



Original Article:

Prevalence, Awareness and Correlates of Hypertension Among Urban Public Workers in Ondo State, Nigeria

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Abstract: Introduction: Due to the asymptomatic nature of hypertension, its diagnosis is often delayed, thus, leading to increasing morbidity and mortality. This study examines the prevalence, awareness and correlates of hypertension among apparently healthy adults working in an urban area of Ondo State, Nigeria. Methods: This was a cross-sectional survey of 4844 public service workers drawn across the 47 ministries, departments and agencies in Akure, the state capital of Ondo State, Nigeria. The WHO STEPwise questionnaire was used for data collection. Blood pressure (BP), blood sugar, weight and height measurements followed standard procedures. Hypertension was defined as BP of $\geq 140/90$ mmHg or a history of hypertension while self-reported prior diagnosis was defined as hypertension awareness. Bivariate and logistic analysis were performed to determine the prevalence, awareness and correlates of hypertension and a p-value of <0.05 was considered significant. Results: The prevalence of hypertension was 35% while an additional 36.4% had pre-hypertension. Males had a slightly higher prevalence of hypertension (39.1%) compared to females (21.3%). Of all the hypertensive participants (n=1692), only 28% were aware of their hypertension status with a higher awareness rate among females (10.8%) compared to males (8.7%). After adjusting for confounders in a logistic regression model analysis, only male sex, age above 40 years, primary or no education, marriage, obesity and diabetes were independent and significant predictors of hypertension among the study participants. Conclusion: There is a high prevalence of hypertension among the study participants with a high hypertension unawareness. There is a need to implement

effective workplace health policy and regularly organise health screening for public civil servants in the setting to reduce the burden of undiagnosed hypertension and its accompanying complications.

Key Words: Hypertension, Prevalence, Awareness, Correlates, Public workers, Ondo state.

Introduction:

Hypertension is one of the leading risk factors for morbidity and mortality worldwide. Aside this, it contributes significantly to the burden of heart disease, stroke, kidney failure, premature death and disability.(1) It is often referred to as a silent killer as a result of its asymptomatic nature which allows its diagnosis to be evaded among several individuals.(2) This potentially increase the chance of developing target organ damage and other life threatening conditions as early diagnosis affords opportunity for prompt intervention.(3)

Gone are the days when hypertension was considered a disease found only in the developed nations. Currently, hypertension has spread its tentacles across several countries, even to economically disadvantaged regions, including Sub-Saharan Africa.(4,5) Nigeria is not exempted from this growing menace. Studies have reported a high prevalence of hypertension in the country.(6-8)

A significant contributor to the rising hypertension burden is the increasing burden of obesity. While several individuals have a possibility of developing obesity, some are particularly at a greater risk. One of such is an important population group, the public civil servants, whose nature of job promotes

sedentary behaviour coupled with unhealthy dietary practices and consequently, obesity.(9) Public civil servants constitute a large percentage of a nation's workforce and they contribute significantly to the economic development of a nation. While the focus of hypertension has always been on the hospitalised patients, the assumption that asymptomatic individuals are healthy is doubtful. In the light of this, this study examined the prevalence, awareness and correlates of hypertension among apparently healthy individuals working in Ondo State Civil Service Commission. Information on the prevalence, awareness, and correlates of hypertension in specific population will play a crucial role in planning effective preventive measures tailored to the peculiarities of each population group. Particularly, among the public civil servants, such information might be useful in crafting an effective workplace policy on non-communicable diseases.

Methods

Study area and design

We undertook a workplace population study (cross-sectional study) of public service workers drawn across the 47 ministries, departments and agencies (MDAs) in Akure, the state capital of Ondo State, Nigeria. The majority of the State MDAs are located within the state secretariat at Alagbaka, Akure. About 30,000 workers are employed across the various MDAs, with the official working hours between 8:00am to 4:00pm, with variations in some departments.

Participants and Sample Size

We chose the public service workers to test the study hypotheses; (1) whether a workplace screening will lead to increase diagnosis of hypertension at the population level and (2) whether a significant proportion of men will access the hypertension screening in their workplace. All public civil service workers at the study settings who fulfilled the inclusion criteria and were on duty during the period of the study were eligible for recruitment into the study. Participants were included if they were 18 years and above, willing to participate and had fasted for eight hours prior to study. Pregnant and lactating women, and those with physical deformities which impacts on anthropometric assessments were considered ineligible. A convenient sample of workers ($N = 4844$), corresponding to about one-sixth of the workers in Akure, across the various MDAs was considered adequate to test the hypotheses of the study. A communique detailing the purpose, process and specific dates for each ministry was sent to the relevant authorities and all workers. Each MDA was allocated one to three days in which to gather adequate samples of workers for the study.

Data Collection

Trained research nurses took measurements and conducted the interviews. Participants were interviewed using standardized World Health Organization (WHO) STEPwise Methodology for the surveillance of non-communicable diseases (NCDs) risk factors at the country level.(10) The questionnaire was pre-tested in a pilot that included 25 workers in the ministry of health and finalized after necessary amendments. However, the pilot data was not included in the main study.

The questionnaire included items on gender, age, grade level of employment, marital status, smoking status, alcohol intake, diet, hours of sleep and physical activity. The level of education was determined according to the grade level attained in school and participants were categorized as having no formal education, primary (grade 1-6), secondary (7-12), tertiary (first degree in university or colleges of higher learning) or post-graduate (minimum of second degree). Public service workers were categorized based on their grade level into; senior management staff (13-17), middle level staff (8-12) and junior management staff (less than 8). Participants were questioned on daily consumption of red meat (Western-type diet), cigarette smoking status (considered as smoked if they have ever smoked cigarette or not), excessive

consumption of alcohol (if they ever had three or more units of alcohol for men and two for women or not). Physical activity was based on self-reporting and participants were categorized as inactive (sedentary lifestyle) if they spent eight or more hours in sitting position per day. Participants were asked whether or not they have ever had their blood pressure measured by health workers.

Measurements

Participants gave consent to visit their family doctors or accept a referral to the state specialist hospital in event of an abnormal measurements.

Blood pressure: Blood pressure (systolic and diastolic) was measured in accordance with standard protocol (11) with a validated Microlife BP A100 Plus model (Omron HEM – 705 CP Device, Tokyo, Japan), which provided average of two readings for each participant. Hypertension was defined as average of two systolic blood pressure of ≥ 140 mmHg and diastolic of ≥ 90 mmHg or a history of hypertension.(12)

Blood Glucose: Glycaemia was measured using ACCUTREND R test strips (2010 LifeScan, Inc. 021-606, Switzerland) for capillary blood glucose (fasting state). Pre-diabetes and diabetes were defined as fasting blood glucose 6.1-6.9mmol/l and greater than or equal to 7.0mmol/l, respectively.(13)

Weight and Height: Body weight was measured in light clothing to the nearest 0.5kg in the standing position using Soehnle Scale (Soehnle-Waagen GmbH Co., Muurhardt, Germany). The height was measured by stadiometer in standing position with closed feet (without shoes to the nearest 0.5cm), holding their breath in full inspiration and Frankfurt line of vision.(14) Body mass index (BMI) was calculated as weight divided by height in square metres. BMI was categorized in accordance with WHO criteria (15) as <18.5 kg/m², 18.5-24.9kg/m², 25.5-29.9kg/m² and ≥ 30.0 kg/m² as underweight, normal, overweight and obese, respectively.

Ethical Considerations

Ethical approval was granted by the Ondo State Health Research Ethics Committee (SHREC – AD4693/307). Prior to each day's interview, a public lecture was delivered to the participants describing all information regarding the study. Information sheets and consent forms were provided to the participants. All participants provided written informed consent before they were enrolled for the study. Participants were interviewed in a secured room to ensure privacy and confidentiality of each worker.

Data analysis

Data were analysed using Statistical Package for Social Science (SPSS) version 21 for windows (SPSS Inc., Chicago, IL, USA). Data were expressed as mean values \pm standard deviations (SD) for continuous variables. Frequencies (n) and proportions (%) were reported for categorical variables. Counts (frequency = n) and proportions (%) were reported for categorical variables. Percentages were compared using chi-square test. A bivariate and multivariate analysis was done to determine the prevalence, awareness and correlates of hypertension among the participants. We calculated multivariate ORs and their 95% confidence intervals (95% CIs) using logistic regression to identify the predictors of hypertension in our sample. Our logistic regression model analysis adjusted for sex, age, level of education, hours of sleep, formal exercise programme, excessive alcohol intake, cigarette smoking and red meat consumption. A p-value of < 0.05 was considered statistically significant.

Results

Of the total participants ($N=4844$); 52.4% ($n=2538$) were females while 47.6% ($n=2303$) were males. The majority had at least a secondary education (86.5%), were married (76.6%), and middle level category (53.2%). Sedentary behaviour (spending up to 8 hours daily in sitting position) was reported by 24.5% of study participants with no significant difference

between sexes. The majority (85.2%) sleep less than six hours daily. Only few smoke more than three cigarettes per day (2.9%) and consume alcohol daily (8.5%). One in three of the participants consume red meat daily and engage in physical exercise. About 25% of the participants spend up to eight hours daily sitting (Table 1).

Variables	Total (n=4828)	Male (n=2299)	Female (n=2529)	p-value
Age groups (Years)				
≤24	215(4.5)	91(4.0)	124(4.9)	0.000
25-34	1185(24.5)	541(23.5)	644(25.5)	
35-44	1673(34.7)	773(33.6)	900(35.6)	
45-54	1408(29.2)	681(29.6)	727(28.7)	
55-64	333(6.9)	200(8.7)	133(5.3)	
≥65	14(0.3)	13(0.6)	1(0.0)	
Level of education				
No formal education	59(1.3)	49(2.2)	10(0.4)	0.000
Primary Education	568(12.4)	356(16.1)	212(8.9)	
Secondary Education	1258(27.7)	556(25.2)	702(29.6)	
Tertiary Education	1783(38.9)	779(35.3)	1004(42.3)	
Post Graduate Education	911(19.9)	467(21.2)	444(18.7)	
Marital Status				
Single	934(19.8)	442(19.9)	492(19.8)	0.000
Married	3606(76.6)	1766(79.3)	1840(74.1)	
Widowed	131(2.8)	10(0.4)	121(4.9)	
Separated	38(0.8)	8(0.4)	30(1.2)	
Grade level				
Junior staff	1162(29.1)	555(28.8)	607(29.5)	0.000
Middle level	2125(53.2)	962(49.8)	1163(56.4)	
Senior level	704(17.6)	413(21.4)	291(14.1)	
Sleep less than six hours daily	4125(85.2)	1952 (84.8)	2173 (85.6)	0.701
Smoke more than three sticks of cigarette per day	138(2.9)	99(4.3)	39(1.5)	0.000
Consume lots of red meat daily	1555(32.1)	816(35.4)	739(29.1)	0.000
Consume alcohol daily	411(8.5)	353(15.3)	58(2.3)	0.000
Engage in physical exercise	1906(39.4)	937(40.7)	969(38.2)	0.13
Spend up to eight hours daily on sitting	1187(24.5)	560(24.3)	627(24.7)	0.005

Prevalence of hypertension

High prevalence of pre-hypertension 36.1% (n=1751) and hypertension 35% (n=1692) was found in the study sample. Of the hypertensive participants, only 28% (n=474) had a prior diagnosis of hypertension by history. As shown in Fig. 1, males have a slightly higher prevalence of hypertension (39.1%) than females (21.3%).

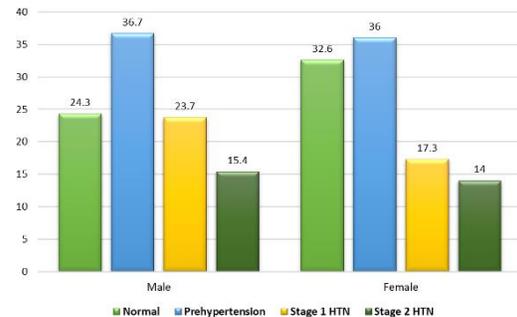


Fig. 1: Hypertension Prevalence by Gender
Determinants of hypertension

In the bivariate analysis, sex, educational level, age, marital status, obesity, physical activity, cigarette smoking, sedentary lifestyle, sleeping less than 6 hours, alcohol use, work cadre and diabetes were significantly associated with hypertension (Table 2).

However, after adjusting for confounding factors (educational level, physical activity, cigarette smoking, sedentary lifestyle, sleeping less than 6 hours per day and work cadre) in the multivariate (logistic regression model) analysis; only sex, age, educational level, marital status, obesity and diabetes were the independent and significant determinants of hypertension among the study participants (Table 3).

Variables	Hypertensive	Not hypertensive	p-value
Sex			
Male	974(42.3)	1326(57.7)	<0.001
Female	895(35.3)	1638(64.7)	
Educational level			
Primary or no education	323(51.7)	302(48.3)	<0.001
Post-primary education	1457(36.9)	2492(63.1)	
Obesity			
Yes	510(52.4)	464(47.6)	<0.001
No	1291(34.9)	2410(65.1)	
Age			
41 and above	1263(52.9)	1125(47.1)	<0.001
40 and below	603(24.8)	1833(75.2)	
Diabetes			
Yes	159(62.6)	95(37.4)	<0.001
No	1702(37.3)	2855(62.7)	
Marital status			
Married	1669(42.8)	2235(57.2)	<0.001
Never married	202(21.7)	730(78.3)	
Engage in physical activity			
Yes	801(36.9)	1371(63.1)	0.011
No	1070(40.2)	1594(59.8)	
Cigarette smoking of more than 3 sticks per day			
Yes	70(50.7)	68(49.3)	0.002
No	1801(38.3)	2897(61.7)	
More than 8 hours in sitting position			
Yes	509(42.9)	678(57.1)	<0.001
No	1362(37.3)	2287(62.7)	
Sleep less than 6 hours per day			
Yes	661(40.5)	970(59.5)	0.033
No	1210(37.8)	1995(62.2)	
Drink alcohol daily			
Yes	178(43.3)	233(56.7)	0.026
No	1693(38.3)	2732(61.7)	
Cadre			
Junior staff	477(41.2)	681(58.8)	<0.000
Middle level	819(38.6)	1305(61.4)	
Senior level	348(49.6)	354(50.4)	

Variable	Beta	S.E	Wald	OR (95%CI)	P-value
Age					
41 and above	1.02	0.07	202.35	2.8(2.4-3.2)	<0.001
40 and below (Reference)					
Educational level					
Primary or no education	0.39	0.09	16.93	1.5(1.2-1.8)	<0.001
Post-primary education (Reference)					
Obesity					
Yes	0.75	0.08	77.97	2.1(1.8-2.5)	<0.001
No(Reference)					
Sex					
Male	0.43	0.07	37.22	1.5(1.3-1.8)	<0.001
Female (Reference)					
Marital status					
Married	0.38	0.10	14.54	1.5(1.2-1.8)	<0.001
Never married (Reference)					
Diabetic					
Yes	0.65	0.15	19.93	1.9(1.4-2.6)	<0.001
No(Reference)					

Hypertension awareness

Of all the study participants, about half (48.1%) check their blood pressure regularly. More females reported that they regularly check their blood pressure (50.5%) than males (45.4%). Females had a higher prevalence of ever been diagnosed of hypertension (10.8%) than males (8.7%). Prior admission for severe hypertension occurred more in females (4.3%) than in males (2.6) (Table 4). Of all the hypertensive participants (n= 1692), only 28% (n=474) were aware of their hypertension status.

Variables	Total (n=4841)	Male (n=2303)	Female (n=2538)	p-value
Measure BP regularly	2327(48.1)	1045(45.4)	1282(50.5)	0.001
Ever been diagnosed of Hypertension	474(9.8)	200(8.7)	274(10.8)	0.016
Ever been admitted for severe hypertension	171(3.5)	61(2.6)	110(4.3)	0.000

Discussion

Hypertension is one of the leading causes of morbidity and mortality with an increasing prevalence in the developing nations. This study sought to determine the prevalence, awareness and correlates of hypertension among urban public civil servants in Ondo State. The overall prevalence of pre-hypertension and hypertension was 71.4%. This connotes a high burden of hypertension among this sect. The prevalence of hypertension was 35%. This finding is slightly higher than the reported prevalence among civil servants in a northern area

of Nigeria, Nigeria (29%),(16) civil servants in Ethiopia, 27.3% (1) and Ghana, 27.4%.(3) The prevalence in this study is higher than the overall prevalence (28.9%) of hypertension in Nigeria as reported in a systematic review.(6) The higher prevalence found among this study population could be linked to their work characteristics which entails long period of sitting coupled with physical inactivity and unhealthy dietary practices which predispose them to obesity. This is evidenced by the significant association between physical inactivity and hypertension as well as high prevalence of obesity already documented among this study population.(9) Also, the settings of this study, being an urban area might have informed the higher rate reported as urban dwellers have been shown to have a higher burden of hypertension compared to their rural counterparts.(7) In addition to this, 36.4% of the participants were diagnosed as pre-hypertensive. Given that pre-hypertension is a precursor to the development of hypertension, this shows that this group of workers could further increase the present burden of hypertension in the nearest future if prompt actions are not taken.

Pertaining to hypertension awareness, only 28% of those diagnosed of hypertension were aware of their hypertension status. This finding is lower than the reported rate among university workers, 62.9% (17) and bank workers (79.1%) in Nigeria.(18) The awareness rate in this study population is even lower compared to the reported rate among informal workers such as commercial bus drivers (28.8%) and traders (29.4%) in Nigeria. The wide disparity in the reports suggest that workplace screening should be mandatory and periodic practice among civil service workers in the state and the country. This finding affirms our postulation that asymptomatic individuals are not necessarily healthy. This is quite disheartening, considering that this is a group that is supposedly exposed to workplace health assessment, and their level of education is also expected to influence their health behaviour.(17) There is a need to further enlighten this group about cardiovascular diseases especially undiagnosed hypertension and the consequent complications. Therefore, regular NCD screening at the workplace will benefit this population and might further prevent cardiovascular morbidities. Females were found to have better awareness about their hypertension status than males. This can be associated with better health seeking behaviour of females.(19) Also, females have several reasons to visit the healthcare system and thus, afford them opportunities to screen for hypertension, which is a routine screening at all clinic visits.

Male sex, older age, educational level, marital status, obesity and diabetes were the independent determinants of hypertension among the study population. The higher prevalence found among male workers could be ascribed to lifestyle factors such as work stress, high alcohol and salt intake which are more common among men than women.(20) Also, to some extent, females are offered some protective effect by the female hormones, especially before menopausal age.(21) Since the majority of the study participants were below the age of 45 years, this could also be a plausible reason for the lower prevalence of hypertension found among the females.

Participants who were older than 40 years were found to have a higher odds of developing hypertension. This finding is consistent with studies conducted in Nigeria(6,8) and other countries.(22,23) High burden of hypertension is inevitable among the elderly. Ageing is often accompanied by changes in body system and the cardiovascular system is not exempted from such changes. Changes in cardiovascular system such as arterial stiffness, inflammation and endothelial dysfunction account for the greater burden of hypertension among the elderly.(24,25)

Also, those with primary or no educational qualification had higher odds of being hypertensive. This corroborates the findings among civil servants in Northern Nigeria and among South African adults.(16,22) Although, there exist a complex relationship between educational level and hypertension, however, it is presumed that the more educated an individual is, the more knowledgeable they are about their health.(26) Higher level of knowledge might foster better health practices and prevent the development of hypertension and its associated predisposing factors such as obesity.(27) Married workers had higher odds of developing hypertension than the unmarried ones. This could be linked to the higher prevalence of obesity usually found among married adults.(28) The higher prevalence of hypertension found among the obese participants in this study confirms this assumption. Obesity is a leading predisposing factor for hypertension and often stimulate mechanisms such as inflammation and endothelial dysfunction which promotes hypertension development.(29) The impact of genetics in the development of hypertension however cannot be overruled and this might have also contributed to the higher prevalence of hypertension found among the married participants. Finally, we found a significant association between diabetes and hypertension. This is not surprising. There is always an intersection between both conditions as a result of shared metabolic pathway and risk factors.(30,31) Individuals with diabetes have been reported to have two-fold risk of developing hypertension compared to those who do not have diabetes.(32)

Strengths and Limitations

The cross-sectional design and the convenience sampling are obvious limitations of the study. Notwithstanding the limitations, the use of standard measures and the large sample size gives credence to the findings of this study.

The present study established that workplace screening for hypertension and other NCDs will indeed lead to increased diagnosis in a population with poor health seeking behaviour. This strategy could potentially be a game changer in reducing the burden of undiagnosed hypertension similar population, and especially among men who tend to utilise healthcare facilities less frequently.

Conclusions

High burden of hypertension and pre-hypertension prevalence as well as high level of hypertension unawareness warrant attention of the state government. Findings from this study suggest that a carefully crafted workplace policy with focus on periodic cardiovascular health screening might mitigate the burden of undiagnosed hypertension among the civil service workers. Future studies should seek to explore the effectiveness of this strategy on the broader population of workers across all sectors of the economy.

Declarations

Consent for publication

All authors approved the submission of the final draft towards publication in a peer review journal.

Availability of data and materials

Data from this study will be made available on request.

Competing interests

The authors declare no conflict of interest.

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This project was partly funded by the Ondo State ministry of health which has no influence in the conceptualization, design, implementation of the study and the outcomes.

Authors' Contributions

IA1, OF4, MA5: conceptualised, designed the protocol and collected data. OVA2, DTG5, EOO3: provided intellectual input to the design of the protocol and drafted the manuscript. AIA7: conducted the statistical analysis. All authors read the manuscript and approved the final version.

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