

Original Research Article

Assessment of clinical profile among hypertensive patients, Meru, Kenya

Elizabeth W. Kathuri^{1*}, Catherine Gichunge², Lucy K. Gitonga²

¹Department of Nursing, Meru University of Science and Technology, Nchiru, Meru, Kenya

²Department of Nursing, School of Nursing and Public Health, Chuka University, Chuka, Meru, Kenya

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*Correspondence:

Elizabeth W. Kathuri,

E-mail: ekathuri@must.ac.ke

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ABSTRACT

Background: Non-communicable diseases (NCDs) are the leading cause of global morbidity and mortality. Globally, more than 1.28 billion adults are hypertensive and in Kenya, 24% of adult population has elevated blood pressure and 56% of these have never been screened for hypertension. Assessment of clinical profile helps guide the management of hypertensive patients towards obtaining normal blood pressure levels. The aim of this study was to investigate the clinical profile of hypertensive patients at the Meru Teaching and Referral Hospital in Kenya.

Methods: A cross sectional survey was conducted and systematic random sampling was used to sample 75 hypertensive patients who participated in the study. The collected data were summarized using frequencies and percentages. Chi square was used to assess the relationship between the participants' demographic characteristics, clinical profile and hypertension. Statistical significance was set at $p \leq 0.05$.

Results: The average mean age of the participants was 58.53 years and majority were female (52%). Thirty-three (33.3%) were overweight and 24% were obese. The mean body mass index (BMI) for both genders was 26.48 ± 5.24 , the mean waist-to-hip ratio (WHR) and waist circumference (WC) was 0.94 and 102.09 respectively with 85.3% of the participants having a substantially increased WHR. Diabetes was the most common comorbidity (70.73%). Of the five clinical profiles assessed (BMI, RBS, WHR, presence of comorbidities and drug used) only the presence of comorbidity was associated with BP levels $\chi^2(10.01, 3)$, $p=0.018$.

Conclusions: Participants had high blood pressure, BMI, WHR and WC readings as well as several comorbidities.

Keywords: Clinical profile, Comorbidity, Hypertensive patients, Blood pressure control, Kenya

INTRODUCTION

Approximately 41 million deaths globally occur due to non-communicable diseases (NCDs).¹ Further to this, more than three quarters (77%) of the total deaths are in low- and middle-income countries with cardiovascular diseases (CVDs) being the highest contributor.^{1,2} Current estimates indicate that approximately 1.28 billion (31%) of the global adult population are hypertensive.³ Countries in sub-Saharan Africa (SSA) carry the highest burden of hypertension with the majority of the affected population being undiagnosed, untreated and having uncontrolled hypertension.⁴ The prevalence of hypertension in the

developing countries is expected to rise by the year 2025 to 1.56 billion from 1 billion in 2000.⁵ Kiber and colleagues' (2019) reported that the rise is associated with lack of awareness, insufficient treatment and control of the disease. Further to this, few countries in sub-Saharan Africa have national policies, strategies or action plans to address the modifiable risk factors related to hypertension which have contributed to a significant number of adults (30%) being obese and having high blood pressure.⁵

Comorbidity of hypertension with other chronic diseases has made it difficult to control the blood pressure (BP) levels in sub-Saharan Africa leading to increased morbidity and mortality in the region.⁶ Higher plasma

glucose levels is a risk factor for increased blood pressure levels.⁷ Overweight and obese patients in Kenya have been found to have higher rates of hypertension, compared to the normal weight counterparts.⁸

In Kenya the prevalence of hypertension is approximated at 22%.⁹ The high prevalence of the disease in the country is associated with lack of awareness and primary prevention strategies.¹⁰ The purpose of the study was to assess the clinical profile (BMI, WHR, blood sugar, comorbidity and antihypertensive therapy) and their association with the blood pressure among the hypertensive patients at Meru Teaching and Referral Hospital, Kenya.

METHODS

The study adapted a cross-sectional survey design. Data was collected in the months of April and May 2021 at the Meru Teaching and Referral Hospital Outpatient Medical Clinic in Kenya. Study included all adult patients who had been diagnosed with hypertension and were attending the medical outpatient clinic. Systematic random sampling method was used to select sample size of 75 patients who participated in the study.

Variables

The variables included in the study included both the independent and dependent variables. The independent variables included participants' demographics (age, gender, level of education, employment status), participants clinical profile (BMI, WHR, RBS, comorbidity, type and number of antihypertensive medication). The dependent variable was the blood pressure

Sampling technique

Systematic random sampling was used to sample participants. The n^{th} number was calculated by dividing total population (813) with the sample size (75) to give the eleventh number. As the patients reported to the outpatient clinic, they were entered to the patient daily register with serial numbers. Males and females were separated and each eleventh number was used to allocate the n^{th} number to identify the participant for both genders.

Data collection instrument and personnel

Data was collected by trained degree nurse interns using a researcher administered questionnaire. The questionnaire was adapted from World Health Organization (WHO) STEPS instrument for chronic diseases surveillance.¹¹ Participants physical measurements (weight, height, BMI, waist circumference and waist hip ratio) and blood pressure were also taken. The participant's blood pressure was taken after the participant was seated quietly for at least 5 minutes and the measurements were classified using the JNC 8 BP classification.¹² Participant's weight was

taken when the participant was standing on a stadiometer with light clothing and without shoes. Height was measured while the participant was standing erect with SECA microtoise. The study used WHO BMI classification.¹³ Blood sugar was taken on the fingers with On Call Plus pocket blood glucose meter and was categorized according to WHO classification.¹⁴ Waist circumference was taken with an inextensible tape measure of 150 cm capacity at the midpoint between the last rib and upper edge of the iliac crest while the hip circumference was measured at the level of the greater trochanters to the nearest 0.1 cm. The waist hip ratio was calculated by dividing waist circumference by hip circumference. The study adopted WHO classification of waist circumference and waist hip ratio.¹⁵

Data analysis

Data was analysed using the statistical package for the social sciences (SPSS) version 25. Descriptive statistics were used to summarize data into frequencies, percentages, means and mode. Chi square was used to assess the association between the participants' sociodemographic characteristics and their BMI, WHR, RBS, long standing illness, type and number of drugs with BP levels. A p value of less than 0.05 was considered significant for the study. Data was presented in tables.

Ethical approval

Ethics approval for the study was obtained from Chuka University Research Committee (NACOSTI/NBC/AC-0812), the National Commission for Science Technology and Innovation (NACOSTI) (NACOSTI/P/21/8760), and Meru Teaching and Referral Hospital Research Committee (MRU/MED/GEN/R.14). Participants gave consent before filling in the questionnaire and confidentiality was maintained.

RESULTS

Participants demographics

A total sample of 75 patients was used in all analyses. Majority of the participants who were interviewed were females (52%). The mean age of the participants was 58.53 (± 14.29 SD) years and their ages ranged from 20 to 88 years. Majority of the respondents had primary education and below (62.7%). A high percentage of the participants were married (93.3%) with more than half of the participants (52%) having some form of employment.

Physical measurements

Less than half of the participants (37.3%) had normal levels of BMI with the mean BMI for both genders being above normal (26.48 ± 5.24) indicating overweight among the participants. Majority of the participants had a substantially increased waist hip ratio (85.3%) with a mean of 0.94 and 102.09 for WHR and WC respectively.

Majority of the participants had normal levels of blood sugar (72%) with a mean random blood sugar of 7.01 ± 3.22 for both genders (Table 1).

Table 1: Physical measurements of participants.

Variable	Frequency (N) /mean $\pm$ SD, n=75,	Percentage
BMI		
Underweight	4	5.3
Normal weight	28	37.3
Over weight	25	33.3
Obese	18	24
Gender		
Male	25.26 (± 3.86)	
Female	27.61 (± 6.08)	
Both genders	26.48 (± 5.24)	
Waist circumference		
Both genders	102.09 (± 20.08)	
WHR		
Male	0.97 (± 0.10)	
Female	0.92 (± 0.59)	
Both genders	0.94 (± 0.85)	
RBS		
Normal	54	72
Prediabetes	16	21.3
Diabetes	5	6.7
Both genders	7.01 (± 3.22)	

*SD=Standard deviation.

Comorbidity

More than half (54.67%) of the participants had other long-standing illness alongside hypertension with 45.33% suffering from hypertension alone. The most common comorbidity was diabetes (70.73%) as shown in Table 2.

Table 2: Comorbidities among the participants.

Variable	Frequency (n)	Percentage
Comorbidity		
Yes	41	54.67
No	34	45.33
Specific diseases		
Diabetes	29	70.73
Cerebral vascular accident	4	9.76
Congestive cardiac failure	4	7.76
Goiter	1	2.44
Arthritis	1	2.44
Asthma	2	4.88

Antihypertensive medications

Almost all the participants (98.7%) were on antihypertensive medications. Majority of the participants were on combined therapy (66.2%), followed by diuretics

(13.5%), calcium channel blockers (12.2%), beta blockers (4.1%), angiotensin converting enzyme inhibitors (2.7%) and angiotensin II receptor antagonists (1.4%) respectively. The number of drugs in the combination varied among the participants with the majority having two types (71.62%), three (24.3%) and more than three (4.1%) respectively. Majority of the participants, 93.3% (70) adhered to medication regimen as advised by the health workers (Table 3).

Table 3: Antihypertensive regimen used by the participants.

Variable	Frequency (N)	Percentage
Patients on hypertensive medications		
Yes	74	98.7
No	1	1.3
Type of drug		
Diuretics	10	13.51
Beta blockers	3	4.05
Angiotensin II antagonists	1	1.35
Calcium channel blockers	9	12.16
Combined therapy	49	66.22
ACEs	2	2.70
Number of drugs		
Two	53	71.62
Three	18	24.32
More than three	3	4.05
Medication adherence		
Yes	70	93.3
No	5	6.7

Association between clinical profile and blood pressure

Comorbidity was found to be significantly associated with BP levels χ^2 (10.011,3), $p=0.018$ as shown in Table 4.

Additionally, the participant's age and comorbidity χ^2 (9.0, 2) $p=0.011$ and the participants' employment status and BMI χ^2 (8.38, 3) $p=0.039$ were also significantly associated with BP levels (Table 5).

Table 4: Association of BP and clinical profile.

Variable	χ^2	df	P*
Comorbidity	10.011	3	0.018
WC	7.555	6	0.273
WHR	1.211	3	0.750
BS	4.233	6	0.645
BMI	9.681	9	0.377
Combined antihypertensive medications	6.688	6	0.351

*Chi square.

Table 5: Association between demographic characteristics and clinical profile.

Clinical profile and demographic characteristics	χ^2	df	P*
Age (years)			
Comorbidity	9.0	2	0.011
WC	0.606	4	0.977
WHR	0.554	2	0.758
BS	3.345	4	0.502
BMI	3.434	6	0.753
Education			
Comorbidity	0.393	1	0.531
WC	3.409	2	0.182
WHR	1.632	1	1.201
BS	0.324	2	0.850
BMI	0.505	3	0.918
Employment			
Comorbidity	0.376	1	0.352
WC	1.399	2	0.512
WHR	0.221	1	0.442
BS	4.604	2	0.1
BMI	8.380	3	0.039
Marital status			
Comorbidity	1.198	1	0.252
WC	1.674	2	0.432
WHR	1.816	1	0.178
BS	1.857	2	0.395
BMI	1.874	3	0.599

DISCUSSION

Our findings resonate with those from other studies that found that more females had hypertensive compared to their male counterparts.^{16,17} This could be associated with lack of ovarian hormones (estrogen) during the postmenopausal period. Estrogen is responsible for lowering blood pressure levels and lack of it in the menopausal period may pose a risk to high blood pressure.¹⁸

The mean age of the participants was above 50 years and advancement in age above 50 years has been associated with increased prevalence of hypertension in both males and females which could be attributed with changes of the cardiovascular system that comes with ageing.^{19,20} Arterial stiffening has been associated with increased blood pressure levels in this age and later renal compromise that further contributes to higher blood pressure levels.²¹

Majority of our participants were obese and overweight which could explain the high prevalence of hypertension in our study. Obesity has been associated with activation of the sympathetic nervous system, increase in the intra-abdominal and intravascular fat, alterations in adipose derived cytokines, sodium retention and the activation of the renin- angiotensin system thus contributing to high pressure.²² These findings are consistent with other

findings in Kenya that reported a high prevalence of obesity that has contributed to high levels of hypertension.⁸ Additionally, this study also revealed high mean waist/hip ratio for both genders (0.94±0.85) with a mean waist circumference of 100.69±23.22 cm and a mean hip circumference of 107.98±19.76 cm. This could be explained by overweight and obesity among the participants. People with hypertension have been found to have high WC and WHR.²³

Almost all the participants were on hypertensive medication with the majority using combined treatments. Further to this a high percentage used two or more hypertensive drugs. The eight Joint National Committee on hypertension recommends use of more than one drug to control hypertension.¹² This showed compliance of prescription by health workers towards control of blood pressure levels among the participants. Apart from hypertension, the participants also had other comorbidities with the most common being diabetes. Similar results have been reported in Sub-Saharan Africa.²⁴ This could be associated with the increased metabolic risk from uncontrolled weight among the participants as obesity has been found to be a risk factor for hypertension.²⁵ Additionally having diabetes also increases one's risk of getting high blood pressure and management of comorbidities is important in the management of hypertension.²⁶

Limitations and strengths

The study was a cross- sectional observational study and thus was not able to make casual references based on the results. Secondly, the study did not assess the factors associated with comorbidities among the participants. Despite these limitations the study had some strengths. The first strength of the study is that it provided the prevalence of comorbidities among the hypertensive patients. Further to this it provided the clinical profile of these patients raising awareness of the importance of weight and comorbidity management among the hypertensive patients.

CONCLUSION

The study found that anthropometric and blood pressure measurements among the hypertensive patients were high. Although a high percentage of participants were on the recommended drug combinations their blood pressure was still high, highlighting the need for weight management among hypertensive patients as a measure for control of the blood pressure levels.

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