

Determinants of Hypertension Among Patients in Bale Zone, Southeast Ethiopia: A Case Control Study

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Received date: February 3, 2018; Accepted date: February 12, 2018; Published date: February 27, 2018

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Abstract

Background: Hypertension is a chronic disease in which the prevalence has been steadily increasing in Ethiopia.

Objective: To examine determinants of Hypertension among patients in Bale Zone, Southeast, Ethiopia, 2016.

Methods: Institutional based case control study design was conducted in four public Hospitals, of Bale Zone from November to February 2017. The sample size was 492 (164 cases and 328 controls). Using simple random sampling technique cases and controls were selected. The data was checked, entered and analyzed using statistical package for social science (SPSS) version 21.0.

Result: The finding of this study indicated that the most significantly risk factors of Hypertension were; present history of alcohol use were (AOR 1.26, 95% CI 1.08-2.23); having past history of cigarette smoke were 2 times (AOR 2.06, 95% CI 0.93-3.44); those Body Mass Index was categorized in overweight were 5 times (AOR 5.20, 95% CI 3.63-11.54) more likely to be hypertensive than controls.

Conclusion and recommendation: The identified determinants of the past or present risk factors; overweight, alcohol use, smoking cigarette are clinically significant on Hypertension patients. Therefore, Quitting alcohol use and smoking cigarette as well as controlling Body Mass Index should be a focus on prevention and control program of Hypertension via creating proper awareness and advocacy.

Keywords: Hypertension; Patients; Body mass index; Alcohol

Introduction

Hypertension is a chronic disease in which blood flows through arteries at higher than normal pressures. Normal blood pressure (BP) for adults is defined as a systolic pressure below 120 mmHg and a diastolic pressure below 80 mmHg [1,2]. From the types of Hypertension, primary Hypertension, 'silence killer', is by far the most common type [3,4] that cause of Cardio alcohol (CVDs) and premature deaths worldwide with an estimated 1.56 billion in adult's patients, in 2025 [5].

Determinants of Hypertension can be influenced by a number of factors, including adopting a healthy lifestyle [6,7], like due to urbanization, that accounts for the rising of prevalence of Hypertension at large [8]. Primary prevention provides an attractive opportunity to interrupt and the continuing costly cycle of managing Hypertension and its complications [9,10].

Globally, there are nearly one billion people living with Hypertension; from which >17 million deaths it accounts, and 2/3 is in developing countries [11,12]. It is a major risk factor for a variety of cardiovascular diseases, including coronary artery disease, heart failure, stroke and peripheral vascular disease and responsible for at least 45% of deaths due to heart disease and 51% of deaths due to

stroke [7]. Most adults are vulnerable to risks of Hypertension by influencing factors [5].

The prevalence of Hypertension has been steadily increasing in Ethiopia from 3.6% in 1983, to 11.8 in 2002 and 29.6 in 2006 [13-15]. It accounted for 1.4% of all deaths in 2000/01, making it the 7th leading cause of death in the country [16]. In 2011, 34% of Ethiopian population is dying from non-communicable diseases (NCDs), with a national cardiovascular disease prevalence of 15% [17]. If it continues in such way, the result of double burden of NCDs constrains the health resources in the country [18] and it could be major obstacles to the country's effort in the achievement of Sustainable Development Goals (SDGs), Goal 3.4, stated as "reduce pre-mature mortality by one-third from None communicable diseases, by 2030" [19].

The general aim of the study was to examine determinants of hypertension among patients in Bale zone, Southeast Ethiopia, February 2016. The information obtained from the study was to develop of an appropriate strategy for the prevention and control of the major determinants of hypertension among adult population in Ethiopia; moreover, it will fill a gap in various research literatures by establishing baseline information for hypertension risk factors.

Methods

Study setting and participants

Institution based unmatched case control study design was conducted in four public Hospitals namely Goba, Robe, Ginnir and Delomena Hospital, of Bale Zone from November to February 2016/2017. Bale Zone is found in Oromiya region, 430KM far from the capital city of Ethiopia.

The sample size was calculated by using Epidemiological Information Program (Epi-Info) version 3.5.1 using the proportion difference approach and the following assumptions: 1 to 2 cases to controls ratio was recruited to achieve 80% power to detect an odds ratio of 2.0 at the 5% significance level if 15% or more of the general population was exposed to the risk factors [17] at 95% confidence level. Finally, the software yields: 492 total sample size (164 cases and 328 controls). After added 5% for contingency, the total sample size was 517 people (172 cases and 345 controls).

Simple random sampling technique was used to select study cases from the available follow-up registration book that have appointment during the study period. Two consecutive controls were selected for each case from the same medical centers who seeking other services and proved to be free from Hypertension. Mark was put on the patient's card to avoid overlapping.

The total sample size was distributed proportionally to the four hospitals. The Source populations were all patients diagnosed as having Hypertension and attended follow-up clinic. For controls all adults of the same medical centers who seeking other health care services.

Study populations of cases were sample clients diagnosed as having Hypertension (BP \geq 140/90 mmHg and attended services during the study period. Inclusion criteria of cases were clients diagnosed as having Hypertension (BP \geq 140/90) and attended services during the study period was select randomly from the follow-up clinic and newly diagnosed Hypertension clients were referred to the follow-up clinic during the data collection period and reconfirmed by the re-measurement of blood pressure. Pregnant women, client with renal disease, age <18 years old, physical deformity were excluded among cases.

Controls were chosen from the same medical centers who seeking other services. Patients from the same medical centers who seeking other services, proved to be free from Hypertension (diagnosed as a normal BP and confirm by the measurement of BP) during the study period were included in the study. Pregnant women, client with renal disease, age <18 years old, physical deformity were excluded among cases.

The outcome variable was Hypertension. The independent variables were categorized socio demographic factors such as educational, occupational, religious status, household income etc. Non-modifiable determinants such as age, gender, family history of Hypertension and Diabetes mellitus and Modifiable lifestyle determinants such as stress management, smoking and Khat chewing

Operational definition

- Hypertension: defined as systolic blood pressure of \geq 140mmHg and/or diastolic blood pressure of \geq 90 mmHg.
- BMI categorized: underweight <18.50 kg/m²; normal 18.5- 24.99; overweight 25.0-29.99 and obese >30 [20].

- Current khat use: Reported consumption of khat at the time of the survey.
- Past Khat chewers: Individuals who reported Khat use before but stopped now.
- Former alcohol drinker: A person who drink alcohol before but discontinued now.
- Current alcohol drinker: A person who has been drink at the time of the survey.
- Ex-smoker: Reported previous history of smoking, but quit at the time of the survey.
- Current cigarette smoking: Reported current smoking at the time of the survey [14,21-23].

Data collection procedures

A pre-tested, structured, questionnaire adapted from WHO , approach to surveillance Non communicable diseases (NCDs), was modified according to Ethiopian context and was translated to local language (Afaan Oromo) by experts and back to English language by another translator to see its consistency. Pre-test was done two weeks before the actual data collection day on 22 (5% of the sample size) randomly selected cases and controls and modification was done on questioner.

Data was collected through a face-to-face interview and blood pressure and anthropometric measurements was taken as per WHO Step guidelines. The blood pressure was measured and recorded to the nearest 2 mmHg on the right arm after a 5-minute rested in a sitting position by a mercury sphygmomanometer. Height was measured and recorded to the nearest millimeter using a wall mounted standing erect and without a cap, with the occipital, back, buttock, and heel making contact with a vertical wall. The weight was measure using scale weighing machine with wearing light summer clothing. Data was collected by 8 trained MPH or MSc health professionals and local language speakers after two day training was given. Close supervision was done by the investigators during data collection.

Data processing and analysis

The data was check for completeness, coded and entered then analyzed using statistical package for social science (SPSS) version 21.0. Descriptive statistics was used to describe the study population in relation to relevant variables. Binary and multivariable logistic regression analysis computed to examine determinants associated with Hypertension. Statistical significance declared at P value <0.05. The final results presented in form of text, tables.

Results

Socio demographic characteristics of respondents

A total of 517; 172 cases and 345 controls were included in this study, with response rate of 100%. The mean (+SD) age of cases and controls was 52.32 (\pm SD 16.2) years and 31(\pm SD 7.9) years, respectively. More than half (52.3%) of cases and controls (53.3%) were found at the age of 40 years and above.

The majority 104(60.5%) of cases were male whereas 223(64.6%) of controls were female. About forty seven percent 81(47.1%) of cases were unable to read and write whereas 170(49.3%) of controls able to read and write. About eighty two percent 142(82.6%) of cases and ninety percent 311(90.1%) of controls were Oromo in ethnicity. Sixty

two percent 107(62.2%) of cases and sixty percent 207(60%) of controls were Muslim. Eighty nine percent 153(89%) of cases and eighty two percent 285(82.6%) of controls were married. 60.5% of cases and (65.5%) of controls had family income of >500 birr/month as shown in Table 1.

Variable		Cases (n=172)		Controls (n=345)	
		Number	%	Number	%
Age	<40	82	47.7	161	46.7
	≥ 40	90	52.3	184	53.3
Sex	Female	90	52.3	223	64.6
	Male	82	47.7	122	35.4
Residence	Rural	26	15.1	126	36.5
	Urban	146	84.9	219	63.5
Education	Unable to read and write	81	47.1	124	35.9
	Able to read and write	53	30.8	170	49.3
	Grade 1-6	18	10.5	16	4.6
	Grade 7-12	8	4.7	13	3.8
	Above 12	12	6.9	22	6.4
Occupation	House wife	60	34.9	108	31.3
	Farmer	37	21.5	68	19.7
	Employed	16	9.3	86	24.9
	Merchant	16	9.3	24	7
	unemployed	15	8.7	22	6.4
	Daily laborer	0	0	21	6.1
	Retired	28	16.3	16	4.6
Ethnicity	Oromo	142	82.6	311	90.1
	Amhara	13	7.6	17	4.9
	Somali	14	8.1	15	4.4
	Tigre	3	1.7	2	0.6
Religion	Muslim	107	62.2	207	60
	Orthodox	62	36.1	120	34.8
	Protestant	3	1.7	14	4.1
	Catholic	0	0	4	1.1
Marital status	Single	6	3.5	28	8.1
	Married	153	89	285	82.6
	Divorced	10	5.8	22	6.4
	Windowed	3	1.7	10	2.9
Household income /month	<500 birr	68	39.5	119	34.5

≥ 500 birr	104	60.5	226	65.5
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Table 1: Socio-demographic characteristics of adults clients in bale zone hospitals, southeast Ethiopia, 2016/2017(n=517).

Health status indicators and lifestyle related risk factors

One hundred and one (64.5%) of cases and two hundred and thirty nine (69.3.5%) of controls had an immediate family member with a history of Hypertension and of which about half (45.1%) and (49.4%) were mothers respectively. Forty two (24.4%) of cases and one hundred and nine (31.6%) of controls had self-reported history of Diabetes Mellitus. More than half (54.1%) of cases had past history of alcohol use, 17(9.9%) drink currently, 83(48.3.7%) had past history of cigarette smoke, 128(74.4%) had past history of Khat chew and 22(12.8%) currently chew khat. More than half (54.8.8%) of controls had no past history of alcohol use, 88(25.5%) drink currently, 273(79.1%) had no

past history of cigarette smoke, 246(71.3%) did not smoke currently, 297(86.1%) had no past history of Khat chew and 247(71.6%) had not chew khat currently.

Regarding self-stress management, 119 (69.2%) of cases did nothing special, 14(8.1%) discuss with others, 14(8.1%) chew Khat, 2(1.2%) smoke cigarette, 4(2.3%) drink alcohol, 8(4.7%) sleep and 11(6.4%) did something related to religious and 235(68.1%) of controls did nothing special, 17(4.9%) discuss with others, 12(3.5%) chew Khat, 44(12.8%) smoke cigarette, 18(5.2%) drink alcohol, 8(2.3%) sleep and 11(3.2%) did something related to religious as shown in Table 2.

Variable		Cases (n=172)		Controls (n=345)	
		Number	%	Number	%
Family history of Hypertension	No	61	35.5	106	30.7
	Yes	111	64.5	239	69.3
Relationship with family	Father	46	41.4	98	41
	Mother	50	45.1	118	49.4
	Siblings	15	13.5	23	9.6
Self-reported Diabetes mellitus	No	130	75.6	236	68.4
	Yes	42	24.4	109	31.6
Past history of alcohol use	No	79	45.9	156	45.2
	Yes	93	54.1	189	54.8
Present alcohol use	No	155	90.1	257	74.5
	Yes	17	9.9	88	25.5
Past history of cigarette smoke	No	89	51.7	273	79.1
	Yes	83	48.3	72	20.9
Present smoker	No	164	95.3	246	71.3
	Yes	8	4.7	99	28.7
Live with smoker	No	170	98.8	298	86.4
	Yes	2	1.2	47	13.6
Past history of khat chew	No	44	25.6	297	86.1
	Yes	128	74.4	48	13.9
Present khat chew	No	150	87.2	247	71.6
	Yes	22	12.8	98	28.4

Table 2: Health status indicators and lifestyle related risk factors associated with Hypertension, among adults, Bale Zone Hospitals, Southeast Ethiopia, 2016/2017(n=517).

Awareness of adults about hypertension

Only nine (5.2%) of cases and eight (2.3%) of controls answered that Hypertension was blood flows through arteries at higher than normal. About forty three percent 74(43%) of cases and forty five percent 156 (45.2%) of controls answered that Hypertension was high amount of blood, the rest twelve percent 22 (12.8%) of cases and nine percent 33(9.6%) of controls answered that Hypertension was high level of stress, tension and thirty nine percent 67 (39%) of cases and forty two percent 148 (42.9%) of controls did not knew about Hypertension.

About thirty three percent 57(33.1%) of cases and five percent 18(5.2%) of controls responded that normal high blood pressure should be less than or equals 120/80. About sixty six percent

144(66.3%) of cases and ninety three percent 324(93.9%) of controls did not knew about normal high blood pressure, 1 (0.6%) of the case answered that normal high blood pressure should be less than or equals 139/89 and 3(0.9%) of controls answered normal high blood pressure should be less than or equals 160/100.

One hundred and sixty eight percent of cases (97.7%) and three hundred and seven percent 307(89%) of controls had about symptoms of Hypertension and both and almost all had the awareness that headache, dizziness and general tiredness were the symptoms of Hypertension. One hundred and sixty six (96.5%) of cases and three hundred and thirty seven (97.7) of controls believed that change of lifestyle could help to prevent Hypertension as shown in Table 3.

Variable		Cases (n=172)		Controls (n=345)	
		Number	%	Number	%
Hypertension awareness	High level of stress, tension	22	12.8	33	9.6
	High amount of blood	74	43	156	45.2
	Blood flows through arteries at higher than normal	9	5.2	8	2.3
	I do not know	67	39	148	42.9
Awareness about normal Hypertension	< 120/80 mmHg	57	33.1	18	5.2
	< 139/89 mmHg	1	0.6	0	0
	< 160/100 mmHg	0	0	3	0.9
	I do not know	114	66.3	324	93.9
Awareness about symptoms of Hypertension	No	4	2.3	38	11
	Yes	168	97.7	307	89
Hypertension can be prevented through lifestyle changes	No	6	3.5	8	2.3
	Yes	166	96.5	337	97.7

Table 3: Awareness of adults about hypertension (high blood pressure), Bale Zone Hospitals, Southeast Ethiopia, 2016/2017(n=517).

Blood pressure measurement among adults

The average mean systolic and diastolic blood pressure of cases was (mean ± SD) 152.25 ± 22.85 mmHg and 97.36 ± 15.4 mmHg, respectively. The average mean systolic and diastolic blood pressure of controls was (mean ± SD) 135.67 ± 16.6 mmHg and 75.66 ± 8.6 mmHg, respectively.

Height and weight of cases are (mean ± SD) 1.68 ± 0.10 m and 73.5 ± 16.83 kg respectively. Height and weight of controls are (mean ± SD) 1.66 ± 0.08 m and 67.5 ± 13.64 kg respectively.

About twenty eight percent 49 (28.5%) of cases were overweight, twelve percent 22(12.8%) obese and more than half had 101(58.7%) had normal body weight and about twenty five percent 88 (25.5.6%) of controls had normal body weight, about half 168 (48.7%) overweight and twenty five percent 89 (25.8%) were obese as shown in Table 4.

Variable		Cases (n=172)	Controls (n=345)
First blood pressure	mean SBP ± SD (mmHg)	161.41 ± 25.2	136.1 ± 17.1
	mean DBP ± SD (mmHg)	98.52 ± 18.3	76.14 ± 9.1
BP after 5 minutes for newly diagnosed	mean SBP ± SD (mmHg)	143.1 ± 20.5	135.24 ± 16
	mean DBP ± SD (mmHg)	96.17 ± 12.5	75.17 ± 8.1

Average blood pressure	mean SBP ± SD (mmHg)	152.25 ± 22.85	135.67 ± 16.6
	mean DBP ± SD (mmHg)	97.35 ± 15.4	75.66 ± 8.6
	Height mean ± SD (meters)	1.68 ± 0.1	1.66 ± 0.08
	Weight mean ± SD (kilogram)	73.5 ± 16.83	67.5 ± 13.64
BMI(kg/m ²)	Normal 18.5- 24.99 kg/m ²	101 ± 58.7	88 ± 25.5
	Overweight 25.0-29.99 kg/m ²	49 ± 28.5	168 ± 48.7
	Obese >30 kg/m ²	22 ± 12.8	89 ± 25.8

Table 4: Anthropometric and BP measurement of adults, Bale Zone Hospitals, Southeast Ethiopia, 2016/2017(n=517).

Determinants of hypertension

The most common modifiable and non-modifiable lifestyle determinants of Hypertension were educational status, marital status, annual family income, alcohol use, cigarette smoking and obesity, age, family history of Hypertension and self-reported Diabetes mellitus respectively.

Participants whose were being aged 40+ years were 2 times (AOR 2.17 95% CI1.02-4.96) more likely to be hypertensive than those who aged <40 years. Twelve (6.9%) of cases with educational status of above 12 were 2 times (AOR 2.77, 95% CI, 0.96 – 4.99) more likely to be hypertensive than those who were unable to read write. One hundred and fifty three (89%) of cases who were married were 2 times (AOR 2.90, 95% CI 1.62-5.19) more likely to be hypertensive than those who were single.

One hundred and four (60.5%) of cases and two hundred and twenty six (65.5%) of controls who did have family income of 500 and more birr/month were 2 times (AOR=2.14; 95%CI: 1.15–8.68) more likely to be hypertensive than those who have less than 500 birr/

month. One hundred and one (64.5%) of cases who did have family history of Hypertension were almost 2 times (AOR 2.08, 95% CI 1.82-3.74) more likely to be hypertensive than those who did not have.

Forty two (24.4%) of cases who did have self-reported Diabetes mellitus were 2 times (AOR 2.42, 95% CI 1.68-4.34) more likely to be hypertensive than those who did not have.

More than half (54.1%) of cases who did have past history of alcohol use and 17 (9.9%) of cases who has present history of alcohol use were (AOR 1.26, 95% CI 1.08-2.23) and (AOR 2.16, 95% CI 1.58-5.18) were more likely to be hypertensive than those who did not have respectively. Almost half 83 (48.3%) of cases who did have past history of cigarette smoke were almost 2 times (AOR 2.06, 95% CI 0.93-3.44) more likely to be hypertensive than those who did not have. Forty nine (28.5%) of cases whose BMI was categorized in overweight were 5 times (AOR 5.20, 95 CI 3.63–11.54) and 22 (12.8%) of cases who were obese 6 times (AOR 6.46, 95 CI 4.01-14.62) were more likely to be hypertensive than those who did have normal BMI as shown in Table 5.

Variable		Cases	Controls	COR (95% CI)	AOR (95% CI)
Age	<40	82	161	1	1
	> 40	90	184	1.04 (0.08-0.86)*	2.17 (1.02-4.96) *
Education	Unable to read and write	81	124	1	1
	Able to read and write	53	170	2.09 (0.47-4.38)	1.93 (0.60-2.86)
	Grade 1-6	18	16	0.58 (0.29-0.96)	0.67 (0.23-1.56)
	Grade 7-12	8	13	1.06 (0.24-2.42)	1.83 (1.16-3.21)
	12+	12	22	1.19 (0.68-0.98)*	2.77 (0.96-4.99)**
Marital Status	Single	6	28	1	1
	Married	153	285	0.40 (0.22-0.80)*	2.90 (1.02-5.19)**
	Divorced	10	22	0.47 (0.03-1.90)	1.64 (0.61-4.39)
	Widowed	3	10	0.71 (0.12-2.56)	1.60 (1.00-2.42)
Monthly income	< 500	68	119	1	1
	≥ 500	104	226	1.24 (0.04-0.74)*	2.14 (1.15-8.68)**

Family history of Hypertension	No	61	106	1	1
	Yes	111	239	1.24 (0.05-0.76)*	2.08 (1.82-3.74)*
Self-reported Diabetes Mellitus	No	130	236	1	1
	Yes	42	109	1.43 (0.12-0.84)*	2.42 (1.68-4.34)*
Past history of alcohol use	No	79	156	1	1
	Yes	93	189	1.03 (0.20-0.98)*	1.26 (1.08-2.23)
Present alcohol use	No	155	257	1	1
	Yes	17	88	3.12 (1.05-3.74)*	2.16 (1.58-5.18)*
Past history of smoke	No	89	273	1	1
	Yes	83	72	0.28 (0.06-0.86)*	2.06 (0.93-3.44)*
BMI	Normal	101	88	1	1
	Overweight	49	168	3.94 (2.24-8.74) *	5.20 (3.6-11.54)**
	Obese	22	89	4.64 (2.68-9.86) *	6.46 (4.1-14.62)**

*p<0.05, **p<0.001, 1= reference

Table 5: Determinants of hypertension among patients, Bale Zone, Ethiopia, 2016/2017.

Discussion

This study found that the most common non-modifiable determinants associated with Hypertension among patients in Bale zone, Southeast Ethiopia were age, family history and self-reported diabetes mellitus and among modifiable lifestyle determinants were educational status, marital status, annual family income, alcohol use, cigarette smoking and obesity.

The result of this study revealed participants whose were being aged 40 years and above were 2 times (AOR 2.17 95% CI 1.02-4.96) more likely to be hypertensive than those who aged < 40 years. The result is supported by one study done in Addis Ababa, Ethiopia that indicated participants who were age 48 years and above (AOR=5.88, 95% CI (2.36-14.67) were more likely to be hypertensive as compared to those who were in age category of 18-27 years [24].

The result is in line with one study conducted in Zimbabwe showed participants who were 40 years and above were 7 times (AOR=7.08; 95% CI: 4.08 – 12.30) more likely to be Hypertension than those who were below the age of 40 years [25].

This supports the fact many people develop Hypertension late in life, when ages were higher, the chance of Hypertension increased. This study shows cases with low level of educational status (unable to read and write) had 2 time less likely to be hypertensive compare to participants with educational status of above 12 (AOR 2.77, 95% CI, 0.96 – 4.99).

This study was different from one study done in Gaza Governorates the prevalence of Hypertension was 5 times higher among cases (AOR=5.93, 95% CI, 3.0–11.82) found in low educational level [26].

This might be due to socioeconomic status, cultural, dietary and lifestyle difference of the areas and countries. This study revealed cases who were married were 2 times (AOR 2.90, 95% CI 1.62-5.19) more likely to be hypertensive than those who were single.

This is supported by a study conducted in Zimbabwe being married had more likely to be Hypertension (AOR=1.90; 95%CI: 1.15-3.13) [25] but different from study done in Gaza Governorates the burden of Hypertension was insignificantly lower among married subjects OR=1.31 (0.36-4.93) that could be referred to age variation [26]. This difference might be due to the difference in socioeconomic status and lifestyle of the countries.

The study also revealed cases who did have family income of 500 and more birr/month were 2 times (AOR=2.14; 95%CI: 1.15–8.68) more likely to be hypertensive than those who have less than 500 birr/month.

This study is in line with one study done in Zimbabwe showed participants with family income of more than US\$ 500 was more likely (AOR=1.65; 95% CI: 1.00–2.73 to be Hypertension [26]. This is may be due to the fact that peoples with high incomes will have Hypertension that can result from psychological tensions, change in life styles like eating habit etc.

This study revealed cases who had family history of Hypertension were almost 2 times (AOR 2.08, 95% CI 1.82-3.74) more likely to be hypertensive than those who did not have. This is similar with study done in Turkey people who had positive family history had 2.23 times (95%CI 1.62- 3.07; p<0.0001) more risk to develop Hypertension than who did not have this factor [27]. This supports the fact that Hypertension can transmit from families (parents), it is hereditary. So people born from hypertensive parents should make regular check-up. This study shows cases who did have self-reported Diabetes mellitus were 2 times (AOR 2.42, 95% CI 1.68-4.34) more likely to be hypertensive than those who did not have.

This is supported by the study done in Shui Guo Hu district reported that the presence of coexisting Diabetes mellitus was associated with increased risk of developing Hypertension from pre-hypertension. Participants with Diabetes mellitus were about 2.51

times (95% CI, 1.66- 3.80) more likely to have Hypertension than those without Diabetes mellitus [28]. Hypertension is more common in people with diabetes than in the non diabetic because people with diabetes will develop Hypertension disease due to hardening of the arteries.

In this study cases who did have past and present history of alcohol use were more (AOR 1.26, 95% CI 1.08-2.23) and (AOR 2.16, 95% CI 1.58-5.18) likely to be hypertensive than those who did not have respectively.

This is in line with one study in Uganda showed that factors found to be associated with Hypertension included: past alcohol use Odds Ratio (OR)=2.28, (1.42 - 3.64), present alcohol use OR=1.64 (1.12 - 2.43) [29]. This may be due to the fact that alcohol can cause some people to become overweight. It has long been a contributing factor to overweight due to the number of calories it contains and will be risk factor in the development for Hypertension.

In this study cases did have past history of cigarette smoke were almost 2 times (AOR 2.06, 95% CI 0.93-3.44) more likely to be hypertensive than those who did not have. This is similar with one study done in Addis Ababa, Ethiopia showed that past or present cigarette smokers are 2.34 times more likely to have Hypertension as compared to non-smokers (AOR=2.34, 95% CI: 1.31-4.17) [24]. This may support the fact that cigarette smoking is a powerful cardiovascular determinant and smoking cessation is the single most effective lifestyle measure for the prevention of a large number of cardiovascular diseases [30,31].

This is slightly higher than one study conducted in Ghana revealed that only 2% of participants indicated that high blood pressure was blood flows through arteries at higher than normal pressures [32]. This difference might be due to the time gap between these two studies. This indicates still a lot work remain regarding increment on awareness of peoples about Hypertension. This study revealed cases whose BMI was categorized in overweight were 5 times (AOR 5.20, 95 CI 3.63-11.54) and twenty two (12.8%) of cases who were obese 6 times (AOR 6.46, 95 CI 4.01-14.62) were more likely to be hypertensive than those who did have normal BMI.

This is different and less than with one study done in Jima hospital showed that BMI over 25 kg/m² was found to be a strong predictor of Hypertension (OR: 8.47; 95% CI: 5.30-13.53) [33]. This is probably cases had got more health information and that helps them to control their body weight. The finding also supports the fact that there is a strong and direct relationship between excess weight and Hypertension.

Conclusion

The identified determinants of the past or present risk factors; overweight, alcohol use, smoking cigarette are clinically significant on Hypertension patients among patients in Bale zone, Southeast Ethiopia. A significant proportion of participants were unaware about Hypertension. Most of the identified determinants associated with Hypertension among patients in Bale zone, Southeast Ethiopia are modifiable and preventable.

Acknowledgment

First and foremost, we would like to acknowledge data collectors and the respondents for their willingness to participate in the study.

We also like to forward our specifically thank to administrators and staff of Baze Zone hospitals for giving permission and assistance during the process of data collection.

Finally, we would like to acknowledge Madda Walabu University for funding this research paper, Bale Zone health office for making it possible for us to complete this study and all those who in one way or another contributed to the success of this study.

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