

## Original Research Article

### POINT PREVALENCE OF HIGH BLOOD PRESSURE AMONG UNIVERSITY OF PORT HARCOURT STUDENTS

#### ABSTRACT

Hypertension is a long term medical condition in which the blood pressure in the arteries is persistently elevated. Over the last decade, it has been demonstrated that the prevalence of mild hypertension in youth aged from 18-30 years is more common than expected and is progressively rising. This study documented the point prevalence of high blood pressure among the student population of the University of Port Harcourt by determining the body mass index, level of physical activities and socioeconomic status. A cross sectional study was conducted among the University of Port Harcourt students within a period of two weeks. Blood pressure was measured using sphygmomanometer and stethoscope, the body mass index was also calculated using the weight and height. A total of 300 students were sampled and anthropometric data such as height, weight and age were collected. Participants were aged 19-30 years. 48.7% were observed to be female while 51.3% were of the male gender. The point prevalence of pre-hypertension and hypertension was observed to be high among the students 11.3% and 31.7% respectively. It was observed that 36.3% of the male students had normal blood pressure while 76.6% of the female students had normal blood pressure, this accounted to be  $22.3 \pm 0.14$  for the mean age normotensive,  $22.6 \pm 0.37$  for pre-hypertensive and  $23.2 \pm 0.14$  for hypertensive. There was no significant difference between all three ( $P > 0.05$ ). The body mass index of the normotensive, pre-hypertensive and hypertensive were observed to be  $18.3 \pm 0.19$ ,  $24.21 \pm 0.19$  and  $32.5 \pm 0.32$  respectively. There was significant difference between the body mass indexes ( $P < 0.05$ ). From the survey carried out, it was observed that the physical activity of the students was low. Hypertension is identifiable in young adults and appears to increase with age. Notable risk factors are also associated with hypertension in youths. Regular screening will improve awareness and help mitigate the complications of this condition. Finally, routine screening should be undertaken by health care managements and the university's health service.

**Keywords:** Point Prevalence, High Blood Pressure, University of Port Harcourt, Students

#### 1. INTRODUCTION

Hypertension is a long term medical condition in which the blood pressure in the arteries is persistently elevated [1]. It is a major risk factor for stroke, coronary artery disease, heart failure, atrial fibrillation, peripheral arterial disease etc. [2]. Hypertension is an important

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public health problem in both economically developed and developing nations [1]. Hypertension is the single most important risk factor for cardiovascular diseases (CVD) and a key driver of global disease burden [3]. It is also a high-yield target to reverse the epidemic of non-communicable diseases (NCDs) globally. Cardiovascular (CV) diseases represent the main cause of death in developed countries, being responsible of about one third of deaths worldwide [4]. Hypertension among students and youths is increasingly being seen in the University clinics, some who end organ abnormalities are already present. There has been a varied report on the prevalence of hypertension among youths aged from 18-30 years ranging from 0-36% [4]. This wide disparity may be related to sample size, race, age, and sex, environmental and social factors. Over the last decade, it has been demonstrated that the prevalence of mild hypertension in youth aged from 18-30 years is more common than expected and is progressively rising over the years [4]. This phenomenon has been mainly attributed to the increasing prevalence of obesity or unhealthy lifestyle habit (including poor physical activity, regular assumption of high salt-junk food and sedentary living. However, evidences on the burden of hypertension and associated factors are lacking among university students in resource-poor settings. It is suggested that hypertension has its origin in childhood through youth but goes undetected unless specifically looked for during this period. Thus early detection of hypertension and its precipitating or aggravating factors are important if one is to evolve measures so that complications of hypertension can be prevented [5].

The world is still recovering from the impact of the corona virus pandemic which had affected the lives of almost every nation and Nigeria is no different. Jobs have been lost and due to high cost of foods, the youths have turned to the unwholesome or inappropriate diets which are a risk factor for hypertension. Given the economic situation as well as the university difficult living

conditions in addition to keeping up with packed school calendar, there is heightened stress level among students. This lifestyle can indeed expose students to risk factors of hypertension. From the aforementioned factors, it is important to determine the point prevalence of high blood pressure among the student population.

## 2. METHODOLOGY

**Study Area:** The study was conducted in three campuses located within the university of Port Harcourt namely Delta campus, Choba campus and Unipark campus.

**Research Design:** This study was a cross sectional type survey type. The cross sectional study survey design involved data collection at one point in time to find out the prevalence of hypertension in the student population of the University of Port Harcourt

**Determination of Sample Size:** The formula by Araoye [6] for determining sample size was used to draw the sample size from the relatively large population of the study area. The sample size was calculated using the formula for populations more than ten thousand. A minimum of three hundred (300) subjects were recruited for the study. The formula is given below;

$$N = \frac{Z^2 \times P \times 1 - P}{d^2}$$

Where;

N = minimum sample size required

Z = Confidence level (95%)

P = Standard deviation

d = margin of error

**Sampling Technique:** Simple random sampling method was used for this study. Written consent was obtained from respondents. Procedures were explained to participants to allay anxiety.

**Type and Source of Data:** Data collected included demographic characteristics, anthropometric and blood pressure reading for the screening.

**Blood Pressure Measurement:** Blood pressure was taken by trained personnel using a mercury sphygmomanometer and stethoscope. Measurements were taken from the left upper arm after subjects had been sitting for >5 minutes. Participants were asked to sit on a chair for five minutes. Different cuff sizes were used for different body sizes and placed to cover the left arm at the heart level. Systolic and diastolic blood pressure was taken three times, with at least 5 minutes interval, using a digital sphygmomanometer. The average of the three readings was used for the analysis.

**Physical Activity Data:** Data on physical activity level was taken by adopting the WHO Global Physical Activity Questionnaire (GPAQ), version 2. Data on vigorous, moderate activity and sedentary behaviour were collected. Amount of time in (minutes) each participant spent in moderate and vigorous intensity activities was determined. The activities were given intensity, relating to the criteria provided in the WHO GPAQ, version 2 standards.

**Anthropometric data:** Anthropometry is the measurement of weight and height (measured without shoes). The anthropometric measurements were taken according to methods described by [7]. The weight was measured using a calibrated bathroom weighing scale to the nearest 0.5kg. The bathroom has been recommended for the use in young adult where the beam balance is not available [7]. Subjects were asked to stand on the weighing scale without shoes while wearing light clothes. Height was measured using an erect meter rule placed against a

perpendicular wall [7]. The body mass index (BMI) was also calculated from the height and weight already measured using the formula [7].

$$QI = \frac{\text{Weight (kg)}}{\text{Height (m)}^2}$$

**Statistical Analysis:** Data was analyzed using IBM SPSS 22.0 (Chicago). Statistical significance was mainly tested using ANOVA (Analysis of Variance). Descriptive statistics of mean and standard deviation, standard error was used to examine the data. The level of statistical significance was fixed at  $p < 0.05$ .

### 3. RESULTS

#### 3.1 Social-Demographic characteristics of study population

Table 1 shows the gender distribution, the occupation of parents and benefactor for education. 48.7% of the respondents were females and 51.3% are males. Father's occupation to be unemployed (0.7%), public servant (17.7%), and self-employed (70.3%) while for the mothers, unemployed (29%), public servant (47.6%) and self-employed (35.7%). 87.7% of the subjects revealed to have a parent as a benefactor while 12.3% revealed to have themselves as their benefactor.

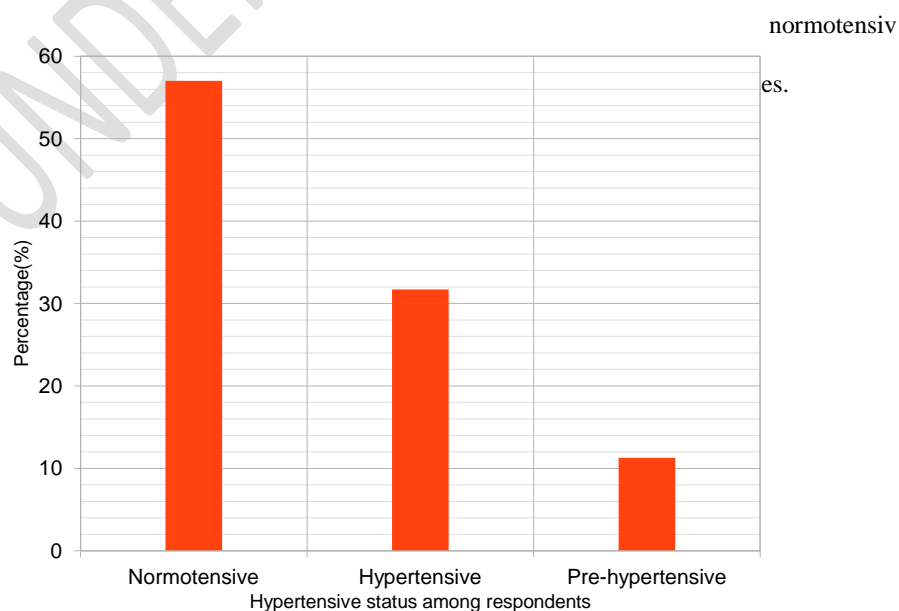
**Table 1: Socio-economic and demographic of subjects**

Variables	Percentage
Gender	

Male	51.3
Female	48.7
Father's Occupation	
Unemployed	0.7
Public servant	17.7
Self-employed	70.3
Mother's Occupation	
Unemployed	29
Public servant	47.6
Self-employed	35.7

### 3.2 Prevalence of Hypertension within the respondents

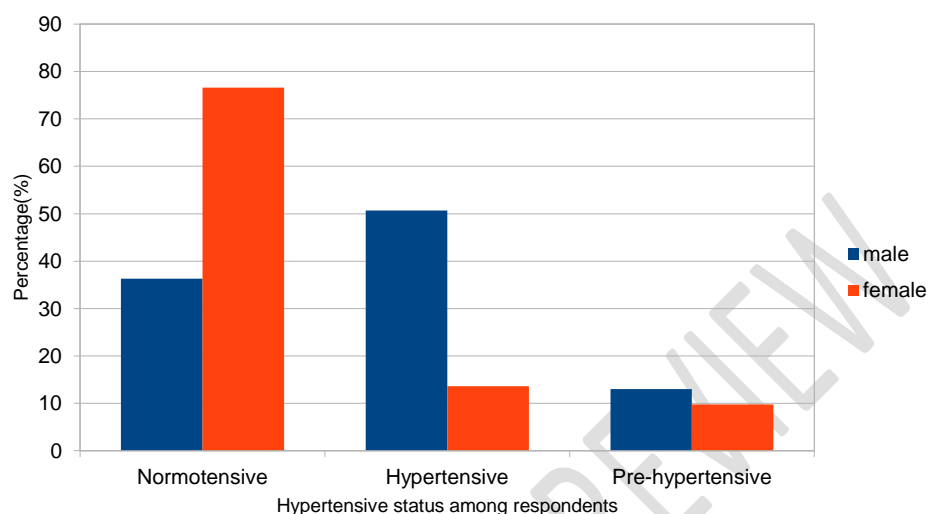
The prevalence of hypertension was determined using the systolic and diastolic blood pressure measurements taken during the anthropometric studies. It was found out that 31.7% (95) were hypertensive, whereas 11.3% (34) were found to be pre-hypertensive and 57% (171) were



**Figure 1:** Hypertension status of participants after rescreening using systolic and diastolic measurements

### 3.3 Prevalence of hypertension within the sex distribution of respondents

Considering the sex distribution, 50.7% of the male participants were diagnosed to be hypertensive with 13.0% and 36.3% as pre-hypertensive and normotensives respectively. The females recorded 76.6% for normotensives, 9.8% and 13.6% as pre-hypertensive and hypertensive respectively.



**Figure 2:** Hypertension status of participants with respect to sex distribution after screening using systolic and diastolic measurements

### 3.4 Age and Anthropometric and Hypertension Prevalence of respondents

The age and BMI were determined and evaluated for their correlation with the hypertensive status of the participants. The ages of the participants who were categorized as hypertensive were averagely  $23.2 \pm 0.14$  years with that of the pre-hypertensive participants being  $22.6 \pm 0.37$ , followed by the normal participants being  $22.3 \pm 0.14$  in a decreasing order, though the difference is not statistically significant at  $p > 0.05$ . The hypertensive class recorded BMI of averagely  $32.5 \pm 0.32$ , followed by the pre-hypertensive and the normotensive group recording  $24.21 \pm 0.19$  and  $18.3 \pm 0.19$ . There was a significant difference between the groups at  $p < 0.05$ , (Table 2).



**Table 2: Age and Anthropometric of Normotensive, Pre-hypertensive and Hypertensive respondents**

Parameter	Normotensive	Pre-hypertensive	Hypertensive		<i>P</i> - value
Age	22.3 ± 0.14	22.6 ±0.37	23.2±0.14	±1 0.14	0.31
Body Mass Index	18.3 ± 0.19	24.21 ± 0.19	32.5 ±0.32		0.0015

Values are Means ± SEM. Significant at  $p < 0.05$

### 3.5 Physical activity and hypertensive status of participants

According to Table 3, 97.9% of the participants diagnosed as hypertensive did not undertake any routine exercise or physical activity. The result also indicated 84.8% of the normotensive students were sedentary, likewise 79.4% of the pre-hypertensive.

**Table 3: Physical activity profile of participants and hypertension status**

Physical Activity	Normotensive	Pre-hypertensive	Hypertensive	<i>P</i> -value
None	145 (84.8)	27 (79.4)	93 (97.9)	0.052
Once per week	22 (12.9)	1 (2.94)	2 (2.1)	
Twice per week	4 (2.3)	6 (17.6)	0	
Thrice per week	0	0	0	
Four times a week	0	0	0	
Five times a week	0	0	0	

#### 4. DISCUSSION

Results from the screening showed point prevalence of hypertension among adolescents in the University of Port Harcourt was 31.7%, whilst 11.3% of them were pre-hypertensive. Similar but higher prevalence (38.3%) of hypertension among adolescents was found in a study by [8]. On the other hand, another study by Tadesse and Alemu [9] in Ethiopia found lower prevalence of hypertension (7.7%) among youths and University students. An observed high prevalence of pre-hypertension and hypertension among youths and students raises alarm that this disease is gradually emerging among young adults. High prevalence of hypertension among youths would affect the public health system in the University, if appropriate measures are not put in place. According to [10] and [11], hypertension was associated with low socio-economic status, waist circumference, overweight/obesity, high soft drinks consumption, low fruit consumption and physical inactivity. It could also be that the listed associated risk factors might be present in these adolescents, hence contributing to high prevalence of hypertension. There was higher prevalence of hypertension in males than females; it was significantly different ( $P < 0.05$ ). The higher prevalence in males is similar to the finding by [12], where they realized a prevalence of 9.3% in males as against 6.5% in females. [13] also reported a higher prevalence of 4.1% in males, as opposed to 2.8% in females. They attributed the cause of the increasing prevalence of the condition to the changing lifestyles of the population, following the rural-urban drift, particularly in sub-Saharan Africa with the primary causes being diet, salt intake and physical inactivity. They also observed that the socio-economic and environmental conditions the youths were exposed to from childhood to youth were the risk factors to the development of the condition. The high prevalence of hypertension in males, as opposed to females could be attributed to the higher tendency of males to eat more and resort to unhealthy lifestyle practices, such as

alcoholism and smoking [14]. Studies have shown that sedentary lifestyles, use of tobacco and alcohol, lack of physical exercises, and unhealthy diet are mostly found among young adults with 67 % of premature death and 33 % of disease burden being associated with these lifestyles [15]. Many studies have found the relationship between blood pressure and age to be significant [16]. In general, blood pressure rises as people get older. Age is known risk factor for high blood pressure [17]. In all ethnic groups, men tend to have higher mean SBP (Systolic Blood Pressure).

In the present study, we found statistically significant difference between all the anthropometric parameters. Studies in various populations also showed strong relationship between different anthropometric indicators and blood pressure levels [18]. Considering the correlation between the anthropometric measurements and the hypertensive status of the participants, it was discovered that the age did not affect the condition significantly ( $P>0.05$ ) as seen in Table 1. The BMI on the other hand, showed a trend which was however not significant statistically but could be considered as a risk factor of hypertension. The participants diagnosed as hypertensive and pre-hypertensive recorded higher BMIs ( $32.5 \pm 0.32$  and  $24.2 \pm 0.19$ , respectively), while the normotensives recorded a BMI of  $18.3 \pm 0.19$  (Table 1). BMI was a significant predictor of both diastolic and systolic blood pressure. The BMI obtained in the study supports the findings of [12], where a BMI of  $21.1 \pm 5.3$  was recorded. These findings are in agreement with other studies [19] which support a strong relationship between BMI and blood pressure across developed and developing countries [18]. Body mass index is reported to be positively and independently associated with morbidity and mortality from hypertension, cardiovascular disease, type II diabetes mellitus, and other chronic diseases [20]. In Caucasian populations, a strong association has been depicted between BMI and mortality, and positive relationship between BMI and BP has also been reported among African and Asian populations [21]. In West Africa, a meta-

analysis conducted on 55 articles from 5 countries includes obesity, age, and gender as significant predictors and is similar to studies of adults in Sierra Leone [22]. Significant relationships have also been reported between age and BMI among adolescents in northeast Nigeria [23], in which BMI was found to be a significant factor in predicting hypertension in rural Nigeria. The importance of BMI has been recognized for estimating cardiovascular disease (CVD) risk factors, particularly due to their positive association with hypertension [24]. It is said that an active lifestyle is required for one to stay healthy and prevent conditions like obesity and related complications such as hypertension [25]. According to Diaz and Shambo [26], one of the recommended guidelines in preventing the risk of hypertension is by increasing physical activity level. This implies sedentary lifestyle may be associated with risk of hypertension. A study by [27] showed that sedentary behaviour was associated with likelihood of developing hypertension, independent of leisure-time physical activity. This makes the activity profile of the participants an essential component of the study in establishing the link between hypertension and the level of activity. The results obtained from the study showed a very low activity profile which can be a predisposing factor to hypertension. It was found that 97.9% of the participants with raised blood pressure had a lifestyle of no physical activity (Table 2), while 84.8% and 79.4% of the normotensive and pre-hypertensive participants also had no active lifestyles. Physical activity and exercise are known to demand energy and thus the rapid utilization of blood glucose and the breakdown of glucose resulting in the reduction of body and visceral fat. This reduces the risk of atherosclerosis by fat deposits and ultimately reducing the risk of cardiovascular diseases [28]. The study showed very low activity levels with only none of the participants having a recorded profile of five times weekly exercise sessions. This means that majority of the students' population were not physically active and this might have influenced the prevalence of

hypertension. Physical inactivity is a risk factor for developing hypertension. This could be due to lack of understanding of the benefits of an active lifestyle.

A study by [29] reported a wide range of stressful experiences, including money, exams and essays, noise, health of family members and themselves, water supply, and relationships. [29] suggested that stress related to lack of money is more prevalent among male and female students, given that most of them have to finance their own education, feeding, transportation for getting around the campus, and paying for educational materials and medical treatment when they are sick.

## **5. CONCLUSION**

From the study carried out, it was revealed that the prevalence of pre-hypertension (11.3%) and hypertension (31.7%) was relatively high among the student population in the University of Port Harcourt. The study also revealed that the majority of the students' population were not physically active. Classification as pre-hypertension or even at the risk of hypertension may cause subjects to take notice. Appropriate diet and lifestyle management are needed to prevent the progression of pre-hypertension and hypertension to stages where they can cause target organ damage

## **6. RECOMMENDATIONS**

The prevalence of youth hypertension is increasingly becoming a global health problem therefore, it is recommended that routine screening should be undertaken by the University's health service, lifestyle modification; management programs are important for the students.

## 7. PUBLICATION OF THIS ARTICLE

Authors wish to state that this article have not been published or submitted for publication in any journal or elsewhere and no funding was received for carrying out this research study.

### COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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References 2 to 4, 12 & 14, 17 to 19, 22, 24, 29 are same

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