PREVALENCE OF HYPERTENSION AND ASSOCIATED RISK FACTORS AMONG ADULT POPULATION IN WOLAITA SODO TOWN, SOUTHERN ETHIOPIA

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Abstract

Background: Arterial hypertension is a sustained elevation of the systemic arterial pressure (systolic BP ≥140 and/or diastolic BP ≥90). It is most commonly due to increased peripheral resistance and is a very common abnormality in humans. The main objective of this study is to estimate the prevalence of hypertension and factors associated with it in the study area.

Methods: A community based cross-sectional study was conducted in 548 sampled adults (age 25-64 yrs) of Sodo town from July-September, 2016. Data were collected and analyzed by using SPSS version 20.0. Arterial blood pressure was measured from brachial artery of left arm in sitting position using the mercury sphygmomanometer.

Result: The overall prevalence of high blood pressure in the study population was 21.9% (in male and female was almost the same 22%, 21.8 % respectively). The mean arterial blood pressure (MAP) in this population was 91.3±10.7. In bivariate analysis of independent variables with hypertension; age,educational status, occupation, family history, physical activities,BMI & Waist to Hip ratio were significantly associated with occurrence of hypertension in this population. In multivariate analysis, age group 45-54 years (AOR = 3.999, 95% CI (1.5,10.5)), family history, AOR = 2.5, 95% CI (2.0,4.0), WHR of >95 (AOR=2.9) and BMI ≥ 25.00 (AOR=200) were independent predictors for the occurrence of hypertension in the study population.

Conclusion & Recommendations: Advancing age, family history of hypertension, physically in active which may be related to change anthropometric measurements were observed as significant risk factors for the prevalence of hypertension in the studied population. Early detection, combined with early treatment and lifestyle modifications can reduce the risk of complications and the burden of hypertension diseases on the individual with advancing age and family history as well as high BMI.

Introduction

Blood pressure is created by the force of blood pushing against the walls of blood vessels (arteries) as it is pumped by the heart. Blood pressure varies from person to person and by ages. In general: normal blood pressure for adult is less than 120 mmHg systolic and less than 80 mmHg diastolic (1). Hypertension, is a condition in which the blood vessels have persistently raised pressure greater than normal. It is defined as an abnormal elevation in systolic blood pressure (≥ 140mmHg) and/or diastolic blood pressure ((≥ 90mmHg) (2,3).

Normally, BP is controlled by the endothelial autocrine secretions which play an important role in local vasoconstriction and vasodilation (4). In addition to the local control of blood flow, global control of cardiac output

and arterial resistance is mediated by the autonomic nervous system (5). The most powerful long term mechanism that controls BP over weeks and months however is the integrated renal-endocrine systems that balance the body fluid and salt homeostasis with control of arterial hypertension (6).

Once high blood pressure develops, it usually lasts a lifetime (3). Hypertension is often called the silent killer. It is especially dangerous because it often has no warning signs or symptoms (7). The higher the pressure in blood vessels the harder the heart has to work in order to pump blood. If left uncontrolled, hypertension can leads to kidney failure, blindness, rupture of blood vessels and cognitive impairment (8).

Hypertension is an important public health problem worldwide. Analysis of the global burden of hypertension revealed that approximately 40% of the world's adult population (age above 25 yrs) had hypertension in 2008. According to the 2013 WHO report from data generated from 2008 database, the prevalence of high blood pressure in age group of 25 and above in Ethiopia is 33% in male & 28.3 in female (9).

Other than the small scale studies, there is no national prevalence study on hypertension in the country. The prevalence of hypertension also varied largely across these small studies ranging from 10.3 to 31.5% & 8.5 to 30.3 in male and female respectively (10-14).

This study is to come up with the current status of hypertension in adult population by elucidating the magnitude of the problem and various factors associated with prevalence of hypertension relevant to the study area.

Methods And Materials

1.1. Study Area and Period
Community based cross-sectional survey was conducted in Sodo town from July to September 2016. WolaitaSodo is one of the towns in south part of the country.

1.2. Sample Size Determination and Sampling
Source Population: All adults (25 to 64 years old) living in Sodo town.
Study Population: All adults (25 to 64 years old) fulfill inclusion criteria in the selected kebeles of the town.
Inclusion and Exclusion Criteria
Inclusion Criteria

All adults:-
 ➢ Aged from 25 to 64 years
 ➢ Who lived at least 1 yr. in Sodo town
 ➢ Healthy person who able to respond.

Exclusion criteria
Any adult:-
 ➢ Pregnant women
 ➢ Severely seek and unable to respond.
Study Unit: A single adult found in sampling unit.

1.2.1. Sample Size Determinations
The sample size was calculated using single population proportion formula determined from prevalence of HTN 31.5% (13).

$$n = \frac{(Z_{\alpha/2})^2 \times p \times (1-p)}{d^2}$$

Where: n= the minimum sample size

=1.96 (95% CI),   p= 31.5 % ,d= margin of error (5%)

Therefore the value of n will be calculated as follows

$$n= \frac{(1.96)^2 \times 0.315 (1-0.315)}{(0.05)^2} \qquad n=332$$

With anticipation of 10% non response rate the final sample size will be 365.
After considering design effect of 1.5   the final is n=548

1.2.2.   Sampling Technique
Stratified multistage sampling method was used to approach the study units. The Kebeles found in the town were stratified as kifleketema. 3 kebeles were selected from each strata (kifleketema) by simple random sampling. Proportional allocation method was applied to divide the sample for each stratum &kebele according to their household size. The list of the households for the study kebeles were acquired from the kifleketema office. Secondly, households were selected within each cluster using the systematic sampling technique. Finally, one individual was selected out of eligible adults in each household using simple random sampling.

Data Collection instrument and processing
Pre tested interviewer administered the WHO STEPS instrument (15) was used to collect data from respondents.
Blood pressure measurement

The measurements were taken using Mercury sphygmomanometer from left arm after 5 min sit quietly with the legs uncrossed and the arms free of clothing. The measurements were performed three times repeatedly at an interval of 3 minutes. First measurement was excluded, and the mean systolic and diastolic blood pressures of the last two measurements were taken into

Height Measurement
Height (in cm) was measured by height measuring board. The respondents standing on the board without foot wear or head wear, facing the interviewer, placing their feet together, heels against the back of the board, knees straight and looking straight ahead; and the interviewer moving the measuring stick down and placing it on top of the head and recording the height in centimeters.

Weight Measurement
 Body-weight (in Kg) was measured using 'digital weight scale for adult' instrument.

Waist Circumference
Waist girth was measured at the mid-way circumference between the lowermost rib margin and the iliac crest at the end of normal expiration using a non-elastic tape measurement.

Hip Circumference
Hip circumference was measured at the level of widest circumference of the hip over the greater trochanter using a non-elastic tape measure.

1.3. Data analysis
The data were analyzed using SPSS version 20.0, bivariate and multivariate analysis was done with 95% CI.

1.4. Operational definition
Physical inactivity – In this study is a response of being always or usually engaged in light/leisure activities for most days of the week or a response of sometimes/never engagement in moderate to intense physical activity outside

work for most days of the week, that would add up to at least three hours per week of moderate to intense (vigorous) physical activity.

Positive Family History of Diabetes and Hypertension - is a reported history of diabetes   and/or hypertension in the father, mother, full brother or sister, or the respondent.

Alcohol Consumption - Refers to the average consumption of more than 3 standard alcoholic drinks per day for men (≈30gm of alcohol) or >2 alcoholic drinks (or 20gm alcohol) for women. A standard alcoholic drink is the equivalent of one glass/can/bottle (330ml) of regular beer (with 3% ethanol), one glass (100ml) of wine (10% ethanol) or one glass or measure (40ml) of distilled spirit, each of which adds up to about 10g of ethanol per drink.

Result

Socio-demographic characteristics of the respondents
A total of 548 adults (100% response rate) of ages 25-65 years were included in this study. More than half (53.6%) were females. The mean age (with the $\pm$ SD) of the respondents was 35.1 $\pm$ 9.7 years. Majority (76.5.8 %) were woliata in ethnicity (table-1).

Table-1 Socio-demographic characteristics of study participants in WolaitaSodoTawn, southern Ethiopia, 2016 (n=548).

Characteristics	Frequency	Percent
Sex		
Male	254	46.4
Female	294	53.6
Age		
25-34	356	65.0
35-44	113	20.6
45-54	51	9.3
≥55	28	5.1
Ethnicity		
Wolaita	419	76.5
Amhara	37	6.8
Dawro	2	.4
Oromo	4	.7
Yam	4	.7
Gurage	12	2.2
Others	70	12.8
Educational status		
No formal education	35	6.4
Primary level	95	17.3
Secondary level	127	23.2
Tertiary level	291	53.1
Occupation		
Government employed	118	21.5
Merchant	101	18.4
Daily laborer	37	6.8
Student	117	21.4
House wife	112	20.4
Retired	20	3.6
Others	43	7.8

Family monthly income		
<500 birr	138	25.2
501-1000	116	21.2
1001-1500	50	9.1
1501-2000	78	14.2
≥2001	166	30.3

Prevalence of HTN

The overall prevalence of high blood pressure (systolic BP ≥140 and/or diastolic BP ≥90) in the study population was 21.9%. The prevalence of high blood pressure in male and female was almost the same 22%, 21.8 % respectively. The mean arterial blood pressure (MAP) in this population was 91.3±10.7. MAP in male and female was 92.4 ±10.1, 90.3±11.1 respectively.

Bivariate analysis

Association of socio-demographic factors with hypertension

In bivariate analysis of the socio-demographic variables with hypertension, age was found to have statistically significant association with the odds of hypertension among 45-54 was, **[OR 3.396 (1.834, 6.288)]** compared to the young age group 25-34 years. Related to association of educational status of the respondents with the occurrence of hypertension, there is an increase in proportion of hypertensive cases as the educational level increase but, only secondary level educational status have significant association COR = **2.335** with **95% CI (1.387-3.929)** comparedto no formal education.

The overall prevalence of family history of hypertension in the population was 233 (43.5 %), irrespective of the disease status. A family history of hypertension (parents, grandparents or siblings) was present in (38.6.0 %) of participants with hypertension. Family history was significantly associated with the occurrence of hypertension in participants' with the family history of parents and siblings with the OR= 123.5 (46.1, 330.5) & 2.028(1.089, 3.778) compared to no family history of hypertension. (Table-4)

Table-4 Bivariate logistic regression analysis of socio-demographic factors associated with study participants in WolaitaSodoTawn, Southern Ethiopia, 2016 (n=548).

Characteristics	Hypertension		COR (95% CI)
	Yes (%)	No (%)	
Sex			
Male	56 (46.7)	198 (46.3)	1.016 (0.677,1.525)
Female	64 (53.3)	230 (53.7)	1.00
Age			
25-34	65 (54.2)	291(68.0)	1.00
35-44	24 (20.0)	89(20.8)	1.207(0.472,1.090)
45-54	22(18.3)	29(6.8)	**3.396(1.834, 6.288)**
≥55	9(7.5)	19(4.4)	2.121 (0.918, 4.900)
Ethnicity			
Wolaita	91 (75.8)	328(76.6)	.936 (0.512,1.713)
Amhara	10 (8.3)	27(6.3)	1.250(0.501,3.122)
Dawro	-	2 (0.5)	.000
Oromo	1(0.8)	3(0.7)	1.125(.109,11.573)
Yam	-	4(.9)	.000
Gurage	2(1.7)	10 (2.3)	.675(.134,3.402)

Others	16(13.3)	54(12.6)	1.00
Educational status			
No formal education	9(6.1)	26(7.5)	1.00
Primary level	32(26.7)	63(14.7)	1.591 (.704,3.595)
Secondary level	27(22.5)	100(23.4)	**2.335(1.387,3.929)**
Tertiary level	52(43.2)	239(55.8)	1.241(.738,2.088)
Occupation			
Government employed	23(19.2)	95(22.2)	.625(.279,1.402)
Merchant	22(18.3)	79(18.5)	.719(.318,1.628)
Daily laborer	9(7.5)	28(6.5)	.830 (.304,2.266)
Student	16(13.3)	101(23.6)	**.409 (.175,.957)**
House wife	30(25.0)	82(19.2)	.945 (.430,2.076)
Retired	8(6.7)	12(2.8)	1.722 (.564,5.255)
Others	12(10.0)	31(7.2)	1.00
Family monthly income			
<500 birr	34(28.3)	104 (24.3)	1.00
501-1000	29(24.2)	87 (20.3)	1.020 (.576,1.806)
1001-1500	7(5.8)	43 (10.0)	.498 (.205,1.210)
1501-2000	16(13.3)	62 (14.5)	.789 (.403,1.546)
≥2001	34(28.3)	132 (30.8)	.788 (.459,1.353)
Family history of HTN			
Parents	65(54.2)	5(1.2)	**123.5(46.1,330.5)**
Grand parents	6(5.0)	49(11.4)	1.163(0.460,2.941)
Siblings	19(15.8)	89(20.8)	**2.028(1.089,3.778)**
No history	30(25)	285(66.6)	1.00

Behavioral risk factors of participants
Behavioral risk factors of the respondents like smoking status, alcohol intake, and frequency of weekly fruits and vegetable intake of the study participants have no significant association in this study.

Physical activities and anthropometric risk factors of HTN
In this study, those who do not undertake daily ten minutes walk were 1.8 time more likely to develop hypertension with OR= 1.791 with 95% CI(1.128-2.845) compared to their reference group. Individuals with BMI ≥25 was 25 time more likely to have hypertension than groups with the BMI<18.5 [OR=**25.570 with 95% CI (3.424, 190.959)**]. Males with central obesity (W/H>95) were 3 times more likely to develop hypertension than the reference group.

Table-6 Physical activities and anthropometric risk factors associated with hypertension in WolaitaSodoTawn, Southern Ethiopia, 2016 (n=548).

Characteristics	Hypertension		COR (95%CI)
	Yes (%)	**No** (%)	
Physical activities/wk			
Vigorous PA			
No	92(76.7)	358(83.6)	.642(.392-1.053)
At least once per week	28(23.3)	70(16.4)	1

Moderate PA			
No	53(44.2)	179(41.8)	.909(.604-1.367)
At least once per week	67(55.8)	249(58.2)	1
Daily ten minutes walk			
No	35(29.2)	80(18.7)	**1.791(1.128-2.845)**
At least once per week	85(70.8)	348(81.3)	1
Anthropometric risk factors			
BMI			
<18.50	1(0.8)	41(9.6)	**.118 (.016, .871)**
18.50-24.99	61 (50.8)	294 (68.7)	1.00
≥ 25.00	58 (48.3)	93 (21.7)	**3.006(1.958, 4.614)**
Waist to hip circumference ratio			
Male			
≤0.95	41(73.2)	147(74.2)	1
>0.95	15(26.8)	51(25.8)	**3.087(1.377-6.921)**
Female			
≤ 0.80	17(26.6)	84(36.5)	1
>0.80	47(73.4)	146(63.5)	1.591(.859-2.946)

Multivariate Analysis

Factors Independently Influencing Occurrence of Hypertension
Variables which were significant in bivariate analysis were put in to multiple logistic regression by enter method and the final factors significantly influencing occurrence of hypertension were age, family history BMI & WHR in male remain to be significantly associated with the presence of hypertension in the study population (Table-7).

Table-7 Multivariate Logistic Analysis of Factors Influencing Hypertension among Adult Population of Sodo Town, Southern Ethiopia, 2016. (n=548)

Characteristics	Hypertension		COR (95% CI)	AOR (95% CI)
	Yes (%)	No (%)		
Age				
25-34	65 (54.2)	291(68.0)	1.00	1.00
35-44	24 (20.0)	89(20.8)	1.207(0.472,1.090)	1.580(.713,3.501)
45-54	22(18.3)	29(6.8)	**3.396(1.834, 6.288)**	**3.997(1.527,10.459)**
≥55	9(7.5)	19(4.4)	2.121 (0.918, 4.900)	2.727(.444,16.734)
Educational status				
No formal education	9(6.1)	26(7.5)	1.00	1.00
Primary level	32(26.7)	63(14.7)	1.591 (.704,3.595)	1.886 (.561,6.341)
Secondary level	27(22.5)	100(23.4)	**2.335(1.387,3.929)**	.796(.231,2.748)
Tertiary level	52(43.2)	239(55.8)	1.241(.738,2.088)	.712(.204,2.483)
Occupation				
Government employed	23(19.2)	95(22.2)	.625(.279,1.402)	.578 (.227,1.470)
Merchant	22(18.3)	79(18.5)	.719(.318,1.628)	.643(.261, 1.583)

Daily laborer	9(7.5)	28(6.5)	.830 (.304,2.266)	.743(.254,2.171)
Student	16(13.3)	101(23.6)	**.409 (.175,.957)**	.724(.286,1.835)
House wife	30(25.0)	82(19.2)	.945 (.430,2.076)	.716(.294,1.744)
Retired	8(6.7)	12(2.8)	1.722 (.564,5.255)	1.348(.265,6.855)
Others	12(10.0)	31(7.2)	1.00	.701(.396,1.241)
Family history of HTN				
Parents	65(54.2)	5(1.2)	**12.35(4.1,22.5)**	**23.97(7.468,41.1)***
Grand parents	6(5.0)	49(11.4)	1.163(0.460,2.941)	1.382(.497,3.847)
Siblings	19(15.8)	89(20.8)	**2.028(1.089,3.778)**	1.642(.809,3.331)
No history	30(25)	285(66.6)	1.00	1.00
Daily ten minutes walk				
No	35(29.2)	80(18.7)	**1.791(1.128-2.845)**	.664 (.331,1.332)
At least once per week	85(70.8)	348(81.3)	1.00	1.00
Anthropometric risk factors				
BMI				
<18.50	1(0.8)	41(9.6)	.118 (.016, .871)	.456(.132,1.678)
18.50-24.99	61 (50.8)	294 (68.7)	1.00	
≥ 25.00	58 (48.3)	93 (21.7)	3.006(1.958, 4.614)	**3.12(1.897,5.211)***
Waist to hip circumference ratio				
Male				
≤0.95	41(73.2)	147(74.2)	1	
>0.95	15(26.8)	51(25.8)	**3.087(1.377-6.921)**	**2.990(1.182,7.412)***
Female				
≤ 0.80	17(26.6)	84(36.5)	1	
>0.80	47(73.4)	146(63.5)	1.591(.859-2.946)	1.161(.506,2.662)

Discussion

The current study attempted to determine the prevalence of hypertension among adult population and factors associated with occurrence of hypertension in the study area. The overall prevalence of hypertension was 21.9%; which was consistent with the results obtained in Durame Town, Southern Ethiopia (16) & in other study areas of Africa Oyo State South West Nigeria (17) Oghara, Delta State Nigeria (18). This finding is higher than the cross-sectional study conducted in Badale Town Oromia region (14) &rural and urban areas of southern Ethiopia (13). The higher prevalence of hypertension in this study than the previous studies in Badale town & rural and urban areas of southern Ethiopia could be explained in two ways: one age group difference of the study participants (in Bedele the initial age was 15 & the mean age of the population was 29.6 as well as 67.9% of the participants age is <35 which showed majority of the study participants were younger, in which hypertension is most likely less prevalent). Two this study considers only urban population. But, lower than the finding in Addis Ababa city (11)&Gonder town (10).

In this study, as the age increase the prevalence of HTN also increase and age group 45-54 were 3.4 time more likely to develop hypertension than the reference group. The more occurrence of HTN in the higher age of this study was explained by direct relationship of age with the occurrence of hypertension. This finding is comparable with other studies (10, 12, 14). Respondents with positive familial history, particularly parents' history of hypertension were 24 times more likely to develop hypertension than compared to no familial history of HTN. It is well known that one of non-modifiable cause of HTN was genetic factor that pass to the offspring (8).   The

significant association of positive family history of hypertension and it occurrence in the population in this study was similar with other studies in Africa and elsewhere (19-21).

Anthropometric measurements of the study participants like BMI & WHR has showed significant association with occurrence of hypertension. Respondents with BMI >25 were 3 times more likely to develop hypertension than the normal BMI group AOR=**2.990** with the CI of **(1.182, 7.412)**. As stated in different literatures over weight is the major risk factor for hypertension (10, 13, 14). This finding is similar with other studies in country and other parts of the world (11,12, 22,23).

Conclusion & recommendations

Advancing age, family history of hypertension, physically in active which may be related to change anthropometric measurements were observed as significant risk factors for the prevalence of hypertension in the studied population. Early detection, combined with early treatment and lifestyle modifications can reduce the risk of complications and the burden of hypertension diseases on the individual with advancing age and family history as well as high BMI.

Conflict of interests: The author(s) declare(s) that they have no competing interests.

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