Blood Pressure Patterns, Stress Assessment and Anthropometric Characteristics of Health Workers in Jos University Teaching Hospital, Jos, Nigeria

[1]Olanrewaju, O.I, [2]Olaitan, O.O, [1]Roland-Ayodele, M.A, [3]Umeaku P.O

[1]Nutrition and Dietetics Department, Rufus Giwa Polytechnic, Owo, Ondo state
[2]Nutrition and Dietetics Unit, Wesley University Ondo, Ondo state, Nigeria
[3]Nutrition and Dietetics Department, Federal University of Agriculture, Abeokuta, Nigeria

[1]**Correspondence Author:** tunakinshealthcare@gmail.com

ABSTRACT

Background: *Globally, the burden of cardio-metabolic diseases especially obesity, hypertension, diabetes is rapidly increasing, and the African continent is most affected region in the world.*

Objective: *The study assessed the blood pressure patterns, stress assessment and anthropometric characteristics of health workers in Jos university teaching hospital, Jos, Nigeria*

Methods: *Apparently healthy 283 staff was randomly selected. Structured questionnaire, anthropometric instruments and digital sphygmomanometer were used to source information from the respondents. Obesity, blood pressurepatterns and stress assessment of the respondents were assessed in according to WHO standard and International Stress Management Association (ISMA) respectively. Data were analyzed using descriptive statistics and chi-square. In all cases, a probability of (<0.05) were taken to indicates level of significance*

Results: *The mean age of the respondents was 36.72 ± 9.47years. More females (68%) participated in the study than males (32%). Only (21.6%) of the respondents drink alcohol, 2.5% smoke cigarette, 65% did not engage in physical exercise while 18.1% eat late at night. Prevalence of Overweight/Obesity as determined by abnormal values for BMI, WC, WHR, BIA and WHtR were 48.9%, 31.1%, 43.1%, 65% and 71.4% respectively while 30.1% had a raised blood pressure,more than half (69.9%) of the respondents were either moderately or highly stressed. Significant difference was found in age, nature of work and parents with chronic Diseasesacross the gender (p<0.05).*

Conclusion: *Overweight, obesity, moderate stress level and high blood pressure were prevalent among the health workers. Obesity was the risk factor of high blood pressure among them.*

Keywords: Hypertension, obesity, stress, health workers, alcohol

INTRODUCTION

It is estimated that high blood pressure which is one of the risk factors for Cardio metabolic syndrome affects about 1 billion people all over the world and it is the main risk factor for many other cardiovascular diseases (1, 2, 3).

According to the World Health Organization (WHO), the African region has the highest prevalence of hypertension 27% of adults aged 25 years and above while the lowest was found in the American region (4). The incidence of hypertension and cardiovascular mortality has been increasing in sub-Saharan Africa over the past few decades (5) and is expected to nearly double by the year 2030 (6). In Sub-Saharan Africa from 2000 and 2013 the prevalence of hypertension was reported to be 30% in adults and a range from 14.7 to 69.9% depending on the sex and age (5)

In Nigeria, the prevalence of hypertension has been on the increase affecting a significant number of highly productive populations. It was estimated that there were about 20.8 million cases of hypertension in Nigeria among people aged at least 20 years, with a prevalence of 28.0% and projected increase to 39.1 million cases with a prevalence of 30.8% by 2030 (1).A review of prevalence among adults from 1990 to 2009 showed combined prevalence of 22% and range from a minimum of 12.4% to a maximum of 34.8% (7). More than 80% of urban, professional Nigerian adults do not meet the World Health Organization (WHO) recommendations for physical activity (8).

The prevalence of obesity is increasing worldwide and it has been identified as a major risk factor contributing to the overall burden of disease worldwide (9).This trend of emerging obesity in Nigeria population is seen more not just in urban dwellers, but also among health workers (10).

Anthropometric status such as body mass index above 30kgm-2 has been identified as one of the most notable risk factors for the development of hypertension (11), work place stress (13), myocardial infarction and insulin resistance (14, 15).It has been demonstrated that waist circumference is a more sensitive parameter than body mass index for prediction of cardiac risk (14). It is also reported that defective oxidative metabolism seems to be involved in visceral fat gain and the development of insulin resistance (16).

The effectiveness of patient education can be enhanced by a healthy lifestyle of the attending health workers. For example, the predictor's study (17) highlighted how physicians who drank less alcohol, smoked tobacco and engaged in healthier habits were more likely to have higher success rates in patient management. Similarly, the nurses' body size study by Hicks et al. (18), indicated that patients showed more confidence in health education when being given by a normal weight nurse than when being delivered by an overweight nurse. Truncal obesity coupled with work place stress and raised blood pressure has been found to be the leading risk factors of cardio-metabolic diseases(19).Differences in jobs descriptions and responsibilities may contribute to varying exposures to diseases including high blood pressure (20).

In Nigeria, health care provider are short in numbers and don't meet up to the international standard when compared to patients to health care provider ratio and losing some of them to pressure from the patients will further jeopardize the health care system in Nigeria. Periodic assessment of blood pressure, weight status, stress level and other metabolic screening is necessary for the health workers in order detect those that are at risk of developing hypertension, to reduce development of chronic diseases especially obesity and cardiovascular diseases so that the health workers can be fit to deliver adequate healthcare. Few studies have examined the significant of these assessments among health care workers in Nigeria, especially among health workers in north central part of Nigeria. Therefore this study assessing the blood pressure patterns, stress assessment and Anthropometric characteristics of health workers in Jos university teaching hospital, Jos, Nigeria

Materials and methods

Study Design

The study was a descriptive cross-sectional study

Study Area

Jos is a city in the north central part of Nigeria (21). It is the administrative capital of plateau state. The city is located on the Jos Plateau at an elevation of about 1,238m or 4,062ft high above sea level (20). The city has a population of about 900,000 residents based on the 2006 census (22).The research was conducted at the Jos University Teaching Hospital, an over 550 beds space and the largest of 3 tertiary health care facilities in Jos metropolis, the leading urban Federal Tertiary Hospital in North-Central Nigeria. Jos University Teaching Hospital, (JUTH), earned its name as one of the foremost referral health institutions in the northern part of the country. It is said that the hospital accommodates more than 60 percent of the doctors in the entire

North central region. It offers various services such as research, teaching, consultation and clinical services. Health service providers account for over 1000 with non-clinical staff strength of 500.

Study Population

Apparently healthy clinical and non-clinical staffs of the Jos University Teaching Hospital (JUTH) were recruited for the study.

Sample size determination

The sample size was determined using the formula for descriptive studies (23).

$$n = \frac{Z^2_{1-\alpha/2} P(1-P)}{d^2}$$

P is the proportion of the factor under investigation i.e. 23.3 (23.3% represents the prevalence of hypertension among employee of tertiary hospital in Nigeria (11).

Sampling Procedure

Multistage sampling and systematic sampling procedure were adopted in selection of respondents for the study.

Ethical Consideration

Prior to the survey, permission was obtained from Nutrition and Dietetics Department of Wesley University, Ondo. Ethical approval was sought and obtained for the study from the Ethic committee of the Jos University Teaching Hospital; Jos. Oral consent from the participants was obtained after the objective of the study was explained to them.

Data collection

Questionnaire

Self-administered questionnaires were used to obtain data. The questionnaire captured information on personal and lifestyle patterns of the respondents.

Anthropometric measurements

Weight and height measurement

The weight of the subjects were measured using a portable bathroom scale (HANSON model), to the nearest 0.1kg with the subjects standing upright on the scale barefooted at shoulder level, arms by the side and the head straight in line with using standard methods (8).The height of the participants were measured by Standiometer with the subject standing erect and barefoot on the height meter with back to the height meter and looking straight in a Frankfurt position. The height was taken and recorded to the nearest 0.1cm (8).

Waist and Hip circumference measurement

Waist circumference measurement was taken using in line with the WHO protocol using a non-stretch tape measure (Butterfly, China) the tape rule was placed at the midway between the lower rib margin and iliac crest. Measurements were taken and recorded to the nearest 0.1cm (24). Hip Circumference measurement was taken by placing the tape horizontal plane around the hip at the point of the greatest circumference with the measurement taken to the nearest 0.1cm (24).

Body Fat Measurement

Body fat % was measured with a BIA device (Omron BF-212, Omron Healthcare Europe BV, Hoofddorp, and The Netherlands) following the manufacturer's instructions. The device sends an extremely weak electrical current of 50 kHz and less than 500 μA through the subject's body and combines the electrical resistance with the distance of electricity conducted and the pre-entered particulars of the subject (age, sex, weight and height) to give the body fat %. The in-built formula used by the device was not disclosed by the manufacturer (25)

Blood Pressure Measurement

Blood pressure were measured in the right arm after at least 5min of rest and while participants sitting down (26). The cuff (about 12.5 cm wide) was applied evenly and snugly around the bare arm, with the lower edge 2.5 cm above the ante

cubital fossa. The first and fifth Korotkoff sounds were be taken as the systolic blood pressure (SBP) and diastolic blood pressures (DBP) respectively. The mean of two separate readings will be determined after an interval of 10 min and recorded to the nearest 2 mm (26).

Data Analysis

Central obesity was determined with Waist –Hip-Ratio (WHR) and waist circumference (WC). Waist –Hip- Ratio (WHR) was calculated by dividing the waist circumference by the hip circumference. Truncal obesity was determined with Waist –Hip-Ratio (WHR) and waist circumference (WC). Waist–Hip-Ratio (WHR) was calculated by dividing the waist circumference by the hip circumference. Abnormal WHR and WC for females and males were classified in line with (24). Body Mass Index was classified as underweight BMI (<18.5), Normal within (>18.5 ≤24.99), Overweight (>25≤ 29.99) and Obesity BMI (>30kg/m^2) (8) and percentage body fat≥32.0% (overweight) and ≥37.1% (obese) in black females and ≥21.7% (overweight) and ≥28.3% (obese) in black males (27).

Blood Pressure Classification

Hypertension was defined as Systolic Blood Pressure (SBOP) as 130 mmHg and above or Diastolic Blood Pressure (DSP) 90 mmHg (26). Blood pressure pattern was classified according to the Seventh Joint National Committee criteria (26). Normal Blood Pressure is less or equal to 120/80 mmHg; Prehypertension is 120-129mmHg for systolic Blood Pressure and 80-89mmHg for diastolic Blood Pressure; Stage 1 hypertension is set at 130-149mmHg for systolic BP 90-99mmHg for diastolic Blood Pressure. Stage 2 hypertension is set at 160mmHg for systolic Blood Pressure and 100mmHg for diastolic Blood Pressure.

Stress Assessment

A modified of questionnaire from International Stress Management Association (ISMA) in assessing chronic stress level were adopted for this study. Levels of stress were classified on 20point scale. Low score (≤4 points), scored moderate stress level (5-13points), and high stress level (14-20points) according the classification of ISMA (28).

Statistical Analysis

Statistical analysis was performed using the statistical package for social science (SPSS version 20). Descriptive statistics such as frequencies, percentages, mean and standard deviation were used to analyze socio-demographic characteristics and all anthropometric data. For the inferential statistics, t-test was used to determine the mean differences and Chi-square and correlation were employed to determine the relationship. Level of significance was set at $p<0.05$.

RESULTS and DISCUSSION

Personal and lifestyles history of the respondents

Table (1) presents personal and lifestyles history of the respondents. A total of 283 respondents having mean age of 36.72 ±9.47years participated in the study. More than half (64.3%) of them were within the age of 30-49 years. Female workers (68%) who participated in this study were more than male workers (32%). About (37.5%) of the respondents were clinical worker and others were non-clinical staff. Medical history revealed that more than half of the respondents (56.2%) had parents that were suffering chronic diseases. Only (29.7%) of the respondents' parents were either father or grandfather and 26.5% either mother or grandmother. Large number (89.7%) of the respondents was without any disease as at the time of the study. A total of 85(30.0%) of the participants ate their dinner between the hours of 5-6pm, 17.3% between the hours of 6-7pm. Twenty-one percent (21.6%) of the respondents drinks alcohol, of which 10.2% of these had been drinking for about 5years ago. More than half (55.1%) of the respondents were not involved in physical exercise. Only 44.9% of respondents did engage in physical exercise, of which 40.0% of them practiced low intense exercise.

Table 1: Personal and lifestyles history of the respondents

Medical history	Male (n=91) (%)	Female N=192(%)	Total (n=283) (%)	X^2	P value
Age (Years)					
20-29	20(7.1)	51(18.0)	71(25.1)	16.889	0.001*
30-39	48(17.0)	61(21.5)	109(38.5)		
40-49	21(7.4)	52(18.4)	73(25.8)		
≥50	2(0.7)	28(9.9)	30(10.6)		
Mean (SD)	35.0(7.36)	37.5(10.25)	36.72 (9.47)		
Nature of work					
Clinical	45(15.9)	61(21.6)	106(37.5)	8.238	0.004*
Non-clinical	46(16.3)	131(46.2)	177(62.5)		
Parents with Chronic Diseases					
Yes	43(15.2)	116(41.0)	159(56.2)	4.346	0.037*
No	48(17.0)	76(26.8)	124(43.8)		
Current Diseased Conditions of the respondents					
None	85(30.0)	169(59.7)	254(89.7)	14.156	0.168
Arthritis	1(0.4)	2(0.7)	3(1.1)		
Ear impairment	0(0.0)	1(0.4)	1(0.4)		
obesity	0(0.0)	1(0.4)	1(0.4)		
Migraine	0(0.0)	1(0.4)	1(0.4)		
Postnatal HBP	2(0.7)	5(1.8)	7(2.5)		
Ulcer	0(0.0)	3(1.1)	3(1.1)		
HB cholesterol	0(0.0)	6(2.1)	6(2.1)		
HBP/Rhino sinusitis	1(0.4)	0(0.0)	1(0.4)		
Diabetes	0(0.0)	4(1.4)	4(1.4)		
HIV	2(0.7)	0(0.0)	2(0.7)		
Time for Taking Dinner					
4-5pm	17(6.0)	28(9.9)	45(15.9)	5.889	0.317
5-6pm	27(9.5)	58(20.5)	85(30.0)		
6-7pm	10(3.5)	39(13.8)	49(17.3)		
7 and above	16(5.7)	35(12.4)	51(18.1)		
No usual time	21(7.4)	32(11.3)	53(18.7)		
Drinks Alcohol					
Yes	13(4.6)	48(17.0)	61(21.6)	4.192	0.041*
No	78(27.6)	144(50.9)	222(78.5)		
Drinking Duration					
Non-drinker	78(27.6)	144(50.9)	222(78.5)	8.731	0.033*
< 1 year	02(0.7)	14(4.9)	16(5.6)		
1-5years	10(3.5)	19(6.7)	29(10.2)		
>5years	10(3.5)	16(5.7)	26(9.2)		
Types of Alcoholic Drink					
Non-drink	78(27.6)	144(50.9)	222(78.5)	8.088	0.044*
Local drink	16(5.7)	9(3.1)	25(8.8)		
Whisky/beer/gin	14(4.9)	8(2.8)	22(7.7)		
Others	06(2.1)	8(2.8)	14(4.9)		
Alcohol Bottles Taken Per Day					
No drink					
1-2 bottles	78(27.6)	144(50.9)	222(78.5)	5.817	0.121
3-4 bottles	6(2.1)	26(9.2)	32(11.3)		
5bottles and above	5(1.8)	20(10.6)	25(8.8)		
	2(0.7)	2(0.7)	4(1.4)		
Smoking of cigarette					
Yes	3(1.1)	4(1.4)	7(2.5)	2.734	0.539
No	88(31.1)	188(66.4	276(97.5)		

*Significant at $p < 0.05$

Anthropometric status of the Respondents

Anthropometric status of the respondents is presented intable 2.The entire study population (3.5%)were underweight, nearly half (47.0%) were within the healthful BMI range while a great proportion of the participants about (37.5%) were found to be overweight while about (12.1%) were however, battling with obesity. Waist- hip ratio has revealed that about (56.8%) of the study population had normal WHR while (43.2%) were found to have a high fat accumulation. Central obesity was higher among female respondents about (29.7%) compare to their males counterpart (1.4%) and it was statistically significant ($p<0.05$), while (31.1%) of the participants had normal waist circumference according to WHO classification. Overweight and obesity using percentage body fat shows a significant difference between male and female participants ($p<0.05$), only 18.7% of the entire participants were fit and had normal body fat.

Blood Pressure Pattern of the Respondents

A total of 49.9% of the respondents had normal systolic blood pressure of which 32.1% of them were female participants. Only 20.1% of study population suffered pre-hypertension. Some of the respondents (30.1%) were hypertensive, of which 23.3% of them were females. There was statistical significance in the systolic blood pressure between the male and female respondents ($p=0.002$). Based on diastolic blood pressure pattern, 40.0% of the respondents had normal blood pressure while 36.6% were hypertensive. No statistical significance was observed between the diastolic blood pressure between the male and female respondents ($p>0.005$) (Table 3).

Anthropometric status of the Respondents

Anthropometrics parameters	Male (n=91) (%)	Female N=192) (%)	Total (n=283) (%)	X^2	P value
Body Mass Index					
<18.5 (underweight)	3(1.1)	7(2.5)	10(3.5)	2.923	0.712
18.5 – 24.9 (Normal)	45(15.9)	88(31.1)	133(47.0)		
25-29.9 (Overweight)	33(11.7)	73(25.8)	106(37.5)		
30-34.9 (Obesity class1)	9(3.2)	15(5.3)	24(8.5)		
35-39.9 (Obesity class 2)	1(0.4)	7(2.5)	8(2.9)		
Waist circumference					
<88cm<102cm(Normal)	87(30.7)	108(38.2)	195(68.9)	44.995	0.000*
>88cm >102cm(Excess)	4(1.4)	84(29.7)	88(31.1)		
Waist-Hip Ratio					
<0.85<0.90(Normal)	74(26.1)	87(30.7)	161(56.8)	315.7	0.000*
≥0.85≥0.90 (Excess)	17(6.0)	105(37.1)	122(43.1)		
%Body fat					
Fitness	28(9.9)	53(18.7)	81(28.6)	8.979	0.012*
Overweight	11(3.9)	54(19.1)	65(23.0)		
Obesity	51(18.0)	86(30.4)	137(48.4)		
Waist-Height Ratio					
<0.5 (Normal)	35(12.4)	64(22.6)	99(35.0)	2.097	0.350
≥0.5 (Excess)	54(19.1)	128(45.2)	184(65.0)		

*Significant at $p < 0.05$)

Table 3: Blood Pressure Pattern of the Respondents

Blood Pressure patterns	Male (n=91)n(%)	Female N=192) n(%)	Total (n=283) n (%)	X^2	P value
SBP					
Optimal	13(4.6)	52(18.4)	65(23.0)	19.45	0.002*
Normal BP	37(13.1)	39 (13.7)	76(26.9)		
Prehypertension	19(6.7)	38(13.4)	57(20.1)		
Grade 1 hypertension	19(6.7)	49(18.4)	68(24.0)		
Grade 2 hypertension	2(1.1)	14(4.9)	16(6.1)		
DBP					
Optimal	18(6.4)	47(16.6)	65(23.0)	6.130	0.105
Normal BP	16(5.7)	32(11.3)	48(17.0)		
Prehypertension	29(10.2)	37(13.1)	66(23.3)		
Grade 1 hypertension	28(9.9)	76(26.9)	104(36.7)		

*Significant at p < 0.05 Key: SBP; Systolic blood pressure DBP; Diastolic blood pressure

Stress Assessment of the Respondents

Table (4) presents the stress scores of the respondents. More than half of the respondents (62.5%) had moderate stress level of which (40.3%) of them were female's participants. Only 30.0% of the participants had low stress level, and mostly seen among the female respondents. The relationship between stress score and systolic blood pressure patterns of the respondents was not significant (P>0.05). Although the table shows that 48.4% of the 62.5% of the respondents who suffered from moderate stress were either having Prehypertension, stage 1 hypertension or stage 2 hypertensions.

Discussions

Nearly two-third of the participants in this study (68%) was female health workers. Only 32% of the study populations were males. This establishes that two-third of the staff in Jos University Teaching Hospital, Jos, Plateau State are females. This is contrary to the observation of

Table 4: Stress levels of the Respondents

Stress Level	Male (n=91) (%)	Female (n=192) (%)	Total (n=283) n (%)	X^2	P value
LSL	22(7.8)	63(22.3)	85(30.0)	2.616	0.270
MSL	63(22.3)	114(40.3)	177(62.5)		
HSL	6(2.1)	15(5.3)	21(7.4)		

*Significant at p < 0.05 Key: LSL; low stress level MSL; moderate stress level; HSL; High stress level

Table 5b: Relationship between Stress Level Score and Systolic Blood Pressure Patterns of the Respondents

Stress level score	Systolic Blood Pressure							
Stress level score	Optimal	Normal	Pre-HNT	HNT grade 1	HNT grade 2	Total (n=283) (%)	X^2	P-value
LSL	23(8.1)	21(7.4)	11(3.9)	24(8.5)	6(2.1)	85(30.0)	12.41	0.134
MSL	40(14.1)	45(15.9)	45(15.9)	37(13.1)	10(3.5)	177(62.5)		
HSL	2(0.7)	6(2.1)	3(1.1)	9(3.1)	1(0.4)	21(7.4)		

*Significant at p < 0.05 Key: LSL; low stress level MSL; moderate stress level; HSL; High stress level.

Egbi et al. (11) in a similar study among health workers in Yenagoa where male health workers (63.6%) constituted higher number of staff population. The reason for having more female participants in this study could be due to enthusiasm shown by the female workers to participate in the study. Chronic diseases are diseases that are persistent or otherwise long-lasting in its effects and their some of them which can be hereditary making which includes heart disease, cancer, strokes, arthritis and metabolic diseases (12).In this present study, more than half of the health workers (56.2%) reported that their parents suffered from chronic diseases higher than the reported figure by Egbi et al. (11) where about 30.3% and 17.3% of their health workers in FMC, Bayelsa State had family history of hypertension and Diabetes mellitus respectively. Although, majority of the study participants (89.7%) did not suffer from chronic disease as at the time the study was conducted. This is also similar to report of Adetunji *et al.* (29) in Ekiti state where it was reported that 92.6% of the health workers were without chronic disease. Only 10.3% of the respondents in this study suffered chronic diseases. This is also closed to 7.4% declared by Adetunji *et al.*(29) among health professionals in Ado-Ekiti.

More than (63.2%) of the respondents in this study ate their dinner between the hours of 4-7pm, this shows that many of the health workers eat their dinner early. This habit can be linked the knowledge acquired by health workers on the negative impact of eating a late dinner. Study have shown that late dinner complicate glucose management and prevent proper night sleep (30). In the other hand, majority (78.4%) of the health workers had not drinks alcohol in the past year and only about 21.6%were drinkers. The lower rate of alcohol use reported among health workers may have resulted from their knowledge of negative consequences of alcohol consumption hence their caution in the use of alcohol.

People who abuses alcohol are prone to occupational and other health problems that make them vulnerable to developing psychological distress (31; 32).Similar study had been reported among health workers in Ekiti State University Teaching Hospital, Ado-Ekiti (29), where it was reported that majority (75.0%) of the health professional in the hospital were abstainers while 25% drinks alcohol. High consumption of alcohol which is associated too weight couple with cigarette smoking has been shown to raise blood pressure (33). Generally, females drink less than men. But, reverse is the case in this study, alcohol use was the prevalent of among female workers. Studies have reported association between gender, chronic illness like hypertension and harmful alcohol use(33).

Abnormal values for Body Mass Index (BMI), Waist Circumference (WC), Waist-Hip Ratio (WHR), Waist-to-height ratio (WHtR) and percentage Body Fat (BF) were 48.9%, 31.1%, 43.1%, 65% and 71.4% respectively. All these measurements confirmed the prevalence of overweight and obesity among the health workers in study location. The highest rates of Overweight/Obesity were observed with BF and WHtR while the lowest was observed with WC method. Difference in the rates of Overweight /Obesity using these methods have been reported (34).

Findings in this study of highest Overweight/Obesity prevalence with BIA and WHtR method seems to contradict reports that have identified WC as a more effective method. Overweight and obesity are the fifth leading risk for global death. At least 2.8million adults died each year as a result of being overweight or obese (35). The prevalence of overweight and obesity (37.5% vs 11.4%) in this study respectively was lower than similar study reported (44.7vs 27.3%) by Sandra et al. (18), in Lagos while in Akwa-Ibom state (62.6%) of the 500 nurses were obese (36).

The prevalence of obesity among these nurses was much higher than the combined overweight and obesity rates (48.9%) reported in this study. In contrast to the findings of this study, most reports from developed countries suggest lower obesity prevalence among health service providers

compared to the general population and other categories of workers (16, 37).The prevalence of central obesity as determined using waist circumference was significantly higher (29.7%) among the female health workers than their male counterparts. This shows that the female health workers in the study location are more at risk of metabolic syndrome than the male health workers ($p<0.05$). Excess abdominal fat is an independent risk factor for non-communicable disease (NCDs). It has been reported that women who have waist circumference >88cm are at higher risk of developing hypertension, diabetes, elevated cholesterol levels and cardiovascular diseases (1, 35).

The high rates of obesity in the health workforce (which is still grossly inadequate)in developing countries like Nigeria, will translate to reduced productivity, contributed to absenteeism and work related injuries and long term retention of health workers as obesity has been shown to be a factor in early retirement (38). Using the systolic blood pressure measurement, the numbers of the respondents who are hypertensive (30.1%) in the study population is considerably high (23.3% females and 7.8% males). Based on diastolic blood pressure, 36.7% were hypertensive (26.9% females; 9.9% males). It becomes evident that hypertension is more among the female health workers than the male respondents. The prevalence of high blood pressure is in this study was higher than what was observed among secretariat staff (27.8%) and tertiary hospital workers 23.3% in Yenagoa (11), but lower than32.0% reported among civil servants and 30.0% among professionals including engineers, lawyers and accountants in Port Harcourt(39). Control of hypertension would have been expected to be high among the health workers who have easy access to health information as well as prevention procedures, early disease diagnosis and treatment of HTN but the case is different among the study population. Stress has been defined as the perception of environmental demands that are believed to exceed one's resources for adapting to the situation (12).Findings from this study reveal that 70% of the workers were either highly/moderately stressed at the time of data collection. This was in line with the study conducted in Miami among Residents doctors which shows that (87%) of the participants were either averagely stressed or severely stressed (40). High demand of work, shortage of staff, lack of knowledge and lack of co-operation among health professions couple with patient's agitation for quick response from health care providers could have been responsible for stress observed among the respondents in this study.

Conclusion

This study observed prevalence of hypertension, Overweight, central obesity moderate chronic stress level patterns among the health workers in Teaching Hospital, Jos. Despite the relatively easy access to health care and assumption that the health workers should be aware of what it takes to stay healthy, obesity and hypertension control was very poor. The study shows that the female health workers are more hypertensive than their male counterparts. Many of the workers were physical inactive. There was inadequate intake of fruits among the health workers suggesting that many of the health workers are suffering from micronutrient deficiency which is associated with various chronic diseases.

Acknowledgment

Sincere appreciation goes to the staff of Jos University Teaching Hospital, Plateau State, Nigeria who gave their consents to participate in the study.

Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the design, data collection, writing and funding of this research.

References

1. Adeloye D, Basquill C, Aderemi A.V, Thompson J.Y, Obi F.A (2015). An estimate of the prevalence of hypertension in Nigeria: A systematic review and meta-analysis. *Journal of Hypertension*. 33(2)230-242
2. Beaglehole R, Bonita R, Alleyne G, Horton R, Li L, and Lincoln P (2011). UN high-level meeting on non-communicable

diseases: addressing four questions. *Lancet* 378:449–455

3. World Health Organization(2011). Waist Circumference and Waist - Hip Ratio: Report of a WHO Expert Consultation, World Health Organization; 2011. P. 1-39
4. World Health Organization WHO (2015). Why is hypertension an important issue in low and middle- income countries? Report of a WHO Expert Consultation on hypertension. Pp, 1-3
5. Ataklte F, Erqou S, Kaptoge S, Taye B, Echouffo-Tcheugui J.B, Kengne A.P (2015). Burden of Undiagnosed Hypertension in Sub-Saharan Africa. A Systematic Review and Meta-Analysis. *Journal of Hypertension* 65:291-298
6. Damasceno A, Azevedo A, Silva-Matos C, Prista A, Diogo D and Lunet N (2009). Hypertension prevalence, awareness, treatment, and control in mozambique: urban/rural gap during epidemiological transition. *Journal of Hypertension* 54:77-83.
7. Ekwunife O.I, Aguwa C.N (2011). A meta-analysis of prevalence rate of hypertension in Nigerian populations. Journal Public Health Epidemiology. 3:604-607.
8. World Health Organization (2008). Waist Circumference and Waist - Hip Ratio: Report of a WHO Expert Consultation, Geneva, 8-11 December, 2008. Geneva:
9. Centre for Disease Prevention and Control (2013).The fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents. U.S.
10. Oladapo O.O, Salako L, Sodiq O, Shoyinka K, Adedapo K, Falase A.O (2010). A prevalence of cardio metabolic risk factors among a rural Yoruba south-western Nigerian population: a population-based survey. *Cardiovascular Journal of Africa*. 21(1):26-31.
11. Egbi O.G, Rotifa S, Jumbo J (2015). Obesity among workers of a tertiary hospital in Nigeria: Prevalence and associated factors. *Highland Medical Research Journal*.15:8-13
12. Centre for disease prevention and control (CDC) (2016). Chronic disease overview. http://www.cdc.gov/chronic disease/overview/index.htm
13. Cohen S, Janicki-Deverts D, Miller G.E (2007). Psychological stress and disease.*Journal of America Medical Association*. 298:1685–1687.
14. Castro J.P, El-Atat F.A, MacFarlane S.I (2003). Cardio metabolic syndrome: pathophysiology and treatment. *Current Hypertension Reproduction*. 5:393-401
15. Van Snijder M.B, Dam R.M, Visser M, Seidell J.C (2006). What aspects of body fat are particularly hazardous and how do we measure them? International*Journal of Epidemiology*. 35:83–92.
16. Adedoyin, R. Awotidebe, T.O, Borode, A. Ativie, R., A. Akindele, M, Adeyeye, V. and E. Johnson, O. (2016). Comparison of Blood Pressure Patterns of Teaching and Non-Teaching Staff of a Nigerian University. *International Journal of Clinical Medicine*, 7:454-460.
17. Frank E, Segura C (2009). Health practices of Canadian physicians. *Canadian Family Physician*. 55(8):810-1 e7
18. Hicks M, McDermott L.L, Rouhana N, Schmidt M, Seymour MW, and Sullivan T (2008). Nurses' body size and public confidence in ability to provide health education. *Journal of Nursing Scholarship*.40:349-54
19. Sandra, O.I, Olayinka, O.A, Foluke A.O, Michael A.O, Ukandu O.I, Anas AS, Olufemi A.F (2015). Obesity among health service providers in Nigeria: danger to long term health worker retention? *The Pan African Medical Journal*. 22 (1).

Schultz and Schultz, D (2010).Psychology and work today. New York: Prentice Hall. p. 374.

21. Samuel N Nwabara (1991). The Fulani conquest and the rule of the Hausa kingdom of Northern Nigeria (1804–1900)
22. National population commission (2006). National population census, Lagos, Nigeria

23. Araoye MO. Sampling Techniques (2008). Research Methodology with Statistics. Ilorin, Nigeria: University Press; Pp.

68-91.
24. World Health Organization (2004). .Global Strategy on Diet, Physical Activity and Health. Geneva; World Health Organization; Pp. 1-18
25. Chukwunonso E.C.C Ejike and Ifeoma I.I (2012) Obesity in young-adult Nigerians: variations in prevalence determined by anthropometry and bioelectrical impedance analysis, and the development of % body fat prediction equations. *International Archives of Medicine*5:22-27
26. WHO (2017). WHO technical specifications for automated non- invasive blood pressure measuring device with cuff. WHO medical device technical series. Pp 1.72
27. Zhu S, Wang Z, Shen W, Heymsfield SB, Heshka S (2003). Percentage body fat ranges associated with metabolic syndrome risk: results based on the third National Health and Nutrition Examination Survey (1988-1994). *American Journal of Clinical Nutrition 78(2): 228-235.*
28. International Stress Management Association UK (2013).Monmouth shire. NP26 9AP Telephone: 0845 6807083 E-mail: stress@isma.org.uk Web: www.isma.org.ukRegistered Charity No. 1088103 Company Limited by Guarantee No. 407965
29. Adetunji O, Lateef O.O, Mobolaji U.D, and Michael A.O (2018) Alcohol use and psychological wellbeing of health workers in a Nigerian Hospital: An exploratory study. Malawi medical journal 30(1): 31–36.
30. Bolajoko O.O, Olanrewaju O.I, Akingboye O.O (2018). Evaluation of Dietary Adherence and Body mass index of Diabetes Patient Attending Medical Outpatient Clinic of Federal Medical Centre, Idi Aba, Abeokuta, Ogun State Nigerian.*Nigeria Journal of Nutritional Sciences.* 39(1) 59-67.
31. Rosta J, Gerber A. (2009). Excessive working hours and health complaints among hospital physicians: a study based on a national sample of hospital physicians in Germany. *Germany Medical Sciences*. 29; 5 - 9
32. Lucas N, Windsor T.D, Caldwell T.M, Rodgers B (2010). Psychological distress in non-drinkers: Associations with previous heavy drinking and current social relationships. *Alcohol*.45:95–102
33. Husain K, Ansari RA, Ferder L (2014). Alcohol Induced Hypertention; Mechanism and Prevention. *World Journal of Cardiology*. 6(5):245–252.
34. Romero-Corral A, Somers V.K, Sierra-Johnson J, Thomas R.J, Collazo-Clavell M.L, Korinek J, Allison T.G, Batsis J.A, Sert-Kunyoshi F.H, Lopez-Jimenez F (2008). Accuracy of body mass index in diagnosing obesity in the adult general population. *London Journal of Obesity* (32:959–966
35. World Health Organization (2013). A global brief on hypertension: silent killer, global public health crises (World Health Day 2013). Geneva: WHO; 2013; Available: http://apps.who.int/iris/bitstream/10665/79059/1/WHO_DCO_WHD_2013.2_eng.pdf Accessed 2015 Feb 11.
36. Ogunjimi L, Ikorok M.M, Olayinka Y. (2010). Prevalence of obesity among Nigerian nurses: The Akwa Ibom State experience. *International NGO Journal*. 5(2):45-9.
37. Suija K, Pechter U, Maaroos J, Kalda R, Ratsep A, Oona M (2010). Physical activity of Estonian family doctors and their counselling for a healthy lifestyle: a cross-sectional study. *BMC Family Practice*.11:48-54
38. Houston D.K, Cai J, Stevens J (2009). Overweight and Obesity in young and middle age and early retirement: The ARIC study. *Obesity* 17(1):143-9.
39. Onwuchekwa A.C, Mezie-Okoye M.M, Babatunde S (2012). Prevalence of hypertension in Kegbara-Dere, a rural community in the Niger Delta region, Nigeria. *Ethn Diseases* 22:340-6.
40. Ankeet A. Choxi, M.D, MeredithDegnan, M.D, Keith A. C, YilliamFYilliam F. AND Rodriguez-Blanco, M.D (2017). Patterns of Blood Pressure and Stress: A Descriptive Report among Anesthesiology Residents Institution. Journal of Educational Perioperative Medical. 19(2): E601