ORIGINAL ARTICLE

POOR HYPERTENSION CONTROL AMONG PATIENTS ATTENDING THE KILIMANJARO CHRISTIAN MEDICAL CENTRE, TANZANIA: A CROSS-SECTIONAL STUDY

Sabrina Ali Issa, MD [1], Madhur Gajendra Singh, MD [1], Kajiru Gad Kilonzo , MD [1,3], Beatrice John Leyaro, MSc [1,2], Sia Emmanueli Msuya, PhD [1,2,] James Samuel Ngocho, MD [1,2]

ABSTRACT

Introduction: Poor hypertension control contributes significantly to the growing burden of Disability Adjusted Life Years. Despite the awareness and availability of interventions, only a small number of patients achieve the desired outcome, and the factors associated with poor control remain unclear.

Objective: The study aimed to determine the prevalence and factors associated with poor hypertension control.

Methods: We conducted a hospital-based cross-sectional study between June and August 2018. At the medical outpatient clinic, hypertensive patients 18 years and above who gave consent were eligible. An interview schedule was used to collect the general characteristics, followed by blood pressure recording. Poor hypertension control was defined as two consecutive high blood pressure readings of one month apart in patients using anti-hypertensive. Logistic regression was performed to determine factors associated with poor control.

Results: A total of 300 patients were enrolled in this study. More than half (52.0%) of the participants were female and living in rural areas (57.3%). The mean (±SD) age of participants was 64.1 (±12.02) years. More than three quarter (86.7%) of the participants had poor blood pressure control. Factors associated with poor control were; older age (cOR=1.05, 95% CI=1.02-1.08), being unemployed (cOR=3.46, 95% CI=1.30-9.14), and duration on anti-hypertensive (cOR=1.05, 95% CI=1.00-1.11).

Conclusion: Eight in every ten hypertensive patients had poor control. The poor control in this population was associated with unemployment, age and duration on anti-hypertensive. The results call for more concerted efforts to address hypertension control.

Keywords: Prevalence, Hypertension, Control, Factors, Tanzania.

INTRODUCTION

Hypertension is a systolic blood pressure of $\geq$ 140mmHg and/or diastolic blood pressure of $\geq$ 90mmHg (1). Globally, an estimated 1.39 billion people are hypertensive (2), with the majority living in developing countries (3). The prevalence of hypertension varies widely within the region, a review in Africa reported a prevalence range between 9.3% and 48.1% (4). In Tanzania, a prevalence of 37% has been reported while that of Moshi district was far higher (69%) than the national average (5).

The condition is linked to a number of complications such as stroke, kidney failure, myocardial infarction, and heart failure. These complications are the top killers worldwide, whereby 51% and 45% of deaths are due to stroke and heart diseases respectively (6). Additionally, hypertension contributes significantly to the global disability-adjusted life years (DALYs), for example in 2015 alone systolic blood pressure of $\geq$140mmHg was linked to 143 million DALYs (7).

Despite efforts to reduce the burden of hypertension, there have been disparities in the achievements. Between 2000 and 2010, the prevalence of hypertension increased by 7.7% in low and middle-income countries compared to a 2.6% decline in high-income countries (8). A similar shift in the trends of high blood pressure form the high-income countries to low and middle-income countries was also observed in the period between 1975 and 2015 (9).

Despite being a common condition, only a small proportion achieve the desired blood pressure control. In high-income countries, only about a quarter (28.4) of those on antihypertensives have controlled blood pressure (8). For example, in England and the USA 34% and 50% of patients on antihypertensive attained hypertension control, respectively (10). Furthermore, in China, 22.1% of hypertensive patients had their blood pressure controlled (11).

[1]Kilimanjaro Christian Medical University College, Moshi Tanzania
[2] Institute of Public Health, Kilimanjaro Christian Medical University College, Moshi Tanzania
[3]Kilimanjaro Christian Medical Centre, Moshi Tanzania
*Correspondence author e-mail addressed : chabidokta@gmail.com

Considering the noticeable health system gaps in Africa, it is not surprising to find poor hypertension control in these countries. Across the resource-limited regions, previous estimates reported higher (92.3%) rates of poor blood pressure control (8).

Though the prevalence of uncontrolled blood pressure remains unacceptably high in this region, in the recent surveys a decline has been observed. In Ghana, Kenya and Ethiopia a 57.7%, 48.3% and 52.5%% poor blood pressure control has been reported, respectively (12). In Tanzania, only 0.9% of the population was adequately controlled (5,13,14).

The global poor blood pressure control is associated with many factors. The attributes are broad, both individual, disease pathophysiology and the health system. Previous studies have consistently reported personal factors like older age, male sex, high body mass index (BMI), active smoking, poor adherence to physical activity, and poor adherence to medications as predictors of the poor control (14,15). The duration of hypertension and the presence of co-morbid conditions like diabetes mellitus also contribute to poor control (16).

Despite the high prevalence of hypertension and the poor control elsewhere, in Tanzania as to many other low-income countries, the factors associated with the poor control has not been examined extensively. In the present research, we report factors associated with poor hypertension control among patients attending at Kilimanjaro Christian Medical Centre.

METHODS

Design and setting
We conducted a cross-sectional study between June and August 2018 at the Kilimanjaro Christian Medical Centre (KCMC). The hospital is among the four zonal referral hospitals in the country, serving an estimated 15 million people living in the five regions (Kilimanjaro, Tanga, Arusha, Singida, and Manyara) of Northern Tanzania. Since the facility is in the Kilimanjaro region, most patients are from Kilimanjaro, a region with 7 districts. The participants were enrolled at the medical outpatient clinic.

The clinic is scheduled for Monday and Friday of every week, where patients are followed on a monthly basis. Within a period of one month, each client is expected to make at least one visit to the clinic. Upon visiting the clinic, patients refill the drugs and check their blood pressure. In addition to adherence counselling, they are also counselled on the lifestyle modification.

Study population
Adults aged 18 years and above, previously diagnosed with hypertension and on anti-hypertensive drugs were considered eligible. The clients with the hypertensive crisis were excluded from participating in the study.

Sample size and sampling technique
The sample size was calculated based on a precision formula for a single population proportion. Assuming 88.6% prevalence of poor blood pressure control in a recent hospital-based survey in Ethiopia (17) and a 5% margin of error, the minimal required sample was estimated to be 155 hypertensive clients on treatment.

A total of 840 hypertensive patients attended the hypertensive clinic during the study period. Out of 411 clients were referred to the study team for screening. Following the screening, 305 were considered eligible for enrolment. However, 2 clients were not willing, and 3 absconded participation.

Procedures
At the outpatients' clinic, the triage nurse identified potential participants and referred them to the research team. Participants were briefed about the study topic, especially the objectives and procedures. Those willing and gave written consent were interview by the investigators. Interviews were conducted using the adapted WHO STEPS questionnaire (18). The tool was translated and used in the Swahili language.

Data abstraction: blood pressure a month preceding the current visit was extracted from the participant file. Additionally, the date of diagnosis, anti-hypertensive drugs, and comorbid diseases were also extracted from the patient file.

Measures
Blood pressure: The blood pressure was measured by a nurse using digital blood pressure device (Omron brand) following the American Heath Association recommendations (at the right arm, seated comfortably, appropriate calf size, legs uncrossed, upper arm bared, patient relax for 5 minutes before measurement) (19).

A cut-off point of ≥140/90mmHg was used to define high blood pressure (19), patients with two consecutive reading above or equal to 140/90mmHg of one month apart were classified to have poor control (20).

In addition to socio-demographic information (age, sex, level of education, place of residence, employment status and average monthly income), the following explanatory variables were also collected. Smoking status, participants were asked if they were smoking a cigarette or other tobacco products. Alcohol consumption including the type and amount used per day. Also, study participants were asked on physical activity, this reflected walking or riding a bicycle 10 minutes continuously to get to and from. Weight and height were measured using a portable weighing machine (Seca brand), with minimum clothing and barefooted. The BMI was calculated using a formula; BMI=weight/height^2 in kg/m2. Participants were classified using the obtained parameters, whereby, overweight was defined as BMI between 25 and 29.9kg/m^2 and obesity as a BMI of ≥ 30 kg/m^2.

Data analysis
The analysis was done using the Statistical Package for Social Sciences (SPSS) version 20. Hypertension control is the binary outcome, it was coded as Yes and No, whereby yes was for the one who have not attained hypertension control and no for those who have attained hypertension control. Logistic regression was used to determine factors associated with poor hypertension control, and factor with a p-value of <0.05 was considered statistically significant.

Ethical consideration
Permission to conduct this research was obtained from the Kilimanjaro Christian Medical University College Research and Ethics Committee (certificate number 2417). We also obtained the permission from the KCMC Hospital administration to carry out the study at the hospital. The risk and benefits of participating in the study were explained to potential participants then written consent was obtained from respondents before enrollment.

RESULTS

A total 300 of hypertensive patients were enrolled in this study. The mean (±SD) age of the participants was 64.1 (±12.02) years. More than half were females 156 (52.0%) and married 221 (73.7%). Only 105 (35.0%) had completed secondary education. Over three quarters 245 (81.7%) of patients had health insurance, and the median (IQR) income of the participants was 100,000 (50,000-300,000) TZS per month. Moreover, only four (1.3%) partici-

Table 1 **:** General characteristics of the study

Variables	n	%
Age		
Mean (±SD)	64.1(±12.02)	
Sex		
Male	144	48.0
Female	156	52.0
Place of residence		
Rural	172	57.3
Urban	128	42.7
Marital status		
Married	221	73.7
Not married	79	26.3
Education level		
No formal school and primary education	195	65.0
Secondary and above	105	35.0
Employment		
Employed	209	69.7
Not employed	91	30.3
Health insurance		
Yes	245	81.7
No	55	18.3
Income (TZS)		
<50,000	108	36.0
50,000-200,000	77	25.7
>200,000	115	38.3
Time on anti-hypertensive (yrs.)		
Median (IQR):	5(2-14)	
Current alcohol use (n=50)		
Yes	21	42.0
No	29	58.0
Currently smoking		
Yes	4	1.3
No	296	98.7
Physical activity		
Yes	80	26.7
No	220	73.3
Adding table salt.		
Yes	50	16.7
No	250	83.3
Herbal use.		
Yes	84	28.0
No	216	72.0
BMI		
Normal	79	26.3
Overweight	122	40.7
Obese	99	33.0

1USD=2200TZS

Out of 300 hypertensive patients enrolled in this study, more than a quarter (86.7%) had high blood pressure (uncontrolled blood pressure). In a bivariate analysis, three variables (age, unemployment and duration on anti-hypertensive) were significantly associated with poor hypertension control. To begin with is age, an increase in age by one year was associated with an increase of odds of poor control by 1.1

Unemployed patients had 3.5 higher odds of poor blood pressure control compared to employed (cOR=3.46, 95% CI=1.30-9.14). Lastly, a one-year increase in duration of using anti-hypertensive was associated with 1.1 increase in odds of poor control (cOR=1.05, 95% CI=1.00-1.11) (Table 2).

Table 2: Factors associated with poor hypertension control

Variable	Poor hypertension control n (%)	cOR(95%CI)	P-value
Age			
Mean (±SD)	64.1(±12.02)	1.05(1.02-1.08)	<0.01
Sex			
Male	144(48)	1	1
Female	156(52)	1.23(0.63-2.39)	0.541
Marital status			
Married	221(73.7)	1	1
Not married	79(26.3)	2.21(0.89-5.49)	0.087
Employment status			
Employed	209(69.7)	1	1
Not employed	91(30.3)	3.46(1.30-9.14)	0.012
Education level			
Secondary and above	105(35)	1	1
No formal school and primary education	195(65)	1.83(0.93-3.58)	0.078
Insurance			
Yes	245(81.7)	1	1
No	55(18.3)	0.88(0.38-2.03)	0.770
Current alcohol			
No	29(58)	1	1
Yes	21(42)	0.31(0.52-1.90)	0.209
Current smoke			
No	296(98.7)	1	1
Yes	4(1.3)	0.14(0.02-1.07)	0.059
Physical activity	220(73.3)		
No	80(26.7)	`1	1
Yes		0.72(0.35-1.47)	0.372
Adding table salt	250(83.3)		
No	50(16.7)	1	1
Yes		1.15(0.45-2.91)	0.761
Herbal medicine	216(72.0)		
No	84(28.0)	1	1
Yes		1.65(0.72-3.75)	0.230
BMI			
Normal	79(26.3)	1	1
Overweight	122(40.7)	1.13(0.52-2.47)	0.744
Obese	99(33.0)	1.97(0.79-4.88)	0.143
Time on anti-anti-hypertensive			
Median (IQR)	5(2-14)	1.05(1.00-1.11)	0.024
Income			
>200,000	115(38.3)	1	1
<50,000	108(36)	1.26(0.58-2.75)	0.541
50,000-200,000	77(25.7)	1.16(0.50-2.89)	0.720
Diabetic mellitus			
No	131(72.4)	1	1
Yes	50(27.6)	2.03(0.56-7.32)	0.282
Heart failure			
No	119(65.7)	1	1
Yes	62(34.3)	0.80(0.29-2.17)	0.660
Kidney failure			
No	172(95)	1	1
Yes	9(5)	0.87(0.10-7.44)	0.901

DISCUSSION

This cross-sectional study was designed to examine the factors associated with poor hypertension control among patients attending the KCMC hospital. In this population, more than three quarter (86.7%) of hypertensive patients had poor hypertension control. The poor hypertension control was associated with age, duration on antihypertensive and unemployment. Majority of the patients in this study had poor hypertension control. Similar to another cross-sectional survey conducted in Hai district (Tanzania). Among adults ≥70 years, reported 99.1% poor hypertension control. (4). Comparable to other regional prevalence of poor control, Kenya (97.7%) (21) and Uganda (73.3%) (22). However, higher than what was reported in Canada (35.6%) (23), and China (63.9%) (24). Although the findings agree with the previous studies, KCMC is a referral hospital and the majority of clients seen are referral from other facilities, probably with complications or with poor control. This might have contributed to the observed high prevalence of poor control.

Factor that was found to be significantly associated with poor hypertension control was age. Whereby older patients were less likely to have their blood pressure controlled. Similar results were reported in the study conducted in Tanzania, and Khartoum (5,25). Also, a study conducted in USA reported age to be significantly associated with poor hypertension control, whereby older patients were more likely not to control their blood pressure compare to young ones (26). However, a study done in China showed older people had higher control rates (27). A possible explanation might be that older people lack financial means to afford costly anti-hypertensive drugs since majority are retired. (28).

Furthermore, another factor was employment status, whereas, unemployed had more odds of poor blood pressure. Similar results were reported in a study conducted in Ghana, whereby employed were more likely to have their blood pressure controlled (28). However, another study reported no difference in hypertension control between employed and unemployed (29). This might be the result of financial limitations that unemployed faces which hinder them from affording prescribed medications (30). Thus, doctors may wish to consider affordability of medications as a clinical factor before prescribing. Duration on anti-hypertensive was another factor associated with poor hypertension control. In which patients who were on anti-hypertensive for longer duration of time were less likely to have their blood pressure controlled. This differs from another study conducted in Kenya, which reported no statistically significant on blood pressure control with duration on ant-hypertensive, since better control of blood pressure was observed regardless of time on medication (21).

However, similar results were reported in a study conducted in China (31). Not surprising that the duration was associated with poor control, as many families struggle to buy anti-hypertensives, sometimes they have to choose between buying food or anti-hypertensive medication (32). Consequently, missed appointment and poor adherence of anti-hypertension.

Though we used a validated tool (WHO STEP questionnaire) to collect data and measure non-communicable disease risk factors, there are limitations to be addressed. The prior blood pressure readings were extracted from files with limited information to verify how was measured. Also, a single measurement was taken per visit whereas guidelines recommend the average of two consecutive measurements (19). Moreover, since the study was hospital-based, social desirability bias is probable, this might have resulted in the underestimation of the obtained information on some behavioral factors for poor hypertension control, which are; alcohol use, smoking habit, physical activity and salt utilization.

Conclusion and recommendations
The prevalence of uncontrolled blood pressure control is unacceptably high in this population who are on treatment. Unemployed patients, older and those on treatment for longer duration had poor control. To ensure healthy lives and promote well-being for all at all ages (the United Nations sustainable development goal 3), more collaborative efforts are needed to combat poor control of blood pressure. Further studies are needed to examine the health system factors linked to poor control as these patients attend the clinic for monitoring but still have high blood pressure.

Availability of data material
The database analyzed during the current study are not publicly available. But can be freely available from the corresponding author on reasonable request.

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