours of seizures. These findings support previous reports on seizure control in PWE in Nigeria(17). These may be related to several factors including non-adherence, uses of unorthodox medicine, seizure severity and alcohol (18).

The sex and age distribution of PWE who reported a history of SE showed same sex distribution and a bimodal age distribution. In the US, Dham et al(19) reported a bimodal distribution of SE with the first peak in the first decade of life and the second after 60 years. Double peak in the incidence of SE was also reported in a review by Sanchez et al(4). Current demographic in Nigeria and SSA have shown a rise in the older age group; therefore, SE is likely to become a common problem and an important health issue in years to come. Similar to some previous studies, the gender distribution of SE has been reported to be similar in males and females. Male to female ratio varied also from one study to the other with some reporting more males and others more females (4). In Ethiopia, Amare et al(20) reported a male-to-female ratio of SE of 1.5:1 which is different from the index study. In a study by Kariuki et al (8) there was an equal gender distribution.

There are no community-based studies on SE in Nigeria. Community-based studies are frequently limited by recall bias and the ability of onlookers to recognize seizure-types and record their duration appropriately. Even in hospital settings in Nigeria, EEG monitory is not frequently carried out hence there are likely to be low rates of detection.

The definition of SE has evolved over the past decades, however, the incidence of SE has not differed much using different definitions. Leitinger et al (5) reported that reducing the diagnostic time of SE increased the incidence only moderately by 10%. The overall incidence of SE range from 5.2 to 41 per 100,000/year (7) with an average of 9.9 per 100 000. Kantanen, et al (6) reported an annual age-adjusted incidence of 81.1/100,000 based on the new ILAE 2015 definition of SE.

The age and sex adjusted incidence of a first episode of SE, Non-convulsive statue epilepticus and SE with prominent motor phenomena (including Convulsive SE) was 36.1 per 100 000 adults per year in Austria (5). In SSA, Kiruiki and his colleagues reported an overall prevalence of 2.3 per 1,000 from three sites in Kenya(8). Their study included children and were limited to predominantly motor seizures and people without epilepsy. The reported incidence of SE in the index study (36.3%) is similar in males and females. This finding is within the rates reported by previous studies. The prevalence of SE in this study may be affected by several factors listed in table 4 which have been linked to SE in previous studies. Furthermore, our cohort may represent patients with severe forms of epilepsy.

The incidence of SE is affected by age, geographical location, comorbidities and possibly family history (6,21). Similar to the index study in most adult studies there is a spike after the age of 50 (5,22). Geographical factors affect socio cultural characteristics of the population as well as disease pattern(4). For an example, whereas in Kenya (8), Malaria and HIV were associated with SE, in Finland (6) alcohol withdrawal was the single most common acute symptomatic etiology in the study by Kantenen et al (6,23). The relationship between SE and non-adherence and no previous hospital visit have also been documented in PWE(8). These two factors are important in SSA because large treatment gap and poverty.

In the index study, SE was reported in 54.5% of those with a history of stroke and 35.3% of those with Traumatic Brain Injury (TBI). Other cases with small but significant proportion of SE were those with meningitis and alcohol abuse. These findings are in support of previous studies that reported stokes, TBI and infections as common causes of SE a pattern which tends to vary between countries (4). SE has also been reported to be common in neurodegenerative disorders (4). African studies have reported infections and non-adherence to be high on the list of risk factors(8-10,20). Sadarangani et al(10), in Kenyan children, found that 71% of SE cases had an infectious cause, 53% attributed to malaria. Likewise, Amare et al (20) described CNS infections as the primary source of SE in Ethiopia. However, these studies were not limited to PWE. SE may also be related to the premorbid state of the patients (4,24,25). Metabolic disorders such as hyperglycemia, uremia and acidosis of other etiologies are common causes of SE in non-epilepsy patients and may trigger status in PWE. Another risk factor for SE reported in the literature is family history.

In a population-based twin study reported a high pattern of SE concordance between monozygotic twins compared to dizygotic twins, linking familial predisposition and possible genetics factors to the risk of developing SE(25). Family history of epilepsy was reported in 14% of our cohort and correlated to a history of SE in the index study.

Factors that may precipitate/cause SE can also precipitate SC. These risk factors include TBI, longer duration of epilepsy and poor seizure control(26). SE has a direct effect on mortality, quality of life and increased health cost. It leads to repeated admissions in the emergency room or even in the intensive care unit. In the index study seizure related admissions negatively correlated to a history of SE. The reason for this is not clear. Large prospective studies are needed to shed more light on this finding. SE is a condition for which data on incidence, etiology, risk factors and outcomes are required for proper decision-making and for the allocation of resources by policy makers. These resources need to be used in the development of strategies that help improve prevention, diagnosis and reduce morbidity and mortality.

Limitations: This study has some limitations. Firstly, data used in this might have been affected by recall bias which may affect the true incidence of SE. Secondly, the timing of seizures may not be very accurate and subjective. Thirdly, only predominately motor seizures are observable, and subtle form of seizure are likely to be overlooked. Our study addressed only survivors. Mortality rates of SE are important in assessing the true burden of this complication of epilepsy.

Finally, questionnaires were administered in English which may introduce some language bias because some medical terms in English do not have direct local equivalents. These limitations notwithstanding, this study has provided data for comparison for future studies. Large multi-center and community-based studies are needed to accurately document the prevalence of SE in Nigeria.

Conclusion: The reported lifetime history of SE among PWE attending a tertiary hospital clinic in Enugu is high. This may suggest both poor seizure control and/or seizure severity. Careful patient education will improve both adherence and emergency management of epilepsy to reduce the morbidity of epilepsy in the community.

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ORIGINAL ARTICLE

GASTROINTESTINAL ANASTOMOTIC LEAKS AND RISK FACTORS IN FOUR UNIVERSITY HOSPITALS, ADDIS ABABA

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ABSTRACT

Background: *Studies on the incidence and risk factors for anastomotic leak (AL) related to gastrointestinal (GI) surgery are mainly from the developed world. Incidences of AL range from 1.0% to 41.0%, varying widely according to the site, definition, and type of GI resection. Multiple risk factors have been identified. AL typically manifests clinically around the seventh postoperative day. It increases morbidity, mortality, hospital stay and extra costs irrespective of improvements in surgical techniques.*

Objective: *To identify the pattern, risk factors, and mortality rate related to GI anastomotic leaks after GI resection and anastomosis.*

Methods: *A retrospective descriptive study of medical records of 352 patients for ALs following GI tract resection and anastomosis at four university hospitals in Addis Ababa during January 1, 2017 to December 31, 2018 was done. Data were analyzed using SPSS version 23 package. Descriptive statistics and logistic regressions were used to analyze the data. A p-value of <0.05 was used to define statistical significance.*

Results: *The overall rate of AL was 9.9 %. Low preoperative serum albumin and emergency procedure had statistically significant association. The mean hospital stay was 12 days. Anastomotic leak-associated death rate was 48%.*

Conclusion*: In this study, most patients had elective surgeries involving the colon. Most of them developed enteroenteric ALs with longer hospital stays, and higher death rates, affirming that AL significantly increases morbidity, mortality and cost.*

Key words: *GI resection, anastomotic leak, risk factors, mortality.*

INTRODUCTION

Gastrointestinal (GI) surgery-associated anastomotic leaks (ALs) have been one of the main causes underlying postoperative morbidity and mortality irrespective of the continual improvements in surgical procedures. The frequency and consequences of anastomotic failure (partial or complete disruption of anastomosis with leakage of contents) vary widely according to the sites, definitions, and types of resections within the GI tract **(1, 2)**. Varying rates of ALs are found **(1)** based on the anastomosis site involved: rectum (8-41%), colon (3-29%), small intestine (1-3%), bile ducts (10-16%), pancreas (9-16%), stomach (1-9%), and esophagus (2-16%).

In systematic reviews of 97 studies, a total of 56 separated definitions of AL were identified. Combination of clinical features and radiological investigations were used to define and detect anastomotic leak. However, there is no universally accepted definition of anastomotic leak at any site **(3)**.

Studies conducted to identify the incidence and risk factors for anastomotic leak are from the developed world where patient characteristics and availability and utility of diagnostic tools are different from that in the developing world. Several studies have identified risk factors for GI anastomotic leakage with no general consensus on which risk factors consistently feature **(1)**.

An anastomotic defect in colon causes leakage of colonic content into the abdominal and or pelvic space leading to peritonitis, abscess formation, and sepsis that can be fatal. The incidence of colorectal anastomotic leak (CAL) varies between 3% and 19%, with associated mortality rates ranging from 10 % to 20 %. Moreover, CAL is a risk factor for local recurrence of colorectal cancer **(4)**.

AL typically becomes clinically apparent between the 5 and the 8 postoperative days, but many exceptions exist **(5, 6)**. The occurrence of gastrointestinal AL is associated with significantly increased mortality, morbidity, and prolonged hospital stay as well as considerable extra costs **(4, 7)**. Knowledge on the risk factors may influence procedure related decisions and treatment, and possibly reduce the rate of leakage.

The aims of this study were to evaluate the pattern of AL after GI resection and anastomosis, its perioperative risk factors, morbidity and mortality rates related to AL, and to provide surgical professionals, researchers and hospitals with baseline information for further investigation and guideline development to reduce rate of AL and improve outcome of patients.

MATERIALS AND METHODS

This was a multicenter retrospective study of medical records of patients with GI resection and anastomosis undertaken at Tikur Anbessa, Menelik II, Yekatit 12 and Zewditu Memorial Hospitals in Addis Ababa during the period of January 1, 2017 to December 31, 2018.

During the study period, a total of 556 patients had GI resection and anastomosis. Of these, charts of 414 patients were retrieved and 62 patients were excluded from the study because four were pediatric patients, 12 patients had insufficient data, and 46 patients had bypass procedures. The documents of 352 patients make the basis for the analysis of this study.

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Structured questionnaires were prepared for data collection and the study proposal was approved by the Institutional Review Board of Addis Ababa University, College of Health Sciences. At the four hospitals, operating room registers, medical charts, discharge summaries, and death certificates of patients were used for data collection. Demographic features, comorbid conditions, diagnoses for which GI resection and anastomosis were performed, and presence or absence of perioperative infection, bowel preparation, antibiotic use, blood transfusion, and serum albumin level were determined. Emphasis was also made on the urgency of the operation, operating professional, and duration and type of the procedure as well as the duration of hospital stay and postoperative complications. The collected data were checked for completeness, and entered into computer and the SPSS version 23 package was used for statistical analysis.

RESULTS

The mean (±SD) age of patients was 48(±17) years; about 75% of patients were ≤ 60 years of age. Majority (72.2%) of patients were male and 257 (73.0%) were urban residents. The most common reasons for gastrointestinal anastomosis were redundant sigmoid colon and sigmoid volvulus (27.8%) followed by small bowel obstruction (SBO) (14.8%). The rest of the diagnoses in decreasing order of frequency included colorectal cancer (12.8%), esophageal cancer (12.2%), and end colostomy for 26 benign and 9 malignant diseases (9.9%), gastric cancer (5.4%), IBD (4.8%), and 10 penetrating and 3 blunt abdominal trauma (3.7%), and others (8.5%) including mesenteric ischemia, ileostomy or abdominal TB (10 each). Cancer accounted for 35.8% of all patients that underwent GI anastomosis (Table 1).

Table 1. Demographic distribution and diagnosis of 352 patients with gastrointestinal Anastomosis in Four University Hospitals in Addis Ababa, January 2017 to December 2018

Variables	No of Patients	Percent
Sex		
Male	254	72.2
Female	98	27.8
Age (Years)		
15-30	80	22.7
31-60	182	51.7
>60	90	25.6
Mean(±SD) 48±17		
Diagnosis		
Esophageal cancer	43	12.2
Gastric cancer	19	5.4
Small bowel obstruction (SBO)	52	14.8
Colorectal cancer	45	12.8
Redundant sigmoid colon & sigmoid volvulus (SV)	98	27.8
End Colostomy	35	9.9
Trauma	13	3.7
Inflammatory bowel disease (IBD)	17	4.8
Other	30	8.5

As is shown in Table 2, most patients (79.9%) underwent elective anastomotic procedures, in 224 (63.6%) procedures related to the colon. GI resection and anastomosis were performed in 41.8% of patients without preoperative mechanical bowel preparation. Serum albumin level was determined in 70.5% of patients, out of which 15.3% had low serum albumin levels. Evidences of infection (pus and GI content in the peritoneum, abscess or fistula) were noted during anastomosis in 6.8% of patients. Blood transfusion was given for 6.8% of patients. The type of operative procedures in decreasing order of frequency were colocolic anastomosis (33.5%), enteroenterostomy (18.2%), ileocolic anastomosis (15.6%), colorectal anastomosis (13.9%), esophagectomy (12.2%), gastrectomy (5.4%), and jejunotransverse (and coloanal anastomoses (0. 3% each).

The participating surgical disciplines included general, colorectal, and cardiothoracic surgery. Majority of the operations (70.8%) were performed by residents and general surgeons. Colorectal and cardiothoracic surgeons operated on 15.9% and 13.4% of patients respectively.

The surgical procedure lasted 90 minutes or more in 94.6%, 2 to 3 hours in 61.4%, more than 3 hours in 9.7%, and more than 5 hours in 0.6% of patients (Table 2).

Table 2. Types of procedures, surgical professionals and perioperative features in 352 patients with gastrointestinal anastomosis, in Four University Hospitals in Addis Ababa, January 2017 to December 2018

Characteristics	N	%
Type of Surgical Procedures		
Esophagectomy and anastomosis	43	12.2
Gastrectomy and anastomosis	19	5.4
Enteroenterostomy	64	18.2
Ileocolic anastomosis	55	15.6
Colocolic anastomosis	118	33.5
Colorectal anastomosis	49	13.9
Ileorectal anastomosis	2	0.6
Other	2	0.6
Operating Professionals		
Surgery residents	137	38.9
Surgeons	215	61.2
Duration of Procedures		
< 90	19	5.4
90-120	83	23.6
>120	250	71.0
Preop Characteristics		
Urgency		
Elective	267	75.9
Emergency	85	24.1
Presence of infection		
Yes	24	6.8
No	328	93.2
Prophylactic antibiotics use		
Yes	352	100.0
No	0	0.0
Preoperative bowel preparation		
Yes	205	58.2
No	147	41.8
Preoperative hematocrit level		
<35 %	50	14.2
> 35%	302	85.8
Preoperative low albumin level (n=248)		
Yes	54	21.8
No	194	78.2
Not done	104	29.5
Pre or intraoperative blood transfusion		
Yes	24	6.8
No	328	93.2

As depicted in Table 3, anastomotic leak was detected in 35 of 352 patients (9.9%) in this study. AL detection day varied from the 2nd to the 14th postoperative days; and majority of the leaks (21, 60%) were detected on the 5th to 8th postoperative days, and (10, 28.6%) on the 7th postoperative day. Majority of leaks (21, 60%) were detected by GI content or fluid discharge via incisional wounds or drainage tubes. Relaparotomy was performed on 8.8% of patients after GI resection and anastomosis, but 71.4% (25/35) of patients that developed anastomotic leak required relaparotomy, and the rest (10/35) were managed conservatively as enterocutaneous fistula whereas only 1.9% (6/311) of patients who did not develop leak required relaparotomy, for wound dehiscence and postoperative collection.

About 60.0% of patients stayed in hospital for one week or more, 54 (15.4%) for more than two weeks, and 34 (9.7%) stayed for more than three weeks. The mean postoperative hospital stay was 12±12.35 days, with a median stay of 8 days and IQR of 7 to 11 days. When conditions of patients on discharge were assessed, 25 patients (7.1%) died in hospital after GI anastomosis (Table 3).

On bivariate analysis (Table 4), emergency procedure, presence of infection, absence of mechanical bowel preparation, and low serum albumin level were significantly associated with AL. AL was significantly high with increase in age and prolonged duration of surgery. Sex, duration of procedure, low preoperative HCT level, and pre or intraoperative blood transfusion was not significantly associated with the development of AL.

Table 3. Anastomotic leak and relaparotomy rates, duration of hospital stay, and outcome of 352 patients with GI anastomosis in Four University Hospitals in Addis Ababa, January 2017 to December 2018

Characteristics	N	%
Presence of Leak		
Yes	35	9.9
No	317	90.1
Postop date leak detected		
5th day	6	17.1
6th day	4	11.4
7th day	10	28.6
2nd day	2	5.7
Other	13	37.1
How was the leak detected?		
Sign of peritonitis	14	40.0
GI content discharge via wound	15	42.9
Abdominal ultrasound	0	0.0
Other	6	17.1
Relaparotomy done		
No	321	91.2
Yes	31	8.8
Duration of hospital stay		
<1 week	140	39.8
1-2 weeks	158	44.9
>2 weeks	54	15.4
Condition on discharge		
Discharged improved	320	90.9
Dead in hospital	25	7.1
Discharged against medical advice	6	1.7
Referred to other hospital	1	0.3

Table 4. Bivariate analysis of factors associated with gastrointestinal anastomotic leak (AL)

Risk Factors	Presence of leak		
	Yes N (%)	No N (%)	P-Value
Age			0.098
15-30	5(6.2%)	75(93.8%)	
31-60	16(8.8%)	166(91.2%)	
>60	14(15.65%)	76(84.4%)	
Sex			0.370
Male	23(9.1%)	231(90.9%)	
Female	12(12.2%)	86(87.8%)	
Urgency of Procedure			0.006
Elective	20(7.5%)	247(92.5%)	
Emergency	15(17.6%)	70(82.4%)	
Duration of Procedure			0.150
1.5-2hrs	5(6%)	78(94.0%)	
>2-3hrs	23(10.6%)	193(89.4%)	
3-5hrs	6(17.6%)	28(84.4%)	
Presence of infection during anastomosis			0.011
Yes	6(25.0%)	18(75.0%)	
No	29(8.8%)	299(91.2%)	
Preoperative bowel preparation			0.002
Yes	12(5.9%)	193(94.1%)	0.665
No	23(15.6%)	124(84.4%)	
Preoperative hematocrit level			0.122
<35 %	8(16.0%)	42(84.0%)	
> 35%	27(8.9%)	275(91.1%)	
Low preoperative albumin level			<0.0001
Yes	18(33.3%)	36(66.7%)	
No	10(5.2%)	184(94.8%)	
Pre or intraoperative blood transfusion			0.665
Yes	3(12.5%)	21(87.5%)	
No	32(9.8%)	296(90.2%)	

AL rate following enteroenterostomy (Table 5) was high (17.2%) followed by esophagectomy (16.3%), gastrectomy (10.5%), colorectal anastomosis (10.2%), ileocolic anastomosis (9.1%) and colocolic anastomosis (4.2%), but ileorectal anastomosis did not leak (P=0.019). Majority of the procedures (240 patients) were performed by residents and general surgeons. There were differences in the leak rates among the different surgical professionals, but the differences were not statistically significant (P=0.434).

Anastomotic leakage rate was found to be a little bit higher in malignant conditions than benign conditions. (13/126, 10.3% vs 22/226, 9.73%), but the difference was not statistically significant (P=0.357). AL was associated with significantly increased mortality, morbidity, and prolonged hospital stay (Table 6). The rate of death in patients who developed AL was 48.3% compared to the 3.5% death rate in those who did not develop AL. Most patients (71.4%) with AL had relaparotomy compared to the 1.9% relaparotomy rate in those without AL. Majority of patients (62.9%) with AL stayed more than 3 weeks in hospital, whereas only 3.8% of patients without AL stayed that long.

Table 5. Anastomotic leak rate in comparison to type of operative procedure, surgical professional, and disease category

Characteristics (n=352)	Presence of Leak		
	Yes	No	
	35(9.9%)	317(90.1%))	P-Value
Type of Operative Procedure			0.019
Esophagectomy and anastomosis	7(16.3%)	36(83.7%)	
Gastrectomy and anastomosis	2(10.5%)	17(89.5%)	
Enteroenterostomy	11(17.2%)	53(82.8%)	
Ileocolic anastomosis	5(9.09%)	50(90.91%)	
Colocolic anastomosis	5(4.23%)	113(95.76%)	
Colorectal anastomosis	5(10.2%)	44(89.8%)	
Ileorectal anastomosis	0(0%)	2(100%)	
Other	0(0%)	2(100%)	
Operating Surgeon			0.434
Surgery Resident	13 (9.5%)	124(90.5%)	
General Surgeon	11(10.7%)	92(89.3%)	
Colorectal Surgeon	2 (3.6%)	54(96.4%)	
Cardiothoracic Surgeon	7 (14.9%)	40(85.1%)	
Upper GI surgeon	2 (22.2%)	7(77.8%)	
Diagnosis			0.357
Esophageal Cancer	7(16.3%)	36(83.7%)	
Gastric Cancer	2(10.5%)	17(89.5%)	
Small bowel obstruction (SBO)	9(17.3%)	43(82.7%)	
Colorectal cancer	2(4.4%)	43(95.6%)	
Redundant sigmoid colon & sigmoid volvulus	3(3.1%)	95(96.9%)	
End colostomy	4(11.4%)	31(88.6%)	
Abdominal trauma	1(7.7%)	12(92.3%)	

Variables which were statistically significant on bivariate analysis were included in multivariate analysis (Table 6) to see their independent effect on the occurrence of AL. Absence of bowel preparation was strongly associated with AL on bivariate analysis but became out of the range for significance on multivariate analysis. The variable that had strong independent association with AL was a low serum albumin level ($p<0.0001$).

Patients who had low serum albumin were 19 times more likely to develop AL compared to those who had normal serum albumin. The other variable which was independently associated with occurrence of AL was emergency procedures ($p=0.018$) where patients were 4.6 times more likely to develop AL than those who underwent elective procedures.

Table 6. The effect of AL on postoperative outcomes and multivariate analysis of variables with occurrence of AL in GI anastomosis

Characteristic		Presence of leak				P value
		Yes		No		
		N	%	N	%	
Condition on discharge	Improved	15	51.7	305	96.5	<0.0001
	Died	14	48.3	11	3.5	
Hospital stay	<1 week	2	5.7	138	43.5	<0.0001
	1-2 weeks	7		151	47.6	
	2-3 weeks	4	11.4	16	5.0	
	> 3 weeks	22	62.9	12	3.8	
Relaparotomy	No	10	28.6	311	98.1	<0.0001
	Yes	25	71.4	6	1.9	

Multivariate analysis of factors significantly associated with AL on bivariate analysis

Characteristic	B	P value	AOR	95% C.I	
				Lower	Upper
Urgency (emergency)	1.527	0.018	4.606	1.306	16.242
Infection (yes)	0.513	0.444	0.599	0.161	2.226
Bowel prep (No)	0.300	0.554	1.349	0.500	3.642
Albumin (low)	2.979	<0.0001	19.670	5.629	68.733

DISCUSSION

Anastomotic leak is perhaps the most dreaded complication following intestinal surgery and is one of the leading causes of postoperative morbidity and mortality despite improvements in surgical care. The rates and complications of AL vary considerably depending on the definition, risk factors, site, and type of GI tract resection (1,2).

Majority of studies used a combination of clinical features and radiological investigations to define and detect anastomotic leak. The diagnostic methods commonly used when a leakage is suspected are CT scan, contrast enema, endoscopic examination, and reoperation (8). In our series, except one patient who developed wound dehiscence and the leak was detected on re-operation, all ALs were detected and defined clinically only. There is no universally accepted definition of anastomotic leak at any site (3, 9).

In this study, the rate of AL increased with increase in age of patients and pronged duration of surgery, but the increase was not significant and congruent to the findings by others (4, 7, 10, and 11). In our study, female patients developed AL more frequently than males (12.2% vs. 9.1%) even though the variation was not statistically significant (P=0.370). In other studies, AL occurred more commonly in male patients (12, 13). The variation could be due to small sample size of female patients in our study.

Studies have identified risk factors for GI anastomotic leakage, but there is no universal agreement on which risk factors consistently feature (1). Amrika Seshadri (7) reported that serum albumin, need for blood transfusion and others as strongly associated factors for AL. In a retrospective study, male sex, perioperative transfusion, presence of cardiovascular disease and proximal tumor location were predictive factors of anastomotic leakage after gastrectomy for gastric cancer and the leakage rate was 1.9% (13). In a prospective study, Nair et al (14) reported a 35.0% rate of anastomotic disruption in patients undergoing emergency small bowel anastomosis, a much higher rate than our finding. There are clearly many patient and disease factors that contribute to anastomotic leak. AL has been associated with a 6% to 39% mortality rate (15). In this study, emergency procedure, the presence of infection, the absence of bowel preparation, and low serum albumin were significantly associated with anastomotic leak, but on multivariate analysis only emergency procedures (P=0.018) and low serum albumin(P<0.0001) remained significantly associated with anastomotic leakage. This is because of the fact that patients were operated on without bowel preparation on emergency bases which possibly is a confounding variable. This finding is in line with the findings in several other studies (7, 14, and 16).

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In general, the rate of AL varies depending on the tissue anastomosed, and the rates include, stomach, 1.1-3.3%, small intestine, 1.0-3.8%, ileocolic, 2.0-6.5%, colocolic, 3.0-5.4%, colorectal, 4.0-26%, and ileorectal, 5.0-19%. AL is known to be correlated with worse prognosis after curative resection for colorectal cancer **(15)**. In the present study, the rates of AL were 16.3% in esophagogastrostomy, 10.5% in gastrectomy and gastrojejunostomy, 17.2% in enteroenterostomy, 9.1% in ileocolic anastomosis, 4.2% in colocolic anastomosis, and 10.2% in colorectal anastomosis. Compared to the preceding report, AL rates in gastric, small bowel and ileocolic anastomosis were higher in our study probably due to nutritional deficiencies or emergency procedures. Contrary to our finding where ileorectal anastomosis did not leak, higher incidences of AL, probably related to disease or patient factors, were found in other reports **(1,15)**. The overall AL rate of 9.9% observed in this study is similar to the reported rates that ranged from 1.8% to 15.4% in many studies **(2, 10, 16-19)**. Esophagogastrostomy, ileocolic, colocolic and colorectal AL rates were comparable with the findings in other series **(2, 4, 10, 11, 15, 16, 20, 21)**. In our series, anastomotic leakage rate was slightly higher in malignant than benign conditions (10.3 % vs 9.73%), but the difference was not statistically significant (P=0.357).

AL presents in a dramatic fashion early or more often in a far subtler fashion, often relatively late in the postoperative period **(22)**. In majority of our patients (60.0%), in agreement with another report **(6)**, AL was detected between the 5^{th} and 8^{th} postoperative days, and on the 14^{th} postoperative day in one patient.

The consequences of AL are peritonitis, fistula or abscess formation, postoperative infection, and increased hospital costs and mortality **(20, 23, 24)**. It causes considerable morbidity and mortality to the patient, and it doubles the length of hospital stay **(7)**.

In this study, 40.0% of patients developed peritonitis, and the death rate in patients who developed AL was 48.3% compared to the 3.5% in those who did not develop AL. Previous reports showed a 3% to 39% and 8 to 10-fold mortality rates after AL **(2, 4, 7, 20)**. In our series, the mortality rate was higher than the above reported rates, which may be explained by lack of early suspicion, late clinical detection and or delayed intervention since this study could not find usage of diagnostic imaging techniques for the detection of leakage.

In our study, the risk of relaparotomy was high in patients with AL; most patients (71.4%) with AL had relaparotomy compared to the 1.9% relaparotomy rate in those without AL. Compared to a 3.8% of patients without AL, 62.9% of patients with AL stayed more than 3 weeks in hospital. AL is associated with significantly prolonged hospital stay as well as considerable extra costs **(4,7)**.

Conclusion and recommendation:

The incidence of AL in gastrointestinal anastomosis in our series was 9.9%. Low serum albumin and emergency procedures are strong risk factors for AL. The occurrence of AL significantly increases the rate of relaparotomy, sepsis, postoperative mortality and duration of hospital stay.

Awareness of the risk factors, suspicion of AL, and thorough evaluation of patients may impact perioperative decision-making, surgical technique and patient care.

Optimization of nutrition prior to elective GI anastomosis may prevent AL and its far-reaching consequences.

Emergency GI resection and anastomosis should be handled with utmost care. Prospective studies should be conducted to identify determinant factors for AL. We also recommend the four hospitals to have better patient record keeping.

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ASSESSMENT OF THE LEVEL OF JOB SATISFACTION OF RADIOLOGISTS PRACTICING IN ETHIOPIA

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ABSTRACT

Background*: Professional satisfaction is a key factor in delivering quality medical care. However, the level of professional satisfaction of radiologists, among others, in Ethiopia has not been assessed so far. In light of this, this study hopes to determine the Level of Professional Satisfaction in Ethiopian Radiologists.*

Methods*: The study is a cross-sectional survey of the level of professional satisfaction among Ethiopian practicing radiologists who have at least 2 years of experience. We compiled the list of participants that came for the 2017 annual conference to the Radiological Society of Ethiopia (RSE) meeting and used a self-administered structured questionnaire.*

Results*: Eighty radiologists participated in the study of which 2/3rd was males, and 53.9% were younger than 45yrs of age, with an overall satisfaction rate of 62.8%. Male radiologists (p = 0.01) aged 35-44 (P-value =0.02) and working in large cities outside Addis (P = 0.01), as well as radiologist in clinical practice were found to be somewhat or extremely satisfied (p= 0.03). Meanwhile, radiologists of younger age, females, and those working in small towns (p= 0.001), were more dissatisfied. In addition, only 32% of the radiologist are either very satisfied or extremely satisfied with their monthly income which was significantly associated with the overall level of job satisfaction (p=0.001)*

Conclusions*: The survey demonstrated a comparable level of professional satisfaction of Ethiopian radiologists with those of other countries. Professional satisfaction is associated with work arrangement, gender, and age group in addition to years of experience, and place of work. It was also able to determine that income has a major influence on professional satisfaction.*

Keyword: *Ethiopia, Job Satisfaction, Radiologists*

INTRODUCTION

Satisfaction of medical professionals is a key factor in delivering quality medical care. It is important to note that, not only is it vital to keep the professional motivated to stay in their respective specialty; it is also an indirect measure of patient outcome (1). In addition, it affects patient care by also increasing the tendency of professionals to unionize and participate in a strikes (2, 3).

Professional satisfaction is also strongly associated with patient satisfaction (4-6). According to a study in Japan, having a high income as well as, working in large hospitals were associated with high satisfaction, whereas, older age and night shifts were associated with dissatisfaction (8).

Factors affecting work satisfaction may also vary depending on time, with changes in practice, patient load, and income over time. Published works also show that close to half of all radiology professionals reported a decreased level of satisfaction in their job, as compared to five years prior (7, 8).

Although there are published research works in Ethiopia that analyze the radiological services, no published works so far investigate the level of satisfaction among radiology professionals. Therefore, the main aim of this survey is to do a baseline assessment of the level of professional/ job satisfaction of radiologists in local practice.

METHODS

Study design

This was a cross-sectional survey conducted on a source population of 140 radiologists who attended the 22nd annual radiology conference in 2017

Study setting

The study was conducted in Addis Ababa, Ethiopia during the 22nd annual conference of the Radiology Society of Ethiopia.

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Study population and procedure

The study participants were all radiologists who have a minimum work experience of two years. 40 out of 140 radiologists who have work experience of less than two years were excluded from the study. The remaining 100 met the inclusion criteria. Among those eligible, 80 of them consented to participate in the survey.

Data collection and analysis

Data was collected using a structured questionnaire which contains sociodemographic characteristics, area and type of practice, staffing character, work schedule, number of institutions that the radiologist is working or practicing in, stability within the current institution, and career plans. Satisfaction was measured using a five-level Likert scale. Data was entered into SPSS version 20 and analyzed. Descriptive and analytical statistics were used as applicable. The dependent variable was satisfaction and independent variables included age, sex, years of experience, income, and type of practice, and multivariate logistic regression was used to test the association between the two variables. Statistically, a significant association was taken for p values <0.05.

Ethical considerations

Participation in the survey was voluntary. Informed consent was obtained from all respondents, and individual identifiers were not used during data collection. Ethical clearance was obtained from the Research and Ethics Committee of the Department of Radiology. Permission was obtained from the radiology society.

RESULTS

Out of the 100 eligible radiologists, 80 of the participants in the study complied making the response rate 80 %. Around 2/3rd of the respondents were males and 55.1% of them were <45yrs of age (Table I).

All levels of professional experience above 2 years were represented and only 1.3% of the respondents were above the age of 65 (figure I & II). Among the participants, 68% of the respondents had 2-10 years of experience, while 31.3% had above 10 years (figure II). 74 (92.5%) of the respondents were general radiologists and only 6 (7.5%) were subspecialists.

Concerning the area of practice, 88.8% of the respondents were practicing either in Addis Ababa or other larger cities. 88.4% were in clinical practice during the time of data collection and 70% percent of the respondents were full-time employees. Those who were working in private practice accounted for 41.3% of the respondents and the rest were working in government institutions and uninformed services (Table II). The data showed that half of the respondents were working in only one institution while the remaining half was working in two or more institutions.

The overall satisfaction level of radiologists in this study was 62.8%., 31.3% of respondents reported to be satisfied with their current monthly income and 53.8% of respondents were indifferent. Concerning stability of respondents, 83.8% of respondents were stable during the past two years with 52.3% having no plan to change their current working place within the next one year. Among the participants, 78.8% also had a plan to keep the current practice rather than change practice or career path (Table I).

Radiologists who were male and in the age group of 35 -44 were more likely to be satisfied than the females or younger, and older age groups (P-value = 0.02 & 0.01 respectively). (Table II)

Radiologists working in larger cities other than Addis Ababa also reported to be satisfied than those working in Addis and smaller cities. Those who were working in small cities reported more dissatisfaction than those radiologists working in Addis Ababa and other large cities, respectively (P -value = 0.00). Those radiologists in clinical practice also reported better satisfaction than those who were in academic practice (P-value = 0.03). (Table II)

The study also found that those radiologists who had longer years of experience (>11yrs) were more likely to encourage college-age students to join medicine than those who had <10years of experience (P- value= 0.01) (table II).

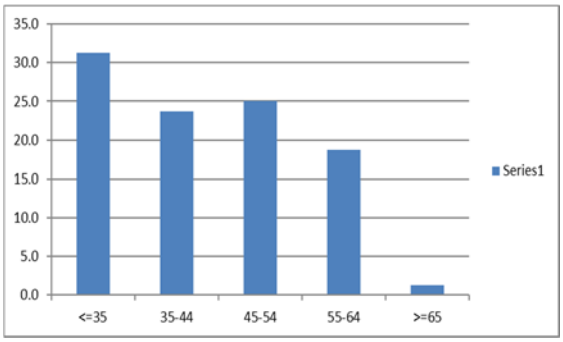

Figure I: *Age distribution of Ethiopian radiologists participated in the survey, Addis Ababa, 2017 GC.*

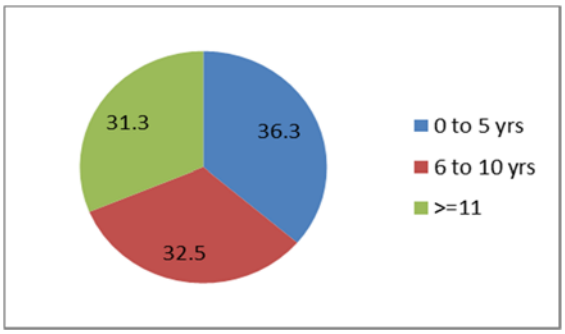

Figure II: *Category of years of professional experiences of Ethiopian radiologists, Addis Ababa, 2017GC*

Table: I:- Professional and Practice Characteristics of Ethiopian radiologists, Addis Ababa 2017GC

		Frequency	Percent
Area of Practice	Addis Ababa	42	52.5
	Other large cities	29	36.3
	Small cities	9	11.3
	Total	80	100
Full-Time Practice	Private	41	51.3
	Government	37	46.3
	Uninformed services	2	2.5
	Total	80	100
Staffing Character	Academic	22	27.5
	Clinical	58	72.5
	Total	80	100
Work Schedule	Full time	56	70
	Part-time	2	2.5
	Both	22	27.5
	Total	80	100
Number of institutions	One	40	50
	Two	29	36.3
	More than two	11	13.8
	Total	80	100
Satisfaction with Income	Extremely satisfied	4	5
	very satisfied	21	26.3
	indifferent	43	53.8
	very dissatisfied	10	12.5
	Extremely dissatisfied	2	2.5
	Total	80	100
Institutions the Past 2yrs	No	13	16.3
	Yes	67	83.8
	Total	80	100
Plan to Change Work Place	Yes next 6months	16	20
	Yes next one year	22	27.5
	No	42	52.5
	Total	80	100
Career Plan	keep practicing	63	78.8
	change practice	16	20
	Make career change	1	1.3
	Total	80	100

Table II. Satisfaction According to their Socio-demographic and Practice Characteristics of Ethiopian radiologists

`Category	Encourage College Ages to Join Medicine n(%)	p-Value	Recommend Radiology n(%)	p-Value	Satisfaction Compared to what was before 2yrs			
					Highly/ Somewhat Satisfied n(%)	No change n(%)	Extremely/ Somewhat Dissatisfied n(%)	p-Value
Age Category								0.02
<=35	10(76.9%	0.18	19(95.0%	0.17	16(64%)	3(12%)	4(16%)	
35-44	16(88.9%	6	14(82.4%	5	15(79%)	0(0%)	4(21.1%)	
45-54	14(73.7%		11(73.3%		8(40%)	8(40%)	4(20%)	
55-64	13(100%		13(100%		9(60%)	4(26.7%	2(13.3%)	
>=65			1(100.0%		1(100%)	0(0%)	0(0.0%)	
Sex								
Female	17(85%)	0.897	23(95.8%)	0.134	14(48.3%)	9(31%)	4(13.6%)	0.01*
Male	36(83.7%)		35(83.3%)		35(68.6%)	6(11.8%)	10(19.6%)	
Years of Experience								0.06
0 to 5 Years	14(87.5%)	0.01*	24(96%)	0.193	20(69%)	3(10.3%)	4(13.8%)	
6 to 10 Years	17(68%)		14(77.8%)		17(65.3%)	5(19.2%)	4(15.4%)	
>=11 Years	22(100%)		20(87%)		12(48%)	7(28%)	6(24%)	
Level of Training								0.23
General radiologist	50(84.7%)	0.606	55(88.7%)	0.415	47(63.5%)	14(18.9%)	11(14.9%)	
Subspecialist	3(75%)		3(75%)		2(33.4%)	1(16.7%)	3(50%)	
Place of Practice								
Addis Ababa	28(82.4%)	0.596	30(88.2%)	0.983	23(54.7%)	13(31%)	4(9.5%)	<0.00*
Other Large Cities	20(83.3%)		22(88%)		21(72.4%)	1(3.4%)	7(24.1%)	
Small Cities	5(100%)		6(85.7%)		5(55.6%)	1(11.1%)	3(33.3%)	
Academic	15(78.9%)	0.46	13(86.7%)	0.87	13(59.1%)	3(13.6%)	6(27.3%)	
Clinical	38(86.4%)		45(88.2%)		36(62.1%)	12(20.7%)	8(13.8%)	
Satisfaction with income								
Extremely satisfied	3(100%)	0.101	2(50%)	0.064	4(100%)	0(0%)	0(0%)	<0.00*
very satisfied	16(100%		21(100%)		19(90.45)	2(9.5%)	0(0%)	
Indifferent	30(81.1%)		30(85.7%)		24(55.8%)	12(27.9	7(16.3%)	
very dissatisfied	3(60%)		4(80%)		1(10%)	%)	7(70%)	
Extremely	1(50%)		1(100%)		1(50%)	0(0%)	0(0%)	
dissatisfied						1(50%)		
working in the same institution during the Past 2yrs Yes	45(83.3%)	0.673	48(88.9%)	0.594	39(58.3%)	13(19.4%)	13(19.4%)	0.03*
Plan to Change Work Place								
Yes next 6months	6(66.7%)	0.301	12(92.3%)	0.814	74(3.8%)	4(25%)	3(18.8%)	0.04*
Yes next one year	14(87.5%)		16(88.9%)		15(68.2%)	3(13.6%	4(18.2%)	
No	33(86.8%)		30(85.7%)		27(64.3%)	8(19%)	7(16.7%)	
Career Plan								
Keep practicing	53(84.1%)	-	45(84.8%)	0.135	40(63,5%	12(19%)	11(17.5%)	<0.00
Change practice			13(100%)		9(56.3%)	2(12.5%)	3(18.8%)	
Make career change			0(0%)		0(0%)	1(100%)	0(0%)	

*** Statistical test was calculated at P<0.05**

DISCUSSION

The survey revealed that the overall satisfaction of radiologists is 62.8%. Given the relatively low level of satisfaction, most radiologists have been stable at their current positions for two years and have no plans of moving to other places in the coming year or changing career paths. Middle-aged male radiologists and those working in the larger cities outside the capital city, Addis Ababa, have a higher level of satisfaction than younger and female radiologists and those working in the capital or smaller regional cities.

So far many studies have been published locally and internationally addressing issues of satisfaction among Ethiopian healthcare workers including general practitioners and specialists (9-12). However, since the discipline differs substantially from other medical specialties in terms of the level of interaction with patients, and the speed of technological evolution, the results of these studies cannot be directly extrapolated to radiologists (13).
Radiologist satisfaction can be affected by many factors, such as income, physical working environment, freedom to choose work method, recognition for good work, job security, and career prospects (14, 15). There are also differences in the level of satisfaction among the different age groups and gender. Most works of literature also demonstrated changes in the level of job satisfaction over time (7, 15, 16).

The level of job satisfaction also was shown to be different among radiologists working in different countries and even in different institutions within a specific country.
This is due to the difference in the determinants of job satisfaction, and the overall satisfaction of radiologists in the published works of literature, which ranged from 49.5% to 93% (7, 8, 14, 15). Our result also fell within this range.

Despite few reports which showing no difference in satisfaction among males and females (14, 15), most literature report the contrary (7, 14, 16, 17). Similarly, our study showed most males reported a higher level of satisfaction than females. In the authors' opinion, Gender differences in satisfaction among radiologists, found both in our study and other works of literature, arise from the different factors and tools used to measure satisfaction.
In contrast to most studies that reported that academic, non-government practitioners reported more satisfaction than private practitioner (7, 15, 17), our results indicate that academic radiologists have a low level of satisfaction than radiologists in private practice (P-value 0.03). The authors attribute this to the work overload and working environment. Most private radiology services are well equipped compared to the academic radiology departments, which are all government-owned.

In addition, radiology equipment downtime in the academic departments is long due to a shortage of budget for equipment maintenance and a lack of preventive and corrective maintenance agreements. On the other hand, private radiologic facilities usually get maintained quickly because of lack of bureaucratic channels and the income they present. As a result, these factors may contribute to the low levels of satisfaction reported by academic radiologists in comparison to private practitioners.
A high level of job satisfaction was also reported from those working in the same institution for two years and above with intentions of staying for at least one more, during the data collection. The possible explanation may be related to fulfillment within their given employment. Job satisfaction is one factor for radiologist turnover intention (18).

Similar to reports in other pieces of literature, our survey showed that there is no statistically significant difference in the level of satisfaction between full-time and part-time employees(14, 16). Likewise, working in single or multiple institutions was not associated with differences in the level of satisfaction.

Conclusion and Recommendations

This survey showed that Ethiopian radiologists have a level of satisfaction comparable with radiologists in the rest of the world. Being female, younger than 35 and older 44, academic radiologists as well as, working in the capital city, Addis Ababa, were associated with a low level of satisfaction.
The authors recommend investigating factors affecting the level of job satisfaction among radiologists and running comparative studies between the different disciplines or specialties.

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Conflict of Interest

The authors declared no sources of financial support or conflict of interest

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DYSPEPSIA AND PREVALENCE OF CLINICALLY SIGNIFICANT ENDOSCOPY FINDINGS IN A GASTROENTEROLOGY REFERRAL CLINIC IN ETHIOPIA

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ABSTRACT

Background: *The clinical features and endoscopic findings of dyspepsia are not well studied in Ethiopia. Dyspepsia is the predominant presentation of patients to Gastrointestinal (GI) Clinics in our country and Endoscopic findings are not routinely recommended to patients. Yet, identifying which patients need an urgent Endoscopy diagnosis is important to diagnose organic causes at an earlier stage. This study assessed the prevalence of dyspepsia, associated factors, and clinically significant endoscopic findings and alarm symptoms in referral GI clinic in Ethiopia*

Methods: *A retrospective cross-sectional record review was conducted among adults who came with complaints of dyspepsia from September 1, 2015, to August 31, 2017 at St Paul hospital millennium medical college GI clinic. SPSS version 23 was utilized for data analysis. Descriptive data are presented as frequencies and percentages for categorical variables. To see the effect of each independent variable on the outcome, binary logistic regression was used, and the strength of the association was assessed by computing odds ratio. A P value of <0.05 was considered statistically significant.*

Results: *From 3542 patients seen at GI clinic, dyspepsia was diagnosed in 418 i.e. in 21.6% of cases. The endoscopic diagnosis showed a high prevalence of gastric cancer of 8.8%. Functional dyspepsia was diagnosed in 15.5% and a high prevalence of non-specific Gastro-duodenitis were reported, especially in younger cases with no associated alarm symptoms. Anemia and weight loss were independent predictors for organic causes.*

Conclusion: *Weight loss and anemia were important predictor of gastric cancer and should alarm physicians for an early endoscopy in these patients. The study also supports to restrict upper GI endoscopy in individuals <45 years of age and no alarm symptoms.*

Keywords: *Dyspepsia, Upper GI Endoscopy, Ethiopia, Alarm symptoms*

BACKGROUND

Dyspepsia is defined as a group of symptoms consisting mainly of epigastric pain, burning, and postprandial fullness (1). It can also include nausea, belching, and bloating (1). Dyspepsia is also defined as predominant epigastric pain lasting at least for one month and can be classified into organic and functional. In organic dyspepsia, specific pathology like peptic ulcer disease, GERD, and malignancies are identified on upper gastrointestinal endoscopy. In contrast, endoscopy will be normal in functional dyspepsia. There are also other non-luminal causes including pancreatic and gall bladder diseases that should be excluded (1, 2). The reported prevalence of dyspepsia ranges from 1.8 to 57% across different countries with an average prevalence of 20.8% among population studies; this variability is explained partly by the use of different criteria for dyspepsia (3). There has been an increased prevalence of dyspepsia in women, smokers, NSAIDs users, and among H. pylori positive people (3). Patients with dyspepsia generate substantial health care costs, with abnormal health care seeking behavior and considerable anxiety affecting their quality of life (4,5,6).Weight-loss related to dyspepsia should be considered as an alarm sign indicating GI malignancy (7).

The prevalence of dyspepsia in African countries like Nigeria and Rwanda ranges from 29 to 38.9%. In Ethiopia, it is the most frequent indication for an upper GI endoscopy, and it is increasingly becoming an important cause of morbidity (8). Although gastrointestinal endoscopy is a primary diagnostic tool for dyspepsia, it is not widely available. There are only two training centers in Ethiopia with a GI fellowship program; because of this, there are few well-trained physicians to diagnose and treat dyspepsia adequately.

In this study, we assessed the burden of dyspepsia, Endoscopic findings of those patients referred with symptoms and from this, we identified alarm symptoms that could predict an organic pathology.

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MATERIALS AND METHODS

This was a retrospective cross-sectional study carried out in the GI clinic of St. Paul's Hospital Millennium Medical College (SPHMMC) from September 1, 2015, to August 31, 2017. SPHMMC is one of the two major tertiary referral hospitals in Ethiopia with Gastroenterology and Hepatology fellowship program. The Endoscopy unit is a recognized regional training site and accredited by World Endoscopy Organization as an African training center. The GI clinic accepts patients referred from different parts of the country. The hospital has 350 beds, sees an annual average of 300,000 patients. It has a catchment population of more than 5 million.

After obtaining ethical clearance from the Institutional review board, data were extracted from medical records of patients and information regarding age, sex, symptoms, risk factors, and endoscopy diagnosis recorded. It was a two years chart review from patients who have visited the clinic and all patients with an initial presentation of Dyspepsia and physician diagnosis of Dyspeptic syndrome were included. Patient data with incomplete medical records were excluded. Dyspepsia was diagnosed based on the treating gastroenterologist diagnosis found and traced from the chart. Data were coded, cleaned and entered, into SPSS version 23, and all statistical tests were performed with the same statistical package.

Statistical analysis

Descriptive data are presented as frequencies and percentages for categorical variables, mean, and standard deviation for quantitative variables. To see the effect of each independent variable on the outcome, binary logistic regression was used, and the strength of the association was assessed by computing odds ratio. Variables with p-value <0.2 in the two variables analyses and relevant with the objective of the study were included in the multiple binary logistic regression model. Multiple binary logistic regressions were run, and the differences between variables were explored. P-values of less 0.05 were considered statistically significant.

RESULTS

Patient characteristics

Out of the 3542 patients seen at GI clinic; 418 (21.6%) were diagnosed with dyspepsia and requested to have an Endoscopy. The mean age of the participants was 42 (ranging from 15-97). A total of 40.7% of patients were from Addis Ababa. The patients consisted of 60% males and 40% females. Demographic characteristics of the participants were depicted in table 1 below.

Table 1: Patient diagnosed with Dyspepsia at St. Paul's Hospital GI Clinic, 2013-2015 G.C.

- (N=418)

Demographic Variable	Number	Percent
Sex		
Male	251	60
Female	167	40
Mean Age	42 years	
Region		
Addis Ababa	170	40.7%
Out of Addis	248	59.3%

*No complete data for occupation, marital status was found

Clinical features of patients with dyspepsia
Three hundred ninety-seven (95%) patients had epigastric pain. Weight loss and dysphagia as alarm symptoms occurred in 112 (26.7%) and 35(8.3%) patients, with organic and functional dyspepsia, respectively. (See Table 2).

Table 2: Clinical presentation of patients at St. Paul's Hospital GI Clinic, 2013-2015 G.C. (N=418)

Clinical Presentation	Number	Percent	Functional dyspepsia **	Organic Dyspepsia***
Epigastric pain	397	95.0	61	336
Epigastric burning	409	98.0	64	345
Postprandial fullness	298	71.0	50	248
Early satiety	280	66.9	48	232
Weight loss	112	26.7	21	91
Dysphagia	35	8.3	2	33
Upper GI bleeding	163	38.9	14	149
Symptoms of GOO *	9	2.1	0	9

*Gastric outlet obstruction
** Patient with clinical symptoms, but normal EGD and imaging findings and decision from treating physician after assessment of the patient
***Patients with Endoscopic findings of an organic cause

Endoscopic findings
From a total 418 patients with dyspepsia, who underwent endoscopy, functional dyspepsia constituted 15.5% while the remaining 84.5% presented has some endoscopic findings. The reported diagnosis on endoscopy were 18.5% duodenal ulcer, 16.4% GERD, 8.8% gastric cancer, while 6.6% had gastric ulcer (See Table 3).

Table 3: Endoscopic findings in dyspeptic patients at St. Paul's Hospital GI Clinic, 2013-2015 G.C.

Endoscopic finding	Freq.	Percent
Gastric Cancer	37	8.8
Duodenal Ulcer	62	14.7
Gastric Ulcer	19	4.5
Gastric and Duodenal ulcers	9	2.1
GERD[&]	31	7.5
GERD[&] + Duodenal ulcer	7	1.7
Gastritis	103	24.6
Duodenitis	17	4.0
GERD[&] + Gastritis	30	7.2
Bile reflux gastropathy*	8	1.9
Gastro-duodenitis	7	1.7
Others	22	5.3
Normal	65	15.5
Total	418	100.0

*physicians report of an endoscopy finding [&] Gastro-esophageal reflux disease

Associated factors for Dyspepsia
From this study, NSAIDs were used in 9.5%, 10.4% were consuming alcohol. H. pylori bacteria was positive in 12.3% of FD patients and 20.9% of organic dyspepsia. (See Table 4)

Table 4: Factors predicting Organic Dyspepsia at St1. Paul's Hospital GI Clinic, 2013-2015 G.C.

Variable		Total(n=418) n(%)[&]	P-value	Crude OR (95% CI)	Adjusted OR (95% CI)
Age	<45 45-60 >60	303(72.5) 71(16.9) 44(10.6)	0.01	1 1.18(1.45-11.02) 2.15(0.64-6.68)	0.83(0.22-3.10)
Sex	Male	249(59.5)	0.05	1.68(0.99-2.86)	1.12(0.50-2.53)
NSAID [*]use	No Yes	202(83.4) 40(16.6)	0.07	1 0.26(0.06-1.13)	
Alcohol hab-	No	257(85.)	0.11	1	
H.Pylori	Neg.** Positive	306(78.) 83(21.4)	0.02	1 0.48(0.22-1.06)	0.56(0.18-1.80)

*Non-steroidal Anti-inflammatory drugs ** Negative [&] Missing data for H.pylori,Alcohol,NSAIDs

The presence of weight loss and anemia were significantly associated with the presence of gastric cancer (see table 5). A biopsy result was collected for 37 patients with Gastric mass, out of this 29 had adenocarcinoma, and one participant had a Histologic diagnosis of lymphoma.

DISCUSSION

Dyspepsia was prevalent in our study. Patients presenting with dyspepsia may have a range of diagnosis from normal endoscopy finding to the diagnosis of cancer.

Table 5 Factors predicting gastric cancer at St. Paul's Hospital GI Clinic, 2013-2015 G.C.

Variables		**Total (n=37),n(%)**	**P-value**	**Crude OR 95% CI**	**Adjusted OR (95% CI)**
Age	<45	23(62.2)		1	
	45-59	8(21.6)	0.01	4.00(1.45-11.)	2.14(0.41,11.21)
	>60	6(16.2)	0.18	2.15(0.696.60)	2.160.34,13.84)
Sex	Male	20(54.1)		1	
	female	17(45.9)	0.12	1.90(0.834.30)	0.98(0.24, 4.05)
Smoking habit	No	31(83.8)		1	
	Yes	6(16.2)	0.05	0.26(0.07-0.93)	2.05(0.35,12.02)
weight loss	No	16(43.2)		1	
	Yes	21(56.7)	<0.01	0.04(0.01-0.17)	2.23(4.95,109.0)
Anemia	No	15(40.5)		1	
	Yes	22(59.5)	0.01	0.22(0.09-0.53)	3.09(1.05, 9.14)

Understanding which patients with dyspepsia could have cancer and prediction based on risk factors and non-invasive tests is important to prioritize and limit the need for endoscopy.

Dyspepsia accounted for 21.6% of patients seen at GI/ Hepatology clinic. This result was closer to a meta-analysis, which reported an overall pooled prevalence of 20.8% (3). Numbers are lower than a prospective study done in Rwanda, which showed a prevalence of 38.9%. This was a prospective study done in 356 health workers and as the study population is focused to a certain group, it might have increased the prevalence (5). Another study from the Northern part of Ethiopia, Gondar, has found a prevalence of 54.4% (9) This study has a larger sample size and it is focused on endoscopy findings as an entry point and included an eight-year study, which leads to a higher recruitment of patients with dyspepsia .

Gastric cancer was found in 8.8% of dyspeptic patients. Previous Ethiopian studies have shown a prevalence of gastric cancer ranging from 0.3-3.6% (9,12,16,22). The prevalence is higher in our study, possibly because it is a tertiary referral center and the catchment area is also considered to have higher prevalence of gastric cancer from previous studies (23)

The presence of weight loss increased the presence of gastric cancer by 23-fold while anemia increased the prediction by three-fold. This is consistent with different studies that reported alarm features as strong predictors of upper GI cancer (25, 26).

Functional dyspepsia with normal upper endoscopy was found in 15.5%, which is comparable to studies in Nigeria (15.4%), UAE (15%) (11) and lower than a study done in Mekelle, Ethiopia (12). Females had a slightly higher proportion of functional dyspepsia. Younger age (<45 years), female gender and lack of alarm symptoms (weight loss and anemia) were indicators of functional dyspepsia. This supports to defer endoscopy for such group of patients.

Gastritis was the commonest endoscopy diagnosis in this study, followed by duodenal ulcer and GERD. Data from Lagos, Nigeria have also shown a higher prevalence of gastritis (59.9%) (11,13,15)

This study showed a higher prevalence of GERD compared to a previous Ethiopian report from 2004, where the prevalence was 2.3%. This could be due to changes in life style and global increase in non-communicable diseases, which could increase GERD prevalence (22).

H.pylori was detected in 19.6%, which was lower compared to previous studies in Ethiopia, which reported a prevalence of 65-83%(8) (16, 17). This disparity may be due to the widespread use of H.pylori eradication therapy that reduced the prevalence of H.pylori in our setup. The patient recruitment may also be different. NSAIDs use was 9.5%, and it was associated with GERD and gastritis on endoscopy. Higher frequency of dyspepsia in persons taking NSAIDs has also been reported from a meta-analysis (19). Another study has also estimated that 4% of all dyspepsia in the community is attributable to NSAID use in subjects aged 40 –49 years (20). Alcohol use was lower in our study compared to a study that reported 34% in southern Ethiopia (6). In this study, the behavioral risk factors such as smoking and alcohol use had no relationship with organic dyspepsia, which is consistent with a study from southern Ethiopia (6). However, different studies in Africa and the western world have shown an increased risk of dyspepsia in people who smoke and drink alcohol (21) (13). This inconsistency may be due to incomplete chart documentation as a limitation of this retrospective study.

An important limitation of our study is the retrospective nature, which was associated with poor documentation of potential risk factors for dyspepsia and gastric cancer. On the other hand, the study was performed in a major referral center and inclusion of many patients in the referral clinic is the main strength of the study.

CONCLUSION

Dyspepsia was a common diagnosis in our clinic patients. Weight loss and anemia were important predictors of gastric cancer and should alarm physicians for an early endoscopy in these patients. The study also supports to defer upper GI endoscopy in individuals <45 years of age and no alarm symptoms.

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ORIGINAL ARTICLE

MAGNITUDE AND ASSOCIATED FACTORS OF UNDIAGNOSED DIABETES MELLITUS AMONG MID-ADULTHOOD URBAN RESIDENTS OF WEST ETHIOPIA

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ABSTRACT

Introduction*: People are more likely to die due to biological impairment than chronological aging. Diabetes is a public health problem, whereby diagnosing proves challenging for health providers. Likewise, the prevalence of undiagnosed diabetes in west Ethiopia is unnoticed.*

Aim*: To investigate the magnitude and associated factors of undiagnosed diabetes mellitus among middle aged adult urban populations in west Ethiopia.*

Methods*: A community based cross-sectional study was conducted from 01 March 2019 -August 2019 on 266 undiagnosed middle aged urban residents. Data was collected using questionnaires, anthropometric measurements, and biomarkers as per WHO steps. Fasting blood glucose ≥ 126mg/dl in the morning was taken as diabetes and FBS>100-125mg/dl, pre-diabetes (impaired FBS). SPSS version 24 multivariable logistic regression analysis was applied, and associated factors were considered statistically significant at 95%CI with p <0.05.*

Results*: The overall magnitude of newly diagnosed raised fasting blood sugar was 7.14% among urban residents in west Ethiopia. Of this, 2.25% was had diabetes and the remaining 4.89 % was pre-diabetes. Having a sleep disorder, sedentary lifestyle, increased: waist circumference, waist to height ratio, BMI, triglycerides, and blood pressure were significantly associated with elevated fasting blood glucose. On multivariable logistic analysis, having a high BMI and elevated blood pressure were four (AOR: 4.87; p=0.049), and five (AOR: 5.22; p=0.005) times more associated with diabetes mellitus, respectively. Sleep apnea (p=0.023) was also shown to have significant association with diabetes.*

Conclusions*: This study revealed undiagnosed diabetes was prevalent and associated to common risk factors in west Ethiopia. Therefore, age targeted community-based education and early detection are significant to reduce its burden.*

Key words: *Undiagnosed diabetes, risks, Middle aged, urban*

INTRODUCTION

Diabetes Mellitus (DM) is one of the four major non-communicable diseases (NCDs) causing a high morbidity and mortality, globally. It is a metabolic disorder of multiple etiologies characterized by chronic hyperglycemia induced from defects of insulin secretion and action or both (1).

Long standing elevated blood glucose leads to micro and macro vascular complications (2) and becomes a serious health problem unless early screened (3). Complication from undiagnosed diabetes could lead to significant decline in quality of life (4) and have a higher risk for premature death (5) unless prevented.

Globally, the magnitude of diabetes has been increasing among adults; According to International diabetes Federation Atlas report, as of 2017, there are451 million people living with diabetes, with projections as tall as 693 million by 2045 (6). Domestically, the prevalence of diabetes is higher in urban than rural areas (7).

In 2014, about 179.2 million people lived with undiagnosed DM worldwide with Africa having the highest percentage compared to other regions; about 62.3% of the people with the diseases do not know the effects, and about 13.4 million were undiagnosed (8; 9; 10).

In Ethiopia, the magnitude of diabetes mellitus is increasing. According to the WHO report, the number of cases documented in 2000 (800,000), is rising and that it would hit an estimated 1.8 million by 2030(11, 12). Evidence from studies conducted in Ethiopia: in Gondar and Bahir Dar city were 2.3% and 10.2% individuals lived with undiagnosed DM, respectively (13, 14). Another study conducted in 2014 in Ethiopia showed, about 1,603,100 people (75.1% of population) were undiagnosed for diabetes mellitus (1, 15).

However, different factors, not quite understood by the community, contributed to risk of diabetes development. Although undiagnosed diabetes is prevalent, it was not addressed well in west Ethiopia. So far, nothing has been done at community level. Therefore, this study aims to investigate the magnitude and associated factors of undiagnosed diabetes among middle aged adult urban residents in west Ethiopia.

METHODS

Study design and setting:

A community-based cross-sectional study was conducted purposively in the hub of western Ethiopian Town, Nekemte, which is located 328km from Addis Ababa. It is divided into

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6 sub cities administratively with an altitude ranging from 1960 to 2170 Meters above sea level. Its average annual rainfall and temperature ranges are 1854.9mm and 14^{oc} to 26^{oc}, respectively. The total population of the city projection in 2017 was estimated to be 117,819, of which 51 % (60,088) of them were adults.

Study period: Study was conducted on 266 people in their mid -adulthood from 1March 2019-1 August 2019.

Sample size: The minimum sample size was calculated using single proportion formula, by taking the prevalence of abdominal obesity the most common component of metabolic syndrome with 19.6% among healthy Ethiopian adults (16). Hence with a margin of error of 5%, confidence level of 95%, and 10% gnawing away, we had minimum sample of 266 participants.

***Sampling techniques*:** Within decision the appropriate sampling method was identified for specific area and study participants. Accordingly, randomly one commune/kebele was selected by lottery method from six kebeles and one kebele not adjacent to the other was selected purposively. Totally two kebeles were selected. Each study participants were selected through simple random sampling techniques.

Eligibility: Adults aged 40-65years who were eligible to participate in the study were asked to undergo diagnosis and respond questionnaires to be included in the study. While who were already on medication for NCDs, pregnant, lactating, serious mental conditions, bariatric surgery and physically disables were excluded.

Measurements: Data was collected using structured self-administered questionnaire, and anthropometric measurements take of each participant. Fasting blood sugar (FBS) level was determined using samples taken early in the morning, with readings ≥126 mg/dLbeing classified as diabetes and 100-125mg/dl, pre-diabetes. In addition, other biomarkers like cholesterol level and blood pressure other biomarkers like cholesterol level and blood pressure were also collected to assess common associated risk factors of diabetes.

Analysis: The data was analyzed using SPSS version 24 (IBM corporation, NY, USA). Frequency, percentage, and descriptive summaries were used to explain the amount of study participants in the analysis. Descriptive statistics was used to summarize and describe various sample characteristics as well as the association between high blood glucose and other risk factors. The binary regression computed the crude OR and variables with p values less than 0.2 were entered into multivariable logistic regression model to control potential confounding effects in the model. The strength of associations between independent and outcome variables was assessed using AOR with a 95% CI and p values ≤0.05 were considered statistically significant predictors of undiagnosed DM.

***Ethical review and confidentiality*:**

Permission was sought from the Institutional Review Board (IRB), Institute of Health, Jimma University (Approval No.IHRPGD/596/2019) to conduct this study. The households willing to participate in the study signed consent form. Confidentiality of the respondents was ensured, and each household had its own identification number. Subjects were free to participate in the study without any coercion.

RESULTS

Socio-demographic and lifestyle characteristics: Out of two hundred sixty-six undiagnosed participants, majority (62.8%) of them were females and more than half (54.89%) were living below poverty threshold (<1.25dollar/day). The average age of adults in our study was 52.2 years, with participants aged 41-48 years accounting for 54.5%.Regarding lifestyle, majority (75.2%) of them live a sedentary life, and about 40.6% have fragmented sleep types, 24.8% had history of alcohol intake, 1.1% are current khat chewers and 2.3% smoke cigarette. (Table 1).

Table 1 Socio-demographic and lifestyle characteristics of participants, west Ethiopia ,2019 (n=266)

		Raised fasting blood sugar	
		Present (%), n=19	Absent (%), n=247
Sex	Female	12(4.51)	155(58.27)
	Male	7(2.63)	92(34.59)
Age in years	Range from 41-48 years	10(3.7)	135(50.75)
	Range from 49-56 years	5(1.8)	72(27.07)
	Range from 57-64years	4(1.5)	140(52.63)
Educational status	Illiterate	5(1.89)	81(30.45)
	Some school	10(3.78)	109(40.98)
	Diploma	3(1.13)	30(11.28)
	Degree and above	1(0.38)	27(10.15)
Marital status	Unmarried	1(0.38)	12(4.51)
	Married	15(5.64)	163(61.28)
	Widowed	2(0.75)	54(20.30)
	Divorced	1(0.38)	18(6.77)
Daily income	≥1.25USD	10(3.78)	110(41.35)
	<1.25UD	9(3.38)	137(51.50)
Physical activity	Low	18(6.77)	224(84.21)
	Moderate >120<150M'/W	0	13(4.89)
	Vigorous>15oM'/W /3days	1(0.38)	10(3.78)
Smoking	Current	0	6(2.26)
	Former	2(0.75)	19(7.14)
	Never	17(6.39)	222(83.46)
Alcohol consumption	Current	3(1.13)	23(8.65)
	Former	4(1.5)	36(13.53)
	Never	12(4.51)	188(70.68)
Chewing of chat	Current	0	3(1.13)
	Former	2(0.75)	16(6.02)
	Never	17(6.39)	228(85.71)
Healthy diet	Low DD score	13(4.89)	168(63.16)
	Medium DD score	6(2.26)	70(26.32)
	High DD score	0	9(3.38)

DM: diabetic mellitus, DD: dietary diversity, USD: US dollar,

Prevalence of undiagnosed Diabetes:

The prevalence of pre-diabetes (impaired fasting blood glucose) and diabetes of the participants was 4.89 % and 2.25 %, respectively (Table 2). Participants with elevated fasting blood sugar (FBS>126mg/dl) were linked to Wollega University Specialized Hospital chronic care unit for further diagnosis and follow up.

Table2. Description of fasting blood sugar by sex, west Ethiopia, 2019 (n=266)

		Pre-diabetes (%)	Diabetes (%)
Variables			
Sex	Female	FBS >100-8(3.01)	FBS>126mg/4(1.5)
	Male	5(1.88)	2(0.75)
Total		4.89	2.25

Factors associated with undiagnosed diabetes mellitus: From 266 participants, 7.14 % were newly diagnosed, of which the actual diabetes accounts for 2.25%. The magnitude of diabetes is shown to significantly be associated with sleep disorders, sedentary lifestyle, increased: waist circumference, waist to height ratio, BMI, blood pressure, TG and HDL on binary analysis. The multivariate logistic regression analysis showed that only sleep related problems, increased BMI and high blood pressure were independently associated with diabetes (Table 3).

The mean fasting blood glucose level was 99.7(29.60 mg/dl) with (95%CL: 96.12, 103.27; p<0.0001). The prevalence of diabetes significantly increased with high BMI (6%) when compared to participants with BMI <25 Kg/m^2 (1.1%) by a factor of AOR: (4.87 (1.01, 23.45), P=0.048). More than half (69.3 %) of the study participants have central obesity (high waist circumference).

The prevalence of diabetes was shown to be higher in these participants (7.14 %) as compared to 0.8 % of the participants with normal/low waist circumference (AOR=1.61 (1.14, 18.53), P =0.702). However, it was shown not to be significantly associated (Table 3).

In addition, our study revealed those participants with sleep apnea had 3.5 (OR=41.37 CI= (1.02, 11.81, p=0.046) times higher chance of having diabetes than those with normal range of sleeping hours. Participants with sleep apnea AOR: (0.19 (0.05, 0.80), P=0.023) and elevated blood pressure >130/85mmHg AOR: (5.22 (1.67, 16.33), P=0.005) were significantly associated with undiagnosed DM (Table 3).

Table 3: Multivariate analysis to identify factors associated with undiagnosed diabetes among urban residents

		Undiagnosed Diabetes			P-		
Variable	**Categories**	Present (%	Absent (%)	**COR (95% CI)**	**value**	**AOR (95% CI)**	**P-value**
Sleep	Has apnea	4(1.5)	88(33.08)	3.47(1.02,11.81)	0.046	0.19(0.05,0.80)	0.023
	Deprived <6hrs	6(2.26)	102(38.34)	2.68 (1.91,7.93)	0.074	0.35(0.10,1.18)	0.089
	Normal(6-8hrs)	9(3.38)	57(21.43)	1		1	
Sedentary life	Yes	12(4.51)	188(70.68)	1.84(1.70,4.94)	0.200	0.80(0.25,2.50)	0.697
	No	7(2.63)	59(21.18)	1		1	
WC (Male/	≥ 94cm/80cm	17(6.39)	139(52.26)	0.15(0.04,0.67)	0.013	1.61(1.14,18.53)	0.702
Female)	<94cm/80cm	2(0.75)	108(40.60)	1		1	
Waist to ht. ratio	>0.49/0.50(M/F)	17(6.39)	148(55.64)	5.69(1.29,25.16)	0.022	1.99(1.19,20.88)	0.565
(M/F)	<0.49/0.50(M/F)	2(0.75)	99(37.22%)	1		1	
BMI	≥25 kg/m2	16(6.02)	103(38.72)	0.14(0.04,0.47)	0.002	4.87(1.01,23.45)	0.049
	<25 kg/m2	3(1.13)	144(54.14)	1		1	
Elevated	≥135/85mmHg	10(3.78)	39(14.66)	0.17(0.07,0.44)	0.000	5.22(1.67,16.33)	0.005
BP	<135/85mmHg	9(3.38)	208(78.20)	1		1	
Raised Triglycer-	≥150mg/dl	10(3.78)	44(16.54)	5.13(1.97,13.36)	0.001	1.27(0.34,4.80)	0.722
ides	<150mg/dl	9(3.38)	203(76.32)	1		1	
HDL low in (mg/dl)	<40 ,50 for M/F	8(3.01)	43(16.17)	3.45(1.31,9.09)	0.012	0.38(0.11,1.31)	0.123
	>40 ,50 for M/F	11(4.14)	204(76.79)	1		1	

DISCUSSION

The current magnitude of diabetes mellitus is 7.14%. This result is slightly higher than the estimated Ethiopian prevalence of DM by IDFA (5.2%) (17). and studies conducted on some urban residents of Ethiopia like Gonder city (5.1%) (17), Dessie Town (6.8%), (18),Mizan-Aman Town (6.5%) (19), and in Hosana, south Ethiopia (5.7%) (20).

Contrary to the above comparison, the magnitude of undiagnosed diabetes is low when compared with a study conducted on 2013 on HIV/AIDS patients taking HAART in Ethiopia (8%)(21), whereas, in Jimma town 15% had Impaired Glucose Tolerances (12). Likewise, the prevalence of undiagnosed DM was lower than studies done in North India, Punjab (8.3%) (22), Pakistan (26.3%)(23) , Bangladeshi (9.7%) (24) and previous studies in African Countries(25,26, 27,28,) This difference might be due to variations in socio-demographic and lifestyle behavior factors. Different scholars agree that a sleep disorder is highly associated with diabetes. For instance, diabetic patients often have a high prevalence of obstructive sleep apnea (OSA) (29). Clinical studies have shown an increase in serum glucose in patients with OSA, independent of obesity (30, 31). In this study, we observed an independent association (P=0.023) between high fasting blood glucose and sleep apnea.

CONCLUSIONS

The magnitude of undiagnosed diabetes mellitus among adult urban residents was found to be high. On multivariate analysis it was shown that having a high body mass index, sleep disorder and elevated blood pressure were significantly associated

with diabetes mellitus. Therefore, age targeted community-based education on early detection and prevention of diabetes, as well as its complications are significant to save adult life.

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Competing Interest:
All the authors declare that they have neither financial nor non-financial competing interests.

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Syibrah Khuzaimah Zahid, Wan Muhamad Mokhzani, Ahmad Fardi Sulaiman, Wan Zainira Wan Zain, Siti Zarqah Omar. *Ethiop Med J, 2022, Vol. 60, No. 1*

CASE REPORT

A RARE CASE OF INTESTINAL OBSTRUCTION SECONDARY TO METASTASIS DERMATOFIBROSARCOMA PROTUBERANS

Syibrah Khuzaimah Zahid[1,2,3], Wan Muhamad Mokhzani[1,2], Ahmad Fardi Sulaiman[3], Wan Zainira Wan Zain[1,2], Siti Zarqah Omar[4]

ABSTRACT

Dermatofibrosarcoma protuberans (DFSP) is a rare soft tissue sarcoma, which arises from the dermis. It behaves as a low to intermediate-grade malignancy, is locally aggressive, and frequently has local recurrence but rarely metastasize. The most common organ of metastasis reported is the lungs. Here we present a rare case of metastasis dermatofibrosarcoma protuberans (DFSP) that presents with intra-abdominal mass causing intestinal obstruction. Exploratory laparotomy and en-bloc resection of the tumor were done followed by adjuvant chemotherapy.
***Keywords**: Dermatofibrosarcoma protuberans, Metastasis, Intestinal obstruction*

INTRODUCTION

Dermatofibrosarcoma protuberans is a rare slow-growing fibrohistiocytic, intermediate-to low-grade malignancy. It accounts for approximately 0.1% from all cancers and 1-6% of soft tissue sarcoma (1-3). It usually occurs in young to middle-aged individuals and commonly affects trunk, proximal extremities, head, and neck (1,4). Most cases present with slow-growing bluish or brownish erythematous skin nodules. It could also present as a keloid scar (1,5). DFSP typically arises in the dermis, has indolent growth but could be locally aggressive as it spreads into the subcutaneous tissue and muscles (1,2). It rarely has distant metastasis with the lung the most common site of metastasis. Intra-abdominal metastasis is rare (1,2,4,5). Treatment for DFSP is either wide local excision or Mohs surgery. It frequently recurs locally in cases of incomplete excision with a recurrence rate of up to 53% being reported (5,6).

Clinical presentation

We report a 41-year-old female with a previous history of dermatofibrosarcoma protuberans of the left shoulder 1 year before the current presentation. Her initial presentation was a mass over the left shoulder progressively increasing in size over 4 months with core biopsy consistent with DFSP. There were no distant metastases on imaging. She underwent wide local excision of the tumor and histopathology reported tumor margin of less than 3 cm. Adjuvant radiotherapy was planned but she defaulted due to logistic reasons. Her current presentation is an intestinal obstruction for 3 days in December 2018. Examination revealed intra-abdominal mass measuring 15 cm x 15 cm over the left flank. The prior surgical wound over the left shoulder was well-healed with no evidence of local recurrence. Abdominal x-ray showed dilated proximal small bowel.

Contrast-enhanced CT thorax, abdomen, and pelvis showed a well-defined intra-abdominal mass measuring 15x 17x 20 cm causing intestinal obstruction and evidence of lung metastasis (Figure A and B). She subsequently underwent laparotomy and tumor debulking. Intraoperative findings showed a multilobulated soft tissue tumor measuring 20cm x 20cm along the mesenteric plane with extension into the retroperitoneum. Complete excision of the tumor was achieved. The tumor displaced the descending colon and retroperitoneal structure medially and caused external compression on the small bowel. The intestine and its associated vascular trunks were preserved.

Histopathological examination of the tumour showed a fairly circumscribed and unencapsulated tumour composed of fibroblastic spindle-shaped cells arranged in a herringbone pattern, with a mitotic index of 6/10 HPF. Immunostaining was positive for CD 34 (Figure E, F, and G). The histopathology assessment was consistent with metastatic high-grade fibrosarcoma.

Post-surgery she was started with intravenous chemotherapy ifosfamide and doxorubicin for 4 cycles. Her condition did not improve post chemotherapy and she developed tumor recurrence.

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Subsequent CT scan showed a recurrent left intra-abdominal mass measuring 5cm x 7cm x 5cm (Figure C and D). Managed as recurrent metastatic intra-abdominal DFSP, she was planned for second line chemotherapy with gemcitabine and docetaxel. Her condition continued to deteriorate due to disease progression. She was not able to undergo the second line chemotherapy and subsequently succumbed to disease progression.

Figure A

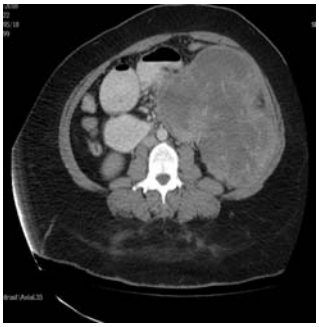

Figure B

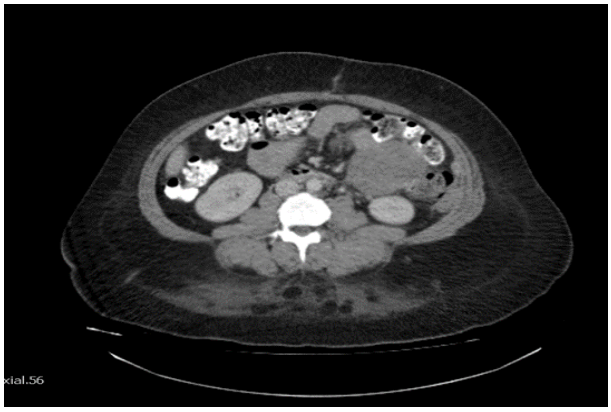

Figure C

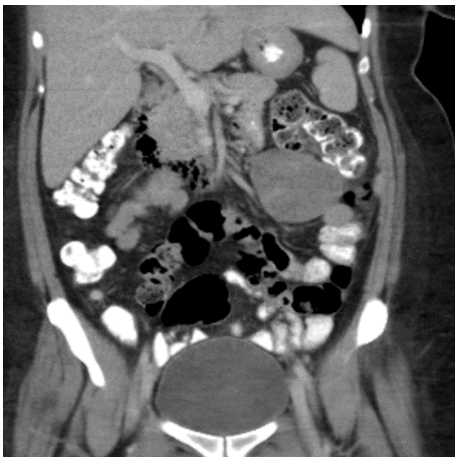

Figure D

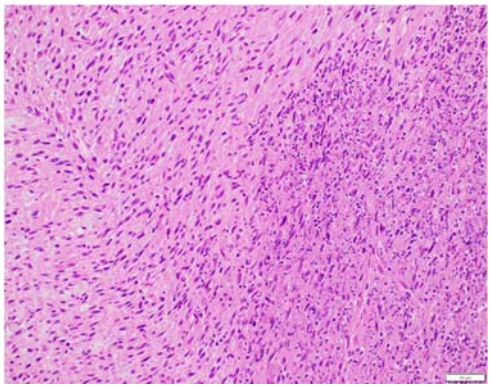

Figure E: Spindle tumor cells arrange in Herring Bone pattern adjacent necrosis (arrow).

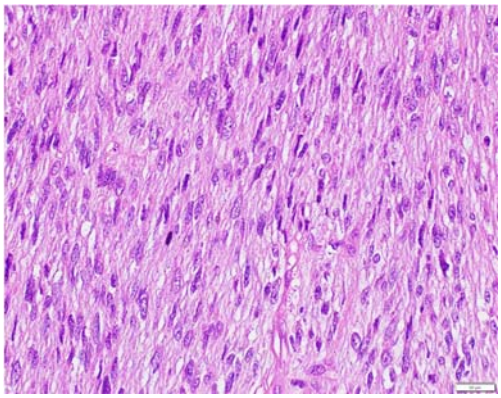

Figure F: The spindle tumor cells are pleomorphic having hyperchromatic nuclei with presence of mitosis, mitotic index of 6/10 HPF(arrow)

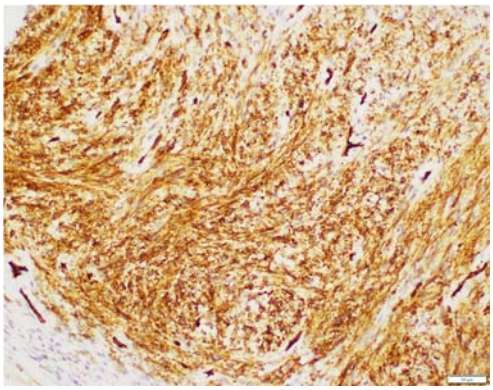

Figure G: CD34 immunostain highlights the tumor cells in brown colour.

Figure A & B: showed heterogenous intra-abdominal mass occupying over the lower left side of the abdomen, that possible arising from proximal jejunum or descending colon.
Figure C & D: Repeated CT showed a recurrent new lesion of intra-abdominal mass over the left side abdomen, possibly the location near the previous lesion. The lesion was smaller in size compared to the previous.

DISCUSSION

Dermatofibrosarcoma protuberans (DFSP) is a mesenchymal neoplasm that typically involves both dermis and subcutaneous tissue (1,7). It commonly occurs in the trunk followed by the extremities, head, and neck (3,5). The lesion is usually painless, has indolent growth but is locally invasive with invasion into the underlying fascia, muscles, or bones (1,4,7). Even though this tumour is aggressive locally, distant metastasis is not common with less than 5% reported cases in the literature (6). It has hematogenous spread, typically to the lungs. Cases of metastases to the retroperitoneum, mediastinum, bones, the kidney, brain, omentum, scalp, ovaries, liver, and heart have been reported (4,8).

It is difficult to diagnose DFSP since the early clinical symptoms are non-specific, it is slow growing and mimics another non-malignant tumour such as dermatofibroma. Dermatofibroma appears similar clinically and is distinguished from DFSP by the absence of extension to deeper structure and the size of the lesion (3,5). The standard diagnosis of DFSP is by tissue biopsy with histopathological and immunohistochemical assessment. Imaging is for the assessment of extension to the deeper and surrounding structures as well as for operative planning. Computed tomography and MRI are both acceptable options, but MRI provides a better assessment of the tissue infiltration and depth of involvement. It is also useful for preoperative and post-operative evaluation (5).

The histological features in DFSP are characterized by spindled cells arranged in a distinct herringbone or storiform pattern and immunohistochemical staining positive for CD-34 (1,2,4,7). There are several histological variants of DFSP that have been described including myxoid, pigmented, atrophic, giant cell fibroblastoma (GCF), and DFSP with fibrosarcomatous change (5). Dermatofibrosarcoma protuberans with fibrosarcomatous areas (DFSP-FS) is recognized as a high-grade type of variant, with higher rates of local recurrence and potential for distant metastasis. This case presentation is most consistent with the DFSP-FS subtype (2). The diagnosis of DFSP-FS is based on Enzinger and Weiss's criteria. It includes the presence of fibrosarcomatous changes of more than 5 mitoses/10 HPF, fascicular growth pattern, increased cellularity, and atypia in at least 5% of the tumor tissue (9).

The standard treatment for DFSP is wide local excision with a margin of more than 3 cm. The alternative approach includes Mohs micrographic surgery (MMS) which requires immediate microscopic examination of the margins in order to ensure a tumor-free margin (1,3,5,7). The recurrence rate associated with MMS is less than 2% with no reports of distant metastasis (2,10).

MMS applies systematic horizontal sectioning compared to the traditional method which applies vertical sections which only assess limited tumor margin. In MMS, all sides of tumour are assessed using a frozen section which allows for a complete evaluation of tumour margins (11).

DFSP is a radiosensitive tumour and indication for radiotherapy includes the margin-positive tumour, unresectable tumour, or recurrent tumour (5). Tyrosine kinase inhibitor such as Imatinib, Sunitinib, and Sorafenib has been shown to induce regression of DFSP and has been applied clinically in recurrent, metastatic, or advanced diseases (5,7). The response rate of tyrosine kinase inhibitor in this clinical scenario of distant intra-abdominal metastasis is unknown as the efficacy of tyrosine kinase inhibitor in DFSP is only proven in the adjuvant setting after resection of primary high-risk tumors (12). Conventional chemotherapy has a limited role in the treatment of DFSP and is associated with poor response rates and clinical outcomes (5). Doxorubicin and ifosfamide for five or six cycles are the common regimes that are applicable in DFSP (5). In regards to this case, it is one of the rare cases of aggressive DFSP-FS that presents with intestinal obstruction due to intra-abdominal DFSP-FS metastasis. We, therefore, advocate a close follow-up protocol in all cases of DFSP which not only leads to a higher rate of compliance to adjuvant treatment but also provides a platform for early detection of possible tumor recurrence.

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CASE REPORT

PERSISTENT HICCUPS IN MEN WITH COVID 19: TWO CASES FROM NIGERIA

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ABSTRACT

Hiccups are defined as extraordinary type of respiratory movement involving a sudden inspiration (intake of air) due to an involuntary contraction of the diaphragm accompanied by closure of the glottis (the vocal apparatus of the larynx). The abrupt inspiration is the result of a sudden contraction of the diaphragm. The classification of hiccups is by their duration. Acute hiccups are of less than 48 hours duration, persistent last over 2 days, and intractable last over a month.

It is a rare but distinct chemosensory presentation of COVID 19 disease and seldomly reported from Africa. We report 2 cases of persistent hiccups in Nigerian men with RT-PCR positive cases of mild COVID-19 disease. Both men (aged 59, 63 years) had associated fever, anosmia and ageusia, with hiccups onset 2-4 days after COVID- 19 diagnosis, and in one case it persisted for 10 days, including for 3 days after SARS-CoV-2 negativity.

Keywords: Hiccups, COVID-19 signs, Nigeria, SARS-CoV-2

INTRODUCTION

Hiccups (singultus) are generated by a reflex arc with phrenic (C3-C5), Vagus and intercostal sympathetic afferents (T6- T12) with central integration at spinal cord C3-C5, and medulla oblongata Dopaminergic neurons, close to the respiratory center and reticular formation, causing efferent phrenic (C3-C5) motor diaphragmatic contractions **[1].** Here we report on two cases of Hiccups seen in COVID-19 patients in Abuja, Nigeria.

Case 1: A 59-year-old man with fever (38^{o}C), headache, cough, dyspnea seen at the Gwagwalada -Abuja quarantine center, who later tested positive for Corona virus disease (COVID -19)by Reverse transcriptase polymerase chain reaction (Rt-PCR) after 3 days of mild illness based on the Sp02 criteria. The RT -PCR test was undertaken at National Center for Disease Control (NCDC) National Reference Laboratory, Gaduwa, Abuja. Hiccups onset was on the 4th day of SARS-CoV-2 positivity, the frequency was roughly 20/minute and lasting a total of 10 days. The hiccups was associated with anosmia/ageusia, anorexia , insomnia, and exacerbated by eating or drinking. The patient received azithromycin, zinc, vitamin D initially . Ivermectin 12mg daily for 5 days was later added, starting after the 2nd day of PCR positive test, after which remarkable clinical improvement occurred, but the hiccups persisted. This constitutes standard of care in Nigeria. The pulse oximetry (SpO2%) was initially 97 and serum creatinine (1.1 mg/dl) and hepatic enzymes were normal .Chlorpromazine 50mg-daily for 3 days was administered to treat the hiccups, but it did not exert any benefit. Patient was not tried on Metoclopramide. Four days after ivermectin dosing commenced, the patient tested negative to SARS-CoV-2 by repeat RT-PCR. He was afebrile, and with SP02% of 99, but the hiccups continued until 3 days after his SARS-CoV-2 PCR negativity. After stoppage of his treatment (he was on ivermectin for five days) and viral clearance at home, his residual symptoms were arthralgia, myalgia and forgetfulness. (Table 1)

Table 1. Table of Laboratory results with reference values.

Case 1	Lab Parameter	Finding	Reference values
	SpO2%	97%	
	Serum creatinine	1.1 mg/dl	
	Liver enzymes		
	ALT Alanine Aminotransferase	34 i.u./l	15-45 i.u/l
	AST Aspartate Transaminase	29i.u.	15-42i.u./l
	Serum Creatinine	93	70-110 umol/l
	Serum Albumin	42	35-50g/l
	Globulin	27g/l	20-40 g/l
	Platelet count	215 x10^{9}/l	100-400 x 10^{9}/l

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Case 2. A 63-year-old man with hiccups of more than 4 days duration, with onset after RT-PCR SARS-CoV -2 positivity. He had mild COVID- 19, with fever, cough anosmia/ageusia. The hiccups frequency was about 1-5 /minute and caused insomnia. He received Vitamin D, azithromycin, Vitamin C but was yet to receive ivermectin, which was not preferred by the attending physician. He self-discharged against medical advice without conversion and was lost to follow up. He promised to seek medical treatment elsewhere. Both cases were seen between December 2020 and February 2021.

DISCUSSION

Persistent hiccups (> 48 hours) has recently been reported atypically in COVID-19 patients [2, 3,4,5.] In the case reported by Prince et al[2] , hiccups was in fact the only presenting symptom. Only a routine X-ray and CT scan showed typical ground glass opacities in the lungs. This suggests that hiccups can be the first presenting sign, and clinicians in the COVID 19 era must have a high index of suspicion in that regard. In the case reported by Bakheet et al, the patient also had fever and sore throat as part of the presenting symptoms. Equally, CT scans revealed typical ground glass appearance and a bloated abdomen. There was no case of hiccups in patients recruited to our recent controlled study of ivermectin in COVID-19 patients seen from May to November in Lagos, Nigeria[6].

Although, racial differences in chemosensory symptoms of COVID-19 are reported globally[7], our new cases which are the first to be published in black Africans, indicate that persistent hiccups is a differential diagnostic symptom for COVID-19 in Nigerians. Both cases were men, aged about 60 years, with hiccups onset after SARS-CoV-2 positivity. Both had fever, cough and associated anosmia/ ageusia with hiccups, indicative of SARS-CoV-2 neurotropism and chemosensory loss. One patient had normal biochemical hepatic and renal functions with persistent and frequent hiccups lasting 10 days, but with no major arterial hypoxemia. His SPO2% was 99 on recovery at home. Significantly, he regained smell and taste sense before , but his hiccups continued for 3 days after SARS-CoV-2 RT- PCR negativity, and he had residual symptoms of arthralgia, myalgia, and amnesia

Since hiccups was not reported in the initial wave of COVID -19, It is not clear if this symptom is SARS -CoV-2-variant-dependent.

CONCLUSION

Persistent hiccups should be sought as COVID-19 chemosensory symptom, in patients suspected of COVID-19 in the tropics, and older men may be more susceptible.

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BRIEF COMMUNICATION

E-LEARNING IN SURGICAL EDUCATION: EXPERIENCE FROM THE DEPARTMENT OF SURGERY, ADDIS ABABA UNIVERSITY

Yonas Ademe*[1], Abebe Bekele [2]

ABSTRACT

Background: *E-learning, or electronic learning, is the delivery of learning and training through digital resources. The department of Surgery, School of Medicine, Addis Ababa University, has recently been using digital E-learning strategies to supplement traditional methods of clinical teaching. This study was conducted to assess our clinical medical students' opinions, interests, and access to e-learning strategies.*

Methods: *This was a cross-sectional study conducted on 171 clinical year 1 and 2 medical students between June 1 and 15, 2021. Data were collected anonymously by an online survey method using a 15-item structured questionnaire. Data were analyzed using nonparametric statistical methods with the help of SPSS software package 26.*

Results: *Most, 162 (95%) medical students confirmed e-learning methods as very helpful and informative. A significant proportion, 147 (89.1%) of the students participating in the survey own a personal computer and the majority, 142 (83.1%) have basic ICT (Information, Communication, and Technology) skills. However, 57 (33.3%) of the respondents reported not having free Internet access on their personal computers.*

Conclusions: *The results of our survey showed that most medical students are very interested in E-learning as one modality of teaching and learning. Most students have personal computers at their disposal and have the skill set to use these devices. However, not all of them have access to free and fast Internet service.*

Keywords: *E-learning, surgical education, Case-Based Collaborative Learning*

INTRODUCTION

E-learning is a type of education where students communicate with teachers and other students via e-mail, electronic forum, videoconferencing, chat rooms, bulletin boards, and other computer-based communication. (1) Dichtanz points to the time and space component of E-learning and emphasizes that E-learning is a collection of teaching and information packages in further education that is available at any time and any place and is delivered to learners electronically. (2) For Chang E-learning is an umbrella concept which comprises almost anything related to learning in combination with information and communication technology. (3)Distance learning evolution can be classified into three generations: The first was "textual", based on printed text only and supported by regular correspondence and mail. The process was known as "education at a distance", "correspondence study" or "correspondence education". The second was "analogical". ". Besides printed texts, the phone, fax, radio-television teaching was used too. Both textual and analogical distance learning models were used mostly in situations when schools were too far away when there were no schools, or simply when adequate teachers couldn't be found.

METHODS

The third generation of distance learning is called "digital". As information technology is rapidly developing, teaching and learning materials are digitized and stored in databases and repositories. Due to the usage of modern ICT, a collaboration of participants involved in the learning process is highly facilitated. The progression of the Internet has set the ground for the rapid development of distance learning based on the Web. (4) In Ethiopia, the first two generations of E-learning have been used for several decades by several institutions. But, with the widespread availability of ICT services in the country and the recent COVID-19 pandemic, the third generation of E-learning is becoming very relevant. (5,6)The following are some of the advantages of E-learning over traditional learning. Digitalization, ICT, and Internet technologies open up new possibilities in creating and implementing the teaching process. Digitalization of teaching and learning materials ensures the availability of vast information, easy manipulation of contents, offers the possibility of real-time update and exchange,

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and it also allows for recording of lessons for possible repetition in the future. Additionally, E-learning allows easy communication between the teacher and students that overcome distance in space. This is especially an important advantage in the current era of COVID-19 where we have to maintain social distancing. The Internet is offering new forms of communication most similar to face-to-face communication such as communication via multipoint videoconference. (1) E-learning has gained increased momentum during the COVID-19 era where traditional classroom teaching was universally interrupted in fear of the spread of the virus. A few weeks after the first case was reported in Ethiopia, most schools, including medical schools, resorted to E-learning strategies to help continue the teaching-learning process where students could attend lectures, seminars, and case discussions from distance. In this regard, the Addis Ababa University, College of Health Sciences adopted the "Lecturio" and "ScholarRx" digital comprehensive E-learning resources. Some departments in the school have also taken the initiative to provide internet-based lectures and discussion sessions to supplement the traditional form of teaching during this pandemic using interactive software such as "Zoom" and "Google Meet".

Our department of Surgery has been using digital E-learning strategies to supplement traditional courses (i.e., traditional classroom lectures and face-to-face patient-based practical clinical teaching) for both undergraduate and postgraduate programs over the one year after COVID-19. Honorary and full-time faculty members from abroad also took this opportunity to help in the teaching-learning process by preparing CBCLs sessions (Case-Based Collaborative Learning) and lectures. And we've observed that the students have been benefiting a lot from these sessions and lectures. .However, it was also observed that students did not benefit to the best of what the E-learning can offer. Our first hypothesis was built on information gathered from informal conversations with students. We've hypothesized that some of the challenges were from the teaching stuff but most appear to originate from the lack of enough digital equipment for the students. Lack of access to a fast and reliable Internet service has also been identified as another potential obstacle. To this end, we've prepared an online survey and collected data from the students to assess if the students own ICT equipment necessary for E-learning or have access to it and more importantly if the students accept E-learning as a new form of learning. We hoped this would provide us with some information on how to expand the E-learning service in our department particularly and our school in general.

OBJECTIVES

- To see how interested the students are in E-learning as a possible form of learning.
- To assess if students own personal computers and have free internet access necessary for E-learning.
- To examine students' opinions on the current E-learning strategies being utilized at our department.

METHODOLOGY

This was a cross-sectional study conducted between June 1 and 15, 2021 on clinical year 1 and 2 medical students enrolled at Addis Ababa University, College of Health Sciences, School of Medicine. The respondents were a subset of clinical medical students who received supplementary E-learning-based lectures and practical clinical sessions during their surgical rotations. The survey was conveniently sent online to 200 students and a total of 171 respondents completed and submitted the online survey, yielding an 85.5 percent response rate. Incomplete questionnaires with missing data were discarded. All data from participants were kept confidential by maintaining the study subjects' anonymity and written informed consent was collected before administering the data collection tool. Written ethical clearance letters were obtained from the departmental research and ethics committee.

Google forms (Google's web-based software) was used to collect data anonymously, using a 15-items structured questionnaire. The data collection tool was pretested on an initial sample of ten medical students. The findings and observations obtained were used to modify the initial questionnaire and the data collection process accordingly.Data were analyzed using SPSS software package 26. Descriptive statistics formed the mainstay of the statistical analysis. Accordingly, frequencies of variables were analyzed using counts and percentages.

RESULTS

We had a total of 171 respondents, age range from 21 to 27 years, and 87 (50.9%) were males. Results of the survey regarding the questions Do you own a computer? (yes/no) showed that 147 (89.1%) of the students participating in the survey own a computer and among those 114 (77%) have free Internet access on their PC.

Sixty-five (57.1%) of them have access to the internet at the school of medicine premises only, 12 (10.5%) only at their home, and only 36 (32.3%) have access to the internet both at the school of medicine and at their home. The majority (56.3%) of students admit they have difficulties with streaming online videos with the speed of the Internet that they get.

We then asked if the students have basic ICT skills such as browsing through the web confidently. One hundred forty-two (83.1%) students reported they have these basic skills. We found that 167 (97.9%) students have attended at least one E-learning session during their medical training. In addition, 162 (95%) of them confirmed they're very interested to pursue more E-learning sessions since they are very helpful and informative. We also wanted to know which form of E-learning they were more interested in (E-learning as a substitute to a traditional course or as a supplement to a traditional course). The majority 122 (75.8%) would prefer E-learning as a supplement to the traditional form of learning (see table 1).

Table 1: Students' interest in E-learning, medical students of Addis Ababa University, 2021

Form of E-learning	Number	Percentage
Supplement to the traditional form	122	75.8
Substitute to the traditional form	40	24.2
Total	162	100

When asked about the presumed benefits of E-learning, the following were reported: ease of access to information, the possibility of repetition of lessons when necessary, and E-learning as a means of preventing the spread of COVID-19 were reported by the students to be the top three advantages of E-learning.

Many recognized E-learning as an advantage for people with restricted mobility (see table 2).

Table 2: Advantages of E-learning, medical students of Addis Ababa University, 2021

Advantages of E-learning	Number of students	Percentage
Learning from own home	130	76
Everything in the same place	87	50.9
Easy access to information	150	87.7
Freedom in choosing teaching materials	118	69
Possibility of repetition if necessary	147	86
Favorable for people with restricted mobility	107	62.6
Means of preventing COVID-19	131	76.6
Other advantages	3	1.8

The biggest drawback of E-learning was identified to be the cost of the internet followed by a lack of physical interaction with teachers. Students also have concerns about the side effects of working long hours on computers (see table 3).

Table 3: Disadvantages of E-learning, medical students of Addis Ababa University, 2021

Disadvantages of E-learning	Number of students	Percentage
No compulsion for learning	62	36.5
No physical interaction with teachers	96	57.6
No physical interaction with fellow students	36	21.2
Side effects of working long hours on computers	80	47.1
Cost of internet	102	60
Other disadvantages	16	9.4

As a prototype model, the department of surgery has been conducting a series of case-based collaborative learning (CBCL) for its clinical students on a one-session per week basis for the past 5 months.

.Ninety-nine out of 171 of our respondents reported they have participated in at least one of these sessions, of which seventy (70.7%) reported that the sessions were very helpful to them, 12 (12%) students reported they would rather have a traditional session with the teacher, and 17 (17.3%) students had no opinion about the sessions. Eighty-four (85.2%) said they would recommend such sessions to be continued to their fellow students.

DISCUSSION

The results of our survey showed that most medical students are very interested in E-learning as one modality of teaching and learning. Most students have personal computers at their disposal and have the skill set to use these devices. However, not all of them have access to free and fast Internet service. Our students are very aware of the many advantages of E-learning but identified the cost of the Internet as a major disadvantage. Most of the students who attended CBCL interactive sessions were very happy with the sessions and recommend similar sessions to their fellow students. Based on our experience, we strongly recommend that the department of surgery and the school of medicine integrate E-learning into its pedagogical strategy. Free/cheap and strong internet should be made universally accessible to all students to support advanced learning. Continuous skills development training should also be provided to students.

We believe this study will be of significant importance in providing basic information regarding the utilization of E-learning as a supplementary, if not an alternative, teaching method in clinical medical education. However, the study does not provide an in-depth analysis on the issue and there is also a possibility of a lack of genuine data from respondents on the account of fear of breach in confidentiality. With these limitations in mind, we recommend further, larger-scale studies on the subject matter.

ACKNOWLEDGMENTS

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Competing interests

The authors declare that they have no conflicts of interest.

Abbreviations

PC: Personal Computer
ICT: Information Communications Technology
CBCL: Case-Based Collaborative Learning

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- 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 immunodeficiency 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 Ophthalmology. 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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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.
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Over the years, The Ethiopian Medical Journal has published numerous articles on its quarterly issues pertaining to medicine and the field of health sciences. Among the many professionals who have dedicated themselves to this task are our team of Peer-Reviewers.

Below is the list of 2021 reviewers who have made every print of literature professional and informative.

The EMJ would like to send its deepest gratitude for these individuals, as well as the many that have preceded them and the many that will follow.

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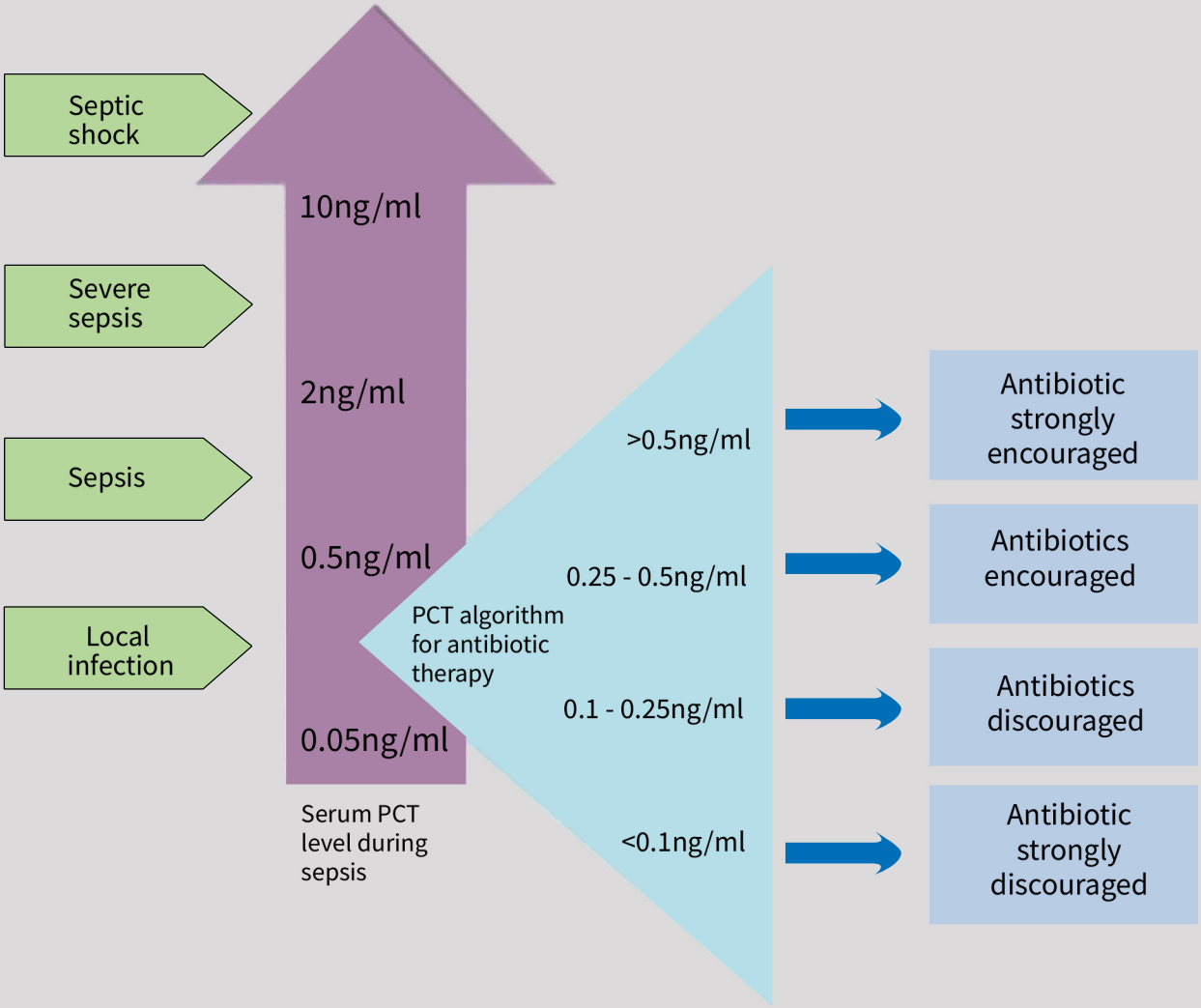

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