

Awareness of hypertension and factors associated with uncontrolled hypertension among nigerian adults; a community-based study

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ABSTRACT

Background: Despite the high burden of hypertension (HTN), most affected persons are not aware of its presence. This study was aimed at determining the awareness status about HTN and the risk factors associated with uncontrolled HTN among adults in Ekiti State, Nigeria.

Method: A cross-sectional study was carried out in six local government areas in Ekiti State, Nigeria. Random sampling method was used to select participants and data collection was by researcher administered questionnaire. Blood pressure (BP) was measured on three occasions using standard methods (WHO criteria BP <140/90 considered normal and $\geq 140/90$ as high). Anthropometric indices of height and weight were assessed to determine body mass index. Data were analyzed using descriptive statistics and student *t*-test at $P \leq 0.05$.

Result: A total of 1590 respondents (20–70 years) with mean age 43.9 ± 16.4 years participated in the study. Participants diagnosed as hypertensive were 524 and HTN prevalence was 33.0%. Among the hypertensive, 214 (40.8%) were aware of their HTN status. Awareness was higher in females 163 (31.1%) than males 51 (9.7%), increased with age and decreased with higher educational status. Although 40 (7.6%) of hypertensive participants were on antihypertensive medications 27 (67.5%) had uncontrolled BP. uncontrolled BP was found to be high (37%) among participants that take alcohol and it was associated with overweight and obesity in 37% and 18.5% of the participants, respectively.

Conclusion: HTN awareness was low in the study area. Uncontrolled HTN was associated with risk factors of HTN and lifestyle and was more prominent in the female gender.

Key words: Awareness, blood pressure, body mass index, uncontrolled hypertension

INTRODUCTION

High blood pressure (BP) is the leading risk factor for mortality worldwide and approximately 80% of all cardiovascular deaths occur in low- and middle-income countries.^[1] Hypertension (HTN) is now being widely reported in Africa, and it is a major factor in the high mortality of adults in sub-Saharan Africa. A recent community-based study of rural and semi-urban population in Enugu, Nigeria, put the prevalence of HTN in Nigeria at 32.8%.^[2] Unfortunately, HTN is often unnoticed and undiagnosed because it is usually asymptomatic. Despite the high burden of HTN, most affected persons are not aware of its presence, thus increasing the occurrence of associated complications.^[3] Among those with HTN, treatment is infrequent and inadequate.^[4]

Awareness of the diagnosis of HTN is an important determinant of treatment and medication adherence.^[5] Awareness of HTN is high in developed countries compared to developing nations. For example, in the third National Health and Nutrition Examination

Survey, the knowledge and awareness of the diagnosis as well as of the risk associated with uncontrolled HTN tend to enhance patients' adherence to lifestyle modifications and to medications.^[3,6] Although most hypertensive patients in the U.S. are aware of their HTN,^[7] in developing countries like Nigeria rates of HTN awareness are still far from optimal. Awareness of HTN approached 73% among the United States adult population while in Nigeria only about 30% of persons with the condition were aware of it at the time of diagnosis.^[8] Another study showed that only 29.4% of the participants screened were aware that they were hypertensive before the screening.^[4]

For the purposes of this study, HTN awareness is defined as a self-report of being diagnosed by a care provider as having HTN.^[9] Improving HTN awareness is a critical first step to reducing morbidity and mortality from HTN among adults, yet the factors associated with HTN awareness in Nigeria are poorly understood. Unawareness or under-awareness of HTN may be attributed to the lack of routine BP screenings and the absence of HTN-related

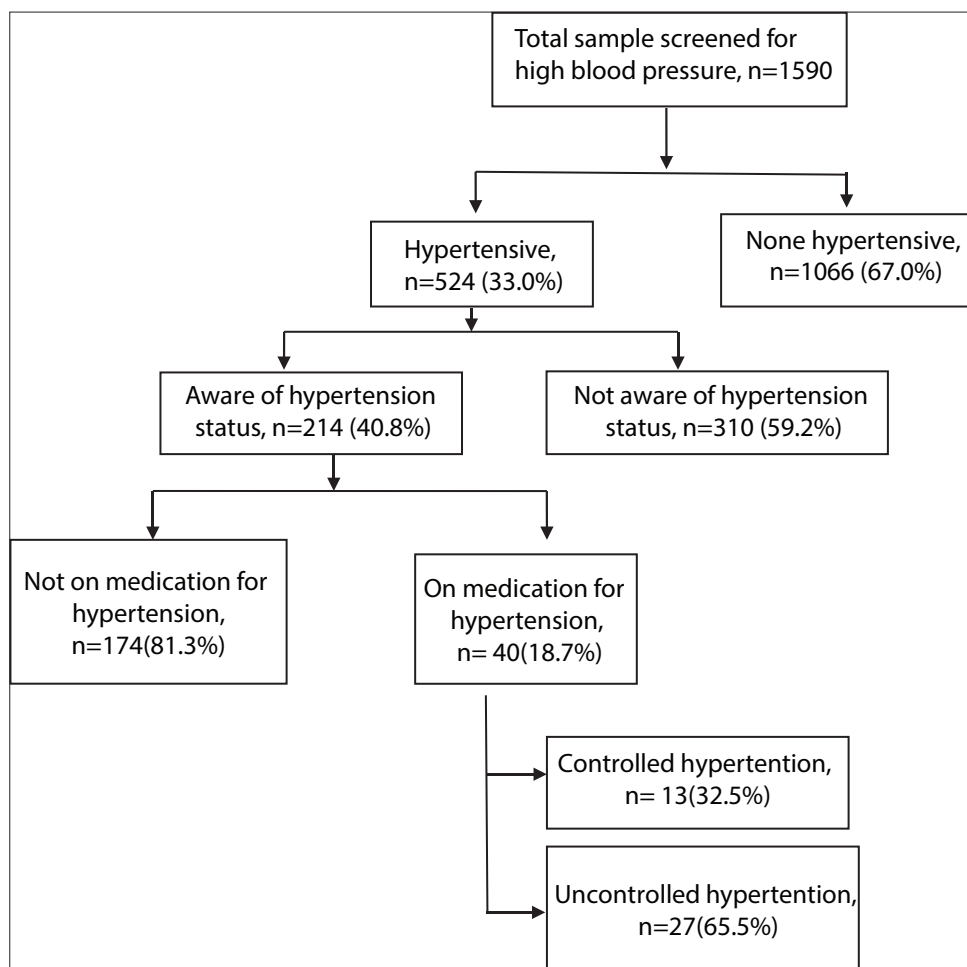
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Schematics for sample selection

education programs among this population (especially in rural areas).^[10] Lack of awareness about one’s own HTN has been associated with failure to receive high-quality care,^[9] and leads to lost opportunity to prevent more severe cardiovascular-related conditions.^[11]

Uncontrolled HTN is common among patients taking treatment and is a major public health problem in both developed and developing countries.^[12] Uncontrolled HTN is associated with serious end-organ damage including heart disease, stroke, blindness, and renal disease.^[13] A study conducted in the USA in older adults (65 years and above) revealed that the presence of uncontrolled HTN was highly prevalent and estimated as 54%.^[14] Improvement in the management and control of HTN will require an understanding of the factors that affect BP control.^[15] Unfortunately, the reasons for uncontrolled HTN remain unclear in low-income countries and have been insufficiently studied in Nigeria.

Cardiovascular-related morbidity and mortality is the most adverse outcome of poorly controlled HTN,^[14] which is also responsible for occurrence of stroke (accounting for 51% of all stroke deaths worldwide), ischemic heart disease (45% of all deaths), chronic kidney disease (CKD), congestive heart failure, aortic aneurysm, and peripheral arterial disease.^[16] It also leads to ventricular remodeling, complex ventricular

arrhythmias, repolarization abnormalities, and autonomic dysfunction.^[17] Evidence had shown that the problem of uncontrolled HTN revolves mainly around non-adherence to medication, lifestyle modifications and obesity, presence of comorbidity including diabetes mellitus, CKD, and advanced age.^[12] Moreover, financial and geographical accessibility of the available health institutions, the accessibility, and clinical practice of clinicians such as nurses and physicians together with the presence of essential medicines have been reported as essential factors in the control of high BP among health service-related factors.^[18] The objectives of this paper are (1) To identify the rates of HTN awareness, treatment, and control among hypertensive adults in Ekiti State, Nigeria and (2) to examine the factors associated with uncontrolled HTN among this group.

MATERIALS AND METHODS

Descriptive cross-sectional study was conducted in six local government areas (LGAs) in Ekiti State, Nigeria, from August to October 2011.

A total of 1590 adults in the age group 20–70 years who were willing to participate and gave their consent constituted the study population. This study employed a two-stage sampling strategy composed of simple random sampling techniques and

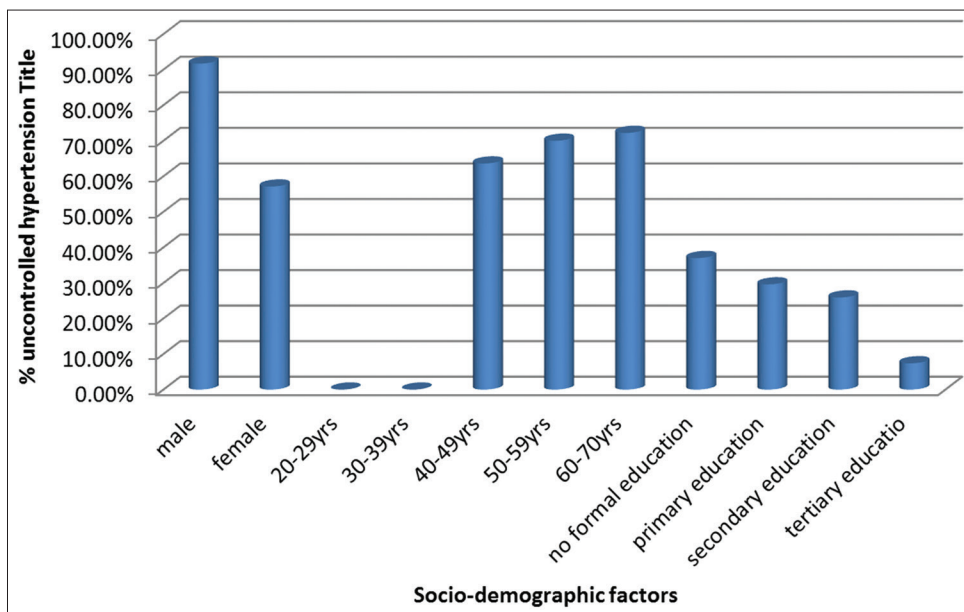


Figure 1: Association of uncontrolled hypertension with socio-demographic factors of respondents

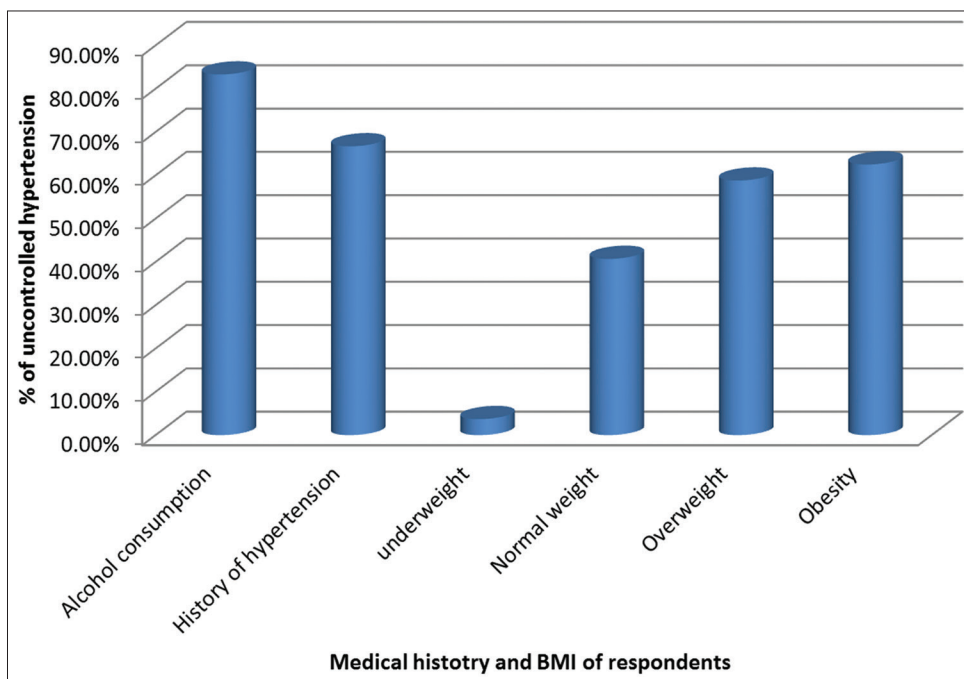


Figure 2: Medical history and body mass index factors associated with uncontrolled hypertension

systematic sampling technique for selecting the respondents. There are three senatorial districts in Ekiti State, two out of which consists of five LGAs each while the remaining one is made up of six LGAs. Two LGAs that are representative of the whole district were selected from each senatorial district using simple random sampling technique. Out of each LGA selected; three communities, one urban and two rural were selected also using simple random sampling technique. In each community, houses were numbered out of which 50 households to be studied were selected using systematic random sampling technique. In each household adults, (male and female) between ages 20 and 70 years who gave their

consent voluntarily participated in the study. Data were obtained from all the participants.

Data Collection

Data were collected through interview using semi-structured, interviewer-administered questionnaires. The questionnaires during the interview were comprised of these categories; sociodemographic characteristics, anthropometric conditions and medical history; awareness of HTN, duration of illness, complications of HTN, and control of HTN.

BP was measured using mercury in glass sphygmomanometers (Accoson brand 300 mmHg), and stethoscope (3MTM Littmann brand). It was ensured that there was no air column in the mercury while measuring BP to reduce measurement errors. To reduce observer error, standard sitting position was maintained by the physician. BP was measured on three occasions following standard techniques. Measurements were taken with participants in a sitting position after 5 min of rest, with the cuff around the upper arm. For respondents with high BP (persistently $\geq 140/90$ mmHg or individual on antihypertensive medication at first measurement, three consecutive measurements were made in an interval of at least 30 min. Mean systolic and diastolic BP were determined from the second and the third measurements. The respondents with elevated mean BP were identified as hypertensive. Normal systolic and diastolic BP was recorded as $<140/90$, mild HTN as $\geq 140/90$ – $159/99$, moderate HTN as $160/100$ – $179/109$, and severe HTN as $\geq 180/110$ (WHO standard).

Statistical Analysis

Data were coded and entered into Statistical Package for the Social Sciences version 16 for statistical analysis. Descriptive statistics (frequencies, percentages, mean values, and standard deviations [SDs]) were calculated for demographic and health characteristics and to assess participants’ BP control status. Comparison of numerical data between patients who were aware and unaware of the presence of HTN was performed with an unpaired student *t*-test, whereas analysis of categorical data between the two groups was performed with Chi-square of Fisher’s exact test. *P* < 0.05 was considered statistically significant. Results were reported as percentages (frequency) for categorical variables or means with SDs for continuous variables, *P*-values (*P* < 0.05) and 95% confidence intervals were used to present results of the bivariate analysis.

RESULTS

Among hypertensive individuals, 40.8% were aware of their HTN status [Table 1]. The result of sociodemographic variables showed that; awareness 127 (59.3%) and control 5 (38.5%) of HTN were highest among age 60–70 years respondents and lowest 3 (1.4%) and 0 (0%) among respondents age 20–29 years, respectively. Awareness was significantly higher in females 163 (76.2%) than males 51 (23.8%). Married respondents significantly had the highest HTN awareness 179 (83.6%) followed by widows 25 (11.7%) whereas awareness of HTN significantly decreased with education attainment where respondents with tertiary education had the least % awareness 11 (5.1%).

Of the 214 respondents who were aware of their HTN status 26 (12.1%) had family history of HTN, 39 (18.2%) take alcohol, and none of them was smoking cigarette. Only 3 (23.1%) of those with a history of HTN had their BP controlled. Awareness of HTN status decreased with body mass index (BMI). Obese respondents had the lowest awareness 37 (17%) and treatment while respondents with normal weight had the highest level of awareness and treatment significantly.

Out of 40 respondents taking regular medication only 13 (32.5%) subjects had adequate BP control while uncontrolled HTN was found in 27 (67.5%) (Figure 1). Uncontrolled HTN was higher in

Table 1: HTN awareness and treatment: Sociodemographic variables

Variables	n (%)		
	HTN n=524	Awareness n=214	Treatment n=40
Sex			
Male	178 (33.9)	51 (23.8)	12 (30.0)
Female	346 (66.0)	163 (76.2)	28 (70.0)
<i>P</i>	0.08	0.00	0.09
Age group (years)			
20–29	37 (7.1)	3 (1.4)	0 (0)
30–39	50 (9.5)	10 (4.7)	1 (2.5)
40–49	98 (18.7)	35 (16.4)	10 (25.0)
50–59	98 (18.7)	39 (18.2)	11 (27.5)
60–70	241 (45.9)	127 (59.3)	18 (45.0)
<i>P</i>	0.00	0.00	0.09
Marital status			
Married	424 (80.9)	179 (83.6)	37 (92.5)
Single	22 (4.2)	0 (0)	0 (0)
Divorced	2 (0.4)	2 (0.9)	1 (2.5)
Separated	15 (2.9)	8 (3.7)	0 (0)
Widowed	61 (11.6)	25 (11.7)	2 (5.0)
<i>P</i>	0.01	0.00	0.03
Highest Educational Attainment			
No formal education	218 (41.6)	94 (43.9)	15 (37.5)
Primary	142 (27.1)	72 (33.6)	12 (30.0)
Secondary	123 (23.5)	37 (17.3)	11 (27.5)
Tertiary	41 (7.8)	11 (5.1)	2 (5.0)
<i>P</i>	0.00	0.00	0.12
Employment status			
Government employed	30 (5.7)	14 (6.5)	6 (15)
Private workers	472 (90.1)	196 (91.6)	34 (85.0)
Unemployed	22 (4.2)	0 (0)	0 (0)
<i>P</i>	0.00	0.00	0.03

**P*<0.05. HTN: Hypertension

females 19 (40.0%), increased with age; respondents aged 60–70 years had the highest level 13 (48.1%) of uncontrolled HTN and decreased with educational attainment with tertiary education having least uncontrolled HTN. Association of uncontrolled HTN with marital status showed that only the married 26 (96.3%) and widows 1 (3.70%) had uncontrolled HTN. Considering their type of employment, uncontrolled HTN was 23 (85.2%) among private workers, 4 (14.8%) among government workers and not found among unemployed.s

Of the 27 respondents with uncontrolled HTN 10 (37.0%) consume alcohol (significantly [*P* < 0.05] higher in males (63.6%) compared to females [18.7%]), 6 (22.2%) had family history of HTN and a total of 15 (55.6%) were overweight/obese. Respondents with normal weight had their BP more controlled (Figure 2).

DISCUSSION

There was low awareness of HTN status (40.8%), treatment, and control among the participants with HTN in this study. This was similar to the findings by^[19] which showed that awareness; treatment and control of HTN were generally low with attendant

high burden of HTN-related complications and also the study by^[20] which reported that only 33.8% of the hypertensive were aware of their hypertensive status.

The result this study showed that awareness of HTN was found to significantly increase ($P < 0.05$) with female gender, older age, and family history of HTN while it decreased with BMI and educational attainment [Tables 1 and 2]. Awareness was high among the females compared to males. This is similar to the work of.^[21,22] As expected awareness was much better among women compared to men and this trend has been observed in high as well as low-income countries.^[23] A plausible explanation that has been suggested for this trend is the more frequent contact of women with health services because of maternal and child health programs.^[23] This could also be explained by the fact that females appear to be more concerned with their health compared to males, and this is expected since health status may affect body image which is more important for females. However, HTN is largely asymptomatic and to increase awareness, there is need to screen all adults at an appropriate opportunity when they get in contact with health system.^[21] In addition, outreach and community programs for the detection of HTN may have to be developed and tested as has been successfully done with other asymptomatic diseases.^[24,25]

This study demonstrated that awareness status increased with increasing age in men and women. Similar finding was noted by.^[26,27] Another study showed that HTN awareness was more common among participants 50 years old and older and among women.^[10] Level of awareness of HTN status significantly decreased with level of educational attainment in this study similar to a study which showed that among all the hypertensive subjects, awareness was more common in those who had low education attainment^[28] but against a study,^[29,30] which showed that awareness level increased with educational attainment. Awareness was higher among married participants. This was similar to a study that shows that after adjustment for age, sex,

and geographical region (North/South and urban/rural), the odds of HTN awareness were higher among participants 50 years old, were married, were overweight or obese and had a higher income.^[10] Awareness of HTN was also significantly higher among participants with family a history of HTN in this study similar to a study that showed that in multiple logistic regression models, awareness of HTN was positively associated with age, and family history of HTN.^[31] Among participants smoking cigarette and taking alcohol awareness was very low. This was similar to the work of^[10] which showed that current smokers, participants who consumed 2 servings of alcohol per day, and those who were less active were less likely to be aware of their HTN.

HTN awareness was significantly higher among overweight and obese subjects similar to a study that reported that among all the hypertensive subjects, awareness was more common in those who were overweight, obese, low high-density lipoprotein-C.^[28] HTN awareness was greater among women, the elderly, overweight, and obese patients, and those with a higher wealth score.^[32]

Treatment of HTN was low 18.7% among respondents, the prevalence of undiagnosed or untreated HTN was more among the male (94.4%) than the female (91.9%) participants, a finding similar to that by^[33] and another study on the pattern in rural Indians^[34] which is also a third world country like Nigeria.

Considering gender, uncontrolled HTN was significantly ($P < 0.05$) higher in males than females similar to the work of^[35] which reported that the prevalence of uncontrolled BP was significantly ($P < 0.001$) higher in males (61%) compared to females (15%) and another study that shows that the rates of awareness and control were found to be higher in women compared with men.^[36] This could be explained by the protection by the female gender due to the presence of the hormone estrogen. In addition, male participants are less likely to seek medical care. This was against a study which reported that women had significantly lower control rates than men (38% vs. 49%, respectively; odd ratio = 1.7, $P < 0.001$).^[37]

Age was associated with uncontrolled HTN supporting evidence from literature that age is most strongly related to systolic BP and isolated systolic HTN accounts for the majority of cases with uncontrolled HTN in individuals <60 years of age^[36] and another study showed that uncontrolled HTN increases with age in an older community-dwelling chinese population in shanghai.^[38]

Uncontrolled HTN was found to decrease with educational attainment in this study similar to the report of a study which showed that education could not play a crucial role to having controlled HTN^[30] and against another study which reported that Surprisingly, the level of education showed a positive association with uncontrolled HTN in our male participants, as the presence of uncontrolled HTN increased with the educational level. It was high in people with higher education.^[35]

Our study also showed that marital status showed that only the married and widows had uncontrolled HTN similar to a study which reported that both marital status and employment were found to be associated with uncontrolled BP in males,^[35] a study which reported that marital status showed a significant relationship with HTN control^[31] and another study showed that characteristics associated with poorly controlled BP/HTN, in

Table 2: HTN awareness, and treatment: Medical history Variables

Variables	n (%)		
	HTN n=524	Awareness n=214	Treatment n=40
History of HTN	27 (5.15)	26 (12.1)	9 (22.5)
P	0.13	0.13	0.03
Alcohol intake	145 (27.7)	39 (18.2)	12 (30.0)
P	0.46	0.00	0.02
Cigarette smoking	23 (4.4)	5 (2.3)	0 (0)
P	0.43	0.08	0.35
BMI (kg/m ²)			
Underweight	25 (4.8)	8 (3.7)	1 (2.5)
<18.5			
Normal weight	287 (54.8)	103 (48.1)	14 (35.0)
18.5–24.9			
Overweight	151 (28.8)	66 (30.8)	17 (25.8)
25–29.9			
Obesity	61 (11.6)	37 (17.3)	8 (20.0)
≥30.0			
P	0.00	0.00	0.72

* $P < 0.05$, BMI: Body mass index. HTN: Hypertension

addition to well-established risk factors, included being a single/divorced or widowed woman.^[39] The negative impact of marriage on HTN control in our study may have been due to complications from other stresses, risk factors, and lifestyle changes.

Uncontrolled HTN greatly increased among patient taking alcohol in our study. Findings of randomized controlled trials and observational studies have shown that heavy alcohol consumption increases BP and the incidence of HTN. A reduction in alcohol consumption reduced BP in a dose-dependent manner with an apparent threshold effect at two drinks per day.^[40]

Overweight and obesity had positive effect on uncontrolled HTN in our study. The association between obesity/overweight and uncontrolled HTN found in this study has also been demonstrated in previous studies;^[36] a study which showed that among the individuals who receiving medication treatment, controlled HTN were less common among overweight and obese. Findings of some studies have shown that among comorbid disease, obesity was more prevalent among controlled HTN subjects.^[30] Uncontrolled HTN was associated with overweight and obesity.^[35] High BMI is proven to be an important risk factor for HTN.^[35]

CONCLUSION

Awareness, treatment, and control of HTN were generally low with attendant high burden of HTN in the study area. Awareness of HTN was found to significantly increase with female gender, older age, and family history of HTN while it decreased with overweight/obesity and educational attainment. Uncontrolled HTN also increased with age, family history of HTN, obesity/overweight, alcohol consumption, and among females whereas it decreases with the level of educational attainment. This may be because the participants do not assess the health-care services in their communities regularly. The high prevalence of HTN in this study area suggests a high risk of a future cardiovascular event.

There is a need to develop population-based HTN detection and control strategies. Health promotion programs and reorientation of primary health care are needed to improve HTN detection and management. There is the need for interventions to raise awareness of HTN by increasing public knowledge and health education and to help modify lifestyle behaviors in reducing the risk of raised BP.

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