

# Assessment of Risk Factors for Hypertension amongst the Staff of a Tertiary Institution in Nigeria

Hope Obiageli Nwoga<sup>1,2,\*</sup>

## ABSTRACT

**Background:** Hypertension is a leading cause of cardiovascular disease, coronary heart disease, stroke, and kidney failure. The aim of this study was to assess the risk factors for hypertension amongst the staff of a tertiary institution in Nigeria.

**Materials and Methods:** All consenting staff of College of basic and clinical medical sciences of the Enugu State University College of Medicine participated in the study. A structured questionnaire was used to collect data on the background characteristics and risk factors for hypertension. The weight and height measures were used to calculate the BMI of the participants. A systolic blood pressure of 140 mmHg and a diastolic blood pressure of 90 mmHg according to the guidelines from American Heart Association were classified as hypertension.

**Results:** Majority of the staff (62.1%) were not aware of their blood pressure value. About 29.3% have a family history of hypertension, 17.9% are diabetic, 27.9% takes alcohol, 9.3% take tobacco, 20.0% exercises while 20.0% add salt to cooked food. Family history of hypertension, intake of alcohol and exercise were significant risk factors associated with hypertension. On logistic regression exercise [AOR = 0.119; CI = (0.030–0.481)] and family history of hypertension [AOR = 3.932; CI = (1.485–10.413)] positively predicted hypertension among the participants.

**Conclusion:** The study revealed that both non modifiable (family history of hypertension) and modifiable risk factors (intake of alcohol and exercise) were significant risk factors for hypertension in the studied population. Hence, awareness should be directed to both areas.

**Keywords:** Nigeria, Risk factors, Tertiary institution, University staff.

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<sup>1</sup>Department of Community Medicine, Enugu State University Teaching Hospital Parklane, Nigeria.

<sup>2</sup>Department of Community Medicine, Enugu State University College of Medicine, Nigeria.

\*Corresponding Author:  
e-mail: nwogahope@gmail.com

## 1. INTRODUCTION

Hypertension or high blood pressure defined as abnormally high arterial blood pressure is a major public health problem with high prevalence globally [1]. It is responsible for over 12.8% or 7.5 million deaths annually globally [2]. There is a prediction that the annual deaths will increase to 1.56 billion adults in 2025 [3]. Hypertension is a leading cause of cardiovascular disease, coronary heart disease, stroke, and kidney failure with other complications such as heart failure, peripheral vascular disease, retinal hemorrhage and visual impairment [4]. The development of hypertension is influenced by a range of factors including genetic, environmental and lifestyle. Others include age, gender, obesity, diet, physical activity, alcohol and tobacco

use, family history and other co-morbid conditions [5]. These factors vary from country to country and with the difference between urban and rural regions of the same place [6]. The Joint National Committee 7 (JNC7) defined normal blood pressure as a systolic BP <120 mmHg and diastolic BP <80 mm Hg while Hypertension was defined as systolic BP level of  $\geq 140$  mmHg and/or diastolic BP level  $\geq 90$  mmHg [7], [8]. Hypertension is a silent killer as no symptoms can be seen in its early stages until probably a severe medical crisis occurs like heart attack, stroke, or chronic kidney disease [8]. Most people are not aware that they have hypertension and detection can only be through regular measurement of the blood pressure. Though the

majority of the patients with hypertension remain asymptomatic, some report headaches, vertigo, altered vision, fainting episode or lightheadedness [9].

A systematic review and meta-analysis of 57 studies reported that higher body mass index (BMI), physical inactivity, and alcohol consumption were associated with an increased risk of hypertension [10]. A similar study also reported that poor dietary habits, including high salt intake and low potassium intake, were associated with an increased risk of hypertension [11].

Despite these findings, the understanding of the complex relationship between various risk factors and their contribution to hypertension is still lacking. This study aims to generate information on risk factors for hypertension among the staff of a tertiary institution in Nigeria.

## 2. MATERIALS AND METHODS

### 2.1. Study Area

The study was conducted at Enugu State University College of Medicine (ESUCOM) Nigeria at the faculties of basic and clinical medicine. ESUCOM is one of the two Colleges of Medicine in Enugu State.

### 2.2. Study Design

The study was an institution based descriptive cross-sectional study.

### 2.3. Study Population

All the staff of the Faculties of Basic and Clinical Medicine of ESUCOM.

#### 2.3.1. Inclusion Criteria

Being a Staff of the College of basic and clinical medical sciences of ESUCOM.

#### 2.3.2. Exclusion Criteria

Staff that were absent or on leave during the time of data collection.

### 2.4. Data Collection

Two research assistants (final year medical students) were the data collectors. They were trained on how to collect the data and guided throughout the data collection by the principal investigator. The staff were approached during working hours in their respective offices within the college. Verbal introductions were made after which the aim of the study was explained to them. Data was collected from consenting staff.

Data was collected with a structured questionnaire with three sections. The first section contained information on the background characteristics of the participants, the second section contained information on risk factors for hypertension. These two sections were self-administered while the third section is a pro forma where the anthropometric measurements (Blood pressure, weight, height and calculated BMIs) were entered.

#### 2.4.1. Blood Pressure Measurement

Their blood pressure was measured with a mercury in glass sphygmomanometer, using an appropriate cuff size,

while in sitting position. Two consecutive measurements were made and the average recorded. The criteria of the Seventh Report of the Joint International Committee on Prevention, Detection, and Treatment of high BP [8] was used to classify the blood pressure levels as:

1. Normal BP: Systolic BP <120 and diastolic <80 mmHg
2. Prehypertension: Systolic BP 120–139 mmHg and diastolic BP 80–89 mmHg
3. Stage 1 hypertension: Systolic BP 140–159 mmHg and diastolic BP 90–99 mmHg
4. Stage 2 hypertension: Systolic BP 160–179 mmHg and diastolic BP 100–109 mmHg
5. Stage 3 hypertension: Systolic BP 180 mmHg or more and diastolic BP 110 mmHg or more.

However, in this study, stages 1, 2 and 3 were classified as hypertension.

#### 2.4.2. Anthropometric Measurements

Hamson weighing scale calibrated in kilograms with an accuracy of 0.1 kg was used to measure the participant's body weight. The weighing scale was checked prior to every measurement to ensure a zero start point. The participants were asked to stand erect on the scale with their foot wears removed, looking straight without bending while the research assistant reads off the weight. To doubly ascertain that the scale is functioning well, it was checked after each measurement to ensure that it returns to zero point. A tailors measuring tape was used to measure their height while they stand against the wall. The Body Mass Index (BMI) was subsequently calculated from the weight and height measurements using the standard formula for calculating  $BMI = \text{weight (kg)}/\text{height in meter square}$ . The BMI was classified according to the National Institute of Health of the US as follows: [12]

1. BMI <18.5 is under weight
2. BMI 18.5–24.9 is normal
3. BMI 25–29.9 is overweight
4. BMI 30–34.9 is Class 1 obesity
5. BMI 35 to 39.9 is Class 2 obesity
6. BMI of 40 or more is Class 3 or morbid obesity.

### 2.5. Data Management

Independent variable  
Background characteristics of the staff  
Dependent variable  
Risk factors for hypertension.

### 2.6. Statistical Analysis

SPSS version 25 was used for data analysis. Categorical variables (age in groups, gender, place of residence, educational level, marital status, staff designation, cadre, blood pressure and BMI categories and risk factors for hypertension) were presented as frequencies and percentages while quantitative variable (age) was presented as mean and standard deviation. Chi-squared test was used to test for associations between risk factors and hypertension with significant level placed at  $p\text{-value} \leq 0.05$ . All the variables that has  $p$  value of  $\leq 0.2$  was imputed into binary logistic regression to determine the predictors of hypertension among the staff.

### 2.7. Ethical Approval

Ethical approval was obtained from the Research and Ethics Committee of ESUTH Parklane Enugu. Oral consent was obtained from the participants after due explanation of the aim of the study. Confidentiality was maintained by ensuring that only the staff and the research assistants knew the readings of the various measurements obtained. There was no form of coercion and anonymity was maintained by using codes on the questionnaires.

## 3. RESULTS

About 86.0% (140 of 163) of the staff participated in the study.

Table I shows the background characteristics of the study participants. Majority of them were aged 40 years and above 83 (59.3%). More than half were females 76 (54.3%) and majority were urban dwellers 120 (85.7%). Majority had tertiary education 96 (68.5%), married 116 (82.9%) and non-academic staff 95 (67.9%). About (45) 32.1% had hypertension while (32) 22.9% had normal weight.

Table II shows risk factors for hypertension. Majority of them are not aware of their blood pressure value 87 (62.1%), about half 74 (52.9%) have never or measured their blood pressure over a year while 22 (15.7%) were on blood pressure lowering drugs. About (41) 29.3% have family history of hypertension, (25) 17.9% are diabetic, (39) 27.9% takes alcohol, (13) 9.3% takes tobacco, (28) 20.0% exercises while (28) 20.0% adds salt to cooked food.

Table III shows the non-modifiable risk factors that affect hypertension. Only family history of hypertension ( $p = 0.006$ ) significantly affected hypertension in the study population.

Table IV shows modifiable risk factors that affect hypertension. Taking alcohol ( $p = 0.027$ ) and regular exercise ( $p = 0.007$ ) significantly affected hypertension among the respondents.

Table V shows predictors of hypertension. Regular exercise [AOR = 0.119; CI = (0.030–0.481)] and family history of hypertension [AOR = 3.932; CI = (1.485–10.413)] positively predicted hypertension among the participants.

## 4. DISCUSSION

Of the non-modifiable risk factors, a family history of hypertension predicted hypertension in our present study. Those with a family history of hypertension had about 4 times the odds of having hypertension when compared to those without a family history of hypertension. It is known that genetics plays an important role in the development of hypertension, and individuals with a positive family history of hypertension are more likely to be at risk. Family studies and twin studies have demonstrated a heritability of blood pressure ranging from 30% to 60% [13]. Shared genetic and environmental factors contribute to this association. Genetic studies have identified multiple genes associated with hypertension, including those involved in blood pressure regulation and renal sodium handling [14]. Other studies in Sudan and India corroborated our study

TABLE I: BACKGROUND CHARACTERISTICS OF THE PARTICIPANTS

Variable	Frequency	Percentage
Age (years)		
Mean $\pm$ SD	43.52 $\pm$ 10.42	
Age in groups		
20–29	13	9.3
30–39	44	31.4
40–49	39	27.9
50–59	32	22.9
60 and above	12	8.5
Gender		
Male	64	45.7
Female	76	54.3
Residence		
Rural	20	14.3
Urban	120	85.7
Level of education		
Tertiary	96	68.5
Secondary completed	39	27.9
Primary completed	5	3.6
Marital status		
Married	116	82.9
Single	24	17.1
Religion		
Christianity	140	100.0
Staff designation		
Academic staff	45	32.1
Non-academic staff	95	67.9
Staff cadre		
Junior	68	48.6
Senior	72	51.4
Hypertension		
Yes	45	32.1
No	95	67.9
BMI		
Normal weight	32	22.9
Overweight	75	53.6
Class 1 obesity	19	13.6
Class 2 obesity	11	7.9
Class 3 obesity	3	2.1

[15]–[17]. A Nigerian study however reported no significant association between a family history of hypertension and the development of hypertension [18].

Regular exercise/physical activity was found to be protective against hypertension among our study participants. This was not surprising as engaging in aerobic exercises, such as brisk walking, jogging, or cycling have been reported to help lower blood pressure by improving endothelial function, reducing sympathetic nervous system activity, and promoting weight loss [19]. The American Heart Association recommends at least 150 minutes of moderate-intensity aerobic activity or 75 minutes of vigorous-intensity aerobic activity per week to maintain cardiovascular health [20]. Other studies from Nigeria corroborated our findings [21].

However, other studies found an inverse association between physical activity and hypertension as hypertension was more among physically active participants when compared to inactive participants [22]–[24]. This may be due to the presence of other confounding factors like age, sex, tobacco smoking, overweight or obesity. It may also be that

TABLE II: RISK FACTORS FOR HYPERTENSION

Variable	Frequency	Percentage
Aware of BP value		
Yes	53	37.9
No	87	62.1
When last was BP measured		
Within past 1 month	43	30.7
Within 6 months	17	12.1
Within 1 year	6	4.3
Never or more than 1 year	74	52.9
Are you on BP lowering drugs		
Yes	22	15.7
No	118	84.3
Family history of HBP		
Yes	41	29.3
No	48	34.3
Don't know	51	36.4
Are you diabetic		
Yes	25	17.9
No	115	82.1
Takes alcohol		
Yes	39	27.9
No	101	72.1
If yes how often		
Very often (at least 3 times a week)	10	7.2
Often (at least once a week)	17	12.1
Rarely	12	8.6
Not at all	101	72.1
Uses tobacco		
Yes	13	9.3
No	127	90.7
If yes, how often		
Very often (at least 3 times a week)	6	4.3
Often (at least once a week)	6	4.3
Rarely	1	0.7
Not at all	127	90.7
Exercises		
Yes	28	20.0
No	112	80.0
If yes, how often		
Very often (at least 3 times a week)	15	10.7
Often (at least once a week)	8	5.7
Rarely	5	3.6
Not at all	112	80.0
Adds salt to cooked food		
Yes	28	20.0
No	112	80.0

TABLE III: NON MODIFIABLE RISK FACTORS THAT AFFECT HYPERTENSION

Variable	Not hypertensive	Hypertensive	X <sup>2</sup> p-value
Age			
20–29	9 (69.2)	4 (30.8)	8.775 0.067
30–39	33 (75.0)	11 (25.0)	
40–49	29 (74.4)	10 (25.6)	
50–59	20 (62.5)	12 (37.5)	
60 and above	4 (33.3)	8 (66.7)	
Gender			
Male	40 (62.5)	24 (37.5)	1.551 0.213
Female	55 (72.4)	21 (27.6)	
Family history of hypertension			
Yes	20 (48.8)	21 (51.2)	10.170 0.006*
No	38 (79.2)	10 (20.8)	
Don't know	37 (72.5)	14 (27.5)	
Diabetic			
Yes	16 (64.0)	9 (36.0)	0.208 0.649
No	79 (68.7)	36 (31.3)	

Note: \* Significant value.

TABLE IV: MODIFIABLE RISK FACTORS THAT AFFECT HYPERTENSION

Variable	Not hypertensive	Hypertensive	X <sup>2</sup> p-value
Educational level			
Tertiary	68 (70.8)	28 (29.2)	2.421 0.298
Secondary completed	25 (64.1)	14 (35.9)	
Primary completed	2 (40.0)	3 (60.0)	
Marital status			
Married	77 (66.4)	39 (33.6)	0.678 0.410
Single	18 (75.0)	6 (25.0)	
Takes alcohol			
Yes	21 (53.8)	18 (46.2)	4.866 0.027*
No	74 (73.3)	27 (26.7)	
Uses tobacco			
Yes	9 (69.2)	4 (30.8)	0.012 0.911
No	86 (67.7)	41 (32.3)	
Exercise regularly			
Yes	25 (89.3)	3 (10.7)	7.368 0.007*
No	70 (62.5)	42 (37.5)	
BMI			
Normal	21 (65.6)	11 (34.4)	6.906 0.141
Overweight	57 (76.0)	18 (24.0)	
Class 1 obesity	10 (52.6)	9 (47.4)	
Class 2 obesity	6 (54.5)	5 (45.5)	
Class 3 obesity	1 (33.3)	2 (66.7)	

Note: \* Significant values.

they had started physical activity probably under medical advice after being diagnosed with hypertension.

World Health Organization (WHO) reported that alcohol consumption was the third largest risk factor for hypertension in developed countries [25]. This study indicated a positive association between alcohol intake and hypertension. The participants that take alcohol were 2 times more likely to develop hypertension when compared to their counterparts that do not take alcohol. A similar study reported similar findings [22]. Some studies corroborated our findings [26]–[30] while others reported

contradictory findings [24], [31], [32]. The settings of these studies and the study population may explain the difference. Also, the duration of alcohol consumption and the



TABLE V: PREDICTORS OF HYPERTENSION

Variable	Adjusted odds ratio	p-value	95% CI	
			Lower	Upper
Age (years)				
<40	0.773	0.547	0.335	1.785
≥40	1			
Family history of hypertension				
Yes	3.932	0.006	1.485	10.413
No	1			
Exercise regularly				
Yes	0.119	0.003	0.030	0.481
No	1			
Takes alcohol				
Yes	2.134	0.091	0.886	5.140
No	1			
BMI				
Normal	0.287	0.381	0.018	4.686
Overweight	0.199	0.244	0.013	3.005
Class 1 obesity	0.717	0.819	0.041	12.469
Class 2 obesity	0.666	0.788	0.035	12.794
Class 3 obesity	1			

quantity of alcohol consumed that was not clearly stated in these studies may be another explanation for the difference.

Those that were aged  $\geq 40$  years were more at risk of hypertension when compared to those aged  $< 40$  years. This is not surprising as age is a well-established predictor of hypertension. This is so because as individuals age, the risk of developing hypertension increases. This can be attributed to various physiological changes that occur with ageing, such as decreased elasticity of blood vessels, reduced renal function, and increased arterial stiffness [33]. Another study reported similar findings [34].

Participants with class 3 obesity are 3 times more at risk of hypertension when compared to those with normal weight. Obesity contributes to the development of hypertension through various mechanisms, including insulin resistance, dyslipidemia, inflammation, and activation of the renin-angiotensin-aldosterone system [35]. Studies have shown a positive correlation between BMI and blood pressure, with each unit increase in BMI associated with an increased risk of hypertension [10], [36].

## 5. CONCLUSION

The study revealed that both non modifiable and modifiable risk factors predicted hypertension in the studied population. Awareness and screening for risk factors should focus on these two aspects.

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## CONFLICT OF INTEREST

Authors declare that they do not have any conflict of interest.

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