ASSESSMENT OF BLOOD PRESSURE PATTERNS AND ASSOCIATED FACTORS AMONG NON-ACADEMIC STAFF OF UNIVERSITY OF PORT HARCOURT, NIGERIA

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ABSTRACT

INTRODUCTION: *Blood pressure is affected by a number of factors and thus varies from person to person. These factors can be classified onto modifiable and non-modifiable factors. This study was aimed at assessing the blood pressure patterns and associated factors among non-academic staff of the University of Port Harcourt.*

METHOD: *This descriptive cross-sectional study sample 259 eligible consenting respondents answer to structured, interviewer administered, close ended questionnaires. Data were then analysed using the Statistical Package for Social Sciences (SPSS) Version 20 and presented in tables.*

RESULTS: *The study determined that 83.78% of respondents had elevated blood pressure which was higher among male respondents. It also showed that factors like smoking, alcohol, family history. Age and obesity were statistically significant as risk factor for high blood pressure.*

CONCLUSION: *There was a high prevalence of elevated blood pressure among this group of workers occasioned by risk factors like such as family history, tobacco and alcohol consumption. So programmes (such as health education and lifestyle modification) which will address these risks factors and control high blood pressure are recommended.*

Keywords: *Blood pressure, non-academic, risk factors*

INTRODUCTION

Blood pressure is defined as the pressure of blood against the walls of the main arteries.[1-4] It is measured routinely at every outpatient visit, ward rounds of inpatients and before most medical procedures. It also has use as a screening tool for estimating suitability for participation in most sporting activities, screening for cardiovascular risk, hypertension and fitness for an occupation which has particular significance to this study.[6] Pressure is highest during systole and lowest in diastole. Muscular exertion and emotional factors such as fear, stress and excitement all raise blood pressure.[5] Although substantial improvement has been made to increase the awareness and treatment of hypertension, its management is the still not optimal even in the developed countries. A National Health Examination Survey (NHANES) spanning 2005-2006 published in 2012 showed that 29% of US adults were hypertensive, 78% of these were aware they had hypertension, 68% were being treated with antihypertensive medications but only 64% had controlled blood pressure levels.[7]

Hypertension is a common and major global public health problem. The prevalence is as high as 44% in Western Europe and 28% in North America.[8] According to Kearney et al in 2005, by 2025 about 75% of the world's hypertensive population will be in developing countries.[9] In Geneva in 2010, the WHO estimated the prevalence of hypertension in Africa at 46% as at 2008.[10] Adeloye in 2014, due to lack of data on the exact burden of hypertension in Africa, did a systemic analysis and pooled burden in Africa was at 30.8% in 2010 with prevalence of 27.8% in sub-Saharan Africa.[11] A review published in 2015 showed that hypertension prevalence varies between 15% and 70% with an average of 30% amongst countries of sub-Saharan Africa.

Furthermore between 44% and 93% of people with this illness are unaware.[12]

In Nigeria, it is the number one risk factor for stroke, heart failure, ischemic heart disease and kidney failure. Ogah S.O et al in 2012 put its overall prevalence between 8% to 46.4% depending on the study target population.[13] Adeloye D et al in 2015 estimated an overall hypertension prevalence of 28.9% in Nigeria with a prevalence of 29.5% among men and 25% among women, with 30.6% and 26.4% in urban and rural dwellers respectively.[14] This transition has been attributed to wholesale adoption of western lifestyle.[15] In Port-Harcourt Ordinioha et al revealed prevalence of 21.3% among lecturers of the University of Port-Harcourt.[16] Another study done in Benue State University on hypertension prevalence in staff and students had an overall prevalence of 15.7%.[17]. Associated factors of hypertension include increasing age[18],obesity[19], sedentary life[20], family history of hypertension[21], diet[22], alcohol[23] and tobacco use.[24] The high incidence and prevalence of blood pressure related morbidity and mortality makes the study of extreme relevance with emphasis on the non-academic staff which seem to be at greater risk with more associated risk factors and lower awareness. This study was to provide valuable information on the blood pressure levels and associated factors of the non-teaching staff - extrapolated to obtain risk for developing other related non-communicable diseases. This can even be used to procure better health schemes for the study population and formulation of policies that will promote the health of the invaluable non-teaching staff of the university.[25-30]

Risk factors for high blood pressure may be modifiable and non-modifiable factors (most cases of hypertension are idiopathic) [31-33] .The non-modifiable being age, genetics, family history of high blood pressure, race. Modifiable factors include: smoking, exercise, body weight, level of physical activity, diet, alcohol consumption, stress, chronic kidney disease, endocrine disorders like adrenal and thyroid diseases.[34-38]

Indications for blood pressure measurement may include but not limited to screening in apparently healthy persons and monitoring of patients previously diagnosed persons, fitness to work, suitability for persons to participate in sports or even undergo surgery[38-40].

A clinical study on Pattern of Blood Pressure indices among the residents of a rural community in South East Nigeria[41] revealed that the prevalence of hypertension is becoming alarmingly high compared to the values gotten years ago. The study involved a total of 858 individuals; 247 (28.8%) males and 611 (71.2%) females. The result obtained was 398 (46.4%) subjects have hypertension.

A cross-sectional survey carried out by Friday S. Wokoma and Datonye D. Alasia on Blood Pressure Pattern in Barako: A rural community in Rivers State, Nigeria" showed that the prevalence of hypertension was 27.9% and pre-hypertension was 34.2%.[42]

A survey carried out by David Guwatudde et al. Burden of Hypertension in Sub-Saharan Africa: A four country cross-sectional study revealed that of 1,269 participants, 468(36.9%) were classified as being hypertensive and 378 participants (29.8%) were classified as pre-hypertensive.[43] Results from a study on Pattern of Blood Pressure in Australian Adults at a National Blood Pressure Screening day of 13825 adults revealed that 34% had elevated blood pressure with 10% were being treated for hypertension while 44% were normotensive.[44]

A descriptive cross-sectional study carried out by B. Ordinioha on the Prevalence of Hypertension and its Modifiable risk factors among lecturers of a Medical School in Port Harcourt, South-South Nigeria: Implications for control effort revealed that the prevalence of hypertension was 21.33%; 75% of which were already aware of their status and were on appropriate therapy. The study comprised of a total of 75 lecturers. Factors that may have been associated with the result included: males (65.33%), married (88.33%), average age of 46.09 +/- 9.62, current smokers (2.67%), high body mass index, social drinkers of less than 3 standard units of alcohol in a day.[45]

A similar study on the Prevalence of Hypertension and its Correlations among employees of a tertiary hospital in Yenagoa, Nigeria revealed that age, marital status, educational level and body mass index have a significant association with blood pressure. It was a cross-sectional study carried out

on 231 participants where data was obtained via an interviewer-administered questionnaire. Blood pressure and anthropometry were measured following standard protocols. Result showed that there were crude and age-adjusted prevalence of hypertension of 21.3% and 23.8% respectively.[46]

A cross-sectional study on Adolescent Blood Pressure Pattern in Rivers State, Nigeria: A Rural-Urban Comparison on adolescents aged 10-18 years from 26 secondary schools showed that blood pressure increased with age in subjects from both areas and the mean systolic pressure was higher in rural subjects than urban subjects; the reverse was the case for diastolic blood pressure. It was also noted that there is a positive correlation between body mass index and blood pressure[47.] This study was to assess the blood pressure pattern and associated factors among non-academic staff of University of Port-Harcourt.

MATERIALS AND METHODS

Study area: This study was conducted in the University of Port Harcourt, a federal University in Nigeria established in 1975. The University campus operates three sites known as "Parks" namely Choba Park, Delta Park and the University Park, the permanent site nicknamed "Abuja". The University of Port Harcourt has a total staff strength of 4,732 (academic and non-academic), number of non-academic staff is 3,186 (Junior Staff 1,402 and Senior Staff 1,784).[59].

Study population: The study population comprises all the 3,186 pensionable non-academic staff of the University that cut across the different departments i.e. Registry – 2,515, Bursary – 195, Health services –79, Works and services – 201, Library – 106, Fire service – 32, Permanent security staff – 12, Legal unit – 10, ICT Centre – 36.

Study design & Sampling: This was a descriptive cross-sectional study where 258 consenting respondents were selected by multi-stage (first, the various departments were allotted as strata then were proportionately balloted by putting all respondents sheets in a bag and randomly pick participants).

Data collection: This was done using two trained assistants; a pre-tested structured self-administered questionnaire was used to obtain data on socio-demographics, awareness, medical & family history and possible risk factors. Also, anthropometric measurements of height, weight, abdominal girth, waist and hip circumferences and Body Mass Index (BMI) were determined. A flexible measuring tape was used for the abdominal girths, waist and hip circumferences. Height was measured using a stadiometer while weight was determined using a standard bathroom scale. Before the commencement of data collection each day, the bathroom scale was calibrated to ensure that it functioned properly and accurately.

Data analysis: The data was processed with the aid of Microsoft Excel package and analysed using the Statistical Package for Social Sciences (SPSS) Version 20. The results obtained were summarised and presented in tables.

Ethical considerations: Approval for study was obtained from the University of Port Harcourt Teaching Hospital Ethics Committee. In addition just as initialled informed consent was obtained from each respondent. Respondents were assured that confidentiality of responses would be maintained during and after the study.

RESULTS

A total of 259 questionnaires were administered to non-academic staff in the University of Port Harcourt**,** all were retrieved (100%).

TABLE 1: ANTHROPOMETRIC RESULTS OF RESPONDENTS

BMI RANGE (kg/m^2)	FREQUENCY	PERCENTAGE
Desirable (18.5-24.9)	64	24.71
Overweight (25-29.9)	106	40.93
obese (>30)	89	34.36
TOTAL	259	100%
WAIST-HIP RATIO RANGE	**FREQUENCY**	**PERCENTAGE**
Excellent	10	3.9
Good	59	22
Average	102	39
At Risk	88	34
TOTAL	259	100

Table 1 shows that 40.93% of the respondents were overweight while 34.36% were obese. Similarly 34% of them were "At Risk" class with only 3.2% at excellent class from their Waist/Hip ratio.

TABLE 2: BLOOD PRESSURE PATTERNS OF RESPONDENTS

PATTERN	SYSTOLIC BP (mmHg)	DIASTOLE BP (mmHg)	FREQUENCY	PERCENTAGE
Desired	90-120	60-79	42	16.22
Pre-hypertension	120-139	80-89	109	42.08
Stage 1 hypertension	140-159	90-99	75	28.96
Stage 2 hypertension	160-179	100-109	24	9.27
Hypertensive emergency	≥180	≥ 110	9	3.47
Total			259	100%

From Table 2, it was observed that about 16% of the staff had a desired blood pressure whereas the level of pre-hypertension was highest in the study.

Table 3: MEAN BLOOD PRESSURE AND SOCIO-DEMOGRAPHIC VARIABLES OF RESPONDENTS

VARIABLE	Mean systolic BP (mmHg)	Mean diastolic BP (mmHg)
Age range		
20-29 years	128.57±10.99	85.36±10.46
30-39 years	127.94±14.36	83.19±10.01
40-49 years	129.73±12.51	83.62±10.68
50-59 years	127.82±16.85	82.35±11.26
≥60 years	128.12±14.39	82.64±12.88
Sex		
Male	129.99±15.36	83.62±11.49
Female	127.10±13.21	82.75±10.14
Tribe		
Igbo	127.50±10.26	80.00±11.28
Ijaw	126.61±12.47	82.26±9.24
Ikwerre	129.79±15.46	84.92±11.82
Ogoni	128.82±16.91	83.62±10.91
Ekpeye	131.79±13.95	83.57±10.91
Ogba	130.45±16.80	85.45±12.93
Others	124.20±11.64	80.00±7.07
MARITAL STATUS		
Single	131.50±13.60	85.75±10.44
Married	128.24±14.52	82.68±10.64
Divorced	122.00±10.95	80.00±10.00
Separated	120.00±12.25	82.00±10.95
Widow	126.31±14.65	82.31±14.23
NUMBER OF CHILDREN		
None	128.02±15.12	84.88±9.91
1-2	131.34±15.25	84.57±11.09
3-4	127.59±14.23	82.59±11.00
5-6	127.55±13.57	82.17±11.21
≥7	127.10±13.33	80.48±10.23
FAMILY SIZE		
1-3	130.52±14.86	85.58±9.79
4-6	128.28±15.50	83.27±10.52
7-10	126.77±12.77	82.01±10.97
≥11	132.15±13.58	82.30±13.24

From Table 3, males had a higher mean systolic and diastolic blood pressure than females. Single respondents had the highest mean systolic and diastolic blood pressures followed by the married and widows the least were those separated. Respondents with 1-2 children and families with 11 and more members had the highest mean systolic and diastolic blood pressures relative to others.

Table 4: MEAN BLOOD PRESSURE AND SOCIO-DEMOGRAPHIC VARIABLES OF RESPONDENTS CONTINUED

VARIABLE	Mean systolic BP (mmHg)	Mean diastolic BP (mmHg)
CONTISS(Consolidated tertiary institution salary scale)		
Grade 1-6	125.66±13.75	81.77±9.62
Grade 7-10	130.24±14.88	82.89±10.58
Grade 11-13	130.31±13.56	86.37±12.66
Grade 14-15	126.00±16.25	82.50±12.58
PLACE OF RESIDENCE		
Low density area	130.89±18.84	84.81±13.41
Medium density area	128.31±13.74	82.86±10.54
High density area	126.36±13.72	84.64±9.30
TYPE OF HOUSE		
Tenement room	122.72±11.60	81.33±9.10
Self-contain	130.75±18.460	84.79±11.07
1 bedroom flat	128.54±13.03	81.67±9.30
2 bedroom flat	127.50±12.48	83.69±9.62
3-4 bedroom flat	129.81±13.76	83.64±13.03
Duplex	125.11±14.64	77.78±12.02

Table 4 revealed that mean systolic and diastolic blood pressure increased with increase in salary scale from 1-13. It also showed that low density residents had the highest blood pressure while the lowest was among those residing in high density areas.

TABLE 5: MEAN BLOOD PRESSURE AND RISK FACTORS OF HYPERTENSION OF RESPONDENTS

Variable	Mean systolic BP (mmHg)	Mean diastolic BP (mmHg)
FAMILY HISTORY OF HYPERTENSION		
Yes	128.62±12.66	83.16±10.18
No	128.42±14.89	83.16±11.02
TOBACCO CONSUMPTION		
Yes	131.25±16.80	90.00±10.445
No	128.34±14.21	82.83±10.71
ALCOHOL CONSUMPTION		
Yes	130.53±14.67	84.32±10.70
No	127.56±14.15	82.64±10.86
EXERCISE		
Yes	129.89±15.55	83.99±11.40
No	126.17±11.72	81.80±9.63
BMI STATUS		
Normal	129.11±13.03	83.14±10.41
Overweight	129.55±16.41	83.11±11.68
Obese	126.73±12.37	83.24±10.03
WAIST/HIP RATIO		
Excellent	126.50±10.01	82±6.33
Good	126.86±13.86	81.20±11.06
Average	128.30±13.16	83.63±9.99
At risk	129.97±16.24	84.07±11.82

Table 5 shows that tobacco and alcohol consumers have higher mean systolic and diastolic blood pressure than non-consumers. It also showed that the least mean blood pressures increased with increasing waist/hip ratio. The least mean blood pressures were among those classified as Excellent and the highest were those in the At Risk class.

Table 6:ASSOCIATION BETWEEN SOCIODEMOGRAPHIC VARIABLES AND BLOOD PRESSURE PATTERN OF ALL RESPONDENTS

Socio-demographic factors		Blood Pressure status					Chi-square Test Result
		Normal	Pre-Hypertension	Stage1 HTN	Stage2 HTN	Hypertensive Emergency	
Sex	Male (151)	18(6.9%)	52(20.1%)	35 (13.5%)	12 (4.6%)	6 (2.3%)	X^2=1.772
	Female (108)	24 (9.3%)	57 (22.0%)	40 (15.4%)	12 (4.6%)	3 (1.2%)	p- value = 0.778
							df = 4
Age	20-29yrs (14)	1 (0.4%)	5 (1.9%)	5 (1.9%)	3(1.2%)	0 (0.0%)	
	30-39yrs(80)	13 (5.0%)	34 (13.1%)	24 (9.3%)	7 (2.7%)	2 (0.8%)	X^2= 11.639
	40-49yrs(74)	8 (3.1%)	33 (12.7%)	25 (9.7%)	5 (1.9%)	3 (1.2%)	
	50-59yrs(66)	15 (5.8%)	26 (10.0%)	16 (6.2%)	7 (2.7%)	2 (0.8%)	p-value = 0.768
	≥60yrs(25)	5 (1.9%)	11 (4.2%)	5 (1.9%)	2 (0.8%)	2 (0.8%)	df=16
Tribe*	Igbo(34)	2 (0.8%)	22 (8.5%)	6 (2.3%)	3 (1.2%)	1 (0.4%)	X^2= 37.246
	Ijaw (38)	8 (3.1%)	16 (6.2%)	11 (4.2%)	3 (1.2%)	0 (0.0%)	
	Ikwerre(98)	14 (13.5%)	35 (13.5%)	33 (12.7%)	10 (3.9%)	6 (2.3%)	p-value= **0.041***
	Ogoni(39)	8 (3.1%)	12 (4.6%)	15 (5.8%)	2 (0.8%)	2 (0.8%)	df = 24
	Ekpeye(14)	1 (0.4%)	8 (3.1%)	3 (1.2%)	2 (0.8%)	0 (0.0%)	
	Ogba(11)	3 (1.2%)	3 (1.2%)	1 (0.4%)	4 (1.5%)	0 (0.0%)	
	Others(25)	6 (2.3%)	13 (5.0%)	6 (2.3%)	0 (0.0%)	0 (0.0%)	
Marital status	Single (48)	6 (2.3%)	16 (6.2%)	17 (6.6%)	8 (3.1%)	1 (0.4%)	X^2= 22.048
	Married(188)	30 (11.6%)	84 (32.4%)	52 (20.1%)	16 (6.2%)	6 (2.3%)	
	Divorced(5)	1 (0.4%)	2 (0.8%)	2 (0.8%)	0 (0.0%)	0 (0.0%)	p-value = 0.142
	Separated(5)	2 (0.8%)	0 (0.0%)	3 (1.2%)	0 (0.0%)	0 (0.0%)	df = 16
	Widow(13)	3 (1.2%)	7 (2.7%)	1 (0.4%)	0 (0.0%)	2 (0.8%)	

Table 6 shows that age, sex and marital status have no statistically significant relationship with blood pressure among all the respondents while tribe has (p-value 0.041).

Table 7: ASSOCIATION BETWEEN SOCIODEMOGRAPHIC VARIABLES AND BLOOD PRESSURE PATTERN OF ALL RESPONDENTS

Socio-demographic factors		Blood Pressure status					X^2 test
		Normal	**Pre-Hypertension**	**Stage1 HTN**	**Stage2 HTN**	**Hypertensive Emergency**	
Number of Children	None (43)	9 (3.5%)	14 (5.5%)	13 (5.1%)	6 (2.4%)	1 (0.4%)	X^2= 15.485
	1-2(56)	2 (0.8%)	28 (11.0%)	18 (7.1%)	5 (2.0%)	3 (1.2%)	
	3-4(76)	16 (6.3%)	30 (11.8%)	20 (7.9%)	8 (3.1%)	2 (0.8%)	p-value = 0.489
	5-6(58)	9 (3.5%)	28 (11.0%)	14 (5.5%)	5 (2.0%)	2 (0.8%)	df = 16
	≥7(21)	5 (2.0%)	8 (3.1%)	7 (2.8%)	0 (0.0%)	1 (0.4%)	
Family size	1-3 (52)	8 (3.2%)	17 (6.7%)	18 (7.1%)	7 (2.8%)	2 (0.8%)	X^2= 9.186
	4-6 (96)	18 (7.1%)	40 (15.9%)	26 (10.3%)	9(3.6%)	3 (1.2%)	p-value = 0.687
	7-10(84)	13 (5.2%)	38 (15.1%)	26 (10.3%)	4 (1.6%)	3 (1.2%)	
	≥11(20)	1 (0.4%)	11 (4.4%)	4 (1.6%)	3 (1.2%)	1 (0.4%)	df = 12
CONTISS*	Grade 1-6 (97)	24 (9.3%)	43 (16.6%)	20 (7.7%)	7 (2.7%)	3 (1.2%)	X^2= 24.608
	Grade 7 - 10(106)	11 (4.2%)	45 (17.4%)	41 (15.8%)	7 (2.7%)	2 (0.8%)	p-value = **0.017****
	Grade 11 -13 (52)	6 (2.3%)	19 (7.3%)	14 (5.4%)	9 (3.5%)	4 (1.5%)	df =12
	Grade 14-15 (4)	1 (0.4%)	2 (0.8%)	0 (0.0%)	1 (0.4%)	0 (0.0%)	
Place of Residence	Low Density Area (27)	6 (2.3%)	7 (2.7%)	8 (3.1%)	5 (1.9%)	1 (0.4%)	X^2= 6.460
	Medium density area (218)	34 (13.1%)	96 (37.1%)	63 (24.3%)	17 (6.6%)	8 (3.1%)	p-value = 0.596
	High Density area (14)	2 (0.8%)	6 (2.3%)	4 (1.5%)	2 (0.8%)	0 (0.0%)	df =8
Type of accommodation	Tenement(18)	5 (1.9%)	9 (3.5%)	2 (0.8%)	2 (0.8%)	0 (0.0%)	X^2= 15.413
	Self-contain(53)	10 (3.9%)	20 (7.7%)	15 (5.8%)	5 (1.9%)	3 (1.2%)	
	1 bedroom flat(48)	7 (2.7%)	22 (8.5%)	16 (6.2%)	2 (0.8%)	1 (0.4%)	p-value = 0.752
	2 bedroom flat(72)	10 (3.9%)	30 (11.6%)	24 (9.3%)	7 (2.7%)	1 (0.4%)	df = 20
	3-4 bedroom flat(59)	7 (2.7%)	24 (9.3%)	17 (6.6%)	7 (2.7%)	4 (1.5%)	
	Duplex(9)	3 (1.2%)	4 (1.5%)	1 (0.4%)	1 (0.4%)	0 (0.0%)	

Table 7 shows that the number of children and family size, place of residence and type of accommodation of the respondents have no statistically significant relationship with blood pressure while salary grade level has (p-value 0.017).

TABLE 8: ASSOCIATION BETWEEN AWARENESS AND FAMILY HISTORY OF HYPERTENSION AND BLOOD PRESSURE PATTERN OF ALL RESPONDENTS

Variable		Normal	Pre-Hypertension	Stage1 HTN	Stage2 HTN	Hypertensive Emergency	X^2
Awareness	Yes(196)	28 (10.8%)	87 (33.6%)	54 (20.8%)	21 (8.1%)	6 (2.3%)	X^2= 5.637 p- 0.228 df = 4
	No(63)	14 (5.4%)	22 (8.5%)	21 (8.1%)	3 (1.2%)	3 (1.2%)	
Family History of HTN	Yes(68)	10 (3.9%)	29 (11.2%)	20 (7.7%)	9 (3.5%)	0(0.0%)	X^2= 4.915 p-0.296 df =4
	No(191)	32 (12.4%)	80 (30.9%)	55 (21.2%)	15 (5.8%)	9 (3.5%)	

Table 8 shows that there is no statistically significant relationship between awareness of hypertension, family history of hypertension and the blood pressure pattern of all respondents.

Table 9: ASSOCIATION BETWEEN RISK FACTORS AND BLOOD PRESSURE PATTERN OF ALL RESPONDENTS

Variable		Blood pressure status					Chi-square test result
		Normal	Pre-Hypertension	Stage1	Stage2	Hypertensive Emergency	
Tobacco use	Yes (12)	2 (0.8%)	1 (0.4%)	6 (2.3%)	2 (0.8%)	1 (0.4%)	X^2 = 6.930
	No (247)	40 (15.4%)	108 (41.7%)	69 (26.6%)	22 (8.5%)	8 (3.1%)	p- 0.140 df=4
Alcohol	Yes (78)	14 (5.4%)	23 (8.9%)	30 (11.7%)	8 (3.1%)	3 (1.2%)	X^2 = 8.139
	No (179)	28 (10.9%)	85 (33.1%)	44 (17.1%)	16 (6.2%)	6 (2.3%)	p- 0.087 df =4
Exercise	Yes(162)	29 (11.2%)	60 (23.3%)	48 (18.6%)	18 (7.0%)	7 (2.7%)	X^2 = 5.567
	No (96)	13 (5.0%)	48 (18.6%)	27 (10.5%)	6 (2.3%)	2 (0.8%)	p- 0.234 df = 4
BMI status	Normal (64)	9 (3.5%)	25 (9.7%)	23 (8.9%)	6 (2.3%)	1 (0.4%)	X^2 = 6.447
	Overweight (106)	20 (7.7%)	42(16.2%)	27 (10.4%)	13 (5.0%)	4 (1.5%)	p- 0.597 df = 8
	Obese (89)	13 (5.0%)	42 (16.2%)	25 (9.7%)	5 (1.9%)	4 (1.5%)	
Waist/ hip ratio	Excellent	1(2.4%)	6(5.5%)	3(4.0%)	0(0.0%)	00.0%	X^2 = 10.425
	Good	13 (31%)	22(20.2%)	17(22.7%)	7 (29.2%	0(0.0%)	P- 0.579
	Average	13(31%)	49(45.0%)	28(37.3%)	8(33.3%	4(44.4%)	df = 12
	At Risk	15 (35.7%)	32(29.4%)	27(36.0%)	9(37.5%	5(55.5%)	

Table 9 shows no statistically significant association between hypertension and smoking (p-value = 0.14). There was also no significant association between hypertension and alcohol consumption (p-value = 0.09). This study did not show an association between exercise and body mass index with the stages of hypertension.

DISCUSSION

The findings from the study showed that a large proportion of the respondents (42.08%) were classified as Pre-hypertensive and 41.7% had blood pressure patterns that was classified as Hypertension, of which 28.96% was classified as Stage 1 Hypertension, 9.27% classified as Stage 2 Hypertension and 3.47% Hypertensive Emergency. A lower percentage of the respondents (16.22%) had desired blood pressure. This showed that majority of the respondents have a blood pressure pattern that was classified as high blood pressure. This correlates with the findings of Friday S.Wokoma and Datonye D. Alasia[42] where majority of respondents (62.1%) had high blood pressure.

Also, males had higher mean systolic blood pressure of 129.99±15.36 mmHg and mean diastolic blood pressure of 83.62±11.49mmHg than females who had a mean systolic blood pressure of 127.10±13.21mmHg and mean diastolic blood pressure of 82.75±10.14mmHg. This correlates with the findings of Jervase E, D Barnabas et al.[48] The study showed as well that singles had a higher mean systolic and mean diastolic blood pressure of 131.50±13.60mmHg and 85.75±10.44mmHg respectively when compared to their married counterparts who had a lower mean systolic and mean diastolic blood pressure of 128.24±14.52 mmHg and 82.68±10.64 mmHg respectively - which is in correlation with the findings of Holt-L Unstad et al,[50-56] which showed that 'happily' married respondents had lower blood pressures than singles possibly due to better satisfaction with life and less depression! However, this study also showed that the separated had the least mean systolic blood pressure of 120.00 ±12.25 mmHg compared to the others who had higher values.

The study further showed that respondents with 1-2 children had a higher mean systolic and diastolic blood pressure of 131.34±15.25mmHg and 84.57±11.09mmHg respectively. On the other hand, respondents had no children had a lower mean systolic and mean diastolic blood pressure of 127.10±13.33mmhg and 80.48±10.23mmHg respectively. This contradicts the study of Holt-L Unstad[57] where respondents without children had higher blood pressure than those with children. This discrepancy may be due to the presence of other risk factors of hypertension in the respondents with children.

The study also tried to show the relationship between blood pressure patterns and salary scale (CONTISS- consolidated tertiary institution salary scale); it was observed that the blood pressure patterns increased as salary scale increased except at Grade 14-15 where there was a drop in the blood pressure pattern. It is possible that these respondents were already diagnosed hypertensive taking anti-hypertensive medications hence the drop in blood pressure pattern. This increase in blood pressure pattern as salary scale increased is in correlation to the study conducted by Victor MO et al[49] which revealed that high income groups have the highest prevalence of central obesity, hypertriglyceridemia, diabetes and low HDL. These are some of the risk factors that have been found to be associated with hypertension.

From the study, those who resided in low density areas had a higher mean diastolic and mean systolic blood pressures of 130.89±18.84mmHg and 84.81±13.41mmHg respectively; this is followed by those who resided in medium density areas with mean systolic and diastolic blood pressures of 128.31±13.74mmHg and 82.86±10.54mmHg respectively and the least were those who reside in high density areas with mean systolic and diastolic blood pressure of 126.36±13.72mmHg and 84.64±9.30mmHg respectively. This shows that those with higher income have a higher blood pressure pattern as opposed to those with low income as housing type is a proxy measure for income and social status. This finding on housing is in correlation to that of the study carried out by Victor MO et al.[49]

Respondents who consumed tobacco had a higher mean systolic and mean diastolic blood pressure pattern of 131.25±16.80mmHg and 90.00±10.45mmHg while those who didn't consume tobacco had a mean systolic and diastolic blood pressure pattern of 128.34±14.21mmHg and 82.83±10.71mmHg. This is correlation with the study carried out by B. Ordinoha[45] which showed

that those who consumed tobacco had a higher blood pressure. Similarly, workers who consumed alcohol had a higher mean systolic and mean diastolic blood pressure pattern of 130.53±14.67mmHg and 84.32±10.70mmHg respectively, while those who didn't consume alcohol had a lower blood pressure pattern with mean systolic and mean diastolic being 127.56±14.15mmHg and 82.64±10.86mmHg.This is also in correlation with the study carried by Ordinoha B[45] which showed that those who consumed alcohol had a higher blood pressure.

Also, mean blood pressure increased with increasing risk of Hip/Waist ratio. Those whose Waist/Hip ratio was classified as "At Risk" had the highest mean systolic and mean diastolic blood pressure pattern of 129.97±16.24mmHg and 84.07±11.82mmHg respectively followed by those classified as Average with mean systolic and mean diastolic being 128.30±13.16mmHg and 83.63±9.99mmHg.These are followed by those classified as good (mean systolic and mean diastolic being 126.86±13.86mmHg and 81.20±11.06mmHg respectively) and the lowest being Excellent (mean systolic and mean diastolic being 126.50±10.01mmHg and 82±6.33mmHg respectively).This is in tandem with the study by R. Fauziana[55] which showed that the higher the hip/waist ratio, the more likely the individual is to have hypertension.

There was also increasing blood pressure pattern as salary scale increased with the highest mean systolic and mean diastolic being 135.00±21.21mmHg and 90.00±14.14mmHg in those with salary scale of grade 14-15, this is followed by grade 11-13 (mean systolic and diastolic being 130.23±14.37mmHg and 86.38±13.20mmHg respectively), then grade 7-10 (with mean systolic and mean diastolic blood pressure of 130.11±15.21mmHg and 83.03±10.7 respectively) and the least being grade 1-6 with mean systolic and mean diastolic blood pressure of 125.27±13.60mmHg and 81.61±9.14mmHg. This correlates with the study conducted by Victor MO et al[49].

Respondents who were reported to exercise had a higher mean systolic and mean diastolic blood pressure pattern of 130.08±15.95mmHg and 84.07±11.33mmHg while those who didn't exercise had a lower mean systolic and mean diastolic blood pressure pattern of 125.44±11.69mmHg and 81.68±9.63mmHg. This could be because exercise alone is not enough to control blood pressure, other lifestyle modifications such as diet, tobacco and alcohol consumption have to be considered. It could also be that the engagement in physical activities was undertaken by those with higher blood pressure as a measure to control the blood pressure since it is well known that physical exercise is a mitigating factor for hypertension[58,59].

The overweight or obese 'should' have a higher blood pressure than those who have a desirable BMI - as in the study conducted by AG Salaudeen, OI Musa et al[53] From this study however, those not previously diagnosed with hypertension but classified as obese had lowest mean systolic and mean diastolic blood pressure pattern of 125.66±12.40mmHg and 83.13±9.82mmHg respectively. This is followed by those who have a desired BMI with mean systolic and mean diastolic blood pressure pattern of 128.18±12.53mmHg and 82.34±9.96mmHg respectively with the highest being those classified as overweight with mean systolic and mean diastolic blood pressure pattern of 130.24±16.89mmHg and 83.62±11.83mmHg.This finding is possibly due to the effect of other factors which affect blood pressure.

Blood pressure patterns (from this study) increased with increasing hip/waist ratio of the respondents. Those classified as Excellent had the lowest mean systolic and diastolic blood pressure while those classified as At Risk had the highest. This is agrees with the findings of R. Fauzina et al.[55]which showed that participants who had a higher hip/waist ratio were more likely to have hypertension. On stratification of the respondents, this study did not show any increasing blood pressure pattern among those not previously diagnosed with hypertension with increasing waist/hip ratio. This contrast might be due to the effect of other factors that affect blood pressure.

From the study, there's a statistically significant relationship between tribe and blood pressure patterns among respondents from the Ikwerre ethnic group - having the highest blood pressure pattern whereas the respondents from Ogba ethnic group had the least blood pressure pattern. This finding relative and could because most of the respondents were from Ikwerre. Again, study also revealed that there is a statistically significant relationship between salary scale (CONTISS) and blood pressure pattern. It was found that mean systolic and diastolic blood pressure increased with increase in salary scale among all the respondents. Even when the respondents were stratified into previously diagnosed and non-diagnosed groups, this study revealed that mean systolic and diastolic blood pressure increased with increasing salary scale. Victor Maduabuchi Oguoma's[49] study showed that higher income earners have more cardiovascular risk factors such as central obesity, hypertriglyceridemia and low HDL and thus, were more predisposed to have a high blood pressure. Most of all, increase in blood pressure is epidemiologically an occupationally - related disease as blood pressure could increase an in undiagnosed individual or even in a known hypertensive when a worker has to work daily in (say) a very noisy work environment like the power generating area of the school.

CONCLUSION: Most non-academic at the University of Port Harcourt had elevated blood pressure pattern occasioned by statistically risk factors such risk factors such as high income (salary scale), family history, and alcohol and tobacco consumption.

RECOMMENDATIONS: Everyone (especially non-academic staff of university of Port Harcourt as in this study) is encouraged to attend regular medical check up whether or not the individual has the associated risk factors for hypertension.

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QUESTIONNAIRE

Information provided will be used purely for study; some delicate questions may be asked but rest assured your data will remain confidential and not used for nefarious purposes so please answer truthfully.

Section A- Socio-demographic data

1. Age range: a. < 20 years ☐ b.20 - 29 years ☐ c.30-39 years ☐ d. 40 – 49 years e. 50 ☐ years f. ☐ ≥ 60 years

2. Sex: a. ☐ male b ☐ female

3. Tribe: a. ☐ Igbo b. ☐ Ijaw c. ☐ Ikwerre d. ☐ Ogoni e. ☐ Ekpeye f. ☐ Ogba g. Others, please specify……..

4. Marital status a. ☐ single b. ☐ married c. ☐ divorced d. ☐ separated e. ☐ co-habitation f. ☐ widow/widower

5. Number of children a. ☐ none b. ☐ 1-2 c. ☐ 3-4 d. ☐ 5-6 e. ☐ ≥7

6. Family size a. ☐ 1-3 b. ☐ 4-6 c. ☐ 7-10 d. ☐ ≥ 11

7. Department: please specify……

8. Salary scale based on CONTISS (Consolidated Tertiary Institutions Salary Structure).

a. ☐ grade 1-6 b. ☐ grade 7-10 c. ☐ grade 11-13 d. ☐ grade 14-15

9. Where do you reside? a. ☐ low density area b. ☐ medium density area c. ☐ high density area

10. Type of accommodation a. ☐ Tenement room b. ☐ self-contained apartment c. ☐ 1 bedroom flat . ☐ 2 bedroom flat e. ☐ 3-4 bedroom flat f. ☐ >4 bedroom flat

Section B- Awareness of hypertension

1. Are you aware of what hypertension is? Yes ☐ No ☐

2.If yes, how were you informed? a. Media ☐ b. friends ☐ c. medical personnel ☐ d. Health worker ☐ e. Others, please specify……

3. What is hypertension ?..... 4.What factors do you think can lead to hypertension? ……

Section C-Family history

1. Has anyone in your extended family ever had hypertension? Yes ☐ No ☐
If yes, who?……..

2. Has anyone in your extended family ever had any heart disease? Yes ☐ No ☐.
If yes who?.....

3. Has anyone in your extended family ever died from unknown causes? Yes ☐ No ☐ If yes who?.....

4. Has anyone in your extended family ever had a str oke ? Yes ☐ No ☐

If yes who?.....

5. Has anyone in your extended family ever died of a stroke ?Yes ☐ No ☐
If yes who?.....

Section D- Medical history

1. Have you ever been diagnosed with hypertension? Yes ☐ No ☐ 2. If yes, how long have you been on hypertensive ? …….. 3. Are you currently on any anti -hypertensives ? Yes ☐ No ☐
If yes, which one?……..

4. Do you take your drugs regularly as prescribed ? Yes ☐ No ☐
If no, why ?.....

5. Is your blood pressure under control ? Yes ☐ No ☐

6. How often do you check your blood pressure? a. Daily ☐ b. Weekly ☐ c. fortnightly d. monthly ☐ e. quarterly ☐ f.6 monthly ☐ g. yearly ☐ h. rarely ☐ i. never ☐

7. How often do you see your doctor for your hypertension ? a. Daily ☐ b. Weekly ☐ c. monthly ☐ d. quarterly ☐ e. yearly ☐ f. never ☐ 8. Are you currently on any drugs? Yes ☐ No ☐.
If yes, which drugs and what for ?……..

9. Do you have or have you had in the past, any chronic illness? Yes ☐ No ☐ .
If yes what is the illness? …….

Section E-Risk factors

1. Do you consume tobacco? Yes ☐ No ☐ .
If yes, in what form? a. cigarette ☐ b. chewing ☐ c. snuff ☐.
What quantity do you consume daily? Cigarette- 1-5 sticks ☐, 6-10 sticks ☐, 11-15 sticks ☐, 16-20 sticks ☐, more than 20 sticks ☐.
If snuff, what is the quantity consumed weekly or how many snuffs a day?…….. If chewed, what is the quantity consumed weekly ?..... 2. Do you consume alcohol? Yes ☐ No ☐
If yes, what type a. beer ☐ b. stout ☐ c. wine ☐ d. palm wine ☐ e. spirit ☐ f. native gin (kai-kai) ☐

3. What quantity do you consume in a week ?

A. Beer- a. 1-5 bottles ☐ b. 6-10 bottles ☐ c. 11-15 bottles ☐ d. 16-20 bottles ☐ e. > 20 bottles ☐ ……units

B. Stout- a. 1-5 bottles ☐ b. 6-10 bottles ☐ c. 11-15 bottles ☐ d. 16-20 bottles ☐ e. > 20 bottles ☐ ……units

C. Wine- What brand ?.....

a. 1-3 bottles ☐ b.4-6 bottles ☐ c.7-10 bottles ☐ d.11-13 bottles ☐ e. >13 bottles ☐ ……units

D. Palm wine- a. 1-3 bottles ☐ b.4-6 bottles ☐ c.7-10 bottles ☐ d.11-13 bottles ☐ e. >13 bottles ☐……units (1 bottle is 75mls)

E. Spirit- a. 1-5 tots ☐ b. 6-10 tots ☐ c. 11-15 tots ☐ d. 16-20 tots ☐ e. > 20 tots ☐ ……units

F. Native gin- a. 1-5 tots ☐ b. 6-10 tots ☐ c. 11-15 tots ☐ d. 16-20 tots ☐ e. > 20 tots ☐……

4. Do you exercise a. Yes ☐ b. No ☐.

If yes, what form of exercise? a. running or jogging ☐ b. weight lifting ☐ c. sporting activities eg football, basketball, tennis etc ☐ d. Others ☐.

Please specify……. How often do you exercise? a. Daily ☐ b. weekly ☐ c. monthly ☐

d. quarterly ☐ e. Never ☐.

How long do you usually exercise each session? a. <15 minutes ☐ b. 15-30 minutes ☐ c. 30 – 60 minutes ☐ d. 60- 90 minutes ☐ e. 90-120 minutes ☐ f. > 120 minute

4. Do you always add salt to your meals ? a. Yes ☐ b. No ☐

If yes, what quantity ?…….……..

5. Anthropometric measurements

a. Height ……..centimetres

b. Weight……..kilograms

c. Abdominal girth……centimetres

d. Waist circumference……centimetres

e. Hip circumference……..centimetres

f. Body mass index (BMI)…….

Waist/Hip ratio……..

6. Vital signs

a. pulse rate……

b. blood pressure…….