Prevalence of Controlled Systemic Hypertension and its Associated Risk Factors among Hypertensive Patients at Mbeya Zonal Referral Hospital, Tanzania

Samson Peter Mvandal*, Victor Jastin Mwinuka

Department of Health Sciences and Public Health, PIM Foundation, Dar es Salaam, Tanzania

ABSTRACT

Objectives: To determine the prevalence of controlled systemic hypertension and its associated risk factors among the hypertensive patients who attended the clinic at Mbeya Zonal Referral Hospital in Tanzania.

Methods: A descriptive cross-sectional quantitative study was used determine the prevalence to 252 hypertensive patients were recruited during clinic visit from September to November 2020 and participant was randomly selected interviews using structured self-administered questionnaires. Data was analyzed using chi square test to find the risk factors associated with controlled hypertension.

Results: Among 252 participants, 94 (39.7%) individuals with controlled hypertension giving the prevalence of controlled hypertension. The proportion of females with controlled hypertension was slightly higher than male (49 females to 45 males). The prevalence of uncontrolled hypertension was 152 (60.3%) participants. The prevalence of controlled hypertension was higher among patients who have regular clinic visit (p<0.05) and have daily adherence to their anti-hypertensive medication. A similar trend was observed among participants without financial challenges to attend clinic, short duration of illness, higher level of education and there was no association between age, sex, marital status, smoking, alcohol consumption, having health insurance and having chronic illness.

Conclusion: Prevalence of controlled hypertension is higher among patients who have regular clinic visit and have daily adherence to their anti-hypertensive medication. Also, it is higher among participants without financial challenges to attend clinic so they can have regular clinic visit and checkup. Reinforcement on regular drug intake and clinic visit, good nutrition and reduced salt intake and modifying lifestyles of patient with hypertension is important.

Keywords: Age, Adherence, Anti-hypertensive, Controlled hypertension, Clinic, Hypertension, Prevalence, Systemic

*Correspondence: Samson Peter Mvandal, Department of Health Sciences and Public Health, PIM Foundation, Dar es Salaam, Tanzania, E-mail: samsonpim@gmail.com

INTRODUCTION

Hypertension is among the leading causes of death in Tanzania, and also it is a public health rattrap. This affecting most people in Tanzania, whereby life modification factors are less considered. It is a common non-communicable disease which may lead to cardiovascular diseases, heart failure and sometimes sexual dysfunction (American Heart Association, 2020).

In 2010, the global burden of hypertension was estimated at ~1.4 billion, and is likely estimated to exceed 1.6 billion by 2025. In 2016, non-communicable diseases accounted for 40.5 million or 71% of deaths globally; 17.9 million (44%) of non-communicable disease related deaths were due to cardiovascular disease with hypertension as the leading risk factor (World Health Organization, 2013).

According to WHO 2013, explained controlled hypertension as average systolic blood pressure <140 mmHg and an average diastolic blood pressure of <90 mmHg. All these factors based on both risk factor approach and cardiovascular approach (World Health Organization, 2013; Lu J, *et al.*, 2018).

Studies done in Sub-Sahara Africa (SSA) indicate that hypertension is a widespread problem, and it has been reported to be as high as 38% in some communities. It is estimated that out of the approximately 650 million people in SSA, between 10 to 20 million may have hypertension however many countries in SSA still lack detailed information on the prevalence of hypertension. Hypertension is a growing public health problem in Sub-Saharan Africa (Guwatudde D, *et al.*, 2015).

The highest prevalence of uncontrolled hypertension is reported in sub-Saharan Africa, and treatment for hypertension is unacceptably low. Uncontrolled Hypertension (UHTN) in SSA is a challenge despite increasing knowledge of hypertension care and the availability of low-cost medications (Centers for Disease Control and Prevention, 2012). A 2013 systematic review showed a very low level of treatment (18%) and a high (97%) prevalence of uncontrolled hypertension in SSA. Morbidities, such as stroke, associated with uncontrolled hypertension are costly to treat and pose a burden to health care systems in SSA that are already weak. High uncontrolled rates of hypertension have economic and public health implications (Mohamed SF, *et al.*, 2020).

Among patients who have detected HTN, few are taking treatment and, among those on treatment, very few are controlled (Musinguzi G, *et al.*, 2015). Untreated or uncontrolled, hypertension is the single largest contributor to cardiovascular disease globally, causing stroke, heart failure, coronary artery disease, and kidney disease, and also is a major contributor to kidney disease (Fisher ND and Curfman G, 2018).

Hypertension is often called 'the silent killer' because it is a disease that shows no early symptoms, and simultaneously, is the single most significant risk factor for heart disease, The complications of hypertension are related either to sustained elevations of blood pressure, with consequent changes in the blood vessels and heart, or to the accompanying atherosclerosis that is accelerated by long-standing hypertension (Feng X, *et al.*, 2013).

Hypertension burden is increasing in East Africa, local studies done in 2017 have shown an extensive evidence of growing burden of hypertension in Tanzania with variation in prevalence, there is extensive evidence of the growing burden of chronic diseases in both rural and urban populations of Tanzania (Isungula K and Meda J, 2017). Between 1990 and 2000, the prevalence of

hypertension ranged from 3%-27% in rural and 5%-39% in urban. Between 2000 and 2016, hypertension prevalence ranged between 13%-70% in rural and 12%-65% in urban (Isungula K and Meda J, 2017).

A study done in states that hypertension in sub-Saharan Africa is a widespread problem of immense economic importance because of its high prevalence in urban areas, its frequent under diagnosis, and the severity of its complications (Opie LH and Seedat YK, 2005). In Tanzania for example, a study done in Northern Tanzania in 2019 showed the complications such as heart failure, stroke, renal failure, ischemic heart disease, chronic kidney disease (Hertz JT, *et al.*, 2019).

Several factors related to poor control include ageing, obesity, lack of exercise, gender, race, access to health care, drug adherence and co-morbid conditions such as diabetes. Results from studies suggest that it may be possible to solve this public health problem. This requires interdisciplinary approaches to increase patient awareness and physician adherence to guidelines to realize the full benefits of hypertension research. Controlled hypertension is key to prevent hypertension related complications such as stroke, chronic kidney disease and heart failure (Chiong JR, 2008).

In a study done involving six countries in Sub-Saharan Africa around 2018, showed that between 44% to 93% of hypertensive patients were unaware of their disease, only 18% were on medication, and a mere 7% achieved adequate blood pressure control overall (Antignac M, *et al.*, 2018). Also, in study done at Mafia Island in Tanzania around year 2016, out of the 118 participants who were aware of having hypertension, 68 (57.6%) were currently taking medication. From those taking medication, only 14 (20.6%) had controlled hypertension (Muhamedhussein MS, *et al.*, 2016). Therefore aim of this study was to determine the prevalence of controlled systemic hypertension and its associated risk factors among hypertensive patient attending clinic at Mbeya Zonal Referral Hospital, Tanzania.

MATERIALS AND METHODS

The research design was descriptive cross-sectional study.

Study area

This study was conducted at Mbeya Zonal Referral Hospital. Mbeya Zonal Referral hospital is the largest government hospital in Southern part of Tanzania, the hospital was formally upgraded from the former Mbeya regional hospital back in 1984. The hospital serves approximately 8 million people in seven regions namely; Katavi, Njombe, Rukwa, Ruvuma, Iringa, Songwe and Mbeya. In the realm of providing both preventive and curative health care services in the zone. The study conducted at MZRH and data collected from September to November 2020.

Study population

The study included all hypertensive patients aged 18 years and above.

Inclusion criteria

All hypertensive patients attended at Mbeya Zonal Referral Hospital and were under anti-hypertensive drugs, who were having illness for at least 6 months, above 18 years of age and those who were willing to participate were included.

Exclusion criteria

All hypertensive patients not on medication, less than 18 years of age and those who refused to participate in the study.

Study design and sampling

Study participants were drawn from patient attending at hypertensive clinic at Mbeya Zonal Referral Hospital. Patients were excluded if they refused to sign informed consent. Patients' age, sex, marital status, educational level, employment, use of anti-hypertensive medication, fre-

quency of use of medication, regular visit of clinic, presence of co-morbid condition such as diabetes and obesity, life style risk factors like cigarette smoking and alcohol consumption, use of other drugs like steroids and anti-retroviral and duration of disease were recorded on structured questionnaires.

Methods of data collections

Data was collected from the participants by two ways by using questionnaire and by measuring two blood pressure measurements using aneroid sphygmomanometer after five minutes of rest. Self-administered Questionnaire prepared in English and Swahili language and was used to obtain information from all hypertensive patients aged 18 years and above who attended at clinic during study time.

Data analysis procedure and statistical analysis

The data analysis planned to include descriptive and inferential statistics; data were entered into Microsoft excel and then exported to Statistical Package for Social Sciences software (SPSS version 25.0) for further analysis and presented on the percentages and table, regression analysis was used when making comparisons between hypertensive patients with controlled hypertension and those with uncontrolled HTN. The analysis of strength of relationships between categorical variables were conducted using the Chi-square test. A p-value of <0.05 was considered to be statistically significant.

Ethical consideration

Clearance obtained from CREC and permission to conduct this study granted by Medical officer in-charge Mbeya Zonal Referral Hospital. Individual consent was considered and confidentiality was guaranteed. No participant name filled in the form to ensure confidentiality and right to withdraw.

RESULTS

Socio-demographic characteristics of study population

This study involved 252 hypertensive patients attended at Mbeya Zonal Referral Hospital (MZRH) hypertension clinic. Their socio-demographic characteristics have been summarized in the *Table 1* below. Among 252 participants, 52% (131) were female and 48% (121) were male. About 45% (114) participants were aged between 39-59 years followed by 60-80 years who were 30.6% (77) participants, 40.5% (102) participants were tribes found in Southern highland of Tanzania and 59.5% (150) participants were non-southern highland tribes. Also 47% (120) participants were standard seven leavers, 65.9% (166) participants were married, 33.3% (84) participants were peasants and the income range per month for many participants lies between 20000-100000 Tanzania shillings which was 54.8% of all participants.

Table 1: Sociodemographic characteristics of the study population

Variable	Frequency	Percent (%)
Sex		
Male	121	48
Female	131	52
Age		
18-38	48	19
39-59	115	45.6
60-80	77	30.6
>80	12	4.8
Education level		
No formal education	52	20.6
Primary education	120	47.6
Above primary level	80	31.78

Marital status		
Married	166	65.9
Non-married	86	34.1
Occupation		
No job	58	21.4
Farmers	84	33.3
Non-farmers	110	45.3
Income/month (TShs)		
20000-100000	138	54.8
100000-500000	73	29
>500000	41	16.3

Among 252 participants, there were 94 individuals with controlled hypertension giving the prevalence of controlled hypertension of 39.7% *(Figure 1)*. The proportion of females with controlled hypertension was slightly higher than male (49 females to 45 males). The prevalence of uncontrolled hypertension was 60.3% (152 participants).
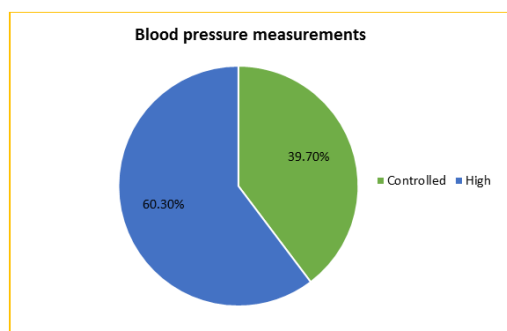
Blood pressure measurements

39.70%
60.30%

■ Controlled ■ High

Figure 1: Prevalence of controlled hypertension

The prevalence of controlled hypertension was higher among patients who have regular clinic visit and have daily adherence to their anti-hypertensive medication. A similar trend was observed among participants without financial challenges to attend clinic, short duration of illness, higher level of education *(Table 2)*.

Table 2: Factors affecting controlled hypertension

Variables	Controlled BP (n=94)	Uncontrolled BP (n=158)	p-value
Age			0.105
18-38	25	23	
39-59	37	78	
60-80	33	44	
>80	5	7	
Sex			0.793
Female	53	78	
Male	47	74	
Education			0.021
No education	18	34	
Primary	39	81	
Secondary	33	28	
Coll/University	10	9	
Tribe			0.012
Southern Tz aboriginal	39	63	
Non-southern Tz aboriginal	61	89	
Marital status			0.592

Married	61	105	
Not married	39	47	
Occupation			0
No job	9	41	
Peasants	32	52	
Non-peasants	59	59	
Earning (Tsh)			0.018
20000-100000	45	93	
100000-500000	32	41	
>500000	23	18	

Factors affecting controlled hypertension

The results of our study were analyzed using chi square test to find the risk factors associated with controlled hypertension. Controlled hypertension was found to have significant association with a number of variables, that included tribe (p=0.012), physical activities (p=0.000), regular clinic attendance (p=0.000), adherence to anti-hypertensive medication (p=0.000), use of table salt (p=0.000), occupation (p=0.000), earning per month (p=0.018), education (p=0.021) and duration of illness (p=0.037). There was no association between age, sex, marital status, smoking, alcohol consumption, having health insurance and having chronic illness *(Table 3)*.

Table 3: Associated factors to controlled hypertension

Variables	Controlled BP (n=94)	Uncontrolled BP (n=158)	p-value
Smoking			0.188
Yes	10	24	
No	90	128	
Alcohol			0.596
Yes	28	38	
No	72	114	
Table salt			0
Yes	14	55	
No	86	97	
Exercise			0
Yes	80	85	
No	20	67	
Insurance			1
Yes	50	76	
No	50	76	
Clinic attendance			0
Usually	73	68	
Often	13	53	
Not often	14	31	
Financial challenges			0.003
Yes	17	52	
No	83	100	
Adherence			0
Yes	83	86	
No	17	66	
Reason for not adhering			0.817
Expensive	9	34	
Out of stock	3	12	

Herbal	7	19	
Chronic illness			0.237
Yes	24	56	
No	69	96	
Medication for illness			0.335
Yes	24	50	
No	4	15	
Duration of HTN (years)			0.037
<5	76	102	
05-Oct	20	49	
>10	4	1	

DISCUSSION

This study was done to determine the prevalence of controlled hypertension and its associated risk factors among hypertensive patients attending at Mbeya Zonal Referral Hospital. This prevalence of controlled hypertension of 39.7% is similar to the study done at Muhimbili National Hospital of Tanzania in 2013 assessing hypertension control which showed control rate of 34% (Mwita JC, *et al.*, 2013).

However the prevalence of controlled hypertension found in this study was higher than the study done in 2020 by Alfa Muhihi *et al.* involving seven communities of East and West Africa in sub-Saharan Africa which showed that among participants with prevalent hypertension, 13% had their blood pressure controlled (Okello S, *et al.*, 2020). Also the study done in Ghana in 2018, in which the prevalence of blood pressure control was 23.8% among of patients taking anti-hypertensive medication (Sanuade OA, *et al.*, 2018). Similarly, a study done in rural-dwelling Tanzanian older adults in 2012 reported a prevalence of controlled hypertension of 14.9% of those on regular treatment and 0.9% of all hypertensives (Dewhurst M, *et al.*, 2013).

Also, the prevalence of controlled hypertension was lower than data from American College of Cardiology/American Heart Association (ACC/AHA) which show that the age standardized proportion of hypertension control was 43.5% in 2015-2016 (American Heart Association, 2020; Dorans KS, *et al.*, 2018).

The difference in prevalence of controlled hypertension between various studies and this study can be explained by difference in socio-cultural aspect that affect the life style in different areas such as diet, occupation and ethnicity (Dorans KS, *et al.*, 2018). Also, the time frame from which this study was done which is shorter compared to other studies. The study involved few participants (252 participants) compared to study done by American Heart Association (AHA) in 2018 which involved 38276 participants (Dorans KS, *et al.*, 2018).

The results of our study showed a significant association of occupation, level of education, earning per month, adherence to antihypertensive, having regular clinic attendance, reduced use of table salt, exercise, short duration of illness and controlled hypertension (Muntner P, *et al.*, 2020). This was similar to the study done in USA by JAMA Network in 2020 that showed increased prevalence of hypertension control among US adults with HTN among those with vs. those without a usual health care facility visit (48.4% vs. 26.5% respectively) (Muntner P, *et al.*, 2020).

Likewise, study done in India in 2017 showed that high education level was useful in controlling BP among hypertensive patients (Roy A, *et al.*, 2017). Moreover, similar findings were reported in study done in Southwest China in 2017, in which reduced salt intake, adherence to medication, exercise, and high economic status were responsible for controlled hypertension among those hypertensive patients on medication (Liu X, *et al.*, 2017).

CONCLUSION

The finding from this study show controlled hypertension is higher among patients who have regular clinic visit and have daily adherence to their antihypertensive medication. Also, it is higher among participants without financial challenges to attend clinic so they can have regular clinic visit and checkup. Other factors responsible for controlled hypertension include reduced use of table salt and physical activities which were all associated with controlled hypertension among hypertensive patients attending at Mbeya Zonal Referral Hospital.

RECOMMENDATIONS

Considering low rate of hypertension control among patients with hypertension, health care providers should reinforce their activities to help to improve patient's knowledge level on factors responsible for their blood pressure control such as physical activities, regular drug intake and clinic visit, good nutrition and reduced salt intake and modifying lifestyles of patients with hypertension.

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REFERENCES

1. American Heart Association. Health threats from high blood pressure. American Heart Association. 2020.

2. World Health Organization. Package of Essential Non communicable (PEN) disease intervention for primary health care in low resources settings. WHO. 2013.

3. Lu J, Lu Y, Krumholz MH, Jian L. Prevalence and control of hypertension. Lancet. 2018; 392(10155): 1306.

4. Guwatudde D, Nankya-Mutyoba J, Kalyesubula R, Laurence C, Adebamowo C, Ajayi I, *et al.* The burden of hypertension in sub-Saharan Africa: A four-country cross sectional study. BMC Public Health. 2015; 15(1): 1-8.

5. Centers for Disease Control and Prevention (CDC). Vital signs: awareness and treatment of uncontrolled hypertension among adults-United States, 2003-2010. MMWR Morb Mortal Wkly Rep. 2012; 61: 703-709.

6. Mohamed SF, Uthman OA, Caleyachetty R, Chumo I, Mutua MK, Asiki G, *et al.* Uncontrolled hypertension among patients with co-morbidities in sub-Saharan Africa: protocol for a systematic review and meta-analysis. Syst Rev. 2020; 9(1): 1-5.

7. Musinguzi G, van Geertruyden JP, Bastiaens H, Nuwaha F. Uncontrolled hypertension in uganda: A comparative Cross-Sectional study. J Clin Hypertens. 2015; 17(1): 63-69.

8. Fisher ND, Curfman G. Hypertension-a public health challenge of global proportions. JAMA. 2018; 320(17): 1757-1759.

9. Feng XL, Pang M, Beard J. Health system strengthening and hypertension awareness, treatment and control: Data from the China Health and Retirement Longitudinal Study. Bull World Health Organ. 2013; 92: 29-41.

10. Isungula K, Meda J. The Burden of Hypertension in the Rural and Urban populations of Tanzania: A review of Trends, Impacts and Response. Tanzan J Health Res. 2017; 1(1): 41-52.

11. Opie LH, Seedat YK. Hypertension in sub-Saharan African populations. Circulation. 2005; 112(23): 3562-3568.

12. Hertz JT, Sakita FM, Manavalan P, Madut DB, Thielman NM, Mmbaga BT, *et al.* The Burden of Hypertension and Diabetes in an Emergency Department in Northern Tanzania. Ethn Dis. 2019; 29(4): 559.

13. Chiong JR. Controlling hypertension from a public health perspective. Int J Cardiol. 2008; 127(2): 151-156.

14. Antignac M, Diop IB, Macquart de Terline D, Kramoh KE, Balde DM, Dzudie A, *et al.* Socioeconomic status and hypertension control in sub-Saharan Africa: The Multination EIGHT study (Evaluation of Hypertension in Sub-Saharan Africa). Hypertension. 2018; 71(4): 577-584.

15. Muhamedhussein MS, Nagri ZI, Manji KP. Prevalence, risk factors, awareness, and treatment and control of hypertension in Mafia Island, Tanzania. Int J Hyperten. 2016; 2016.

16. Mwita JC, Mugusi F, Lwakatare J, Chiwanga F. Hypertension control and other cardiovascular risk factors among diabetic patients at Muhimbili National Hospital, Tanzania. East Afr J Public Health. 2013; 10(1): 337-342.

17. Okello S, Muhihi A, Mohamed SF, Ameh S, Ochimana C, Oluwasanu AO, *et al.* Hypertension prevalence, awareness, treatment, and control and predicted 10-year CVD risk: A cross-sectional study of seven communities in East and West Africa (Seven CEWA). BMC Public Health. 2020; 20(1): 1-13.

18. Sanuade OA, Boatemaa S, Kushitor MK. Hypertension prevalence, awareness, treatment and control in Ghanaian population: Evidence from the Ghana demographic and health survey. PLOS One. 2018; 13(11): 0205985.

19. Dewhurst M, Dewhurst F, Gray WK, Chaote P, Orega GP, Walker RW. The high prevalence of hypertension in rural-dwelling Tanzanian older adults and the disparity between detection, treatment and control: a rule of sixths? J Hum Hypertens. 2013; 27(6): 374-380.

20. Dorans KS, Mills KT, Liu Y, He J. Trends in prevalence and control of hypertension according to the 2017 American College of Cardiology/American Heart Association (ACC/AHA) guideline. J Am Heart Assoc. 2018; 7(11): e008888.

21. Muntner P, Hardy ST, Fine LJ, Jaeger BC, Wozniak G, Levitan EB, *et al.* Trends in blood pressure control among US adults with hypertension, 1999-2000 to 2017-2018. JAMA. 2020; 324(12): 1190-1200.

22. Roy A, Praveen PA, Amarchand R, Ramakrishnan L, Gupta R, Kondal D, *et al.* Changes in hypertension prevalence, awareness, treatment and control rates over 20 years in National Capital Region of India: results from a repeat cross-sectional study. BMJ Open. 2017; 7(7): e015639.

23. Liu X, Gu W, Li Z, Lei H, Li G, Huang W. Hypertension prevalence, awareness, treatment, control, and associated factors in Southwest China: An update. J Hyperten. 2017; 35(3): 637-644.