International Journal of Community Medicine and Public Health
Gladys MM et al. Int J Community Med Public Health. 2021 Jun;8(6):2733-2739
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20211976

Original Research Article

Prevalence of uncontrolled hypertension and associated factors among hypertensive patients attending medical outpatient clinic, Thika level 5 hospital, Kenya

Magara Monyenye Gladys[1]*, John Gachohi[1,2], Alex Muriithi[3]

[1]Department of Public Health, Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya
[2]Washington State University, Global Health, Nairobi, Kenya
[3]Department of Pharmacy, Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya

Received: 30 March 2021
Accepted: 30 April 2021

***Correspondence:**
Gladys M. Magara,
E-mail: gladmagara@gmail.com

ABSTRACT

Background: Uncontrolled hypertension is a key risk factor for stroke and heart and kidney disease. A study was conducted to determine the factors associated with the prevalence of uncontrolled hypertension among hypertensive patients (study participants) attending a medical outpatient clinic, Thika level 5 Hospital (TL5H), Kenya.
Methods: The study adopted a cross-sectional study design and a mixed-methods approach. While the quantitative arm sampled 394 study participants using systematic random sampling, purposive sampling selected 18 health care workers who served as key informant sand 35 study participants took part in focus group discussions in the qualitative arm. Uncontrolled hypertension was defined as systolic and or diastolic blood pressure ≥140 and or ≥90 in one or both previous and current readings during clinic visits. Quantitative data including socio-demographic, socioeconomic, and clinical characteristics of study subjects were collected using interviewer-administered questionnaires. Qualitative data were collected using guides and checklists. Data were analysed descriptively and inferentially using Pearson's chi-square statistics, Fishers exact tests and regression modelling to determine associations between independent variables and uncontrolled hypertension using STATA 14. Qualitative data were organized thematically using NVIVO.
Results: 48% of the study participants had uncontrolled hypertension at the time of the study. Univariable analyses returned level of education (p=0.017), source of financing for hypertensive drugs (p=0.011), BMI (p=0.005) as significant factors.
Conclusions: The study recommends community health promotion activities to increase awareness of how to modify these significant factors to reduce hypertension.

Keywords: Prevalence, Uncontrolled hypertension, Kenya

INTRODUCTION

Non-communicable diseases (NCDs) are increasingly becoming a public health concern in low and middle-income countries (LMICs) similar to high-income countries.[1] Hypertension, a major NCD, is the most significant single contributor to the global burden of disease and global mortality.[2-4] Uncontrolled hypertension is estimated to account for close to 10.4 million deaths and 37 million disability-adjusted life years (DALYs), the equivalent of 3.7% of the total DALYs, yearly according to the WHO.[5,6] Low education levels, constrained access to health facilities, low socioeconomic status, and high costs of drugs contribute to uncontrolled hypertension.[7,8] Health complications of uncontrolled hypertension include stroke, blindness, heart attack, kidney failure, and premature deaths. Managing these complications escalates

the economic burden on individuals, families, and governments.[5]

International standards for managing hypertension globally, including the latest JNC-8 guidelines exist. The guidelines require that hypertension management follow lifestyle changes, drug therapy, and individual focus on particular cases.[6,9] In Africa's diverse regions, sustaining optimal blood pressure control is challenging due to a myriad of challenges.[4,10,11] To achieve WHO global targets of reducing hypertension prevalence to 25% by 2025, the Kenyan government formulated a national strategy for prevention and control of NCDs 2015-2020 that covered hypertension.[12] While the proportion of uncontrolled hypertension ranges between 45.5% and 64.7% in Kenya, uncontrolled hypertension factors largely remain unidentified.[3,13] Therefore, this study determined the prevalence and factors associated with uncontrolled hypertension among hypertensive subjects attending MOPC TL5H in Kenya to contribute to the country's national strategy for prevention and control of NCDs.

METHODS

The study was conducted at TL5H, Kiambu County, Kenya. A descriptive cross-sectional study design was adopted to collect quantitative and qualitative data from adult hypertensive patients. The study targeted 394 hypertensive patients who were on antihypertensive treatment one year before the study and signed consent. Cochran 2007 formula was used to calculate the sample size of 394 and Systematic random sampling technique was used to select the subjects. Interviewer administered questionnaires; key informant, focussed group discussion guides and observation checklist were used to solicit information.

Quantitative data was organised, cleaned, coded, checked for accuracy and analysed using STATA 14. Descriptive statistics was used to summarise and organise the data. Associations between variables were estimated using chi square statistics or Fishers exact test. The use of logistic regression analysis determined multivariate variables and their relationships with uncontrolled hypertension. Differences between the parameters were deemed statistically significant at $p<0.05$.

Qualitative data

The key informant interviews and focus group discussions was recorded, transcribed and translated into english by the study team. Coding and analysis were organised thematically using NVIVO.

RESULTS

Table 1 shows the socio-demographic characteristics of study participants. A majority (39%, n=155) of the study participants were >65 years old. Female participants constituted 66% (n=260) relative to males (34%) (n=134). Ninety-seven percent (n=383) of the participants were Christian, 67% (n=263) were married at the time of the study, and 52% (n=203) had a positive history of a parent with hypertension. The majority of participants (47%) had attained secondary school education, followed by post-secondary education (32%).

Table 1: Socio-demographic characteristics of study participants.

Variables	Value label	Frequency	Percentage (%)
Age	18-25 years	0	0
	26-35 years	5	1
	36-45 years	29	7
	46-55 years	86	22
	56-65 years	121	31
	>65 years	155	39
Gender	Male	134	34
	Female	260	66
Religion	Christian	383	97
	Non-Christian	11	3
Current marital status	Not Married	131	33
	Married	263	67
Level of education	Informal	55	14
	Primary	29	7
	Secondary	185	47
	Post-secondary	125	32
History of a parent with hypertension	Yes	191	48
	No	203	52

Association between socio-demographic factors and uncontrolled hypertension

We cross-tabulated socio-demographic factors and uncontrolled hypertension, finding slightly higher proportions of study participants with uncontrolled hypertension among (i) those aged <55 years, (ii) male participants, (iii) those of Christian faith, (iv) those married, (v) those with secondary and post-secondary education and (vi) those whose one or both parents were hypertensive (Table 2). When we analyzed for associations, uncontrolled hypertension was significantly associated with education level ($p<0.05$) (Table 2). Qualitative data collected during key informant interviews revealed that most patients were elderly patients. A good number were patients who are within childbearing age and require specific indications for certain drugs. From the FGDs, male discussants revealed how their sex libido had reduced attributable to both the disease and side effects of the drugs.

Table 2: Association between socio-demographic characteristics and uncontrolled hypertension.

Variables	Variable category	HTN control		Total	Proportion (%) with uncontrolled HTN	P value
		No	Yes			
Age in years	26-35	0	3	3	100.0	0.19
	36-45	13	16	28	57.1	
	46-55	35	51	86	59.3	
	56-65	70	51	121	42.1	
	>65	87	68	155	43.9	
Sex	Male	67	67	134	50.0	0.562
	Female	138	122	260	46.9	
Religion	Christian	199	184	383	48.0	0.866
	Non-Christian	6	5	11	45.5	
Marital status	Married	130	133	263	50.6	0.143
	Other	75	56	131	42.7	
Education level	Informal	35	20	55	36.4	0.017
	Primary	21	8	29	27.6	
	Secondary	86	99	185	53.5	
	Post-secondary	63	62	125	49.6	
Hypertensive parent	Yes	98	93	191	48.7	0.781

Association between socioeconomic factors and uncontrolled hypertension

We cross-tabulated socioeconomic factors and uncontrolled hypertension finding slightly higher proportions of study participants with uncontrolled hypertension among (i) those with non-formal education, (ii) those earning less than KES 15,000 per month, (iii) those whose family income was greater than KES 15,000 per month, (iv) those who used out-pocket money to procure antihypertensive drugs (Table 3). When we analyzed for associations, uncontrolled hypertension was significantly associated with financial sources of procuring anti-hypertensive drugs ($p<0.1$) (Table 3). Qualitative data collected during FGDs corroborated some of these findings. For instance, the study participants indicated that living with hypertension drained them financially owing to the high costs of anti-hypertensive drugs occasionally causing them to skip the recommended dosage.

Table 3: Association between socioeconomic characteristics and uncontrolled hypertension.

Variables	Variable category	Hypertension control		Tot-al	Proportion (%) with uncontrolled HTN	P value
		No	Yes			
Employment Status	Non-formal	182	171	353	48.4	0.582
	Formal	23	18	41	43.9	
Study participant monthly income (KES)	≤15000	170	159	329	48.3	0.802
	>15000	35	30	65	46.2	
Family monthly income (KES)	≤15000	153	139	292	47.6	0.642
	>15000	52	50	102	49.0	
Financial sources of anti-hypertensive's	Full subsidy	8	9	17	52.9	0.005
	Medical insurance	86	52	138	37.7	
	Out of pocket	111	128	239	53.6	

*Chi-square or Fisher's exact p value depending on expected cell frequencies being <5 or >5

Association between lifestyle characteristics and uncontrolled hypertension

We cross-tabulated lifestyle characteristics and uncontrolled hypertension finding slightly higher proportions of study participants with uncontrolled hypertension among (i) those with longer periods since the last clinic visit, (ii) those currently not smoking, (iii) those taking alcohol, (iv) those not purposely exercising for at least 30 minutes daily, (v) those not frequently using salt in their diets and (vi) those whose BMI increased since the last clinic visit (Table 4). When we analyzed for associations, uncontrolled hypertension was significantly associated with BMI change status since the last clinic visit

and use of salt in the diet (p<0.1) (Table 4). Qualitative data collected during FGDs corroborated some of these findings. For instance, study participants narrated how they consume 'little' amounts of salt, without which they found it tasteless. Study participants also narrated how they perceived exercise as walking while running errands such as home chores, going to the market and hospital, working in their farms, and fending for their animals. Besides, they considered the recommended diets as unaffordable.

Table 4: Association between lifestyle characteristics and uncontrolled hypertension.

Variables	Variable category	No	Yes	Total	Proportion (%) with uncontrolled hypertension	P value
Period since last visit	Below 1 month	59	62	121	51.2	0.343
	2-3 months	133	110	243	45.3	
	>3 months	13	17	30	56.7	
Current smoking status	No	200	185	385	48.1	0.830
	Yes	5	4	9	44.4	
Current alcohol use	No	196	180	376	47.9	0.860
	Yes	9	9	18	50.0	
Physical exercise 30 minutes daily	No	29	37	66	56.1	0.149
	Yes	170	152	328	46.3	
Frequently using salt in diet	No	39	50	89	56.2	0.078
	Yes	166	139	305	45.6	
BMI	Increased	55	61	116	52.6	0.005
	Maintained	40	14	54	25.9	
	Reduced	101	88	189	46.6	

*Chi-square or Fisher's exact p value depending on expected cell frequencies being <5 or >5.

Multivariable analyses

Regardless of BMI status change, participants with primary or secondary school education were >2 times more likely to have uncontrolled hypertension than those without formal education (Table 5). However, having post-secondary education reduced the odds of uncontrolled hypertension. On the other hand, study participants who maintained or decreased their BMI were 3.3 and 1.3 times less likely to have uncontrolled hypertension regardless of their education level (Table 5).

Table 5: Multivariable logistic regression analyses of factors associated with uncontrolled hypertension among patients on follow-up at MOPC TL5H Kenya.

Variables	Category	Adjusted odds ratio	Standard error	Adjusted odds ratio 95% CI	P value
Education	None	Ref			
	Primary	2.2	0.76	1.1, 4.3	0.026
	Secondary	2.1	0.78	1.1, 4.4	0.037
	Post-secondary	0.8	0.41	0.3, 2.2	0.644
BMI change	Increase	Ref			
	Maintained	0.3	0.10	0.1, 0.6	0.001

DISCUSSION

This study revealed that 48% of the hypertensive patients we studied had uncontrolled hypertension significantly associated with the attained level of education and increased BMI values computed from preceding and the current clinic visit readings. The 48% prevalence is considerably high, given that uncontrolled hypertension presents cardiovascular risks whose ultimate consequence is end-organ damage precipitating heart failure, stroke, ischemic heart disease, and renal failure.[5] Broadly, the 48% prevalence was within the range reported in previous studies done for instance, among 80 countries globally, 46.3%, 45.5% in Kenya, and 52.7% in Ethiopia with discrepancies attributed to different social demographic, economic, lifestyle practices, and clinical management factors in different regions and countries.[3,11,14]

Pharmacological failure to achieve blood pressure control or non-adherence to treatments prescribed in the clinic could explain the high prevalence of uncontrolled hypertension that we found in this study. Besides, part of this proportion could be attributed to resistant

hypertension, defined as consistent systolic blood pressure ≥140 and or a diastolic pressure ≥90 despite three antihypertensive medications of different classes, one of which must be a diuretic as demonstrated in this study.[9] While developing countries have limited published studies on resistant hypertension, the primary health care in these countries could expect to come across such cases and perhaps in higher proportions in a specialist clinic such as where we conducted this study. On the other hand, the literature primarily attributes non-resistant hypertension to erratic medication compliance or insufficient drug therapy, or both.[15] Other reported factors associated with non-resistant hypertension include failure to adhere to lifestyle advice, poor blood pressure measurement technique, and the use of medications that interfere with blood pressure.[16] Without prior knowledge on whether hypertension belonged to the resistant or non-resistant type, the key informants in this study reported that they considered the degree of hypertension when deciding on the type of therapy to prescribe.

Paradoxically, the level of education inconsistently predicted uncontrolled hypertension in this study. Hypertensive patients with primary and secondary education levels, who constituted 54%, were two times more likely to have uncontrolled hypertension than those with informal education. Given the cost of pharmacological and non-pharmacological management for chronic hypertension, one would speculate that low education, which influences the individual socioeconomic status, is among the critical factors for blood pressure control rates. However, the effect of uncontrolled hypertension among hypertensive patients achieving post-secondary education was similar to the influence exhibited by low education level. These findings suggested a scarcely-reported non-linear relationship between years of schooling and uncontrolled hypertension, previous studies have consistently described positive associations between educational status and blood pressure control even after adjusting for common confounding factors.[17] Research is, therefore, needed to investigate factors that mediate the associations between educational status and blood pressure among hypertensive patients with low or high education levels in low-resource settings such as in Kenya. Perhaps low education levels attract stronger reception to clinicians' instructions and advice, and nonetheless, anthropological studies could authenticate this presumption. On the other hand, those who have attained higher education could have accumulated better health literacy and clarity on long-term uncontrolled hypertension complications.

This study revealed a cumulative occurrence of cardiovascular risk factors, including overweight and obesity, measured by BMI. While 29% of the patients had their BMI increase during the preceding and current visits, the rest either maintained or reduced their BMI. Obesity and overweight are related to changes in blood pressure, with studies reporting an increase of short-term blood pressure variability by 0.25 for every one-unit increase in BMI.[18] Respectively, patients who maintained or reduced their BMI during the two visits in our study were 70% or 20% less likely to have uncontrolled hypertension than those BMI increased. We postulated that these patients who maintained or reduced their BMI, therefore, could experience low or no short-term blood pressure variability, which, if real, needs to be supported among hypertensive patients. Recommended BMI lowering activities include regular physical activity (which did not reach significance in this study), high dietary intake of non-starch polysaccharides (dietary fibre), low glycemic foods, and increased eating frequency of small food portions.[19] However, investigation of the nutritional, social, and broader determinants of lowering BMI was outside the scope of our study.

Compared with a study done in Ethiopia most hypertensive patients in our study stopped cigarette smoking and alcohol consumption, though these variables did reach statistical significance.[11] Knowledge of the implications of alcohol and cigarette smoking among the participants could have influenced the reported behaviour modification. On the other hand, the study failed to associate salt use in the diet with uncontrolled hypertension. Indeed, focus groups reported that unsalted food usually is 'flat', potentially explaining the high prevalence of uncontrolled hypertension as reported elsewhere.[20] The WHO recommends reducing dietary salt intake to target the global NCD crisis, rallying member nations to raise population-wide awareness of increased dietary salt intake that escalates hypertension, cardiovascular disease, and stroke.[21] Other factors that did not reach statistical significance included age, gender, antihypertensive medications of different classes, presence of co-morbidities that otherwise have a practical significance as illustrated in other studies.[22,23]

Limitations

The data generated in this study was cross-sectional and, therefore, difficult to make causal inferences besides providing differing findings had another timeframe been chosen. Secondly, the study relied on self-reported measures for selected health and lifestyle characteristics introducing the possibility of recall bias.

Besides, single or double-occasion blood pressure measurements could overestimate true hypertension as previously reported.[24]

CONCLUSION

In conclusion, our study has shown that 48% of hypertensive patients on treatment and follow-up at TL5H had uncontrolled hypertension at the time of the study. Without mitigation, the patients are at a progressive risk of developing long-term hypertension complications.

However, further studies are needed to confirm our findings. Awareness of factors that elevate the risk of

uncontrolled hypertension among hypertensive patients needs to be raised, especially in maintaining a healthy BMI.

ACKNOWLEDGEMENTS

We sincerely thank the academic staff at the department of public health Jomo Kenyatta university of Agriculture and Technology for organising seminars for us to share on our research results. We do appreciate our data analyst too for his input in our research.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Heller O, Somerville C, Suggs LS, Lachat S, Piper J, Pastrana AN, et al. The process of prioritization of non-communicable diseases in the global health policy arena. Health Policy Plan. 2019;34(5):370-83.
2. Beaney T, Schutte AE, Stergiou GS, Borghi C, Burger D, Charchar F, et al. May Measurement Month 2019: The Global Blood Pressure Screening Campaign of the International Society of Hypertension. Hypertension. 2020;76(2):333-41.
3. Ogola EN, Barasa F, Barasa AL, Gitura BM, Njunguna B, Beaney T, et al. May Measurement Month 2017: the results of blood pressure screening of 14,845 individuals in Kenya-Sub-Saharan Africa. Eur Heart J Suppl. 2019;21:71-3.
4. Seedat YK. Why is control of hypertension in sub-Saharan Africa poor? Cardiovasc J Afr. 2015;26(4):193-5.
5. WHO. A global brief on hypertension Silent killer, global public health crisis, 2013. Available at: https://www.who.int/cardiovascular_diseases/publications/global_brief_hypertension/en/. Accessed on 23 March 2021.
6. Unger T, Borghi C, Charchar F, Khan NA, Poulter NR, Prabhakaran D, et al. 2020 International Society of Hypertension Global Hypertension Practice Guidelines. Hypertension. 2020;75(6):1334-57.
7. Cuschieri S, Vassallo J, Calleja N, Pace N, Mamo J. The Effects of Socioeconomic Determinants on Hypertension in a Cardiometabolic At-Risk European Country. Int J Hypertens. 2017;7107385.
8. Kubota Y, Heiss G, Mac LRF, Roetker NS, Folsom AR. Association of Educational Attainment With Lifetime Risk of Cardiovascular Disease: The Atherosclerosis Risk in Communities Study. JAMA Intern Med. 2017;177(8):1165-72.
9. James PA, Oparil S, Carter BL, Cushman WC, Dennison HC, Handler J, et al. 2014 evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eighth Joint National Committee. JAMA. 2014;311(5):507-20.
10. Nansseu JR, Noubiap JJ, Mengnjo MK, Aminde LN, Essouma M, Jingi AM, et al. The highly neglected burden of resistant hypertension in Africa: a systematic review and meta-analysis. BMJ Open. 2016;6(9):11452.
11. Tesfaye B, Haile D, Lake B, Belachew T, Tesfaye T, Abera H. Uncontrolled hypertension and associated factors among adult hypertensive patients on follow-up at Jimma University Teaching and Specialized Hospital: cross-sectional study. Res. Reports Clin. Cardiol. 2017;8:21-9.
12. Ministry of Health. Kenya national strategy for the prevention and control of non-communicable diseases, 2015. Available at: www.health.go.ke. Accessed on 23 March 2021.
13. Kubo MN, Kayima JK, Were AJ, McLigeyo SO, Ogola EN. Factors Associated with Uncontrolled Hypertension among Renal Transplant Recipients Attending Nephrology Clinics in Nairobi, Kenya. J Transplant. 2015;746563.
14. Beaney T, Burrell LM, Castillo RR, Charchar FJ, Cro S, Damasceno A, Kruger R, Nilsson PM, et al. May Measurement Month 2018: a pragmatic global screening campaign to raise awareness of blood pressure by the International Society of Hypertension. Eur Heart J. 2019;40(25):2006-17.
15. Sheikh D, Mateti UV, Kabekkodu S, Sanal T. Assessment of medication errors and adherence to WHO prescription writing guidelines in a tertiary care hospital. Futur J Pharm Sci. 2017;3,60-4.
16. Burnier M, Egan BM. Adherence in Hypertension. Circ Res. 2019;124(7):1124-40.
17. Liu SY, Buka SL, Linkletter CD, Kawachi I, Kubzansky L, Loucks EB. The association between blood pressure and years of schooling versus educational credentials: test of the sheepskin effect. Ann Epidemiol. 2011;21(2):128-38.
18. Chen H, Zhang R, Zheng Q, Yan X, Shouling W, Youren C. Impact of body mass index on long-term blood pressure variability: A cross-sectional study in a cohort of Chinese adults. BMC Public Health. 2018,1193.
19. Johnson M, Backman D, Kohatsu N, Stewart O, Abbott R, Yu Z, et al. Interventions for Reducing Body Mass Index and Other Weight-related Indicators: A Review of Systematic. Reviews Acknowledgements. 2016;1-30.
20. Yang MH, Kang SY, Lee JA, Kim YS, Sung EJ, Lee KY, et al. The Effect of Lifestyle Changes on Blood Pressure Control among Hypertensive Patients. Korean J Fam Med. 2017;38(4):173-80.
21. Payne RS, Piernas C, Aveyard P, Sheppard JP, Rayner M, Jebb SA. The Salt Swap intervention to reduce salt intake in people with high blood pressure: protocol for a feasibility randomised controlled trial. Trials. 2019;20(1):584.
22. Oliveros E, Patel H, Kyung S, Fugar S, Goldberg A, Madan N, et al. Hypertension in older adults: Assessment, management, and challenges. Clin Cardiol. 2020;43(2):99-107.

23. Dipette DJ, Skeete J, Ridley E, Campbell NRC, Lopez JP, Kishore SP, et al. Fixed-dose combination pharmacologic therapy to improve hypertension control worldwide: Clinical perspective and policy implications. J Clin Hypertens (Greenwich). 2019;21(1):4-15.
24. Mendenhall E, Kohrt BA, Norris SA, Ndetei D, Prabhakaran D. Non-communicable disease syndemics: poverty, depression, and diabetes among low-income populations. Lancet. 2017;389(10072):951-63.

Cite this article as: Gladys MM, Gachohi J, Muriithi A. Prevalence of uncontrolled hypertension and associated factors among hypertensive patients attending medical outpatient clinic, Thika level 5 hospital, Kenya Int J Community Med Public Health 2021;8:2733-9.