Research Article

Factors Associated With Hypertension among Age Groups of 18 Years and Above In, Southwestern, Ethiopia, 2020: A Community Based Cross-Sectional Study

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ABSTRACT

Background: Hypertension is one of the major non-communicable chronic diseases in the globe which is now changed from a relative rarity to a major public health problem. Because now a day's, globally cardiovascular disease accounts for approximately 17 million deaths a year, nearly one-third of the total death. Of these, complications of hypertension account for 9.4 million deaths worldwide every year. Hypertension is responsible for at least 45% of deaths due to heart disease, and 51% of deaths due to stroke. The study aimed to assess the magnitude and associated factors of hypertension among the age group of 18 years and above in Southwest, Ethiopia, 2020.

Method: A community based cross-sectional study was conducted. A total of 356 adults were recruited for the study. A pre-tested and structured questionnaire was used to collect the data. Both bivariate and multivariate logistic regressions were carried out to assess the association of independent variables with hypertension and P-value <0.05 was considered as significant.

Result: A total of 351 participants were included in the analysis. About 17.7% of the respondents had elevated their Blood pressure. Sex (AOR = 6.7, 95% CI 2.10-21.53), age (AOR= 2.6, 95% CI.1.07-7.40), and body mass index (BMI), (AOR=2.8, 95% CI. 1.14-6.93 and AOR=8.5, 95%CI.1.68-42.45), and vigorous physical exercise (AOR=3.9, 95% CI. 1.40-11.13) were significantly associated with hypertension.

Conclusions and recommendation: The study showed that the overall prevalence of hypertension was higher in the study area which was comparatively higher in men than females. The study also showed that BMI, sex, age, and engaging in vigorous physical exercise were found to be significant factors that influence hypertension in the study area. Community-based screening programs should be established for hypertension in this community.

Keywords: Hypertension; Associated factors; Southwestern; Ethiopia

List of Abbreviations: AA: Addis Ababa; AOR: Adjusted odds ratio; BP: Blood Pressure; CVD: Cardiovascular Disease; CI: Confidence Interval; ETB: Ethiopian Birr; HIV/AIDS: Human Immune Virus/ Acquire Immune Deficiency Syndrome; NCD: Non-Communicable Diseases; OR: Odds Ratio; PPS: Probability Proportional to Size; STEPS: Stepwise Approach to Chronic Disease Risk Factor Surveillance; SD: Standard Deviation; SNNPR: Southern Nations, Nationalities, and Peoples Region; WHO: World Health Organization

Introduction

Non-communicable diseases (NCDs) are the leading causes of death globally, killing more people each year than all other causes combined [1]. Chronic diseases account for the greatest share of early death and disability worldwide. Over the next few decades, this burden is projected to rise particularly fast in the developing world [2]. Hypertension is one of the major NCDs in the globe which is now changed from a relative rarity to a major public health problem [3]. Because now a day's globally cardiovascular disease (CVD) accounts for approximately 17 million deaths yearly, nearly one-third of the total [4]. Of these, complications of hypertension account for 9.4 million deaths worldwide every year [5]. About 80% of the deaths occurred in low- and middle-income countries, if current trends continue 20 million people will die from it annually by 2015 [6].

Hypertension is responsible for at least 45% of deaths due to heart disease, and 51% of deaths due to stroke [4].It is a widespread problem of immense economic impact because of its high prevalence in urban areas, its frequent under-diagnosis, and the severity of its complications [7]. If nothing is done about it, by 2020, three-fourth of all deaths in Africa will be attributable to hypertension. Despite the high prevalence of hypertension, awareness, and blood pressure control of the patients is very low worldwide [6-7]. Although the effect of risk factors on CVD in Africa is similar to that in other populations, the risk of CVD morbidity and mortality associated with hypertension may even be higher in Africans [8].

The prevalence of hypertension in general increases with

advancing age, and it is higher in urban than rural areas due to differences in lifestyle [7]. In Ethiopia, hypertension prevalence ranged from 4.1% among adult workers in 1984 to 30% among a sampled population in 2009 [9]. In the regions, hypertension prevalence accounted for about 10% in the Southern Nations, Nationalities, and Peoples Region (SNNPR) in 2011 [10].

Uncontrolled hypertension is associated with serious end-organ damage such as heart disease, stroke, renal disease, and blindness. These serious complications can be prevented by adequate blood pressure control [11]. However, Developing countries including Ethiopia policies and programs are mainly focused on communicable diseases but know a day's developing countries are threatened with the non- communicable disease more than communicable diseases & malnutrition due to urbanization and changing lifestyles of the community. Particularly CVD, are a severe threat to our economic development due to the long-term costs of treatment and the negative effects on productivity [12]. Even if Hypertension is one of the most modifiable risk factors for cardiovascular diseases, awareness about treatment and control of hypertension is extremely low among developing nations including Ethiopia, and the prevention and control of hypertension have not received due attention by many developing countries. In these countries, health care resources are overwhelmed by other priorities including human immune virus/ acquire immune deficiency syndrome (HIV/AIDS), tuberculosis, and malaria [13]. Substantial data regarding hypertension and the extent of population, who are affected, are relevant for policymakers and health care authorities to decide on prevention of hypertension, so this community-based surveillance played a very curtail role in generating data that are important to fill gaps for program and policymakers. It could be also the source for those who are interested to conduct any further study. The aim of the study was the assessment of the magnitude and associated factors of hypertension among 18 years and above in Southwestern, Ethiopia.

Materials and Methods

A community-based cross-sectional survey was conducted from September 2015 upto January 2016 to assess the prevalence and associated factors of hypertension among adults of Mizan-Aman town. The town is located in the south-west of Ethiopia, 561 km from Addis Ababa (AA). With the total population of 34,080 based on the 2007 national census, which 18,138 are males. The District is structured in such a way that it has two kifleketma (administrative unit) with a total of 5 Kebeles (the smallest administrative sub-unit). There is one general hospital, one health center, and 5 health posts all run by the government. In the private sector, there are 9 clinics (of which 5 are medium clinics), three-drug distribution stores, and 5 drug vendors. All men and women whose ages are 18 years and older residing in the study area, with or without known previous history of hypertension and not severely ill were included, while, the female lady who was pregnant was excluded from the study.

Samples of 356 adult populations aged 18 and above years were recruited from usual residents of the town who stayed for at least six months in the study area. The sample size was determined using a single population proportion formula. It was computed by considering the proportion of hypertension 16.9% [14]; margin of error of 5%, and 95% confidence level.

Then, a 10% non-response rate and 1.5 design effects were considered to obtain the total sample size of 356. Out of the total 5 small administrative units (Kebeles) in Mizan-Aman town, 3 Kebeles were selected by lottery method. The total sample size was then allocated using probability proportional to size (PPS) of households in the selected Kebeles. Study participants were selected from households from each selected Kebele using systematic random sampling. The sampling interval was obtained by dividing the total household in each selected Kebele by the allocated sample. The first household was then chosen at the center of each Kebele by a lottery method as a starting point, and then data collectors were going in the right direction from the first chosen household until the required sample size for the Kebele was obtained. In case the eligible participant was not in the selected household, the next household was considered. If more than one eligible were found in the selected household one of them was selected randomly.

Operational /term / definitions

Hypertension: a subject was considered as hypertension if the blood pressure $\geq$ 140 mmHg was systolic and $\geq$90 mmHg diastolic after 2 measurements were taken and the average of two measurements was determined or self-reported use of drug treatment for hypertension irrespective of measuring blood pressure.

Alcohol intake: Alcohol consumption intake was considered as excessive intake if it is either more than 2 bottles of beer or 3 ounces of liquor for men (1 bottle of beer or 1.5 ounces of liquor for women) per day.

Physical activity: Level of physical activity was classified to vigorous or moderate and activity that involves walking briskly, bicycling, swimming for recreation, dancing or mowing a lawn for at least 30 minutes for at least 5 days per week was considered as moderate physical activity, whereas an activity that involves running, fast cycling, fast swimming or carrying/ moving heavy loads greater than 20kg/for at least 10 minutes continuously was considered as vigorous physical activity.

Bodymass index: Weight (in Kg) divided by height (in meters) squared. A subject whose BMI is between 18.5 and 24.9 Kg/m^2 is assumed to be normal.

Central obesity: Those who had waist circumference to hip ratio $\geq$ 0.95 for male and $\geq$ 0.8 for female was considered as central obesity

Cigarette smoking: Subjects who smoked at least 1 cigarette per day at the time of the study were classified as current smokers and those who have smoked for at least 3 years in the past but had stopped by the time of the study were classified as habitual smokers.

Khat (Catha edulis leaves) chewer: Those who use chat for 5 days or more in a week was considered as regular khat chewers.

The questionnaire was adapted from related studies including the world health organization (*WHO*) *Stepwise approach to chronic disease risk factor surveillance (STEPS)*. The data collection instruments were first prepared in English and then

translated to Amharic. To check the consistency of the translation; back translation to English was done by another person. Then the questionnaire was pre-tested on 5% of the sample in a similar population with the same context. Based on the findings of the pretest, questions were modified. Data were collected using a combination of a structured questionnaire and measurements of weight, height, hip, waist circumference, and Blood Pressure (BP). Data collectors were five-diploma nurses supervised by investigators and supervisors. Training and practical demonstrations on interview techniques and measurement procedures were given to data collectors for two consecutive days.

After completing the interview, the participant's height weight, hip, and waist circumference were measured and recorded by interviewers. Weight measuring scales were checked and adjusted at zero levels between each measurement and others measured following the standard steps. The measurement of BP was recorded for 3 days before a diagnosis of hypertension could be made. It was recorded in the morning or/ and evening. Two consecutive measurements were taken, at least 5 minutes apart, and with the person seated from both arms at sitting position with back supported. Then the average of the last two days measurements was used for analysis. The measurement was made after study participants had avoided, smoking, and intake of caffeine during the last hour and rest for 5 minutes.

Data entry and cleaning were done using Epi Info version 3.5.1. Cleaned data were exported to SPSS Version 21 for analysis. Statistical analyses were done by bivariate and multivariate methods. Chi-squared tests were used when comparing groups. All factors with a p-value <0.2 in the bivariate logistic regression analysis were further entered into the multivariate model to control confounding effects. The association between the dependent and independent variables was determined using the odds ratio (OR) with a 95% confidence interval (CI). Statistical significance was accepted at the 5% level (p<0.05)

Results

Socio-demographic characteristics

A total of 351 adults age 18 years and above were interviewed, making a response rate of 98.6%. The majority, 213(60.7%) of the study participants were male. And 205 (58.4%) were between in the age group of 18-34 years, with the mean and standard deviation (SD) (29$\pm$9). Of educational status, 108 (30.8%) of the participants were primary, and 93(26.5%) of the study subjects were the governmental employee. Of all, 101 (28.8%) of the participants were got a monthly income of 927 -1500 Ethiopian Birr (ETB), with mean and SD of (1960$\pm$1516) (**Table 1**).

Behavioral risk factors

Regarding smoking status, 49 (14%) of the study participants had ever smoked in their lifetime, while, 30(8.5%) of them were current smokers, of which, 13(43.3%) were smoking more than 4 cigarettes per day. And 136(38.7%) of the study population were current chat chewers, of those, 95(69.95%) were chewing chat 5 and more days per week (**Table 2**).

About alcohol consumption, 125(35.6%) of the study participant have ever used alcohol, of these, 16(12.8%) were

Table 1: Sociodemographic characteristics of study participants in Mizan Aman town, Bench Maji zone, SNNPR, Ethiopia, 2015 (N=351).

Variable	Frequency	Percentages
Sex		
Male	213	60.7
Female	138	39.3
Age group		
18-34	205	58.4
35-45	100	28.5
> 45	46	13.1
Marital status		
Single	134	38.2
Married	190	54.1
Divorced	27	7.7
Religion		
Orthodox	138	39.3
Muslim	65	18.5
Protestant	146	41.6
Others	2	0.6
Educational status		
Cannot read &write	60	17.1
Primary	108	30.8
Secondary	79	22.5
College and above	104	29.6
Occupation		
Student	49	14
Gove employee	93	26.5
private employee	49	14
Merchant	62	17.7
House wife	41	11.7
retired	28	8
Others	29	8.3
Income category		
≤926	88	25.1
927-1500	101	28.8
1501-2580	75	21.4
>2580	87	24.8

consumed alcohol daily. Beer was the most commonly used alcohol. Ninety-nine (28.2%) of them were drinking alcohol 1-3 bottles averagely per day. According to the operational definition of the alcohol drinking status, 47(13.4%) of the study participants were alcohol drinker and it was higher in male, 38(17.8%) than female, 9(6.5%). The difference was statistically significant (X^2= 9, p value= 0.002).

About 327 (93.2%) of the study participants consumed fruit, of those 256 (78%) were consuming fruit 1-3 days per week. Banana, avocado, mango, and papaya were the most commonly consumed fruits in the study area. All most all, 336 (95.7%) of the study participants were consuming vegetables, of which, 212 (63%) were using vegetables 1-3 days per week. The most commonly used vegetables by the study subjects were cabbage, potatoes, and redroot (**Table 2**).

Just about half, 179(51%) of the study participants' work involve vigorous activity (lifting loads, digging, or construction works for at least 10 minutes), of those, 125 (69.8%) worked for at least 4 days per week and 87(48.6%) of them worked for more than 4 hrs per day (**Table 2**).

Regarding moderate physical exercise, 233(66.4%) of the study populations' work involves moderate activities. Eighty-three (35.6%) of them worked 1 - 3 days per week for 1-4 hrs per day. The majority, 332(94.6%) of the study population were walk on foot for at least 10 minutes per day (**Table 2**).

The study also showed that 74(21.1%) of the study participants were doing vigorous physical exercise such as (running, carrying/moving heavy loads continuously), of those 18(24.3%) were doing vigorous physical exercises for at least 5 days per week, and 68 (91.9%) were doing for at least 10 minutes per day. Whereas 79(22.5%) of study subjects were doing moderate exercise such as (walking briskly, mowing a lawn or woods cut and the like), of those, 18(22.8%) were doing a moderate activity for at least 5 days per week and 36 (45.6%) were doing for at least 30 minutes per day. One hundred thirty-four (38.5%) of the study participants got rest more than 3 hrs per day (**Table 2**).

Physical measurement

Of all, 100 (28.5%) of the study participants had a family history of hypertension. 109 (31.1%) of the study participants have ever measured their BP, of which, 37(10.5%) have been informed as they had hypertension, and among those who had hypertension, 23(62.2%) took anti-hypertension medications. Based on the operational definition of central obesity (waist circumference to hip ratio ≥ 0.95 for male and ≥ 0.8 for female), just about, 116(33 %) of study participants were centrally obese, it was higher in female 95(68.8%) than males 21(9.9%) and the difference was statically significant (X^2=131, P-value=0.000). Two hundred sixty-five 265(75.5%) of study participants were in normal BMI, while, 12(3.4%) were obese with the mean and SD of (22.5$\pm$3.6) (Figure 3).

The mean systolic and diastolic BP results were 119.9mmHg ($\pm$15.3 SD) and 78.7mmHg ($\pm$10.8 SD) respectively. The overall prevalence of hypertension was 62 (17.7%) in the study population. The prevalence of hypertension was comparatively higher in males 49(23%) than women 13(9.4%), and the difference was statically significant (p = 0.002).

Factors Associated with hypertension

The result of binary logistic regression analysis on independent variables concerning hypertension Showed that age

Table 2: Behavioral factors hypertension in Mizan Aman town, Bench Maji zone, southwestern Ethiopia, 2015 (N=351).

Variable	Frequency	Percent
Current smoker		
yes	30	8.5
No	321	91.5
Number of cigarette per day		
1-3 cigarettes	17	56.7
$\geq$4 cigarettes	13	43.3
Fruit per week		
None	24	6.8
1-3 days per week	256	72.9
$\geq$4 days per week	71	20.2
Vegetable per week n=351		
None	15	4.3
1-3 days per week	212	60.4
>=4 days per week	124	35.3
Did your work involve vigorous activity (n=351)		
No	172	49
Yes	179	51
Working days of vigorous activity per week (n=179)		
1 -3 days	54	30.2
$\geq$4 days	125	69.8
Did your work involve moderate activity (n=351)		
No	118	33.6
Yes	233	66.4
Working days of moderate activity per week (n=233)		
1 -3 days	83	35.6
$\geq$ 4 days	150	64.4
Walking daily on foot for at least for 10 minutes (n=351)		
No	19	5.4
Yes	332	94.6
For how many minutes do you walk per day		
$\leq$30 minutes	68	20.5
> 30 minutes	264	79.5

Table 3: Bivariate and multivariate logistic regression analysis of factors associated with hypertension among study participants in Mizan- Aman town, Ethiopia, 2015 (n=351).

Variable	Hypertension		COR ,95%CI	AOR,95% CI
	No	Yes		
sex				
male	164	49	2.9(1.49,5.53)*	6.7(2.10 ,21.53}*
female	125	13	1.00	1.00
Age				
18-34	179	26	1.00	1.00
35-45	78	22	1.9(1.04,3.64)*	1.2(0.53,2.88)
>45	32	14	3.0(1.422,6.381)*	2.6(1.07,7.40)*
Family history of hypertension				
No	214	37	1.00	1.00
Yes	75	25	1.9(1.09,3.41)*	1.7(0.88,3.38)
Ever told to decrease salt intake				
No			1.00	1.00
Yes			2.9(1.64,5.02)*	3.2(1.62,6.29)*
BMI				
18.5.24.9	229	36	1.00	1.00
<18.5	27	2	2.1(0.48,9.31)	0.46(0.10,2.23)
25-29.9	28	7	8.2(1.73, 38.91)*	2.8(1.14,6.93)*
>30	5	7	18.9(3.01,38.83)*	8.5(1.68,42.45)*
Vigorous intensive physical exercise				
No	220	57	3.6 (1.38, 9.28)*	3.9(1.40, 11.13)*
Yes	69	5	1.00	1.00
Alcohol dinking status				
No	32	15	1.00	1.00
Yes	257	47	2.6 (1.29, 5.10)*	1.5(.65, 3.33)

* indicates association

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of the respondent, family history of hypertension, sex, alcohol consumption, vigorous intensive physical exercise, and BMI were found to be significantly associated with hypertension (**Table 3**).

The result of multiple logistic regression analysis showed that the BMI, sex, age of the respondent, and vigorous-intensity physical exercise were found to be significantly associated with hypertension as clearly depicted in the table below (**Table 3**).

There is a strong association between sex and hypertension. That is Being male was 6.7 times more at risk for hypertension than female (AOR = 6.7, 95%CI 2.10 -21.53). And those whose age group of above 45 years were 2.6 times more at risk for hypertension than 18-34 years age group (AOR= 2.6, 95% CI. 1.07-7.40) (**Table 3**).

Body mass index (BMI) was also significantly associated with hypertension. That is, those whose BMI >30 and 25-329.9 were 8.5and 2.8 times increased the risk of hypertension respectively when compared to those whose BMI was 18.5-24.8 (AOR=2.8, 95% CI. 1.14-6.93 and AOR=8.5, 95%CI.1.68-42.45). Similarly, those who had ever told to decrease weight were 3.2 times more at risk for hypertension than their counterparts (AOR=3.2, 95% CI. 1.62-6.29) (**Table 3**).

Those who did not take part in vigorous-intensity physical exercise were3.9 times more at risk for hypertension than those who took part in vigorous-intensity physical exercise(AOR=3.9 95% CI.1.40-11.13) (**Table 3**).

Discussion

Chronic diseases account for the greatest share of early death and disability worldwide. Over the next few decades, this burden is projected to rise particularly fast in the developing world [2]. Hypertension is one of the major NCD in the globe which is now changed from a relative rarity to a major public health problem [3].

Hypertension was found to be prevalent in the Mizan Aman town population Southwest Ethiopia. It accounted for 17.7%. This result was comparable with a community-based study conducted at Bedele which was 16.9% [14]. However it was lower than study findings in a different part of the country in Gonder (28.3%) and AA (30%) [9,15] and outside the country in Nigeria, Cameron and Zambia which was 22.7%, 29.7%, and 34.8% respectively [16-18]. On the contrary, this study finding is significantly higher when compared to the study finding of Mekele which was 11% [19]. This might be due to the study setting. That is the study population might have differences in lifestyle in a different setting. It might be also due to the age variation of the study population in the study sites.

The study also revealed that the prevalence of hypertension among sex was significantly different (23% in males and 9.4% in females). That is male was 6.7 times more at risk for hypertension than female (AOR = 6.7 95% CI 2.10 -21.53). This finding was in line with the study finding in Cameron, which reveals men were at higher risk for having hypertension (OR=1.25, 95% CI 2.54-8.74) [17]. Besides, this finding is strengthened by a study finding at Zambia which shows female respondents were 16% (AOR =0.84, 95% CI 0.74, 0.96) less likely to have hypertension [18]. Quite the reverse, a study conducted in Bedele, Gonder, Nigeria, and Mekele showed that the prevalence of hypertension is lower in

men when compared to women [14-16,19]. This difference might be explained by the age of the study population. In this study, the majority of the participants were in the age group of 45 years and below. It is supported by current scientific knowledge. That is the prevalence of hypertension is high in males before the age of 50 years or premenopausal period of females but lower after the age of 55 years.

In this study, the likelihood of hypertension significantly increased as age increase. Those whose age groups of 45 years and above were 2.6 times more at risk for hypertension than the age group of 18-34years (AOR = 2.6, 95% CI. 1.00, 7.40). This finding is in line with study findings that were done inside the country in Mekele, Bedele, AA, and Gonder [9,14-15,19] and outside of the country in Cameron, Nigeria, and India [16-17,20]. This is mainly due to arterial stiffness as age gets older.

This study also showed that being obese or overweight was at high risk for hypertension than normal weight. That is Those whose BMIs >30 and 25-29.9 were 8.5 and 2.8 times increased the risk of hypertension respectively when compared to those whose BMIs were 18.5-24.9 (AOR=2.8, 95% CI. 1.14-6.93 and AOR=8.5 95%CI.1.68-42.45). This result was in line with studies conducted in elsewhere of the country in AA, Gonder, and Mekele [9,15,19] and outside of the country in Zambia, Cameron, and Nigeria [16-18].

This study also revealed as there is a strong association between involved in vigorous-intensity physical exercise and hypertension. That is those who didn't involve in vigorous-intensity physical exercise were 3.6 times increased the risk of hypertension when compared with those who did vigorous intensive physical exercise (OR=3.6 95% CI.1.38, 9.28). This finding is supported by different scientific studies which explained that regular exercise reduces rising in BP and additionally, exercise protects against developing hypertension [21]. This finding was in line with a study conducted in Kuwait, which revealed that being involved in vigorous activity were less likely to develop hypertension than their counterpart [22].

In this study, no association was recognized between hypertension and the different categories of alcohol consumption. This finding is in line with the study done at Mekele, Bedele, and Gonder [14-15,19]. But different from a study done in Zambia which explains that those who consume alcohol were more at risk for hypertension when compared to those who did not consume alcohol [18] this might be due to types of alcohol and the differences of the study setting.

Physical measurement instruments such as weight scale were standardized on a daily base. Data collectors can speak both Amharic and local languages. The Questionnaire was standardized based on WHO steep wise approach tools. However, Perceived social-desirability of responses rather than actual practices could be response biases concerning behavioral factors. And biochemical measurements, the level of blood glucose or cholesterol level were not determined.

Conclusions and Recommendations

The study showed that the overall prevalence of hypertension was 17.7 % in the study area which was comparatively higher in men than females. It also showed that the risk of hypertension was increased in older age, male sex, obsess, and overweight

individuals. The study also showed that engaging in vigorous-intensity physical exercise was found to be a significant factor that decreases the risk of hypertension in the study area. Community-based screening programs should be established for hypertension in the community. Community education about hypertension, and its screening, and impacts is needed. Moreover, to explore further on hypertension and factors related to it, further studies need to be conducted.

Declarations

Ethical approval and consent to participation

Ethical clearance was sought from the Research approval Committee of Mizan -Tepi University. Oral informed consent was obtained from each study participant before data collection. The privacy of respondents and confidentiality of information was kept throughout the study. The research approval committee of the university confirmed as we could collect the data by taking the oral informed consent from all participants because the issue has no harm for being participating in the study rather it has great importance and very essential to take any action based on their status. Those who were hypertensive linked with health facility for follow up.

Consent for publication: not applicable

Available of the data and materials: The data sets generated during the study are available from thecorresponding author upon request

Competing interests

Acknowledgments

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