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Prevalence and Predictors of Hypertension among Army Personnel in Adekunle Fajuyi Military Cantonment, Ibadan, Nigeria

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Abstract

Background: Hypertension is one of the most prevalent non-communicable diseases globally. Hospital records show that it is a common reason for out-patient visits and admissions. This study was conducted to determine the prevalence and predictors of hypertension among Army personnel in Adekunle Fajuyi Cantonment, Ibadan, Nigeria.

Methods and materials: This descriptive cross-sectional study was conducted among 400 officers and soldiers selected through a stratified random sampling method. Interviewer-administered questionnaire was used to collect data. Measurement of blood pressure, height and weight was done using standardized instruments and methods; urinalysis was done with Uristix. Hypertension was defined as systolic BP≥140 mmHg, diastolic BP≥90 mmHg or being currently on antihypertensive drugs. Data was analyzed with SPSS version 20. Chi-square test and logistic regression were used to test associations with level of significance set at ≤0.05.

Results: The mean age was 34.5±8.3 years; respondents were mostly males (92.8%), married (73.8%), and having at least secondary education (94.8%). Prevalence of hypertension in the population was high at 34.3%; out of these, 67 (49%) were previously diagnosed as hypertensive but not regular on medication, while 18(13.1%) were controlled on antihypertensive medications. Risk factors identified included alcohol consumption (32.5%), tobacco smoking (11.3%), positive family history (31%) and overweight and obesity (38.8%). The major predictors for hypertension were male sex, (OR 3.3, 95% CI 1.1-10.2, p<0.05) and obesity, (OR 2.1, 95%CI 1.4-3.3, p<0.05).

Conclusion: The prevalence of hypertension among the military personnel is high and the main predictors were male sex and obesity. Appropriate and comprehensive hypertension prevention and control measures should be instituted for the officers.

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Keywords: Hypertension; High blood pressure; Army personnel; Obesity; Nigerian army.

Abbreviations: BMI: Body Mass Index; BP: Blood Pressure; HBP: High Blood Pressure; NCDs: Non-Communicable Diseases; WHO: World Health Organization.

Introduction

High blood pressure (HBP) or hypertension is the most common non-communicable disease and a significant risk factor for cardiovascular diseases, such as heart attacks, stroke, and left ventricular hypertrophy globally. It is called a "silent killer" since most people with hypertension are unaware of the problem because it has no warning signs or symptoms and is the major cause of premature death worldwide [1]. According to the 2020 World Health Statistics, cardiovascular diseases were the leading cause of deaths due to non-communicable diseases (NCDs) globally [2]. The prevalence of hypertension varies across regions and country, income and occupation groups, with the World Health Organization (WHO) African Region having the highest prevalence of hypertension (27%) [1], while data by World Bank shows that the prevalence of hypertension was highest in low-income countries (28.4%) and lowest in high-income countries (17.7%) in 2015 [3].

Hypertension is classified into essential (primary) or secondary hypertension based on the etiology. Primary or essential hypertension which is the rise of blood pressure of unknown origin, is the most common type, affecting 90-95% of hypertensive patients. Secondary hypertension on the other hand, is the increase in blood pressure caused by diseases. In addition, HBP can be regarded as mild or moderate. The ultimate goal in the treatment of hypertension is to reduce the risk of cardiovascular event for individual patients and in the population as a whole. If left untreated, complications such as atherosclerosis, heart attack, stroke, enlarged heart or kidney damage may occur due to high blood pressure.

Emerging epidemiological data in sub-Saharan Africa suggests that hypertension has become a major public health challenge [4], giving rise to a double burden of disease. There has been an increase in the number of adults with hypertension in recent years, especially in low- and middle-income countries (LMICs), which is due mainly to a rise in hypertension risk factors in those populations [1]. LMICs, including Nigeria, appear to be worst hit by effect of hypertension and imminent complications, with relatively higher number of cases and limited awareness, treatment, and control rates, against the trend observed in developed countries [5,6]. A significant number of highly productive populations is affected by the rising prevalence of hypertension, with resultant greater economic and health burden.

High prevalence of hypertension exacts a tremendous public health burden on individuals, families and countries. As a primary contributor to heart disease and stroke, the first and third leading causes of death worldwide, respectively, high blood pressure was the top modifiable risk factor for disability adjusted life-years lost worldwide in 2013 [7,8]. Effective blood pressure management has been shown to decrease the incidence of stroke, heart attack, and heart failure [9,10]; thus identifying prevalence and risk factors is essential for planning effective management strategies. This study aims to assess the awareness, prevalence, as well as the predictors of hypertension among the Nigerian Army personnel in Ibadan as a special at risk yet very important group of Nigerians in the programme for non-communicable diseases (NCDs) control in Nigeria.

Methodology

This was a cross-sectional study, involving 400 officers and soldiers of the 2 Mechanized Division of the Nigerian Army at Ibadan, Nigeria. This cantonment serves as offices and homes to officers, soldiers, and families belonging to the division. The population of the cantonment is about 25,000 inhabitants out of which only about 2,000 are service personnel. Using the Leslie Fischer's sample size formula ($n= Z\alpha^2pq/d^2$) [11], where prevalence was taken as 0.5, and level of error (d), 0.05 at 95% confidence interval, a minimum sample size of 384 was calculated which was rounded up to 400 to account for non-response. The nominal roll of all the work units under Headquarters 2 Division formed the sampling frame for each work unit and these were further stratified by gender and by rank (as this is the official determinant of an individual's socio-economic class in the military). Study participants were selected using a stratified random sampling technique with proportional allocation; strata were defined by gender, socio-economic status (rank) and work unit.

A pre-tested, interviewer-administered structured questionnaire was used to collect information on socio-demographic characteristics, lifestyles, major risk factors for hypertension from respondents. The questionnaire was pre-tested at 81 Batalion, located in Letmauk Cantonment, Mokola, Ibadan, which is a Cantonment very similar to that of the target population in many aspects. Measurement of blood pressure (BP), height and weight were performed for all the respondents using standardised sphygmomanometer, weighing scales, stadiometer and utilizing standardised methods; and urinalysis was done with Uristix urinalysis strip.

Conventional mercury sphygmomanometers with cuffs sizes appropriate for the arm circumference were used. Participants were in an upright sitting or reclining positions and blood pressure recordings were made after each participant had rested for about 5 minutes. Korotkoff phase 5 sound was used to determine the diastolic pressure, and pressures were measured to the nearest 2 mmHg. The second blood pressure measurement was recorded. Hypertension was classified according to the seventh report of the Joint National Committee on prevention, detection, evaluation and treatment of Hypertension (JNC 7). Hypertension was defined as systolic BP≥140 mmHg, and/or diastolic BP≥90 mmHg, or currently being on antihypertensive medications.

The height (m) of the study participants were measured using a calibrated meter rule to the nearest 0.1 centimeters (cm). Participants removed their shoes prior to height measurements and measurement was done from heel to head crown with the participant standing straight upright. The weight (kg) of the volunteer study participants was measured using a scale to the nearest one kilogram. Weight was measured without shoes and with minimum clothing. The body mass index (BMI) – defined as the weight in kilogram divided by the square of the height in meters – was calculated. Obesity/Overweight was defined as BMI>25.

Data analysis was done using Statistical Package for the Social Sciences (SPSS) version 20, and frequency distributions were generated. Chi-square test and logistic regression were used to test associations with level of significance set at <0.05. Ethical approval was obtained from the Institute for Advanced Medical Research and Training (IMRAT), College of Medicine, University of Ibadan with IRC protocol number UI/IRC/06/0124 and access to the Cantonment was approved by the authority of the Nigeria Army HQ 2 Division. Informed consent was obtained from all participants before they were interviewed. Confidentiality of information collected, and anonymity were also maintained. Any person identified with high blood pressure was counseled and referred to hospital to get appropriate care if he/she was

not already receiving one.

Results

A total of 400 respondents participated in the study. Table 1 shows that 171(42.7%) respondents were within the age group 30-39years, majority were males 371(92.8%), married 295(73.8%), and among the married majority operated a monogamous form of marriage 273(92.5%). Also, almost two-third, 258(64.5%) were Christians and about two-thirds 266(66.5%) of the officers had secondary education. According to the rank of officers involved in the study, 321(80.3%) belonged to the low socioeconomic class.

Table 1: Socio-demographic characteristics of respondents.

Characteristics	Frequency (%) (N=400)
Sex	
Male	371(92.8)
Female	29(7.2)
Age group(Years)	
20-29	122(30.5)
30-39	171(42.7)
≥40	107(26.8)
Marital status	
Single	105(26.2)
Married	295(73.8)
Type of marriage	**N=295**
Monogamous	273(92.5)
Polygamous	22(7.5)
Religion	
Christianity	258(64.5)
Islam	141(35.2)
Buddism	1(0.3)
Rank	
Col-2/Lt (High Socioeconomic Class)	20(5%)
Wo-Sgt (Middle Socioeconomic Class)	59(14.7%)
Cpl-Pte (Low Socioeconomic Class)	321(80.3%)
Education level	
Primary	21(5.2%)
Secondary	266(66.5%)
Tertiary	113(28.3%)

The overall mean systolic and diastolic blood pressures were 131.58±19.47 mmHg and 80.36±11.41 mmHg respectively. The mean systolic and diastolic blood pressure readings were lower among the female respondents (Table 2).

Table 2: Average blood pressure measurement of respondents.

Blood pressure measurement	Mean±Standard deviation(Sd)
Systolic Bp (mmHg)	
Overall	131.6±19.5
Male	123.3±19.6
Female	122.2±14.4
Diastolic Bp (mmHg)	
Overall	80.4±11.4
Male	80.6±11.5
Female	77.8±8.8

Overall prevalence of hypertension in the study population was 137(34.3%), among these were 18(13.1%) previously known hypertensive military officers with BP currently controlled with oral anti-hypertensives, that is, whose current BP<140/90 mmHg (Table 3).

Table 3: Prevalence of Hypertension and distribution of Respondents by the WHO classification of Hypertension.

Category	Frequency n = 400 (%)
Classification of Blood Pressure	
Normal*	271(67.7)
High-normal*	10(2.5)
Grade 1 hypertension (mild)	40(10.0)
Grade 2 hypertension (moderate)	8(2.0)
Grade 3 hypertension (severe)	19(4.8)
Isolated systolic hypertension (ISH)	44(11.0)
Isolated diastolic hypertension (IDH)	8(2.0)
Hypertensive cases	**n = 137**
Hypertensive (systolic & diastolic)	67(49.0)
Isolated systolic	44(32.1)
Isolateddiastolic	8(5.8)
Drug controlled hypertensives	18(13.1)

*Includes Hypertensives on anti-hypertensive drugs with currently well controlled BP

Table 4: Presence of major risk factors for hypertension in respondents.

Characteristic	Frequency n=400 (100%)
Age (years)	
<40.0	107(2.8)
≥40.0	293(73.2)
Positive family history of Hypertension	
Yes	124(31.0)
No	276(69.0)
Body Mass Index (BMI)	
Underweight	11(2.8)
Normal	234(58.5)
Overweight/Obese	155(38.8)
Glycosuria	
Present	58(14.5)
Absent	342(85.5)
Proteinuria	
Present	75(18.8)
Absent	342(85.5)
Currently smoking	
Yes	45(11.3)
No	355(88.7)
Alcohol consumption	
Yes	130(32.5)
No	270(67.5)
Sedentary lifestyle	
Present	15(3.8)
Absent	385(96.2)

On assessment of presence of risk factors for hypertension, some common risk factors identified included alcohol consumption 130(32.5%), age 293(73.2%), positive family history 124(31%), overweight and obesity 155(38.8%), and tobacco smoking 45(11.3%), proteinuria 75(18.8%) and glycosuria 58(14.5%) (Table 4).

Table 5 shows the bivariate analysis showed that sex, age, alcohol consumption, obesity status, and smoking status were statistically significantly associated with being hypertensive. Multivariate logistic regression analysis was carried out on those variables significantly associated with being hypertensive. Being a male (OR 3.27, p=0.036) and obesity (OR 2.00, p=0.015) were found to be significant predictors of hypertension. Males are 3 times more likely to be hypertensive, while obese military personnel are two times likely to develop hypertension.

Table 5: Bivariate and multivariate analyses showing variables associated with development of hypertension among the respondents.

Variables (N=400)	Hypertension status		χ^2	(p-value)
	Hypertensive	Non-Hypertensive		
BMI				
Overweight	70(51.1)	85(32.3)	13.379	**<0.001**
Obese	67(48.9)	178(67.7)		
Age				
<40	91(66.4)	202(76.8)	4.956	**0.026**
≥40	46(33.6)	61 (23.2)		
Alcohol consumption				
Present	55(40.2)	75(28.5)	5.553	**0.018**
Absent	82(59.8)	188(71.5)		
Tobacco smoking				
Present	9(6.6)	36(13.7)	4.572	**0.032**
Absent	128(93.4)	227(86.3)		
Sedentary lifestyle				
Present	4(2.9)	11(4.2)	0.398	0.528
Absent	133(97.1)	252(95.8)		
Sex				
Male	133(97.1)	238(90.5)	5.810	**0.016**
Female	4(2.9)	25(9.5)		

Variable	Proportion (%) Hypertensive	OR [95% CI]	P-value
Sex*			
Female	13.8	1.0	
Male	35.8	3.3 [1.1-10.2]	**0.036**
Obesity status*			
Non-obese	27.3	1.0	
Obese	45.2	2.1 [1.4-3.3]	**0.015**

* Only variables significant on binary regression

Discussion

The overall prevalence of hypertension in the study population was 137(34.3%) made up of those identified through BP measurements 119(29.8%) and known hypertensives 18(4.5%) with blood pressure currently controlled with drugs. The implication of this finding is that many individuals are not aware of their blood pressure, many are living with hypertension without the knowledge of it, and there is the high possibility that many more are likely to be practising high risk behaviours. This raises the need for constant screening and increased awareness of hypertension and its risk factors among the study group.

A similar study done by Aliyu et al in Maiduguri among military personnel 2014 showed a much lower prevalence of undiagnosed hypertension to be 8.3% among respondents [12]. Also the prevalence of hypertension among police officers in Ibadan Oyo State in a similar study was 17.5% [31], depicting a lower prevalence of hypertension among police officers compared to military officers working in the same ancient city of Ibadan. This difference may be attributed to the higher degree of stress and strenuous activities the military are exposed to [14]. A systematic review of 53 studies by Adeloye et al on the prevalence of hypertension in Nigeria, found strong evidence that hypertension has become far more common among Nigerian adults in recent years and that awareness of the condition remains strikingly low [15].

The study population was relatively young (mean age 34.5± 8.3 years) with overall prevalence of hypertension in the study being 34.3%. This is similar to 38% of adult aged 18 years and above found to be hypertensive in a similar study in Nigeria [16]. Our study population though is much younger than the general population of adults and is also predominantly made up of males. This is a pointer to a high prevalence of hypertension in Nigeria populace. On the contrary, a study among younger military age group (mean age 29±9.77 years) in Brazil showed a lower prevalence of hypertension (22%) and the expected associated factors, such as job stress and psychological distress, were not associated with hypertension [17]. Such disparity may be as a result of younger Brazilian age group factor, racial factor and also difference in lifestyles. The young age of our respondents may be due to the recruitment policy of the Nigerian army which recruits young people between the ages of 16-21 years while the older ones are retired at about 50-55 years. Consequently, the majority of service personnel from which the study was conducted were young and middle-aged adults.

On the risk factors analysed, it is worthy of emphasis that male sex, and obesity status were found to be predictors of hypertension among the military subjects studied; this is consistent with findings in another similar study among military men in Brazil where there was a strong trend towards the increase in hypertension prevalence with the increase in the BMI among military officers [18]. Other studies have also reported higher risks of hypertension among the obese [19,20]. Male police officers were 9 times more prone to having hypertension as a predictive factor in a study done by Hussain in Ibadan [13] in tandem with our study where male military officers are 3 times more likely to develop hypertension. This may be a reflection of the lifestyles of the males which predisposes them more to risk factors for hypertension, and possibly the protective effect of estrogen in pre-menopausal women. Though alcohol and tobacco smoking were statistically significantly related with hypertension development in this study (0.018 and 0.032 respectively), no causal relationship was established on analysis. The findings of this study should also be considered in the light of the limitations associated with cross-sectional studies, including recall bias. Also, the study was carried out in a single military unit, thus limiting the generalizability of the findings.

Conclusion and recommendations

This study showed that; the prevalence of hypertension among the military men was 34.3%. the main predictors of hypertension were male sex and obesity. Based on the findings of this study, policy makers in Nigeria needs to become more proactive in formulating policies and planning interventions regarding hypertension, to reduce and forestall prevalence, and

subsequently complications from hypertension among Nigerians, particularly, men and officers of the Nigerian army. Health education targeted at positive behavioural change, especially healthy weight to promote cardiovascular health among military officers should be built into regular training courses of the Army.

Declarations

Competing interests: The authors declare no competing interests.

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