ISSN: 2476-8642 (Print)
ISSN: 2536-6149(Online)
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Annals of HEALTH RESEARCH

(The Journal of the Medical and Dental Consultants Association Of Nigeria, OOUTH, Sagamu, Nigeria)
Volume 10 | Issue 4| October - December 2024

IN THIS ISSUE

PUBLISHED BY THE MEDICAL AND DENTAL CONSULTANTS ASSOCIATION OF NIGERIA, OOUTH, WSAGAMU, NIGERIA
www.mdcan.oouth.org.ng

Annals of Health Research
(The Journal of the Medical and Dental Consultants Association of Nigeria, OOUTH, Sagamu, Nigeria)

Volume 10, Issue 4: 398-405
December 2024
doi:10.30442/ahr.1004-08-259

ORIGINAL RESEARCH

Prehypertension and Hypertension among Nursing Students in Southwest Nigeria

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Abstract

Background: Hypertension, also known as the "silent killer", constitutes a major threat to the health of people all over the world. It can start during adolescence and continue into adulthood. It is often difficult to diagnose early in adolescents and youths because they are otherwise healthy. Therefore, the risk of presenting with complications and target organ damage is high in them.
Objective: To determine the prevalence of prehypertension and hypertension among Nigerian nursing students.
Methods: A retrospective study of 216 students admitted into the College of Nursing between 2019 and 2021 was done. The gender, age, weight, height and blood pressure were retrieved from the medical records.
Results: The prevalence of prehypertension and hypertension were 31.0% and 2.8%, respectively. Prehypertension was higher among females and overweight students, while hypertension was higher among males and obese participants. Hypertension was significantly associated with gender and body mass index.
Conclusion: The prevalence of prehypertension was high in this study. Therefore, there is a need for regular screening and health education of young adults on prehypertension to prevent progression into hypertension in later life.

Keywords: Body Mass Index, Hypertension, Nigeria, Prehypertension, Undergraduates.

Introduction

Hypertension, or high blood pressure (HBP), is the commonest non-communicable disease. [1] It affects all races, and it is associated with high morbidity and mortality.[1,2] Approximately 1 billion people are affected worldwide, and it accounts for 7.6 million premature deaths and 6% of disability-adjusted life years.[3] Over the past several decades in Nigeria, the prevalence of hypertension has been on the increase, and it varies by region, with recent estimates ranging from 22 to 44%.[4] Recent epidemiological studies have shown that hypertension and prehypertension (PHT) may begin during adolescence and persist into adulthood, although

hypertension (HTN) is typically more common in the elderly.[5] The younger age of onset of hypertension is associated with a reduction in life expectancy, target organ damage and excessive financial burden on populations and health care systems.[6,7] Hypotension can equally be devastating, but this is less common.

The 7th Joint National Committee on Prevention, Detection, Evaluation and Treatment of Hypertension introduced the term "prehypertension" to describe a new class of blood pressure (BP) pattern. A systolic BP between 120 and 139 mmHg and/or diastolic BP between 80 and 89 mmHg indicates a pre-hypertensive state. [1] Regardless of other risk factors, persons with prehypertension have a higher risk of severe cardiovascular events and an increased chance of developing hypertension later in life.[1] The American Heart Association defines hypertension as having Systolic Blood Pressure (SBP) equal to or more than 140 mmHg, Diastolic Blood Pressure (DBP) equal to or more than 90 mmHg, or using antihypertensive medication.[8] It is called the silent killer because it could present without or with only a few symptoms.[8] It is classified as primary hypertension, which has no known cause, and secondary hypertension, which has specific and identifiable causes.[9] The risk factors for hypertension are numerous. Socio-demographic characteristics, such as male gender, advanced age, parental history of hypertension, diabetes mellitus and behavioural factors, like body mass index, sleep duration, smoking, and alcohol consumption, are strongly associated with hypertension.[7]

Guided by the knowledge that prehypertension and hypertension can start in adolescence and continue into adulthood, this study could help detect their presence among students, who are mostly late adolescents and young adults. This could speed up actions such as lifestyle modification and early treatment to prevent disease progression. This study, therefore, aimed to determine the prevalence of prehypertension and hypertension among undergraduate students in a college of nursing in southwest Nigeria.

Methods

A retrospective study was conducted to analyse the pre-admission data of students admitted to the Bowen University Teaching Hospital (BUTH) College of Nursing, Ogbomoso, over a period of three years (2019–2021). Of the 231 students admitted during the study period, only 216 had complete records and were available for final analysis. Approval for the study was obtained from the BUTH Research Ethics Committee with approval number BUTH/REC-960.

The data on the students' age, gender, blood pressure measurement, weight and height were extracted from their medical records. Blood pressure measurements were categorised as normal (SBP <120mmHg and DBP <80mmHg), prehypertension (SBP between 120-139mmHg and DBP between 80-89mmHg), and hypertension (SBP >140mmHg and DBP >90mmHg). Body mass index (BMI) was determined using the weight in kilogram (kg) and height in meters (m), calculated as weight in kg/(height in metres)^2 and classified as underweight (BMI <18.5kg/m^2), normal weight (BMI between 18.5-24.9kg/m^2), overweight (BMI between 25.0-29.9kg/m^2), and obesity (BMI >30.0kg/m^2).[10] To ensure patient confidentiality, the data collected from the medical records department was de-identified, and only authorised personnel had access to it. The data was systematically collated and analysed using SPSS version 26.0 software for Windows (IBM-SPSS Corp., Chicago, USA). The association between variables was tested using Fisher's exact test with a p-value set at <0.05.

Results

Table I shows the frequency distribution of gender, age group, blood pressure and body mass index of study participants. A female preponderance was represented by 182 (84.3%) of the participants. Almost half, 105 (48.6%) of the study participants were under 18 years old. The prevalence of prehypertension and hypertension in this study was 31.0% and 2.8%, respectively, while the prevalence of overweight and obesity was 10.2% and 7.4%, respectively. Table II shows that most of the study participants had normal blood pressure. The prevalence of prehypertension was high among female students (31.3%), while the prevalence of hypertension was high among males (11.8%).

Table I: Clinico-demographic distribution of the study participants (n=216)

Variables	*Frequency (%)*
Gender	
Male	34 (15.7)
Female	182 (84.3)
Age Group (years)	
<18	105 (48.6)
19-25	87 (40.3)
>25	24 (11.1)
Blood Pressure (mmHg)	
Normal (>.80-120?	143 (66.2)
Prehypertension (?cut-off)	67 (31.0)
Hypertension (?cut-off)	6 (2.8)
BMI Category (kg/m²)	
Underweight (put values)	46 (21.3)
Normal	132 (61.1)
Overweight	22 (10.2)
Obesity	16 (7.4)

Table II: Blood pressure distribution based on gender

Blood Pressure Category	*Gender*	
	Male (n = 34) (%)	**Female (n = 182) (%)**
Normal	20(58.8)	123(67.6)
Prehypertension	10(29.4)	57(31.3)
Hypertension	4(11.8)	2(1.1)

In Table III, the prevalence of prehypertension and hypertension decreased with age. Using BMI, the overweight participants had a higher prevalence of prehypertension, while the obese had a higher prevalence of hypertension. There was no significant association between prehypertension/hypertension and age group, but a significant association was observed with gender and body mass index.

Table III: Association between clinico-demographic characteristics and hypertension

Variables		*Blood Pressure Classification*			*Fisher's Exact Test*
		Normal (n = 143) (%)	**Prehypertension (n = 67) (%)**	**Hypertension (n = 6) (%)**	
Age Group	<18	71 (49.6)	31 (46.3)	3 (50.0)	0.212
	19-25	61 (42.7)	24 (35.8)	2 (33.3)	
	>25	11 (7.7)	12 (17.9)	1 (16.7)	
Gender	Male	20 (14.0)	10 (14.9)	4 (66.7)	0.012
	Female	123 (86.0)	57 (85.1)	2 (33.3)	
Body Mass Index	Underweight	39 (27.3)	7 (10.4)	0 (0.0)	<0.001
	Normal weight	88 (61.5)	41 (61.3)	3 (50.0)	
	Overweight	12 (8.4)	10 (14.9)	0 (0.0)	
	Obesity	4 (2.8)	9 (13.4)	3 (50.0)	

Discussion

The prevalence of prehypertension reported in this study was 31.0%. This is similar to the prevalence of 33.5% reported in a cross-sectional survey among first-year students at Vietnam University in Hanoi [5]. Peltzer *et al.* [11] found a lower prevalence of 19% among university students from seven Southeast Asian countries. Higher prevalence rates of 39.5% and 41.3% were found in Kuwait [12] among college students and in Central India [13] among medical students, respectively, compared to the present study. Reports from studies among secondary school students also vary. A prevalence of 17.3% was reported in Enugu, Southeast Nigeria, [6] where a multistage sampling technique was used to select adolescents aged 10-18 years who participated in the study. A prevalence of hypertension and prehypertension of 40.5% was reported from a survey conducted in Palestine[14] among secondary school students aged 16-18 years who met the inclusion criteria for the study.

The present study recorded a prevalence of 2.8% for hypertension. This is high when compared with the findings from cross-sectional studies of prevalence and risk factors of prehypertension and hypertension among students from Vietnam National University in Hanoi [5] and undergraduates in a tertiary institution in Ghana [1] with a prevalence of 1.4% and 2.2%, respectively. Other researchers reported a higher prevalence of 7.0% and 7.9% in Kuwait, [12] and Central India, [13] respectively. A significantly high prevalence of 18.7% was found by Qaddumi *et al.*, [14] where the prevalence of hypertension and prehypertension was studied among secondary school students in Palestine and the diagnosis of hypertension was made based on the average systolic and or diastolic blood pressure ≥ 95th percentile for gender, age and height on more than three or more separate occasions.

The prevalence of prehypertension in this study was higher in females, while males had a higher prevalence of hypertension. This agrees with the findings by Al Majed *et al.* [12], who also studied college students with more female respondents, as seen in the present study. This could result from varied hormonal activity between both genders at this stage of life. [12] The male gender reported a prevalence of prehypertension at 29.4%. This prevalence is high compared with findings among adolescents in Northern India[15], with a prevalence of 11.3%, and another study

among medical students in Central India[13], with a prevalence of 18.6%. However, studies in Hanoi[5] and Kuwait[12] reported higher prevalence rates of 54.1% and 64.4% respectively. This could be because of differences in study geographical locations. Likewise, in this study, the prevalence of hypertension among the male gender is 11.8%. This result is closely related to findings from a study on the prevalence of hypertension and its association with cardiovascular risk factors in Hunan, China [16], with a prevalence of 10.5% among males. Other researchers have also reported a lower prevalence of 2.5% and 3.9%.[5,13] Contrary to this finding, Al-Majed[12] *et al.* reported a high prevalence of 85.7% among male college students. This could be because the study participants were randomly selected across different colleges when compared with the present study.

The prevalence of prehypertension among females was 31.3% in the present study. Other researchers in Southeast Asia, Central India, and Nigeria [5,13,17] reported prevalence rates of 15.2%, 22.6%, and 55.5%, respectively, among the female gender. Also, we found a hypertension prevalence of 1.1% among females. This is higher than the findings by Vo *et al.* [5] in Hanoi, which has a prevalence of 0.5%. Other researchers in Central India, Northern India, and Western Asia reported a prevalence of 3.9%, 13.1% and 14.3% respectively.[12,13,15] However, in Nigeria, hypertension and its associated risk factors were studied by Umuerri *et al.* [17], who recorded a prevalence of hypertension among female adults as 55.6%. This high value could be attributed to the cross-sectional design, the community-based nature and a larger sample size. This may give a better representation of people in the community. In this study, a significant association was observed between gender and hypertension. This agrees with the findings of other researchers. [2,8,18]

The prevalence of prehypertension and hypertension was observed to decrease with age in this study. A cross-sectional study done in China among primary and secondary school students aged 7-17 years found that the prevalence of hypertension increased with age.[19] The difference observed from this finding may be because the age range of the study participants differs, and different diagnostic criteria were used to diagnose hypertension. There was no significant association between age group and hypertension. These findings agree with the report of Qaddumi *et al.* [14] in Palestine. However, other studies in Nigeria [17] and Egypt [2] reported a significant association.

The body mass index (BMI) is a screening tool that can predict the risk for prehypertension and hypertension later in life. Also, overweight and obese adolescents have more body fat and higher blood pressure than normal-weight adolescents. [20] Overweight and obese subjects had a prevalence of 10.2% and 7.4%, respectively, in the present study. A higher frequency of overweight was recorded among the prehypertension group, while obesity was more frequent in the hypertension group. This may be because obesity has been documented as a risk factor for hypertension. A significant association was found between hypertension and BMI, which agrees with the findings of other researchers in Ghana, Palestine, Northern India, and Nigeria. [1,14,15,17] Other studies also correlated BMI with systolic and diastolic blood pressure, and a significantly positive correlation was reported among studied students in India and Malaysia. [21,22]

The small sample size used in this study is a limitation as it makes generalisation of findings difficult. Being a retrospective study, it may be challenging to identify and follow up on those needing further evaluation and treatment. The protocol for blood pressure measurements could not be clarified; ideally, the subject should have

rested a while prior to BP measurements. The BP should be re-measured after 30 minutes of rest to ascertain /clarify the true value. Thus, a single BP measurement has a limited diagnostic value. In addition, a complete medical history detailing a family history of hypertension, use of medications like antihypertensives, social use of caffeine and nicotine, and co-morbidities for hypertension, like kidney disease, were not available.

Conclusion

The prevalence of prehypertension is high in this cohort of Nigerian nursing undergraduates, and there may be a risk of progressing to hypertension if not promptly addressed. Prehypertension had a higher prevalence among females, while hypertension was more frequent among males. Therefore, dietary and lifestyle modifications should be encouraged to curtail overweight and obesity, which are associated factors for prehypertension and hypertension. The high rate of prehypertension reported in this study calls for a need to organise preventive interventions for adolescents and youths. It is recommended that regular screening programmes should be mandatory for undergraduate students rather than being limited to pre-school entry screening alone.

Authors' Contributions: AAO and AIO conceived and designed the study. AAO, AIO and ASA analysed and interpreted the data. AAO drafted the manuscript. AIO, ASA, DAO, IAE, and OAD revised the manuscript to provide sound intellectual content. All the authors approved the final draft of the manuscript.
Conflicts of Interest: None.
Funding: Self-funded.
Publication History: Submitted 01 August 2024**, Accepted** 03 November 2024.

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