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DETERMINANTS OF HYPERTENSION IN METTU KARL HOSPITAL, SOUTHWEST ETHIOPIA: CASE CONTROL STUDY

Muluneh Shuremu[1*] and Negussie Deyessa[2]
[1]Department of Public Health, Faculty of Public Health and Medical Sciences, Mettu University, Mettu, Ethiopia.
[2]School of Public Health, Medical College, Addis Ababa University, Addis Ababa, Ethiopia.

ARTICLE INFO	ABSTRACT
Article history Received 06/04/2017 Available online 30/04/2017 **Keywords**: Determinant, Hypertension, Mettu Karl Hospital, Ethiopia.	Background: Hypertension has been the major public health challenge worldwide. In considerable proportion of cases, the disease tends to be symptomless for prolonged time and the known morbidity is much less than the known morbidity. Various sources revealed that, it became the major cause of morbidity and mortality across the world. Objectives: The main purpose of this study was to assess determinants of hypertension. Methods Facility based matched case control study design was employed in Mettu Karl hospital from individuals visited the hospital for medical care. A total of 342 (114 cases and 228 controls) subjects constituted the sample size for this study. Anthropometric and blood pressure measurement were taken through standardized procedures and the rest data was collected through interviewer administered questioner. Data were entered onEPi Info version 3.5.3.and exported to SPSS version 16.0 statistical software packages for analysis. Results: Cigarette smoking, alcohol consumption and khat chewing, (AOR= 6.465, 95%CI: 3.486, 11.991), (AOR= 6.136, 95%CI: 3.247, 11.596), (AOR= 4.395, 95%CI: 2.308, 8.366) had higher odds of developing hypertension than non- smoker, no alcohol consumption and those who don't chew khat respectively. Similarly body mass index, physical inactivity, family history of HTN and house hold family size, (AOR= 2.234, 95%CI: 1.300, 3.838), (AOR= 1.732. 95%CI: 1.041, 2.879), (AOR= 2.729, 95%CI: 1.797, 5.247), (AOR= 2.840, 95%CI: 1.526, 5.287) respectively were significantly associated with HTN occurrence. Conclusion and recommendation: The study shows that exposure to risk factors such as alcohol consumption, nature of routine work, nature sleep time, khat chewing, urban inhabitant, family history of hypertension, cigarette smoking and physical in activity, house hold family size, sleeping duration and BMI were determinants of hypertension development. So measures should have to be taken to minimize those risk factors.

Corresponding author
Muluneh Shuremu(BSc.,MPH)
Department of Public Health,
Faculty of Public Health and Medical Sciences,
Mettu University, Mettu, Ethiopia.
Email: mulunehshuremu@gmail.com
Website: www.meu.edu.et

INTRODUCTION
Background
Analysis of the global burden of hypertension revealed that over 26% of the world's adult population had hypertension[1]. It is a common health problem without symptom until undergoing with high complication and advancement which is the most important risk factor for main organs morbidity such as heart, brain, kidney and eyes[1].

Usually it is readily detectable, easily treatable condition and if left untreated may lead to serious complications. In considerable proportion of cases, the disease tends to be symptomless for prolonged time and because of this situation it is labeled as 'Silent Killer'. Essential hypertension is the most prevalent form of hypertension accounting for greater than 90% of all cases of hypertension[2]. High blood pressure is a major risk factor for various serious health problems like stroke, heart diseases, kidney failure, and eye complications(8). Hypertension is also considered as an 'Iceberg' disease' because unknown morbidity far exceeds the known morbidity [2]. However, it is a major risk factor in a number of potentially fatal conditions and is also a precursor to several non-fatal but debilitating disorders and life time consequences[3].

In developing countries, its morbidity and mortality are increasing from time to time due to various factors like a change in life style and rapid undergoing transition. Until recently, hypertension has been given low priority in Africa[4]. Recent studies conducted in Africa have revealed that a prevalence ranging from 7.5% in Sudan to as high as 37.7% in Tanzania[5].

In Ethiopia, hypertension accounted for 1.4 percent of all deaths reported by Federal Ministry of Health of Ethiopia (FMOH) in 2000/01, making it the 7th leading cause of death in the country for the year [4, 6].In IlluAbabor zone, though the life styles of the community are similar to other Ethiopian Communities in terms of being exposed to risk factors of Hypertension, up to the search of the researcher there is no research done to explore factors contributing to Hypertension and its consequences. Therefore, this study will attempt to find out the determinants of hypertension among peoples visiting Mettu Karl hospital and come up with significant recommendation which could help designing effective strategies towards preventing and controlling hypertension.

METHOD
Study setting, design and sampling
Facility based case control design were conducted in Mettukarl hospital, Mettu town, Oromiya, which is located 600 km to south west of Addis Ababa. Mettu Karl hospital is the only referral hospital in the Zone, serving about 2.1 million people from IlluAbabor Zone, Gambella Regional State and adjacent Southern Nation and Nationalities Peoples region. The Hospital health service covers, outpatient department, Intensive Care Unit, Obstetrics and Gynecology and in patientservices (medical, pediatrics and surgical wards). The hospital also has medical, surgical and gynecological referral clinics and emergency intervention unit. Mettu Karl hospital has 123 technical and 157 supportive staffs. Patients of hypertension, as chronic illness, are served at outpatient department on a regular base and those hypertensive patients who need admission admitted and treated as inpatient. Sample size was calculated using open epi(version 2, open source – SSCC) With the following assumption; 95% confidence interval, 80% power, 2:1 control to case ratio and proportion of exposure among control = 49.6, proportion of exposure among cases = 66.3% and Odds ratio:2.00.With 10% non-response rate the total sample size was 342 (114 cases and 228 controls). In addition to the software calculation, the formula used to calculate the sample size was the proportion for two populations.

$$N = \frac{n1p1+n2p2}{n1+n2}$$

Where:

n1= weighted number of women   P1= proportion of women
n2 = weighted number of men   P2= proportion of men

Sample size was calculated for exposure status in different variables. The most significant predictor for hypertension (alcohol consumption) was used [7].

Hence, Exposure for controls calculated as;

$$\text{Weighted mean} = \frac{n1p2+n2p2}{n1+n2} = \frac{16{,}515*45+14{,}110*55}{30{,}625} = 49.6\%$$

Based on kelsey et al, methods in observational Epidemiology[8] and adding 10% for non-response a total of 342 (114 cases and 228 controls) has been taken as sample.

Individuals above 20 years of age were included in the study and cases were those visited the hypertension clinic with a diastolic blood pressure greater or equal to 90 mmHg for 2 or more occasions and controls were patients with diastolic blood pressure of < 85 mmHgfrom March 1st - April 30th /2013. Data collection was continued until the desired sample size was achieved for both cases and control.

Measurement

Data collection tool was developed after extensive literature review and some of them were adopted directly from EDHS 2011 and WHO Disability Assessment Schedule 2.0 (WHODAS 2.0) and the questioner translated to local languages(Amharic, and Afan Oromo) and back to English to assess consistency of the tool. Socio- demographic, hypertension status, history of smoking and Alcohol consumption, nutritional behaviors, physical exercise and quality of life were addressed by the tool. Threeday training was given focusing on the objective, procedures, techniques and ways of data collection prior toactual data collection. Three health workers from the hospital were recruited as a data collector and two MPH holder supervised and facilitates the data collection process. Pretest was done at Mettu Health center five days prior to the actual initiation of data collection using prepared questionnaire and due correction was performed. BP was measured, according to WHO guidelines in a sitting position after the participant rested for at least 5 min. Three measurements were taken with intervals of 5 min between consecutive measurements using a sphygmomanometer apparatus (ERCA, ERCA meter 3000). In addition, participants were asked whether they were taking any medications for the treatment of hypertension. Average systolic BP (SBP) and diastolic BP (DBP) were determined from the second and third measurements. Weight was measured using an adult scale (IDA foundation EAP- 350 lb, CAP 160m) participants standing without shoes and wearing light clothing and recorded to the nearest 100g. Height was measured using a meter available with the weighing scale simultaneously while weight was taken and recorded to the nearest 0.5 cm

Data processing and analysis

The collected data were entered to EPI data and exported to SPSS version 16 for cleaning, processing and analysis. Data were summarized using frequency tables. Logistic regression was done to identify determinants, those variables having P-value ≤ 0.25 during the bivariate analysis were selected as a candidate for multi variable logistic regression finally variables having p-values <0.05 taken as determinants. The degree of association was expressed using Adjusted odds ratio (AOR) with 95% CI. Cross tabs with chi square were also employed.

Ethical clearance

Ethical clearance was obtained from the research ethics committee of the school of public health,Addis Ababa University. Support letter was also obtained from Regional health Bureau, Zonal Health office, and Zonal Administrative Office. The study was conducted entirely on voluntarily consent of the participants and personal identifiers were removed from the data to maintain anonymity. For individuals with elevated BP and after calculation of BMI they were advised accordingly by the principal investigator.

RESULT

Socio-Demographic characteristics of the study subjects

From the total 114 cases and 228 controls involved in the study 56(49.1%) of them are male and the commonest age group were above 60years which were 60% and 56.6% among cases and controls respectively. Urban residences contributed 81 (71.1%) and 112(49.1%) among cases and controlsrespectively Among cases frequently reported occupation was government employee which accounts for 25% and for controls peasant is the commonest one contributing 41.25% of the total. Majority of the individuals responded that their monthly income is in between 1797 -2427 which accounts for around 38.6% among cases and 21.9% among controls (Table 1).

Table1: Socio-demographic characteristics of cases (n =114) and controls (n = 228). Mettu Town, Southwest, Ethiopia. March – April 2013.

Variables	Cases		Controls		X^2
	No	%	No	%	(P – value)
Residence					
Urban	81	71.1	112	49.1	14.866
Rural	33	28.9	116	50.9	(0.001)
Ethnicity					
Oromo	81	71.1	142	62.3	
Amhara	25	21.9	56	24.6	3.698
Others	8	7.0	30	13.1	(0.157)
Religion					
Orthodox	65	57.0	97	42.5	6.395 (df=2)
Muslim	27	23.7	72	31.6	(0.041)
Protestant	22	19.3	59	29.9	
Marital status					
Currently on marriage	80	70.2	192	84.2	8.355
Not in marriage	34	29.8	36	15.8	(0.004)
Peasant	28	24.6	95	41.2	
Educational status					
No education/Primary	80	70.2	159	69.7	0.000
Secondary/ More than	34	29.8	69	30.3	(1.000)
Income in birr					
<1797	29	25.4	77	33.8	10.360
1797 – 2427	44	38.6	50	21.9	(0.006)
>2427	41	36.0	101	44.3	

Among cases 52(45.6%) and among controls 30(13.2%) reported that they smoke cigarette. Similarly Of the cases 95(83.3%) and 44(19.3%) of controls had history of alcohol consumption. About 68(59.6%) of cases had duration of sleep less than or equal to 5hr/24hrs which is 19(8.3%) within the controls groups. History of family history of hypertension was 32(28.1%) among the cases and 5(2.2%) among controls (Table 2).

Among cases 52(45.6%) had history of fat intake on daily bases. While, 15(13.2%) were served once per week in contrast only39(17.1%) controls had daily base fat intake. Of the total cases about 70(61.4%) had restless sleep nature compared to 9(3.9%) among controls. About 76(66.7%) cases and only 15(6.6%) of controls had stressful routine work nature. BMI more than or equal to 25kg/m^2 among cases was 72(63.2%) compared to controls 121(53.1%) (Table2).

Table2: individual and environmental related variables of hypertension among cases (114) and controls (228). Mettu Town,Southwest Ethiopia. March – April 2013.

Variables	Cases		Controls		X^2
	No	%	No	%	(P-value)
Cigarette smoke	52	45.6 54.4	30	13.2	42.158
Yes	62		198	86.8	(0.001)
No					
Alcohol consumption					
Yes	95	83.3	44	19.3	126.538
No	19	16.7	184	80.7	(0.001)
Duration of sleep					
< 5 hr/ 24 hrs	68	59.6 40.4	19	8.3	102.825
>=5hr/24hr	46		209	91.7	(0.001)
Khat chewing					
Yes	75	65.8	24	10.5	26.815
No	39	34.2	204	89.5	(0.001)
Family history of hypertension					
Yes	32	28.1	5	2.2	50.090
No	82	71.9	223	97.8	(0.001)
Family history of diabetes mellitus					
Yes	5	4.4	1	0.04	4.771
No	109	95.6	227	99.6	(0.029)
House hold family members					
< 5	36	31.6	182	79.8	74.469
> =5	78	68.4	46	20.2	(0.001)
Regular physical exercise					
Yes	41	36.0	121	53.1	8.247
No	73	64.0	107	46.9	(0.004)
Animal fat intake					
Always	52	45.6	39	17.1	36.239
Once per week	15	13.2	77	33.8	(0.001)
Rarely	47	41.2	112	49.1	
Nature of sleep					
Calm	44	38.6	219	96.1	138.923
Restless	70	61.4	9	3.9	(0.001)
Nature of routine work					
stable	38	33.3	213	93.4	137.455
stressful	76	66.7	15	6.6	(0.001)
BMI					
< 25kg/m^2	42	36.6	121	53.1	7.386
> = 25 kg/m^2	72	63.2	107	46.9	(0007)

During bivariate analysis residence, marital status, monthly income, history of alcohol intake and cigarette smoking, duration of sleep, khat chewing, family history of hypertension, family size, regular physical exercise, animal fat intake, nature of sleep, nature of routine work variables had P.value<0.25 and taken as a candidate for multivariate analysis (Table 3)

In multivariate analysis the odds of individuals who drinks alcohol had 6 times higher odds of having hypertension [(AOR= 6.47 95%CI (3.49, 12.0)].Absence of regular physical activity and those who chew khat had 4 [(AOR= 3.93, 95%CI (2.10, 7.34)] and 4.4 [(AOR= 4.4 , 95%CI (2.31, 8.37)] times higher odds of developing hypertension than those who exercise and don't chew khat respectively (Table 3).

The study revealed that animal fat intake was among the independent risk determinants of hypertension; those subjects served animal fat on daily bases were 4 times more likely to develop hypertension 4.0 [(AOR= 3.92 , 95%CI (2.10, 7.34)]. Similarly sleep duration less than five hours with in twenty four hours had 11 [(AOR= 11.36, 95%CI (5.98, 21.59)) times higher odds of developing hypertension. Individuals with stressful nature of routine work and restless nature of sleep had 2.9 [(AOR= 2.88, 95%CI (1.68, 4.93)] and 3.36 [AOR=3.36 (95%CI) = 3.36(1.98, 5.59)] times higher odds of developing hypertension respectively (Table 3).

Similarly developing hypertension was 2.7 [(AOR (95%CI) = 2.73 (1.20, 5.25) times higher among those having family history of hypertension. Individuals having BMI more than or equal to 25kg/m^2 had 2.2 [(AOR (95%CI) = 2.23 (1.30, 3.84)] times higher odds of developing hypertension (Table 3).

Table 3; multi variable Analyses of determinants of hypertension among cases (n =114) and Controls (n =228). Mettu Town Southwest, Ethiopia. March – April 2013.

Variables	category	Cases (114)	Control (228)	COR (95% C-I)	AOR (95%CI)
Residence	Urban	81	112	2.54(1.57,4.11)	4.05(2.12,7.75)*
	Rural	33	116	1	
Marital status	Currently on marriage	80	192	1	
	Not in marriage	34	36	2.27(1.33, 3.88)	1.12(0.41, 3.42)
Income (in birr)	> = 2427	41	101		
	1797 – 2427	44	50	1.20(1.16, 3.16)	3.36(1.02, 5.01)
	< 1797	29	77	3.64(2.43, 6.84)	6.57(2.24,8.81)*
Cigarette smoke	Yes	52	30	5.54(3.25,9.43)	6.47(3.49,11.99)
	No	62	198	1	
Alcohol consumption	Yes	95	44	4.42(2.53, 7.72)	6.14(3.25,11.60)
	No	19	184	1	
Physical activity	Yes	41	121	1	
	No	73	107	2.01(1.27, 3.20)	1.73(1.04, 2.88)
Fat intake	Always	52	39	3.18(1.86,5.44)	1.93(0.91, 3.34)
	Once per week	15	77	0.46(0.24,0.89)	0.51(0.24, 1.09)
	Rarely	47	112	1	
Sleep duration	<5hr/24hrs	68	19	5.0(3.08, 8.13)	4.36(5.98, 8.59)
	> = 5hr/24hr	46	209	1	
Household member	< 5	36	182	1	
	>= 5	78	46	2.73(1.59, 4.68)	2.84(1.53, 5.29)
Natureof routine work	Stable	38	213	1	
	Stressful	76	15	2.51(1.57,4.0)	2.88(1.68, 4.93)
Nature of sleep	Calm	44	219	1	
	Restless	70	9	5.0(3.08, 8.13)	3.36(1.98, 5.59)
Khat chewing	Yes	75	24	4.42(2.49,7.84)	4.40(2.31, 8.37)
	No	39	204	1	
Family history of HTN	Yes	32	5	17.41(6.56, 46.19)	2.73(1.80, 5.25)
	No	82	223	1	
BMI	<25kg/m^2	42	121	1	
	>= 25 kg/m^2	72	107	1.94(1.22, 3.07)	2.23(1.30, 3.84)

DISCUSSION

Our study has shown urban residents were more likely prone to develop HTN compared to rural residents. This result is consistent with study conducted in Africa which illustrate that urban residents were more affected by hypertension than rural dwellers [9]. Another systematic review conducted in sub-Sahara Africans revealed hypertension is more prevalent among urban residents than rural[10]. The reason for the higher prevalence of hypertension among urban residents might be sedentary life style, easily access and expose to some risk factors. Like alcohol consumption on regular base.

This study has shown thatalcoholconsumption were significantly associated with the development of HTN. Theresult is consistent with study conducted in three sub- Sahara African countries and Nepal which indicate that alcohol consumption was found to be a risk for the development of hypertension[11, 12]. In contradictionthe South Africa study doesn't show significant association between alcohol consumption and hypertension development [13].This might be due to methodological difference and the operationalization of the variable. With regard to smoking, this study shows that smokers had higher odds of developing HTN than non-smokers. This result is in- line with the study done in Thailand which found that, in men's cigarette smoking was modestly associated with increased risk of developing hypertension[14].and in other study done developing countries individuals who smoke had 4.5 times higher odds of developing HTN[15]. Similarly khat chewingwasalso associated with the development of HTN. This result is consistent with a study conducted in Butajira, Ethiopia, that reveal regular chewing of khat is associated with elevated BP[4].This might be due to the presence of cathinone which have peripheral vasoconstrictor effect.

The present study showed that people who had low monthly income developHTN more than individuals with relativelyhigh monthly income. This study is consistent with a study conducted in sub-Sahara African countries which revealed that low income or poverty was significantly remained the major risk factor for HTN development[3].This study has shown those people who did not do regular physical exercises had higher odds of developing HTN. Theresult was consistent with a study done in Gondar city, Ethiopia, that revealed physical in activity was risk factor for HTN development[16].

This study shows that individuals with BMI> = 25kg/m^2 were more likely to develop HTN.This result is in-line with a study done in India in which overweight and obesity (BMI ≥ 25 kg/m^2) had 1.47 times higher risk of hypertension in men and 1.79 times in women compared with normal individuals[13].

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The design which is case control is the strength of the study which is the best design to identify determinants. Limitation of the study are, since the study is facility based it is difficulty to generalize to the general population andtheir might be social desirability bias due tointerviewer administered questioner.

CONCLUSIONS

This study has shown that exposure to risk factors such as alcohol consumption, nature routine work, nature sleep time, khat chewing, urban inhabitant, family history of hypertension, cigarette smoking and physical in activity, house hold family size, sleeping duration and BMI were significantly associated with the development of hypertension. Since Khat chewing , alcohol consumption and smoking are determinants of hypertension individuals should have to avoid this risky behavior and the government and NGOs working on non-communicable areas should have to give due emphasis on promoting healthy life style like having optimal sleep to have regular physical exercise.

List of abbreviations

HTN   ;   Hypertension,
BMI   ;   Body mass index,
NGO   ;   Nongovernmental organization

Competing interests

Have no competing interests

Authors' contributions

MS involved from the inception to design, acquisition of data, analysis and interpretation, drafting the manuscript, ND involved from inception to design, analysis and interpretation of the research.

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REFERENCE

1. Abera D. SM, W/Y and Zelalem B.: Adherence to antihypertensive treatment and associated factors among patients on follow up at University of Gondar Hospital, Northwest Ethiopia.*BMC* 2012, 12:282.
2. Sunil M RS GB: certain modifiable risk factors in essential hypertension: a case control study. *National Journal of community Medicine* 2011, 2(1).
3. Rhonda B TA JI, Kelly D, Arnold N, Charles A and Gbenga O.: An overview of cardiovascular risk factor burden in sub-Saharan African countries: a socio-cultural perspective. Globalization and Health 2009, 5(10).
4. Workineh TG, Fikru T.: Khat (Catha edulis) chewing is associated with elevated diastolic blood pressure among adults in Butajira, Ethiopia: A comparative study. *BMC Public Health*, 10:390.
5. Wamala J KZ, Ndungutse D, Guwatudde D: Prevalence factors associated with Hypertension in Rukungiri District, Uganda - A Community-Based Study *African Health Sciences* 2009, 9(3):153 - 160
6. Shona D JJB JV, Clement A, Francis B,, Marina N DM, Wafaie F,Walter W, Hans-Olov A, H aMD: Non-communicable diseases in sub-Saharan Africa: what we know now. . *nternational Journal of Epidemiology* 2011, 40:885 - 901.
7. Central SA: Ethiopia Demographic and Health Survey 2011. In. Addis Ababa; 2012.
8. Kelsey: methods in observational Epidemiology, 2nd edn; 2007.
9. Jacob.M YN JCaAU: Emergining non-communicable disease epidemic in Africa Preventive measures from the WHO regional office for Africa Ethnicity & Disease. 2006, 16(521-6).
10. Lionel H YK: Hypertension in Sub-Saharan African populations. 2005(112):3562 - 3568.
11. Chataut J AR SN: Prevalence and Risk Factors for Hypertension in Adults Living in Central Development Region of Nepal.*Kathmandu UnivMed J* 2011, 33(1):13 - 18.
12. Joel N1 RC SS, Seye A and Sonia E.S. : Risk factors for non-communicable diseases among older adults in rural Africa. Tropical Medicine and International Health. 2011, 16:640 - 646.
13. heryl R. Dennison NP, Krisela Steyn, Naomi S. Levitt, Martha N: Determinants of hypertention care and control among peri urban black south Africans cross sectional study*Ethnicity & Disease* 2007, 17.
14. Prasutr Thawornchaisit FdL, Christopher M Reid, Sam-ang Seubsman, Adrian C Sleigh: Health risk factors and the incidence of hypertension: 4-year prospective findings from a national cohort of 60 569 Thai Open University students. *BMJ* 2010, 3(6).
15. Manisha L. Bendhari RSK, Santosh J. Haralkar: Study of prevalence and risk factors of hypertension in adults in an urban slum area of Western Maharashtra, India. *International Journal of Community Medicine and Public Health* 2011, 3(10).
16. Akilew A. SA, Berhanu M.: Prevalence and associated factors of hypertension among adults in Gondar,Northwest Ethiopia: a community based cross-sectional study. *BMC* 2012, 12:113.

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