Research Article

Systemic Hypertension among Adults in a Peri-Urban Community in Delta State Nigeria

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Abstract

The upsurge in the prevalence of systemic hypertension and its complications in urban and rural communities in Nigeria cannot be ignored. Periodic surveys on the trend of hypertension in communities are important in the prevention and treatment of the disease. This study was conducted to determine the prevalence, prevailing risk factors, and the level of knowledge of the disease, treatment types, and adherence to antihypertensive medications in a community in Nigeria. A cross-sectional design and a multistage sampling method were used in this study. The JNC7 guideline was used to decide the cut-off value of hypertension. From the data obtained, 38% were hypertensive of which 27.8% were previously diagnosed. The level of knowledge of hypertension and controlled blood pressure was low in this study. There was a statistically signi icant difference between blood pressure and the following risk factors: age, sex, marital status, exercise, BMI, and waist circumference. While the risk of developing hypertension was 2.21 times higher in cigarette smokers than in non-smokers. Participants who engaged in the physical exercise had a 47% lower risk of developing hypertension when compared to those who were inactive; the odds ratio=0.53. Lifestyle modi ications and health promotion can prevent hypertension.

Keywords: Systemic hypertension; Adults; Urban; Nigeria

Introduction

Systemic hypertension or high blood pressure is a significant risk factor for the development of cardiovascular diseases [1]. In many countries of the world, hypertension is defined by a systolic and diastolic blood pressure of ≥ 140 mmHg and ≥ 90 mmHg respectively, but in the current guideline of the America College of Cardiology/American Heart Association (ACC/AHA), hypertension is defined as systolic blood pressure/diastolic blood pressure of >130/80 mmHg [2]. Its incidence is on the rise and currently affects a large percentage of adults worldwide. Approximately, a billion adults had hypertension in 2015 and 13.5% of annual deaths are ascribed to hypertension and its complications [1-3]. Every year, complications from hypertension account for 9.4 million deaths, 45% of deaths due to heart diseases, and 51% of deaths due to stroke [4-6]. The prevalence rate in low-income and high-income countries is approximately 31.5% and 28.5% [7]. In recent studies in Africa, about 20-46% of adults were reported to be hypertensive [8-10]. Its prevalence varies with the study population, type of measuring instruments, and cut-off values used for defining hypertension. In Nigeria, prevalence studies in rural populations' range from 13.5%-46.4%, urban, 8.1%-42.0% [11-13]. Obtained a prevalence of 30.6% among urban and 26.4% among rural Nigerians from a systematic review of population based studies from 1990 to 2013 [14]. The global increase in the prevalence of hypertension has been linked to various factors, including aging, obesity, race, unhealthy diet, harmful use of alcohol, cigarette smoking, lack of physical activity, the stress of urbanization, and underlying diseases [14-17]. The higher the pressure in blood vessels, the harder the heart has to work to perfuse the tissues. Persistently uncontrolled blood pressure can lead to various manifestations of hypertensive heart disease and eventually culminate in

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heart failure. The increased blood pressure may also result in arteriosclerosis ultimately leading to arteriosclerotic vascular disease manifesting clinically as coronary artery disease, peripheral artery disease, and cerebrovascular disease. Hypertension can also lead to renal impairment, visual disturbance, and cognitive impairment. It has a negative impact on the quality of life of affected individuals and on countries' health expenditures, consequently, having a negative impact on the economy. In some low and middle income countries, health expenditure on cardiovascular diseases alone account for 20% of total health expenditure. Premature deaths, disability, psychosocial disorders, loss of income, and healthcare costs due to hypertension take a toll on families, communities, and nations' finances. In poor countries, many people are unable to seek standard care for hypertension because of its cost. Households often spend a substantial proportion of their income on hospitalization and care following complications of hypertension. Epidemiological studies show an inverse relationship between regular blood pressure checks and organ damage [18]. Even pre-hypertensive patients have been documented to have an increased risk of organ damage [19]. It is apparent that early detection, regular blood pressure check, and adherence to treatment are likely to decrease the morbidity and mortality associated with hypertension. Unfortunately, studies show that only 50% of those who are hypertensive are aware of their condition and less than 50% of those who are aware are on treatment, and less than 50% of those on treatment are receiving adequate management, a situation that has been referred to as the rule of halves. In Nigeria, 5.2% to 29.4% of hypertensive are aware of their condition. Therefore, studies that create awareness, and measure community blood pressure, should be continually encouraged. In this study, we determined the prevalence of hypertension, detected hypertensive who are not aware of their condition, assessed the level of knowledge of hypertension, risk factors, treatment types, and compliance to antihypertensive among adults in an urban community in Nigeria. Information from this study will serve as important data for comparison with present/future data to track changes. It will also help in the planning of interventional research for the prevention and control of hypertension.

Materials and Methods

The study was conducted in Oghara, a community in Delta State, located in the South-South geopolitical zone of Nigeria. It lies between longitude 6.10020 E and latitude 5.58670 N. The settlement is made up of five wards. It has a tertiary health facility, a polytechnic, a naval institution, gas stations, and numerous gas storage tanks. The majority of the population are farmers, petty traders, and artisans. However, a sizeable proportion is engaged by organized public and private sectors. A cross-sectional study design was used and the study population was adults aged 18 years and above who had resided in the community for a minimum of one year. Pregnant women were excluded from the study. The sample size was 255, estimated using the formula for cross-sectional studies. A previous study in the community reported a prevalence of 21%. A multistage sampling method was used; in the first stage, three of the five political wards were selected by balloting. In the second stage, the calculated sample size of 255 was divided equally among the three selected wards, hence, 85 adults were recruited from each selected ward. The residential houses in the selected wards were numbered and divided by the sample size of 85 to obtain the sampling interval. The "computed sampling interval" was used to select a residential house from the study area; one adult above the age of 18 years was picked from each of the selected houses and informed consent was obtained. The quantitative method was used to obtain data. The study tools include the following: A structured questionnaire, weighing scale, mercury sphygmomanometer, stethoscope, and calibrated rule. The questionnaire was interviewer administered with the following variables: sociodemographic characteristics, knowledge of hypertension and risk factors, history of hypertension, presently on antihypertensive drugs, routine blood pressure check, and adherence to antihypertensive. Participants were also asked if they indulge in physical exercise, alcohol, and smoking cigarette. The number of fruits and vegetables consumed per day was also determined. Participants who took at least 1 cigarette per day in the last year prior to the survey were classified as smokers while those who had never smoked or quit smoking for at least one year were classified as non-smokers. Participants were also classified into groups based on the units of alcohol consumed in a week: occasional drinkers (<1 unit), mild drinkers (1-<14 units), moderate drinkers (14-21 units), and heavy drinkers (>21 units). One standard unit of alcohol is half a bottle of beer or a glass of alcoholic wine or one shot of gin/whisky. Physical exercise was classified based on work, leisure, and sports. Participants whose daily physical activities are either sedentary or light are categorized as physically inactive while those whose physical activities can be described as moderate and vigorous are classified as physically active. Adequate fruit and vegetable consumption was defined as consuming 5 or more servings of fruits and/or vegetables per day. The weight, height, waist circumference, and blood pressure of participants were taken and the Body Mass Index (BMI) was calculated, as weight (kg) divided by the square of height (m^2). The weight was taken using a standard weighing scale. Height was taken using a calibrated rule. Blood pressure was measured with participants comfortably sitting, back well-supported, elbow resting on the table and legs uncrossed resting on the floor. The diagnosis of hypertension was made when a participant is on treatment for hypertension or detection of systolic and/or diastolic blood pressure (≥140/90 mmHg) during the survey on two occasions using a standardized mercury sphygmomanometer. The seventh joint national committee on prevention, detection, evaluation, and treatment of high blood pressure (JNC7) 2003 guideline was used to decide the cut-off value. Participants were told their readings and counselled. Data collected were analyzed using the computer software SPSS version Age, BMI, waist circumferences, and systolic and diastolic blood pressure measurements were summarized using mean, median,

standard deviation, and range. Most variables were summarized using frequencies and percentages. The explanatory variables were sex, age, level of education, occupation, marital status, fruits and vegetable consumption; cigarette use, alcohol use, BMI, and waist circumference. The outcome variables were participants' hypertension status and knowledge of hypertension. Knowledge was assessed with twenty-two questions and a correct answer was scored one mark. Persons who scored 70% and above were classified as having good knowledge; persons with scores of 50% to 69.9% had fair knowledge and those with scores less than 50% had poor knowledge. The differences between means in hypertensive and normotensive were compared using the independent t-test while the *chi square* test was used to test for associations between hypertension status and risk factors. Odds ratios and confidence intervals were calculated if the explanatory and outcome variables measured were qualitative variables.

Results

A total of 255 adults with 123 (48.2%) males and 132 (51.8%) females participated in the study. Their mean age was 41.73 ± 18.3 years, and the majority of the participants had secondary education 110 (43.1%), followed by tertiary 98 (38.4%). There were more married persons 118 (46.3%), than singles 107 (42.0%). About 10 (3.8%) of the participants were underweight, 128 (50.2%) had normal weight, 93 (36.5%) were overweight (Table 1).

Table 1: Characteristics of adults in the study population (oghara).

Variables	Frequency n=255 (%)
Age	
18-45	151 (59.3)
46-59	58 (22.7)
60-101	46 (18.0)
Gender	
Male	123 (48.2)
Female	132 (51.8)
Level of education	
None	12 (4.7)
Primary	35 (13.7)
Secondary	110 (43.1)
Tertiary	98 (38.4)
Marital status	
Married	118 (46.3)
Single	107 (42.0)
Widowed	14 (5.5)
Separated	8 (3.1)
Cohabiting	5 (2.0)
Divorced	3 (1.2)
Occupation	
Unemployed	67 (26.3)
Self-employed	122 (47.8)
Civil Servant	41 (16.1)
Others	25 (9.8)
BMI (Kg/m^2)	
Underweight	10 (3.8)

Normal weight	128 (50.2)
Overweight	93 (36.5)
Obese	18 (7.1)
Grossly obese	6 (2.4)
Waist circumference	
Male	
<120 cm	123 (48.2)
Female	
<88 cm	89 (34.9)
≥88 cm	43 (16.9)

Median BMI=24.6 (Kg/m^2), Range 13.8-36.6 (Kg/m^2); Median waist circumference 83 cm, Range 60-12

Table 2 shows the knowledge of the participants regarding hypertension: Most had poor knowledge of hypertension 121 (47.5%), followed by fair knowledge 71 (27.8%), while 63 (24.7%) had good knowledge. About 116 (45.5%) of the participants know that cigarette smoking is a risk factor for hypertension, 134 (52.5%) know that obesity is a risk factor, and 144 (56.5%) know age as a risk factor, and race 63 (24.7%). Only about 159 (62.4%) and 68 (26.7%) know that stroke and renal failure are complications of hypertension respectively.

Table 2: Knowledge of hypertension of participants.

Variables	Frequency, n=255 (%)
General knowledge of hypertension	
Good	63 (24.7)
Fair	71 (27.8)
Poor	121(47.5)
Know the definition of hypertension	168 (65.9)
Know the risk factors of hypertension	
Race	63 (24.7)
Sedentary lifestyle	89 (34.9)
Family history	99 (38.8)
High fat diet	92 (36.1)
Increased salt intake	116 (45.5)
Alcohol intake	120 (47.1)
Cigarette smoking	116 (45.5)
Obesity	134 (52.5)
Age	144 (56.5)
Think hypertension can be cured	
Yes	53 (20.8)
No	149 (58.4)
I don't know	53 (20.8)
Agreed that hypertension can be prevented	
Yes	167 (65.5)

No	38 (14.9)
I don't know	49 (19.2)
Agreed that hypertension has orthodox treatment	
Yes	191 (74.9)
No	31 (12.2)
I don't know	32 (12.5)
Knows complications that can arise	
Stroke	159 (62.4)
Heart attack	141(55.3)
Renal failure	68 (26.7)
Blindness	30 (11.8)
Leg ulcer	23 (9.0)
Diabetes	50 (19.6)

The proportion of participants who had hypertension was 97 (38%) of which 71 (27.8%) were previously diagnosed, while 26 (10.2%) were diagnosed during the survey. Of the 97 hypertensives, 53 (54.6%) check their blood pressure periodically. There were 118 (46.3%) normotensives and 40 (15.7%) pre-hypertensive, of which 26 (16.5%) check their blood pressure periodically. The proportion of previously diagnosed hypertensive on antihypertensive medications was 57 (57/71=80.3%). Fourteen of the hypertensive (14/71=19.7%) were on herbal drugs only and 4 (4/71=5.6%) were on both antihypertensive and herbal drugs. Only 39 (39/71=54.9%) of the previously diagnosed hypertensive were compliant with their drugs and only 11(11/71=15.5%) had their blood pressure under control at the time of the survey (Table 3).

Table 3: Blood pressure status of participants.

Variables	Frequency, n=255 (%)
Blood pressure status	
Normotensive	118 (46.3)
Hypertensive (unaware)	26 (10.2)
Hypertensive (aware)	71 (27.8)
Prehypertensive (unaware)	40 (15.7)
Hypertensive that are aware	
BP under control	11 (11/71=15.5)
On antihypertensive drugs	57 (57/71=80.3)
On herbal drugs only	14 (14/71=19.7)
On both antihypertensive and herbal drugs	4 (4/71=5.6)
Compliant with antihypertensive drugs	39 (39/71=54.9)
Blood pressure readings at the survey (mmHg) 27	
Normal (≤120 mmHg systolic and ≤ 80 mmHg diastolic)	129 (50.6)
High normal (≤120-139 systolic and >80-90 diastolic)	62 (24.3)
Grade 1(≥140-159 systolic and >90-100 diastolic)	51 (20.0)
Grade 2 (≥160 mmHg systolic and >100 mmHg diastolic)	13 (5.1)
Duration of hypertension, n=71	

<5 years	34 (34/71=47.8)
5-10 years	25 (25/71=35.2)
≥ 10 years	2 (2/71=2.8)
Practice periodic blood pressure check	
Hypertensive (aware)	53 (53/71=74.6)
Normotensives+prehypertensive (unaware)	26 (26/158=54.9)

Median systolic blood pressure=128 mmHg, Range=90-178 mmHg; Median diastolic blood pressure=80 mmHg, Range=60-120 mmHg

There was statistically significant difference between age, sex, marital status and hypertension: more in males (46.3%) than females (30.3%), p-value=0.008; more in elderly (78.3%) compared to middle-aged (56.9%) and young (18.5%), p-value=0.0001; more in married (55.9%) than singles (15.9%), p-value=0.0001. There was also a statistically significant association between exercise, BMI, waist circumference, and hypertension. Hypertensive mean waist circumference was 89 cm ± 10 cm while normotensive mean waist circumference was 82 cm ± 13 cm, p-value=0.001. Hypertensive mean BMI was 25.8 ± 4.0 kgm^2 while normotensive mean BMI was 24 ± 4.0 kgm^2, p-value=0.003. Those who exercise (30.2%) had less hypertension than does who do not (44.8%), p-value=0.017. There was no statistically significant difference between alcohol, cigarette smoking, fruit and vegetable consumption, and hypertension. However, cigarette smokers showed a risk of 2.21 times more than non-smokers. Participants who engaged in physical exercises had a 47% lower risk of developing hypertension when compared to those that were inactive; the odds ratio=0.533. Males showed a risk of 1.98 times of developing hypertension than females (Tables 4 and 5).

Table 4: Relationship between sociodemographic characteristics and hypertensive status of participants.

Variable	Hypertension		
	Present	Absent	Total
Age (years)			
Young (18-45)	28 (18.5%)	123 (81.5%)	151 (100.0%)
Middle (46-59)	33 (56.9%)	25 (43.1%)	58 (100.0%)
Elderly (60-101)	36 (78.3%)	10 (21.7%)	46 (100.0%)
X^2=64.676, p-value=0.0001			
Sex			
Male	57 (46.3%)	66 (53.7%)	123 (100.0%)
Female	40 (30.3%)	92 (69.7%)	132 (100.0%)
X^2=6.949, p-value=0.008			
OR= 1.98(CI=1.19-3.32)			
Marital Status			
Cohabiting	1 (20%)	4 (80%)	5 (100.0%)
Divorced	2 (66.7%)	1 (33.3%)	3 (100.0%)
Married	66 (55.9%)	52 (44.1%)	118 (100.0%)
Single	17 (15.9%)	90 (84.1%)	107 (100.0%)
Separated	4 (50.0%)	4 (50.0%)	8 (100.0%)
Widowed	7 (50.0%)	7 (50.0%)	14 (100.0%)
X^2=41.373, p-value=0.0001			
Level of education			
None	4 (33.3%)	8 (66.7%)	12 (100.0%)
Primary	19 (54.3%)	16 (45.7%)	35 (100.0%)
Secondary	42 (38.2%)	68 (61.8%)	110 (100.0%)
Tertiary	32 (32.7%)	66 (67.3%)	98 (100.0%)

	X^2=5.240, p-value=0.155		
	Occupation		
Civil Servant	18 (43.9%)	23 (56.1%)	41 (100.0%)
Others	9 (36.0%)	16 (64.0%)	25 (100.0%)
Self-employed	49 (40.2%)	73 (59.8%)	122 (100.0%)
Unemployed	21 (31.3%)	46 (68.7%)	67 (100.0%)
	X^2=2.150, p-value=0.542		
	Family history of hypertension		
Yes	41 (44.1)	52 (55.9)	53 (100.0%)
No	32 (29.6)	76 (70.4)	108 (100.0%)
I don't know	24 (44.4)	30 (55.6)	54 (100.0%)
	X^2=5.623, p-value=0.060		
	OR: Odds Ratio, CI: Confidence Interval		

Table 5: Relationship between alcohol intake, cigarette smoking, intake of fruits/vegetables, and excess fried food, balanced diet, and hypertensive status of participants.

Variable	**Hypertension**		
	Present (n=97)	**Absent (n=158)**	**Total**
	Alcohol intake		
None	67 (39.6%)	102 (60.4%)	169 (100.0%)
Occasional users	16 (31.4%)	35 (68.6%)	51 (100.0%)
Mild users	8 (33.3%)	16 (66.7%)	24 (100.0%)
Moderate users	6 (54.5%)	5 (45.5%)	11 (100.0%)
	X^2=2.64, p-value=0.450		
	Cigarette smoking		
At least 1 cigarette/day	9 (56.3%)	7 (43.7%)	16 (100%)
Never smoke or quit	88 (36.8%)	151 (63.2%)	239 (100.0.0%)
	X^2=2.40, p-value=0.121		
	OR=2.21 (CI=0.79-6.13)		
	Physical exercise		
Yes	36 (30.2%)	83 (69.8%)	119 (100.0%)
No	61 (44.8%)	75 (55.2%)	136 (100.0.0%)
	X^2=5.74, p-value=0.017		
	OR=0.533(CI=0.318-0.894)		
	Excess intake of fried/junk food		
Yes	73 (39.0%)	114 (61.0%)	187 (100.0%)
No	24 (35.3%)	44 (64.7%)	68 (100.0%)
	X^2=7.65, p-value=0.382		
	OR=1.17 (CI=0.478-1.518)		
	Intake of fruits and vegetables		
Appropriate	49 (43.0%)	65 (57.0%)	114 (100.0%)

Inappropriate	48 (42.1%)	93 (57.9%)	141 (100.0%)
	X^2=2.14, p-value=0.144		
	BMI status		
Under weight	3 (30.0%)	7 (70.0%)	10 (100.0%)
Normal weight	39 (30.5%)	89 (69.5%)	128 (100.0%)
Overweight	42 (45.2%)	51 (54.8%)	93 (100.0%)
Obese	11 (61.1%)	7 (38.9%)	18 (100.0%)
Grossly obese	2 (33.3%)	4 (66.7%)	6 (100.0%)
	X^2=9.51, p-value=0.050		
BMI (Mean±2 SD)	25.8 ± 4.0 kg/m^2	24.2 ± 4.0 kg/m^2	
	t=3.02, p-value=0.003		
	WC (women)		
< 88 cm	22 (24.7%)	67 (75.3%)	89 (100.0%)
≥ 88 cm-120 cm	18 (41.9%)	25 (88.1%)	43 (100.0%)
	X^2=4.03, p-value=0.045		
WC women (Mean ± 2 SD)	89.1 cm ± 13.6 cm	82 cm ± 10.2 cm	
	t=3.255, p-value=0.001		

BMI: Body Mass Index; WC: Waist Circumference

Discussion

The rising incidence of hypertension in developing countries severely burdens the already dwindling health systems. It is one of the main causes of frequent hospital visits and admissions. In most cases, the affected individuals have no clue of their condition until complications develop. A man with a blood pressure of ≥ 200/130 mmHg may sit comfortably in his office. The low visibility of this condition and World Health Organization (WHO) advocacy for increased surveillance of non-communicable diseases have prompted this community survey on hypertension. The study aimed at increasing the level of community awareness through screening. We recorded an 11% increase in the prevalence of hypertension compared with the previous survey in the community, using the same case definition. The prevalence in this study was also higher than some previous studies conducted in Nigeria and internationally. It is, however, similar to values obtained by among urban slum dwellers in Lagos among adults in Benue State, and within the range obtained from a nationwide study and a systematic review. The reasons for the higher prevalence rate compared to previous ones may be due to the progressive changes in the trend of the disease. The proportion with pre-hypertension was observed to be three of every twenty persons. In the nationwide study conducted by one fifth had pre-hypertension, while at Ibadan about one-third were pre-hypertensive. The finding from this study and others prove that pre-hypertensive states are often unnoticed. Hence, periodic blood pressure checks, regular community screenings, and surveys for early detection and management should be encouraged to halt the progression to hypertension.

Most national and global studies, reported low awareness of hypertension status. However, the majority of the hypertensive in this study (73%) were aware of their status. In the studies conducted in China and Seychelles Island, awareness rate was 45% and 50% respectively. Also, the previously diagnosed hypertensive check their blood pressure more regularly than the other groups. The awareness of their hypertensive state and knowledge of possible complications may be the reason for the regular blood pressure check. A good proportion of the hypertensive was on antihypertensive medications, however, adherence was poor and many had uncontrolled blood pressure. This finding was nearly similar to what was obtained in Zimbabwe and some studies in Nigeria in their studies, reported few hypertensive on treatment with good blood pressure control. As documented in the American heart association guideline, about one-third of the hypertensive are on antihypertensive and over half had uncontrolled blood pressure. Many factors including underestimation of the impact of drugs, the cost of treatment have been documented as some of the reasons for poor compliance and control. Older persons are at greater risk of developing hypertension as seen in this study and reported in other studies. However, the condition has increasingly impacted all age groups. Dietary pattern changes moving from home meals to fast foods, obesity, and stress of urbanization seen among all ages may be the major contributing factors. Males showed a higher risk of developing hypertension than females; similar to the reports

in most studies reported more hypertensive in females than males. This sex differential may be due to hormonal differences and other factors like greater stress burden on men as breadwinners and better access to healthcare services by females. Although most participants have heard of hypertension, only a few had reasonably good knowledge of the disease. A large proportion had poor knowledge, especially regarding its risk factors and complications. The low knowledge as reported in this study is comparable to other studies across Nigeria and other countries. In Thailand and Zimbabwe studies, knowledge was poor. In the Seychelles Island and Sri-lanka studies, knowledge was good but attitude and practice were poor. Poor knowledge continues to remain a major hindrance in curbing the menace of hypertension, especially as hypertension is usually asymptomatic. Previous observational studies have shown the protective effect of exercise and physical activity against hypertension and its complications. This study also demonstrated the benefit with a good proportion of those that engaged in regular physical exercise and active lifestyle having a 53.3% risk reduction, of developing high blood pressure. While the mechanism for the blood pressure lowering effect of physical activity is not very clear, it is thought to be related to modulation of the autonomic nervous system, renin angiotensin aldosterone system, cardiac output, peripheral vascular resistance, insulin resistance, and endothelial function. There was no statistically significant difference in the blood pressure of the cohort with reference to alcohol consumption, likely because there were no heavy drinkers' in the study population. Recent studies suggested that moderate consumption of alcohol (<30 g of ethanol) is associated with a reduction in blood pressure and consequently cardiovascular events. While heavy drinking (>30 g of ethanol) is associated with elevation of cardiovascular risk as well as blood pressure, affecting systolic more than diastolic blood pressure. Nevertheless, it is always an uphill task to get unequivocal outcomes given the difficulty associated with getting accurate data on the type, pattern, and quantity of alcohol consumption with a lot of confounding socioeconomic and other lifestyle behavior can't be adequately reflected in statistical models. Cigarette smokers showed a higher (2.21 times) risk of developing higher blood pressure compared to non-smokers in this study.

Conclusion

This finding was similar to a study carried out in Ukraine, which reported more hypertensive among smokers compared to never smokers and former smokers of less than twenty years' duration. Paradoxically some studies actually found lower blood pressure values among habitual smokers when compared with never smokers and former smokers. Studies carried out among female smokers in Europe and the health survey of England database also came to a similar conclusion. The effects of cigarette smoking on blood pressure are complicated. It is extensively documented that tobacco smoking acutely increases blood pressure and the risk of severe hypertension and its complications. It also accelerates atherothrombotic processes on chronic usage through possibly deleterious effects on endothelial function, inflammation, and thrombosis. This study also showed a positive correlation between BMI, waist circumference, and blood pressure. Hypertensive had a higher mean BMI and waist circumference than normotensive. This is similar to many studies that have also documented these relationships. A popular quotation by scientists; is "genes are like loaded guns but lifestyle pulls the trigger". Genetic makeups alone are not enough for disease development. Simple changes in lifestyle and health promotion can prevent hypertension. Although; genetic predisposition to hypertension is non-modifiable, environmental factors are modifiable and herein lay the potential to prevent hypertension.

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Conflict of Interest

We declare that we have no known financial/competing interests or personal relationships that could have appeared to influence the work reported in this paper.

Contribution of Authors

This research was for the award of the MBBS degree of the college of medical sciences, Delta State University, and Abraka. Ochei O conceived and supervised this research. All authors contributed to the design of the study; literature review, acquisition of data, analysis, and interpretation of data. Manuscript preparation, editing, and review were done by Ochei O and Aigbe FI. All authors have read the manuscript and approved the work. The manuscript has not been submitted elsewhere for publication.

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