Research Article

Prevalence of Hypertension and Its Association with Substance Use among Adults Living in Jimma Town, South West Ethiopia, 2012

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ABSRACT

Background: Hypertension is a growing public health problem with remarkable contribution to morbidity and mortality. It is estimated that about 1 billion individuals are affected by hypertension, out of which 7.1 million deaths per year worldwide. Several studies revealed that substance use is a risk factor for hypertension. The aim of the present study was to determine the prevalence of hypertension and its association with substance use among adults.

Methods: A cross-sectional community-based study was conducted in Jimma Town from February to April, 2012. Structured questionnaire designed by WHO was adopted for data collection. The questionnaire was pretested and translated from English to local languages and back to English for validation. By systematic sampling technique, 730 individuals were included in the study. Data analysis was done using SPSS Version 16.0.for Windows.

Results: Of 730 adult participants, 436(62.2%) were males. The current prevalence of hypertension was 149(21.3%), out of which, 97 (65.1%) were males. Among independent variables; age (x^2=5.19, p <0.001), cigarette smoking [AOR =2.02, 95%CI (1.1 -3.8)], alcohol drinking [AOR=2.84, 95%CI (1.6-4.9)], khat chewing [AOR =1.5, 95%CI (1.5-2.9)] showed significant association with hypertension. There was also significant association between BMI and hypertension(x^2=61.2, p <0.001).

Conclusion: Hypertension is an important public health challenge in the study area. Cigarette smoking, alcohol drinking, khat chewing were found to predictors of hypertension. It is highly recommended to launch extensive health education aiming at the adverse effect of substance use to prevent hypertension.
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Key words: Khat chewing, smoking, alcohol intake, hypertension

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INTRODUCTION

Hypertension is a persistent elevation of the systemic arterial blood pressure (1). It is one of the major cardiovascular risk factors contributing to myocardial infarction, cerebrovascular accidents, end-stage renal disease, congestive heart failure, peripheral vascular insufficiency and premature mortality (2). In general, it is an important public health challenge in developed as well as developing countries (1).

Globally, the prevalence of hypertension is 25% (3). The overall worldwide magnitude of hypertension was estimated to be 972 million (26.4%) of the adult world population, with 333 million (34.26%) in developed and 639 million (65.73%) in developing countries (4). It has been anticipated that by the year 2025, 1.56 billion of the world population will have hypertension, (5). Globally high blood pressure is estimated to cause 7.1 million deaths, which is about 13% of the total cases (6)

Prevalence of hypertension in the USA documented from 2007 to 2008 was 28 to 30% in the 18 year and older population, which are approximately 65 million hypertensive adult populations (7, 8). One possible explanation its increment was due to marked increase in obesity and average body mass index (9). In surveys conducted in Canada and six European countries, the age- and sex-adjusted prevalence of hypertension was 28 and 44% respectively (10).

It is estimated that more than 20 million people are affected in the African Region, where prevalence ranges from 25 % to 35 % in adults aged 25 to 64 years (11). In Ethiopia, hypertension accounted for 1.4 percent of all deaths reported to Federal Ministry of Health of Ethiopia (FMOH) in 2000/01, making it the 7th leading cause of death in the country for the year (12). The prevalence of hypertension amongst bank employees in Addis Ababa was 11% with 13% in males and 5% in females (13).

For hypertension, many nutritional factors have been implicated: obesity, high salt intake, excess alcohol use, genetic traits, and decreased intakes of potassium, calcium, and polyunsaturated fatty acids (14). Excess caloric intake results in obesity, which brings about hyper-triglyceridemia, hypercholesterolemia, and decreased HDL (15).

Khat chewers experience an immediate increase in blood pressure and heart rate (16, 17). Hypertension is among the health consequences of Khat chewing (18, 19, 20). A study done on regular khat chewers in Ethiopia reported an isolated increase in mean diastolic blood pressure (19). The findings suggest that Cathinone might have a sustained effect as peripheral vasoconstrictor among regular khat chewers (21)

Cigarette smoking acutely exerts hypertensive effect, mainly through the stimulation of the sympathetic nervous system (22). Cigarette smoking causes acute blood pressure (BP) elevation, although some studies have found similar or lower BPs in smokers compared with nonsmokers (23). Hypertension was associated with smoking in a dose–response manner when characterized as number of years of smoking and lifetime cigarette consumption, but was not associated with current smoking status (24). Cigarette smoking is a powerful cardiovascular risk factor. Smoking cessation is most effective lifestyle measure for the prevention of cardiovascular diseases (25). The possible reason for this is, due to the fact that smoking causes an acute increase in arterial stiffness and associated with greater endothelial dysfunction (26).

Excess alcohol intake has been recognized as a risk factor for hypertension. Studies have shown an association between increasing daily alcohol intake and rising blood pressure (27, 28, 29).

Studies on the effect of khat chewing, smoking and alcohol indulgence on blood pressure are scarce despite the ever-growing rate of substance use behaviours. Therefore, the main aim of the present study was to assess association between substance use and hypertension.

MATERIALS AND METHODS

The study was conducted in Jimma Town from February 30 to April 30, 2012. Jimma town is located 354 Kms South West of Addis Ababa. The town is divided in to 13 Kebeles with 26,000. The total projected population of the town from 2007 central statistical agency (CSA) census report was 120**,** 960 (30).

A cross-sectional community based study design was employed. All adults age 18-65 years were considered as target population. The study population was 730 selected households from the selected Kebeles. A multistage sampling procedure was under taken. Seven Kebeles out of 13 Kebeles were selected by lottery method and subsequent households were selected using systematic random sampling. One adult age between 18 and 65 years old was chosen by lottery method for interview from the selected households. Sociodemographic variables and substance use were considered as independent variables whereas hypertension was taken as dependent (outcome) variable.

Sample size was determined using formula for single population proportion with the assumptions of 95% CI and 5% margin of error. Prevalence of hypertension in adults in 31.5% (19), and 10% non response rate was added and was multiplied by 2 for the design effect making the total sample size of 730.

For data collection, a semi-structured questionnaire, modified from the World Health Organization instrument for stepwise surveillance (WHO STEPS) of chronic disease risk factors (31, 32) was used. The questionnaire was pretested and translated from English to local languages and back to English for consistency.
Anthropometric measurements (height, weight, hip, and waist circumferences) and BP were carried out by five trained nurses. Three consecutive measurements of BP were taken on the left arm at 3-5 minutes interval using digital BP apparatus. Average of the second and third measurement was used to describe the mean systolic blood pressure (SBP) and mean diastolic blood pressure (DBP) of study participants.

Data were checked for completeness and was coded and entered the computer. Data analysis was conducted using SPSS Version 16.0 for Windows. Chi-square and logistic regression analysis were used to examine the association between dependent and independent variables. P≤0.05 was taken as a cut-off point for statistical significance.

Ethical Consideration: Ethical approval was obtained from the Ethical Board of Jimma University. Clients consent was taken and confidentiality was maintained.

Operational Definitions

Substance abuse: Persistent or sporadic extensive use of drugs inconsistent or unrelated to acceptable medical practice. Prevalence of chewing/ smoking/ alcohol use: the proportion of the study population who had ever chewed khat/smoked/drunk. Current prevalence of chewing/ smoking/ alcohol use: the proportion of the study population who are chewing khat/smoking / drinking in the last 30 days preceding the study time. Previous use: history of khat/ cigarette /alcohol use in lifetime but not in the past 30 days. Habitual use: refers   to   use   of substances daily or more frequently, otherwise referred as occasional use. Smoking: Refers to the active smoking of one or more cigarettes per day. Heavy smoking: smoking more than >9 cigarette per day. Abuse: Using a substance continuously, even with the knowledge that it causes serious problems. Physically Active: If an individual perform regular physical activities for >150 min/week. Physically inactive: If an individual perform regular physical activities for <150 min/week. Obesity: a body mass index (BMI) $\geq$30.0 kg/ m^2. Overweight: a BMI $\geq$25.0 but less than 30.0 kg/ m^2. Central Obesity: A waist-to-hip ratio (WHR) greater than 0.90 in men or greater than 0.85 in women.

Severity of hypertension was classified into the following categories according to World Health Organization manual (WHO STEPS Surveillance Manual, 2008) (31, 32)

- Hypotension: SBP < 90and DBP < 60mmHg

- Normal: SBP 90 – 139mmHg and DBP 60 – 90mmHg

- Mild: SBP 140 – 159mmHg and DBP 90 - 99mmHg

- Moderate: SBP 160 -169 and DBP 100- 109

- Severe: SBP > 170mmHg and DBP >110

RESULTS

A total of 730 adult individuals with age range of 18–65 years were interviewed, out which, 21 questionnaires were incompletely filled out making the response rate of 96.02%. Among this, 436 (62.2%) individuals were males. The mean ± SD age of participants was 30.6 ± 9.72 years and most of them 277(39.4%) were in the age group of 25 – 34 years. The mean ± SD height of the respondents was 1.62 cm ±0.08), mean ± SD weight 58.9 ± 9.2) Kg, mean ± SD SBP 122.4±19.7 mmHg and mean ± SD DBP 77.01 ±13.9 mmHg. (Table1).

The current prevalence of hypertension in the present study was found to be 149 (21.3%). Regarding sociodemographic variables, age of respondents showed statistically significant association with hypertension [X^2=5.19] p<0.001. Similarly, significant association between hypertension and educational level as well as occupation was recorded [X^2 =55.74] and [X^2= 18.13], p < 0.001 respectively. (Table1).

The prevalence of cigarette smokers was 115(16.4%); alcohol users 289 (41.2%); khat chewing 422(60.2%); physically active 596(85%); coffee users 457(65.2%). Majority, 519(74%) individuals were with normal BMI (18.5 – 24.9 Kg/m^2) and about 107(71.8%) hypertensive individuals had mild hypertension (Table 2 & 4).

Table 1:- Association between sociodemographic variables and hypertension among adults living in Jimma Town, Southwest Ethiopia, 2012.

Sociodemographic Variables	Hypertension			x^2	p –value
	Yes N (%) n =149	No N (%) n = 552	Total N (%) n = 701		
Gender					
Male	97(65.1)	339(61.4)	436 (62.2)		
Female	52(34.9)	213(38.6)	265 (37.8)	0.68	>0.05
Age					
18 -24	9(6.0)	235(42.6)	244 (34.8)		
25 – 34	40(26.8)	235(42.6)	275 (39.2)		
35 – 44	35(23.5)	57(10.3)	92 (13.1)	5.19	<0.001
45 – 54	44(29.5)	23(4.2)	67 (9.6)		
55 -64	21(14.1)	1(0.01)	22 (3.1)		
Education					
No formal	38(25.5)	41(7.4)	79 (11.3)		
Elementary	59(39.6)	164(29.7)	223 (31.8)	55.74	<0.001
Secondary	28(18.8)	143(25.9)	171 (24.4)		
>12	24(16.1)	204(37.0)	224 (32.0)		
Occupation					
Daily labourer	4(2.9)	4(0.07)	8 (1.1)		
Government	33(22.1)	101(18.3)	134 (19.1)		
Merchant	38(25.5)	224(40.6)	262 (37.4)	18.13	<0.001
Student	21(14.1)	41(7.4)	62 (8.8)		
Others	53(35.6)	182(33.0)	236 (33.7)		
Religion					
Orthodox	62(41.6)	185(33.5)	247 (35.2)		
Protestant	17(11.4)	55(10.0)	72 (10.3)		
Muslim	70(47.0)	298(54.0)	368 (52.5)	3.3	>0.05
Others	0	14(2.5)	14 (2.0)		
Marital status					
Single	20(13.4)	301(54.5)	321 (45.8)		
Married	111(74.5)	241(44.0)	352 (50.2)	96.8	<0.001
Divorced	9(6.0)	4(0.04)	13 (1.9)		
Widowed	9(6.0)	6(1.1)	15 (2.1)		

In multivariate logistic regression analysis, age of study participants showed significant association with hypertension. Respondents in age group 55 - 64 years were 483.03 times more likely to be hypertensive than individuals in age 18-24 years [AOR=483.03, 95% CI(4.79–512.76)]. Similarly individuals in age group 45–54 years were 182.5 times more likely to be hypertensive than those in age group 18-24 years [AOR=182.5, 95% CI (1.08 -265.60)]. Study participants in age group 35 – 44 years were also 49.6 times more likely to be hypertensive than those in age group 18 -24 years [AOR=49.6, 95% CI (41.35 -55.4)], and individuals in age

group 25 -34 years were also 11.48 times more likely to develop hypertension than individuals in age group 18 - 24 years [AOR= 11.48, 95% CI ((1.92 – 17.35)] (Table 3).

Table 2:- Association between substance use (life style habits) and hypertension among adults living in Jimma Town, Southwest Ethiopia, 2012.

Life style habits	Hypertension			x^2	p-value
	Yes N (%) n=149	No N (%) n=552	Total N (%) n=701		
Cigarette smoking					
No	110(73.8)	476(86.2)	586 (83.6)	13.17	<0.001
Yes	39(26.2)	76(13.8)	115 (16.4)		
Alcohol consumption					
No	56(38.0)	356(64.5)	412 (57.8)	35.06	<0.001
Yes	93(62.4)	196(35.5)	289 (41.2)		
Khat chewing					
No	46(30.1)	233(42.2)	279 (39.8)	6.29	<0.001
Yes	103(69.1)	319(58.0)	422 (60.2)		
Coffee dinking					
No	43(29.0)	201(36.4)	244 (34.8)	2.95	>0.05
Yes	106(71.1)	351(63.6)	457 (65.2)		
Coffee with salt					
No	78(52.3)	366(66.3)	444 (63.3)	9.84	<0.001
Yes	71(49.7)	186(34.0)	257 (36.7)		
Physical activity					
Physically inactive	23(15.4)	82(15.0)	105 (15.0)	0.03	>0.05
Physically active	126(84.6)	470(85.1)	596 (85.0)		
Body mass index					
Underweight	3(2.0)	47(8.7)	50 (7.1)		
Normal	86(57.7)	433(78.4)	519 (74.0)	61.2	<0.001
Overweight	49(32.9)	63(11.4)	112 (16.0)		
Obese	11(7.4)	9(1.6)	20 (2.9)		

Hypertension has significant associations with substance use. Smokers were 2.02 times more likely to develop hypertension than non smokers [AOR= 2.02, 95% CI (1.1 -3.8)]; alcohol users were 2.84 times more likely to be hypertensive than non users [AOR= 2.84, 95% CI (1.64 – 4.85); khat chewers were 1.5 times more likely to be hypertensive than non chewers [AOR=1.5, 95% CI (1.45 – 2.87)] (Table 3).

Table 3:- Logistic regression analysis for the association between hypertension and independent variables among adults living in Jimma Town, Southwest Ethiopia, 2012.

Variables	COR(95%CI)	p-value	AOR(95%CI)	p-value
Age				
55 -64	548.3(16.14 – 943.06)	0.00	483.03(4.79 – 512.76)	<0.001
45 -54	123.4(4.4- 265.6)	0.00	182.53(1.08 – 265.60)	<0.001
35 -44	34.2(1.39 – 86.86)	0.001	49.57(41.35-55.4)	<0.05
25 -34	10.97(1.39 -86.86)	0.02	11.48(1.92 – 17.35	<0.001
18 -24	1.00		1.00	
Cigarette smoking				
Yes	2.26(1.45-3.49)	0.000	2.02(1.08 – 3.82)	<0.05
No	1.00		1.00	
Alcohol drinking				

Yes	3.02(2.1 – 4.4)	0.000	2.84(1.64 – 4.85)	<0.001
No	1.00		1.00	
Khat chewing				
Yes	1.63(1.11 – 2.4)	0.013	1.5(1.45 – 2.87)	<0.001
No	1.00		1.00	
Coffee with salt				
Yes	1.00		1.00	
No	0.58(0.39 -0.81)	0.002	0.44(0.26 – 0.74)	<0.001
Body mass index				
Obese	19.2(4.44 – 82.64)	0.000	20.57(3.05 – 138.68)	<0.001
Over weight	6.2(2.48 – 15.3)	0.000	7.51(2.31 – 24.48)	<0.001
Normal	1.57(0.6 – 4.09)	0.03	2.37(0.68 – 8.12)	<0.001
Underweight	1.00		1.00	

There was significant association between severity of hypertension and cigarette smoking (x^2=12.9, p<0.05); alcohol consumption (x^2=38.5, p<0.001); khat chewing (x^2= 8.33, p<0.05), Coffee intake with salt (x^2 = 14.9, p<0.001) and BMI (x^2=70.14, p<0.001) (Table 4).

Regarding the association between BMI and hypertension, BMI > 30Kg/m^2 (obese) were 20.6 times more likely to develop hypertension than underweight (BMI < 18.5Kg/m^2) individuals [AOR=20.6, 95% CI (3.05 -138.7)] and overweight (BMI 25 -29.9 Kg/m^2) individuals were 7.51 times more likely to be hypertensive than underweight participants [AOR= 7.51, 95% CI (2.31 - 24.48)] (Table 3).

Table 4:- Association between severity of hypertension and substances use among adults living in Jimma Town, Southwest Ethiopia, 2012.

Variables	Hypertension (Severity)			x^2	p-value
	Mild N(%) n=107	Moderate N(%) n=39	Severe N(%) n=3		
Smoking					
No	80(74.8)	29(74.3)	1(33.3)	12.9	<0.001
Yes	27(25.2)	10(25.6)	2(66.7)		
Alcohol drinking					
No	43(40.2)	12(30.8)	1(33.3)	38.5	<0.001
Yes	64(59.8)	27(69.2)	2(66.7)		
Khat chewing					
No	35(32.7)	10(25.6)	1(33.3)	8.33	<0.05
Yes	72(67.3)	29(74.3)	2(66.7)		
Coffee intake					
No	73(68.2)	30(76.9)	2(66.7)	3.61	>0.05
Yes	34(31.8)	9(23.1)	1(33.3)		
Coffee with salt					
No	47(43.9)	22(56.4)	2(66.7)	14.9	<0.001
Yes	60(56.1)	17(43.6)	1(33.3)		
Body mass index					
Underweight	3(2.8)	0	0		
Normal	61(57.0)	22(56.4)	1(33.3)	70.14	<0.001
Overweight	35(32.7)	14(36.0)	1(33.3)		
Obese	8(7.5)	3(7.6)	1(33.3)		

DISCUSSION

The prevalence of hypertension in the surveyed population was 21.3% (22.2% in males and 19.6 % in females), according to the WHO criteria of hypertension at SBP/DBP (>140/90 mm Hg) (6), which is similar with the prevalence of hypertension in Sub-Saharan Africa (33) which was 22 %, The current prevalence of hypertension is also consistent with reported prevalence in other parts of Africa (3). However, the magnitude of hypertension in the present study is a moderate public health problem. This can be ascribed to the fact that substance use among the study population is quite prevalent as this can be the risk factor. The other possible risk factor could be lack of awareness about physical exercise and feeding habits.

Cigarette smoking has been implicated significant association with the prevalence of hypertension in this study. The possible reason for this is due to the fact that smoking causes an acute increase in arterial stiffness and associated with greater endothelial dysfunction. (26). Additional effects of cigarette smoking on blood pressure might be correlated with the nicotine content of tobacco used, whose action is mediated through the interaction with the sympathetic system, catecholamine release, endothelial function and metabolic profile of the individuals (34). Moreover, nicotine specifically stimulates release of norepinephrine from the hypothalamus and ant diuretic hormone from the pituitary gland (35).

In the present study, there exists significant association between alcohol consumption and hypertension. Alcohol consumption dose dependently increases the risk of developing hypertension in both women and men (36). Heavy alcohol intake increases BP and is the risk of hypertension through several potential mechanisms, such as directly influencing the heart or the vascular smooth muscle or stimulating the sympathetic nervous system or the renin-angiotensin-aldosterone system. Alcohol may increase plasma cortisol levels through magnesium loss into the urine, by an increase in endothelin release, or by a decrease in NO production in the arterial endothelium (37, 38).

Significant association between hypertension prevalence with khat chewing was observed in the current study. This finding is similar with research done in Addis Ababa (39). The possible reason for this is that cathinone increases BP through noradrenaline release similar to amphetamine to produce vasoconstriction (40).

In summary, in the current study the prevalence of hypertension was found to be is a moderate public health problem age dependently and high among substance users. There was strong association between substance use and hypertension indicated that cigarette smoking, alcohol consumption, khat chewing, may contribute to the development of hypertension. Individuals with high body mass index are at great risk to develop hypertension. Therefore, provision of sustainable health education to the community about adverse effects of substance use and prevention of hypertension are highly recommended.

ACKNOWLEGMENTS

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