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Original Articles

Blood pressure and associated risk factors of hypertension in patients attending a Family Medicine Clinic in Delta State, Nigeria.

[1]*Ebereghwa EM* [2], *Orhe OG*[3], *Anyanwu BE*[1]

Abstract

Introduction: Hypertension is a significant public health issue globally. In recent times, its prevalence in Nigeria is experiencing an upsurge due to the increase in the risk factors associated with hypertension and many persons are unaware of their status. The study assessed the blood pressure pattern and associated risk factors of hypertension in patients attending a Family Medicine Clinic in Delta State, Nigeria.

Materials and methods: It was a cross-sectional study conducted in the Family Medicine Clinic, Delta University Teaching Hospital, Oghara, Nigeria. Participants were recruited using systematic random sampling method. Interviewer administered questionnaire was used to collect data and data was analyzed using Statistical Product and Service Solution version 23. The level of significance of analysis was set at $p < 0.05$.

Results: The study had 235 adults with a mean age of 45.1 ± 13.7years, with more females (63.0%) than males (37.0%). The prevalence of hypertension was 29% and 30.2% had prehypertension. Increasing age was significantly associated with hypertension, as hypertension occurred more in the elderly (p= <0.001). Also, hypertension occurred more in participants who were separated (71.4%) and widowed (62.5%) than those who were married. This was statistically significant. Obesity(p=0.002) and a positive family history (p=0.001) were significantly associated with increased risk of hypertension.

Conclusion: Increasing age, obesity and a positive family history were associated with increased risk of hypertension. There is need to educate the public on hypertension risk factors and to adopt healthy lifestyle practices to promote prevention and control of hypertension.

Keywords: Blood pressure**,** Hypertension, Patients, Risk factors**.**

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INTRODUCTION

Commonly referred to as a "silent killer", hypertension is often asymptomatic and many hypertensive patients remain undiagnosed and untreated and only present following a complication. [1] It has been identified as a significant modifiable risk factor for cardiovascular diseases.[2] Globally, about 1.4billion people have hypertension and is responsible for 10 million premature deaths annually.[3] A World Health Organization survey reported that about 44% of men and 25% of women had never checked their blood pressure, thus the prevalence of hypertension may be higher than what is reported.[3] The prevalence of hypertension is rising globally especially in the low- and middle-income countries at a rate of 8% per decade.[3] This is due to the upswing of the risk factors of hypertension and many persons are unaware of their status.[4] Unfortunately, the upsurge of hypertension in Sub-Saharan Africa has made it a significant public health problem.[5]

In Nigeria, the estimated age-adjusted prevalence of hypertension between 1995 and 2020 rose from 8.5% to 32.5%.[6]

The development of hypertension results from the interplay of complex and inter-related factors known as risk factors.[7] A risk factor can be described as an attribute, characteristic or exposure of a person that is significantly associated with the development of a disease.[8] The risk factors associated with hypertension can be classified into modifiable and non-modifiable risk factors.[7] The modifiable risk factors of hypertension are attributes, characteristics, exposure or lifestyle patterns that can be changed or altered to prevent the development of the disease.[9] They include tobacco use, high salt intake, consumption of saturated fat, alcohol consumption, physical inactivity, obesity and environmental stress.[8, 9] While the non-modifiable risk factors are traits or characteristics in a person that cannot be changed or adjusted and so almost nothing can be done to control these factors.[9] These factors include age, gender, family history, genetic composition and race. [9, 10] A population based cross-sectional study in Dubai revealed that obese persons were five times more likely to have hypertension while those that were physically active were less likely to develop hypertension. [10] Also, low physical activity and alcohol consumption were associated with hypertension in a national survey on hypertension conducted in Nigeria.[6]

Moreover, the burden of hypertension is likely to be influenced by the progressive increase in the ageing population, obesity, sedentary lifestyle and high sodium consumption, hence attention need to be focused on these risk factors, so as to curb their effect on hypertension.[11] In recent times, the low- and middle- income countries, Nigeria inclusive have experienced rapid westernization of their lifestyle leading to adoption of unhealthy dietary and lifestyle habits.[1,12] Also, associated with this is the urbanization process that has led to changes in the type of jobs and means of transportation utilized by people resulting in sedentary living. [1] All these can lead to increased vulnerability to the modifiable risk factors of hypertension and hence a rise in the prevalence of hypertension. [12]

The emerging epidemic of hypertension and the ensuing cardiovascular diseases can therefore be controlled by identifying risk factors, promoting routine blood pressure screening and adoption of healthy lifestyle measures to curtail the risk factors of hypertension and thus control blood pressure. [1,3] This in the long term is more cost-effective, considering the high clinical and economic cost attributed to hypertension.[3] Thus, the study seeks to assess the blood pressure and associated risk factors of hypertension in patients seen in a Family Medicine clinic in Delta state, Nigeria.

MATERIALS AND METHODS

A hospital based cross sectional study carried out from November, 2023 to January, 2024.

It was conducted at the Family Medicine Clinic in Delta State University Teaching Hospital, Oghara (DELSUTH). The hospital is a 180-bed ultra-modern facility with many clinical specialties and provides primary, secondary and tertiary healthcare services to Delta indigenes and its adjoining states. It is located in Oghara, Ethiope West Local Government Area of Delta State, South-South Nigeria.

Adults (age 18 years and above) attending the Family Medicine Clinic in DELSUTH. Clinical records of the clinic reported that a total of 4,997 adult patients attended the clinic in the year 2022.

Adults aged 18 years and above willing to participate in the study with the ability to give informed consent. Critically ill patients.

The sample size was determined using the formula, $n = z^2 pq/d^2$, [13] using z as 95% of confidence level, d as 5% margin of error and p the estimated proportion with the attribute of interest (21.0%) from a previous study,[9] and n the minimum sample size was 255. The number of patients seen in the clinic in the previous year was < 10,000, the sample size was adjusted using; $nf = n/(1+ n/N)$,[13] where, n was the desired sample size when the population is >10,000, and N was population of patients. Thus, nf, the desired sample size when the population is <10,000, was 243. So, the minimum sample size was 243.

Participants were recruited using systematic random sampling method. Using $K= N/n$,[13] where K was the sampling interval, N, the sampling frame (4997 patients aged 18 years and above were seen in 12 months, so 1666 patients were seen in 3 months) and n was 243. A sampling interval of 6 was obtained. The first subject was selected by simple random and every 6th participants was selected by systematic random sampling until the required sample size was met.

An interviewer administered questionnaire was used to collect data. The questionnaire was adopted from previous studies.[14,15] The questionnaire consists of socio-demographic characteristics, history of alcohol consumption, cigarette smoke, physical activity and family history of hypertension, anthropometric and blood pressure measurements. Participants who smoke at least one stick of cigarette per day in the last previous year before the study were grouped as smokers while those who had quit cigarette smoke for at least one year or had never smoked were termed non-smokers.[15] Alcohol use was assessed with the question; have you consumed alcohol in the past 12 months?[16] Physical activity was assessed based on work, leisure and sports. Participants with sedentary or light daily physical activities were classified as physically inactive while those whose physical activities can be described as moderate and vigorous were categorized as physically active.[15]

Hypertension was defined as systolic and/ or diastolic blood pressure (≥140/90mmHg) during the study on two occasions using a standardized mercury sphygmomanometer or a patient on treatment for hypertension.[15] The blood pressure was classified based on The Seventh Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC7).[17]

Body Weight, Height and Body Mass Index: The combined Weight Scale and Stadiometer was standardised and tested before daily measurements. Participants were measured standing upright with face forward in normal clothing and without footwear, head-tie, or accessories such as a purse, cell phone, keys etc. Weight was recorded in Kilogrammes (Kg) and height was in Metres (m). These were measured to the nearest 0.1kg and 0.1cm respectively.

Body mass index (BMI) was calculated using the formula; BMI = weight/ $(\text{height})^2$ (kg/m^2). Body mass index was categorised as underweight (< 18.5kg/m^2), normal weight (18.5-24.9kg/m^2), overweight (25.0-29.9kg/m^2), obese (≥30.0kg/m^2).[5]

Data was entered into excel spreadsheet and coded into the Statistical Product and Service Solution (SPSS) version 23 (IBM, Chicago) for analysis. Demographic variables and categorical variables were presented using frequency tables as

appropriate. Statistical association was analyzed using the Chi square test and Fisher's test as applicable in contingency tables. Continuous variables such as age were presented using means and standard deviation. Statistical significance was evaluated at $p<0.05$ at the 95% confidence interval.

Ethical consideration: Approval was obtained from the Research and Ethics Committee of Delta State University Teaching Hospital, Oghara. Informed consent was obtained from all the participants before data collection. All information was treated confidentially and participants could withdraw at any point without prejudice to their future care.

RESULTS

Two hundred and forty-three participants were recruited in the study of which eight were excluded for incomplete data, leaving a total of 235 participants, giving a response rate of 96.7%.

The sociodemographic characteristics of the participants as shown in Table 1. The mean age of participants was 45.1 ± 13.7, with many (41.3%) of the participants within the middle age group of 45 to 59 years old. There were more females (63.0%) than males (37.0%), majority of the participants were married (68.1%) and over half (56.6%) had tertiary level of education.

Table 1: Socio-demographic characteristics of respondents.

Variable	Frequency	Percentage
Gender		
Male	87	37.0
Female	148	63.0
Age (in years)		
Young adult (18 – 26)	25	10.6
Adult (26 – 44 years)	73	31.1
Middle age (45 – 59)	97	41.3
Old age (≥ 60)	40	17.0
Mean age	45.1 ± 13.7	
Religion		
Christianity	228	97.0
Muslim	4	1.7
Traditionalist	1	0.4
Others	2	0.9
Education		
None	5	2.1
Primary	30	12.8
Secondary	67	28.5
Tertiary	133	56.6
Marital status		
Single	57	24.3
Married	160	68.1
Widowed	9	3.8
Separated	7	3.0
Divorced	2	0.9
Residence		
Urban	141	60.0
Semi-urban	71	30.2
Rural	23	9.8
Family history of hypertension		
Yes	100	42.6
No	135	57.4

Less than half 91(41%) had normal blood pressure and about a third 67(30.2%) had pre-hypertensive blood pressure. While those who had hypertension were; stage 1 hypertension 36 (16.2%) and stage 2 hypertension 28(12.6%). The overall prevalence of hypertension in the study population was 64(29.0%). (Table 2)

Table 2: Blood pressure pattern of participants.

Variable	Frequency	Percent
Blood pressure grade		
Normal	91	41.0
Pre-hypertension	67	30.2
Stage 1 hypertension	36	16.2
Stage 2 hypertension	28	12.6
Overall prevalence of hypertension		
Hypertensive	64	29.0
Non-hypertensive	158	71.0

The association between sociodemographic characteristics and the prevalence of hypertension showed that hypertension occurred more in males 30(36.1%) than females 34(24.5%), which was not statistically significant. Likewise, the prevalence of hypertension decreased with the possession of a higher educational level even though it was not statistically significant. However, the prevalence of hypertension increased with increasing age, as it was more prevalent in the elderly 23(59.0%) and was statistically significant. Also, hypertension occurred more in participants who were separated 5(71.4%) and widowed 5(62.5%) than those who were married and this was statistically significant. (Table 3)

Table 3: Socio-demographic factors associated with prevalence of hypertension

Variable	**Hypertension status**		**Test statistics**
	Hypertensive	**Non-hypertensive**	
Gender			
Male	30 (36.1)	53 (63.9)	$X^2 = 3.458$
Female	34 (24.5)	105 (75.5)	p = 0.063
Age (in years)			
Young adult (18 – 26)	0 (0.0)	25 (100.0)	$X^2 = 31.372$
Adult (26 – 44 years)	12 (18.2)	54 (81.8)	p = **<0.001**
Middle age (45 – 69)	29 (31.5)	63 (68.5)	
Old age (≥ 60)	23 (59.0)	16 (41.0)	
Education			
None	3 (60.0)	2 (40.0)	$X^2 = 6.466$
Primary	10 (33.3)	20 (66.7)	p = 0.092
Secondary	23 (35.9)	41 (64.1)	
Tertiary	28 (22.8)	95 (77.2)	
Marital status			
Single	6 (10.9)	49 (89.1)	Fisher's exact test
Married	47 (31.3)	103 (68.7)	p = **<0.001**
Widowed	5 (62.5)	3 (37.5)	
Separated	5 (71.4)	2 (28.6)	
Divorced	1 (50.0)	1 (50.0)	
Residence			
Urban	37 (27.4)	98 (72.6)	$X^2 = 0.421$
Semi-urban	21 (31.8)	45 (68.2)	p = 0.812
Rural	6 (28.6)	15 (71.4)	

Also, the association between risk factors of hypertension and the prevalence of hypertension revealed that the prevalence of hypertension increased with increase in the body mass index of participants. More participants who were obese 25(46.3%) had hypertension compared with those who had normal body mass index and this was statistically significant. Similarly, the presence of a family history of hypertension was significantly associated with increase in the prevalence of hypertension. However, those who had moderate and high physical inactivity levels had a higher prevalence of hypertension compared with those with low level of physical inactivity, although this was not statistically significant. Also, hypertension occurred more in those who did not consume alcohol 34(30.6%) than those who did 30(27.0%), but was not statistically significant. (Table 4)

Table 4: Risk factors association with prevalence of hypertension

Variable	**Hypertension status**		**Test statistics**
	Hypertensive	**Non-hypertensive**	
Smoking status			
Yes	0 (0.0)	8 (100.0)	$X^2 = 3.362$
No	64 (29.9)	150 (70.1)	p = 0.067
Alcohol intake			
Yes	30 (27.0)	81 (73.0)	$X^2 = 0.351$
No	34 (30.6)	77 (69.4)	p = 0.553
BMI			
Underweight	0 (0.0)	8 (100.0)	$X^2 = 15.008$
Normal	15 (19.0)	64 (81.0)	p = **0.002**
Overweight	23 (30.7)	52 (69.3)	
Obese	25 (46.3)	29 (53.7)	
Level of Physical activity			
Physically inactive	14 (23.0)	47 (77.0)	$X^2 = 1.640$
Physically active	48 (31.8)	103 (68.2)	p = 0.440
Family history of hypertension			
Yes	38(40.4)	56(59.6)	$X^2 =10.686$
No	26(20.3)	102(79.7)	P= **0.001**

DISCUSSION

The overall prevalence of hypertension in this study was 29%. This was similar to findings reported in a previous study in Akwa Ibom state, South-South, Nigeria and Ethiopia.[18,19] However, it was lower than 22% reported in a population based study in Oyo state, South-West, Nigeria and 27.4% in Kenya. [12,20] While a higher prevalence was reported in Enugu state, South-East, Nigeria (37.2%) and India (32.9%). [4,21] In recent years, the prevalence of hypertension in Nigeria have been on the rise.[6] Report from a systematic review conducted in Nigeria showed an increase from 8.2% in 1990 to 32.5% in 2020.[22] The probable factors responsible for this rise include adoption of unhealthy lifestyle habits, increase in the ageing population, urbanization leading to change in the kind of jobs people engage in and the type of transport system utilized resulting in sedentary living.[1,5,22] Also, the lack of effective preventive strategies targeted at hypertension can be a contributory factor.[5]

It is worthy to note that about a third of the participants had prehypertension blood pressure. This finding falls within the range reported by a systematic review on the prevalence of prehypertension in Africa of between 32.9% to 56.6%.[23] Also, Raimi and Odusan in Ogun state, Nigeria reported similar finding.[24] A lower prevalence was reported by Sharma et al in South Africa while a higher prevalence was found by Olack et al in Kenya. [5,25] The high rate of prehypertension in this study is worrisome. Although, prehypertension does not necessarily progress to hypertension.[26] Previous studies have reported that its presence can increase the risk of developing hypertension, cardiovascular complications and damage to target organs by 30% in the absence of modification of lifestyle habits.[26] Hence the need to enlighten the public on the need to adopt healthy lifestyle behaviours to reduce the risk of hypertension.

Furthermore, the prevalence of hypertension increased with increasing age, as it was more prevalent in the elderly and was statistically significant. This was in congruent with previous studies in Nigeria and globally. [4,5,6,19] Age have been identified as one of the non-modifiable risk factor that have a positive association with hypertension.[27] This occur due to increase in systolic blood pressure following increase in age, resulting from decrease in the elasticity of arteries and arterioles.[4,27] The current trend experienced globally in population structure which has led to a growing increase in the ageing population, with Nigeria not left out, as the population of the elderly is expected to rise from 9 million in 2016 to 26 million by 2050.[16,28] The implication of this is an increase in the occurrence of chronic diseases including hypertension associated with ageing, thus there is need to develop health policies and strategies that will promote healthy ageing.[16] In addition, hypertension occurred more in participants who were separated, divorced and widowed than those who were married and single and this was statistically significant. This finding was consistent with a study conducted in Saudi Arabia.[20] Also, a population based study conducted in Kenya noted that participants who were widowed had a 20% greater risk of developing hypertension compared to those who were married.[25] In contrast, a national survey carried out in Nigeria (REMAH study) found out that those who were married and widowed had an increased risk of having hypertension.[6] It has been discovered that marriage promotes the uptake of healthy lifestyle practices and better mood which confer various positive health benefits on an individual.[29,30] Whereas, divorce which is regarded as the most stressful life experience is associated with increased risk of early mortality.[29] This could be due to the loss of

this protective benefits of marriage together with the stress of separation which can result in aberration from healthy lifestyle behaviours that may predispose to long-term consequences for disease processes.[29] Also, those who are widowed, separated or divorced have to take up more responsibility to carter for the needs of their children which may give rise to stress that may increase the risk of hypertension.

A significant and well documented non-modifiable risk factor of hypertension is the presence of a family history of hypertension.[1,31] The presence of a family history of hypertension was significantly associated with increase in the prevalence of hypertension in this study. Similar finding was reported by previous studies.[1,12] In contrast, population based studies conducted in Rivers state, Nigeria and in Ethiopia reported no association between family history of hypertension and the prevalence of hypertension.[19,31] A higher risk of hypertension have been described in offspring of first- and second-degree parents with hypertension compared to the general population.[1] Also, the development of hypertension before the age of 55years (early onset) in parents and grandparents is a greater predictor of the risk of hypertension in their offspring.[1] In defiance of the established role played by genetic predisposition in the development of hypertension, it has been documented that the uptake of healthy lifestyle practice can reduce this risk.[1]

Also, increase in the body mass index of participants was associated with increase in the prevalence of hypertension, as more of those who were obese had hypertension compared to those who had normal body mass index. A cohort study carried out in Thailand revealed that an increasingly higher body mass index was positively associated with an increased incidence of hypertension over a 4-year period.[26] Several previous studies in Nigeria and globally reported that overweight and obesity were associated with increased risk of hypertension.[1,4,5,11,12,19,26] The World Health Association (WHO) reports that the prevalence of obesity globally is on the increase.[32] It describes the situation as alarming as diseases associated with obesity are soaring especially cardiovascular diseases which is currently the leading cause of mortality globally.[32] Dietary habits and pattern of physical activity play an important role in obesity. Despite the well-established relationship between obesity and hypertension, the mechanism by which obesity cause hypertension is complex as it involves interactions between renal, metabolic and neuroendocrine pathways.[33] The probable pathogenesis of obesity-related hypertension include over activation of the sympathetic nervous system, alteration of adipose-derived cytokines, insulin resistance, structural and functional renal changes and the stimulation of renin-angiotensin-aldosterone system.[32,33] Weight reduction have been identified as the primary measure to address obesity-related hypertension, as it reverses the pathophysiological mechanism that lead to hypertension.[33] This can be achieved through lifestyle changes such as healthy dietary habit and increased physical activity.[33]

CONCLUSION

In the study, about a third of the study participants had prehypertension and hypertension respectively. Increasing age, being separated, obesity and a positive family history were associated with increased risk of hypertension. There is need to provide health education and health promotion activities that address awareness of the risk factors of hypertension and to encourage the adoption of healthy lifestyle habits targeted at controlling the risk factors of hypertension and hence hypertension. This is necessary because adoption

of healthy lifestyle practices has been found to contribute to the reduction of blood pressure. Also, controlling these risk factors can counterpoise to some extent the genetic predisposition for hypertension and the development of its ensuing sequelae.

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