

## CASE FINDING OF HYPERTENSION AT A SECONDARY HEALTH CARE FACILITY IN SOUTH-WEST NIGERIA.

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### ABSTRACT

**Background:** The prevalence of hypertension is higher in Semi-urban areas than in rural areas. There is a rising prevalence of hypertension in developing countries. Significant independent association has been found between age, family history and prevalence of hypertension according to the literature. This study sought to determine the prevalence of hypertension at the State Hospital Oyo and provide evidence for routine checks of blood pressure (BP) for adult patients.

**Methods:** A Cross-sectional study was conducted at the General Outpatient Clinic of the State Hospital Oyo. 350 adults between the ages of 18 and 70 years were recruited for the study. A total sampling technique was used to recruit consecutive patients until a sample size of 350 was achieved.

**Results:** The prevalence of hypertension was  $102/350 = 29\%$ . Thirty (29.70%) of respondents who were 55 years and above had systolic hypertension while 24 (23.80%) had normal BP ( $t^2 = 87.62$ ,  $p\text{-value} = 0.0001$ ). Majority (57.6%) of respondents who had tertiary education had normal blood pressure while 24 (20.3%) had systolic hypertension ( $t^2 = 39.88$ ,  $p\text{-value} = 0.0001$ ). Twenty one (36.8%) of respondents who were obese had systolic hypertension while 16 (28.1%) had normal blood pressure ( $t^2 = 20.61$ ,  $p\text{-value} = 0.02$ ). Thirteen (12.80%) of respondents who were 55 years and above had diastolic hypertension while a majority (58.40%) had normal BP ( $t^2 = 33.40$ ,  $p\text{-value} = 0.0001$ ).

**Conclusions:** Age, obesity and education were found to be risk factors for developing hypertension. However after adjusting for other variables, the predictor of risk of developing hypertension was age of respondents.

**Keywords:** Obesity, Age, Prevalence, Hypertension.

### INTRODUCTION

Hypertension is defined as a persistent systolic blood pressure (SBP) reading of 140 mmHg or greater and or a diastolic blood pressure (DBP) reading of 90 mmHg or greater.<sup>1,2</sup> Hypertension is divided into two main categories: essential (primary) hypertension and secondary hypertension. Essential hypertension occurs in about 90% to 95% of the cases and is of unknown cause, while secondary hypertension occurs in the remaining 5% to 10% of the cases and are of known causes.<sup>3,4</sup>

Ugwuja *et al* found 23.2% prevalence rate and reported that age, consumption of red meat, body mass index (BMI), and the number of children in the family were associated with hypertension.<sup>5</sup> Hypertension is a major risk factor for other cardiovascular diseases (CVDs).<sup>6,7</sup> However, Suleiman reported a prevalence of 15.00% in a semi-urban community of South-South Nigeria.<sup>8</sup> Asekun-Olarinmoye *et al* also reported 13.16% prevalence in a rural community in South-West Nigeria.<sup>9</sup> According to a study conducted in Iraq the overall prevalence of hypertension was 26.5% (19.1%

were known hypertensive and 7.4% were unrecognized hypertensive). Of the recognized hypertensive, only 25.4% were with controlled blood pressure. Significant independent association was found between age, family history of hypertension, education, type of the family, socioeconomic status and prevalence of hypertension. A substantial number of people with hypertension were unaware of their condition and more than one quarter of hypertensive patients (28.1%) were unrecognized<sup>10,11</sup>. Factors found to be related with hypertension were population group, older age, higher body mass index, higher fasting plasma glucose level, lower level of education and tobacco use. The socio-demographic factors significantly related with hypertension status were age, sex, education, religion, BMI, and marital status.<sup>12,13</sup>

The prevalence of hypertension was associated with family history of hypertension according to a work done by Iloh and Amadi. The prevalence of hypertension in primary care setting is showing an upward trend. However, the occurrence of

hypertension is a reflection of not only family predisposition but interaction and clustering of socio-biological and behavioural factors according to Iloh and Amadi<sup>14</sup>. There is a rising prevalence of hypertension and diabetes mellitus in rural communities in Southern Nigeria. Intensive health education and community surveillance programmes in rural communities is important to achieve prevention and control of non-communicable diseases in Nigeria<sup>15</sup>

High prevalence of undiagnosed hypertension exists in Okparabe community in Southern Nigeria with associated elevated BMI values.<sup>16</sup> Hypertension and stroke are important threats to the people in Sub-Sahara Africa. The prevalence of hypertension is higher in Semi-urban than in rural areas.<sup>17,18,19,20</sup> Systolic and Diastolic hypertension increase with increasing age and higher in males than females.<sup>21</sup> Weight reduction via dietary interventions and calorie restriction can reduce Blood Pressure in the overweight and obese patients. Sodium chloride restriction, potassium and calcium supplements can improve the process of lowering Blood Pressure.<sup>22</sup>

According to the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure, normal blood pressure is less than 120/80mmHg. Pre-hypertension is blood pressure of 120-139/80-89mmHg. Pre-hypertension is not a disease category however it is a description to categorize individuals at high risk of developing hypertension, so that both patients and physicians are informed of this risk and encouraged to intervene and prevent the disease from developing. Pre-hypertensive people are not candidates for drug therapy rather they should be explicitly counseled to practice lifestyle modifications in order to reduce risk of developing hypertension in the future.

This study sort to determine the overall prevalence of hypertension, its determinants and to provide evidence for routine checks of blood pressure for patients attending General Outpatient Clinic at the State Hospital Oyo.

## MATERIALS AND METHODS

A cross-sectional study was conducted from 1st of February 2016 to 31st of March 2016 at the General Outpatient Clinic of the State Hospital Oyo, Oyo State. Three hundred and fifty adults between the ages of 18 and 70 years were recruited for the study. A total sampling technique was used to recruit consecutive patients until a sample size of 350 was achieved. Inclusion criteria include consenting patients who were 18-70 years old.

Sample size was estimated using the formula:

$$n = \frac{Z_a^2 pq}{d^2}$$

Quoting  $n$  = minimum sample size

$Z_a$  = the standard normal deviate, usually set at 1.96, which corresponds to the 95% confidence level.

$p$  = the prevalence of hypertension to be 22.7% for Nigeria.<sup>23</sup>

$q = 1 - p$   $d$  = degree of accuracy desired usually set at 0.05.

$$n = \frac{(1.96)^2(0.227)(1-0.227)}{(0.05)^2} = \frac{(3.84)(0.226)}{(0.05)^2} = 270$$

$$Q = 1 / (1-f)$$

Where  $Q$  is the adjustment factor and  $f$  is the non-response rate, if  $f = 20\%$  then

$$Q = 1/0.8 = 1.25 \text{ and } n = 1.25 \times 270 = 337.5 \approx 338$$

For the purpose of this study, a minimum of 338 patients had been recruited.

## Data collection

A structured questionnaire was administered to consenting subjects. Weights and heights were measured. The weights of the participants were taken using a portable weighting scale (Hana, China). Heights of the participants were measured using a Stadiometer. It has a firm horizontal surface and a vertical surface with calibrations in meter scale to 1.95 meters. The patient stands on the horizontal surface with his heel, back and occiput making contact with the vertical surface. The highest point of the head was projected to the scale with a ruler and read as the patients' height in meters. Body Mass Index (BMI) was calculated by dividing the weight in kilograms by the square of the height in meters. BMI was categorized as normal from 18.5–24.9 kg/m<sup>2</sup>, overweight of 25–29.9 kg/m<sup>2</sup> and obese if  $\geq 30$  kg/m<sup>2</sup>. The weight was recorded in kilograms to the nearest 0.1 kg using a weighing scale, and the height was recorded in meters to the nearest 0.05 m. The body mass index (BMI) was calculated as the weight in kilograms divided by the square of the height in meters.

## Measurement of blood pressure

A standard mercury sphygmomanometer (Accosson, London) provided with an armband for adult of 12 cm large was used, and systolic blood pressures (SBP) and diastolic blood pressures (DBP) were taken as Korotkoff sound phases I and V respectively. The display of the sphygmomanometer was positioned away from the patient to assure blinding to the blood pressure readings. The measurements were taken with the patient in a seated position with their arms supported at heart level, after five minutes of rest, after abstinence from food, nutritional supplements,

caffeinated beverages and smoking for a minimum of two hours before the appointment at approximately the same time and day of the week.

A cuff of appropriate size was applied to the exposed upper arms and was rapidly inflated to 30 mm Hg above the level at which the pulse disappeared and then deflated gradually. Blood pressure was measured as two serial measurements at intervals of two minutes using auscultatory methods. The mean of two measurements was calculated for Systolic Blood Pressure and Diastolic Blood Pressure separately. Patients who were found to have blood pressure of 140/90 mmHg and above for the first time were referred to Medical Outpatient Clinic for a repeat blood pressure seven days after the first measurement. However, those with higher blood pressures of greater than 180/110 mmHg were evaluated and treated immediately depending on clinical presentations. Those who were known hypertensives and those found to have blood pressure  $\leq$ 140/90 mmHg seven days after the first measurements were regarded as hypertensive. The mean of the two blood pressures recorded was used in the analysis. Prevalence of hypertension was calculated as percentage of participants with SBP and DBP according to JNC VII recommendations.

### **Data analysis**

Data was analyzed using IBM SPSS Statistics software version 20. Frequency tables and diagrams were used for relevant variables. Chi-square test was used for bivariate analyses to test the significance of the association between categorical variables.

Logistic regression analysis was performed for the various factors to show the predictors of hypertension. A p-value  $<$  0.05 was considered to indicate statistical significance.

### **Ethical consideration**

Approval of the Ethical Review Committee of Oyo State Ministry of health, State Secretariat Ibadan was obtained. Informed consent was obtained from eligible patients before administration of the questionnaire and examinations. Privacy and confidentiality of the respondents was guaranteed by anonymity of respondents.

## **RESULTS**

### **Prevalence of hypertension**

Respondents with Systolic Blood Pressure of  $\geq$  140 and Diastolic Blood Pressure of  $\geq$  90 were 102. Prevalence was  $102/350 = 29\%$

**Table 1:** Socio demographic characteristics of respondents n=350

<b>Variable</b>	<b>Frequency (n)</b>	<b>Percentage (%)</b>
<b>Age group (years)</b>		
< 35	104	29.70
35-44	74	21.10
45-54	71	20.30
55 and above	101	28.90
<b>Sex</b>		
Male	88	25.00
Female	262	75.00
<b>Religion</b>		
Christianity	136	39.10
Muslim	210	60.30
Traditional	2	0.60
<b>Ethnic group</b>		
Hausa	1	0.30
Igbo	7	2.00
Yoruba	334	96.30
Others	5	1.40
<b>Marital status</b>		
Single	37	10.60
Married	268	76.50
Separated	1	0.30
Divorced	1	0.30
Widowed	43	12.30
<b>Family setting</b>		
Monogamous	198	62.30
Polygamous	117	36.70

**Table 2:** Association of different variables with grouped systolic blood pressure

Variable	Normal BP	Pre-hypertension	Hypertension	$\chi^2$	p-value
<b>Level of education</b>				39.88	0.0001*
No education	20(26.0%)	22(28.6%)	35(45.5%)		
Primary	23(30.7%)	13(22.4%)	22(37.9%)		
Secondary	61(64.9%)	21(22.3%)	12(12.7%)		
Tertiary	68(57.6%)	26(22.0%)	24(20.3%)		
<b>BMI</b>				20.61	0.02*
<b>Underweight</b>	24(60.0%)	11(27.5%)	5(12.5%)		
<b>Normal weight</b>	84(50.6%)	32(19.3%)	50(30.1%)		
<b>Overweight</b>	49(56.3%)	20(23.0%)	18(20.7%)		
<b>Obese</b>	16(28.1%)	20(35.1%)	21(36.8%)		
<b>Age (years)</b>				87.62	0.0001*
34 and less	84(80.80%)	15(14.4%)	5(4.8%)		
35 to 44	41(55.40%)	18(24.3%)	15(20.30%)		
45 to 54	24(33.80%)	24(33.80%)	23(32.40%)		
55 and above	24(23.80%)	26(25.70%)	30(29.70%)		
<b>Exercise</b>				6.50	0.09
<b>Good</b>	68(54.4%)	24(19.2%)	33(26.4%)		
<b>Poor</b>	104(46.4%)	59(26.3%)	61(27.3%)		
<b>Salt intake</b>				2.37	0.499
<b>High</b>	155(49.2%)	78(24.8%)	82(26.0%)		
<b>Low</b>	17(50.0%)	5(14.7%)	12(35.3%)		

\*Significant at 5% level of significance

### Socio-demographic characteristics of respondents

Table 1 shows socio-demographic characteristics of the respondents. Three hundred and fifty patients who met the criteria for recruitment were included in the study and interviewed. The mean age of the respondents was 44.59 (SD  $\pm$  15.84) years. Almost one third of the patients 104 (29.7%) were below 35 years and respondents who were 55 years and above were 101(28.1%). The remaining respondents were between 35-55 years of age. Male respondents were 87 constituting 25.0% while there were 261(75.0%) female respondents.

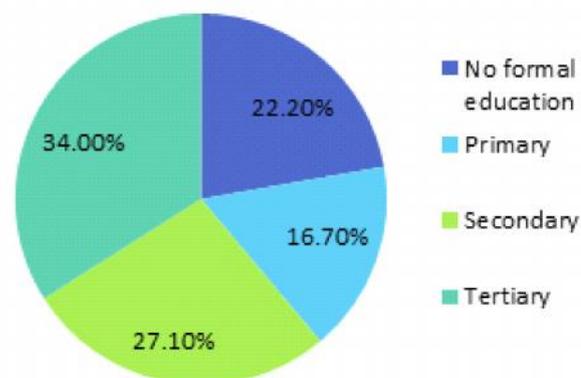
### Association of different variables with grouped systolic blood pressure

Table 2 shows association of variables with grouped systolic blood pressure.

Thirty-five (45.5%) of those respondents with no formal education had systolic hypertension while 20 (26.0%) had normal blood pressure. Majority (57.6%) of the respondents who had tertiary education had normal blood pressure while 24 (20.3%) had systolic hypertension. However, the association was statistically significant ( $\chi^2 = 39.88$ , p-value = 0.0001)

Majority (60.0%) of the respondents who were underweight had normal blood pressure while a minority 5(12.5%) had systolic hypertension. Twenty-one (36.8%) of those respondents who were obese had systolic hypertension while 16 (28.1%) had normal blood pressure. However, the association was statistically significant ( $\chi^2 = 20.61$ , p-value = 0.02)

Majority 84 (80.80%) of the respondents who were 34 years and less had normal blood pressure while a minority 5(4.8%) had systolic hypertension. Thirty 30(29.70%) of those respondents who were 55 years



**Fig. 1:** Distribution of educational levels of respondents

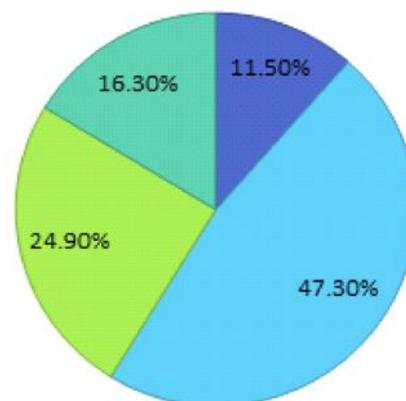
and above had systolic hypertension while 24 (23.80%) had normal blood pressure. However, the association was statistically significant ( $\chi^2 = 87.62$ ,  $p$ -value = 0.0001)

### Logistic regression analysis of risk of developing systolic blood pressure on selected variables

Table 3 shows the logistic regression analysis of risk of developing systolic blood pressure on selected variables. After adjusting for other variables, the predictor of development of systolic blood pressure was age of respondents.

Respondents who were between 45 and 54 years of age were about 2 times less likely to develop systolic hypertension compared with respondents 55 years and above. (OR= 0.529; 95% CI = 0.265-1.055).

Respondents who were between 35 age 44 years of age were about 4 times less likely to develop systolic hypertension compared with respondents 55 years and above. (OR= 0.270; 95%CI= 0.124 – 0.589 ).



■ underweight ■ normal weight ■ overweight ■ obese

**Fig.2:** Distribution of body mass index of respondents

**Table 3:** Logistic regression analysis of risk of developing systolic blood pressure on selected variables

Variable	Odd Ratio	95% CI	p-value
<b>Educational level</b>			
No education	1.080	0.5- 2.336	0.845
Primary	1.202	0.538 – 2.687	0.654
Secondary	0.530	0.233- 1.206	0.130
Tertiary	1		
<b>Age (years)</b>			
34 and less	0.069	0.023 – 0.204	0.0001*
35 to 44	0.270	0.124 – 0.589	0.001*
45 to 54	0.529	0.265-1.055	0.071
55 and above	1		
<b>BMI</b>			
Underweight	0.329	0.100- 1.086	0.169
Normal weight	0.617	0.301-1.268	0.068
Overweight	0.448	0.195-1.031	0.189
Obese	1		0.059
<b>Exercise</b>			
Poor	1.077	0.610 – 1.901	0.798
Good	1		

\*Significant at 5% level of significance

Respondents with 34 years of age or less were about 14 times less likely to develop systolic hypertension compared with respondents 55 years and above. (OR= 0.069; 95% CI= 0.023 – 0.204).

Respondents who were overweight were about 2 times less likely to develop systolic hypertension compared with respondents who were obese. (OR= 0.448; 95% CI= 0.195-1.031).

Respondents who had normal weight were about 1.6 times less likely to develop systolic hypertension compared with respondents who were obese. (OR= 0.617; 95% CI = 0.301-1.268).

Respondents who were under- weight were about 3 times less likely to develop systolic hypertension compared with respondents who were obese. (OR= 0.329; 95% CI= 0.100- 1.086).

**Table 4:** Association of variables with grouped diastolic blood pressure

Variable	Normal BP	Pre-hypertension	Hypertension	$\chi^2$	p-value
<b>Level of education</b>					
No education	46(59.7%)	22(28.6%)	9(11.7%)	11.45	0.246
Primary	37(63.8%)	15(25.9%)	6(10.4%)		
Secondary	71(75.5%)	13(13.8%)	10(10.7%)		
Tertiary	90(76.3%)	17(14.4%)	11(9.3%)		
<b>Age (years)</b>					
44 and less	145(81.46%)	22(12.36%)	11(6.18%)	33.40	0.0001*
45 to 54	42(59.20%)	16(22.50%)	13(18.30%)		
55 and above	59(58.40%)	29(28.70%)	13(12.80%)		
<b>Exercise</b>					
Good	91(72.8%)	18(14.4%)	16(12.8%)	6.49	0.09
Poor	154(68.8%)	49(21.9%)	21(9.4%)		
<b>Salt intake</b>					
Low	224(71.1%)	59(18.7%)	32(10.2%)	6.31	0.097
High	21(61.8%)	8(23.5%)	5(14.7%)		

\*Significant at 5% level of significance

#### Association of different variables with grouped diastolic blood pressure

Table 4 shows association of variables with grouped diastolic blood pressure.

Nine (11.7%) of the respondents with no formal education had diastolic hypertension while the majority (59.7%) had normal blood pressure. Majority (76.3%) of the respondents who had tertiary education had normal blood pressure while 11(9.3%) had diastolic hypertension. However, the association was not statistically significant ( $\chi^2 = 11.45$ , p-value = 0.246)

Thirteen (12.80%) of the respondents who were 55 years and above had diastolic hypertension while a majority (58.40%) had normal blood pressure.

However, the association was statistically significant ( $\chi^2 = 33.40$ , p-value = 0.0001)

Majority 224 (71.1%) of the respondents who had low salt intake had normal blood pressure while 32(10.2%) had diastolic hypertension. Twenty one (61.8%) of respondents with high salt intake had normal blood pressure while 5 (14.7%) had diastolic hypertension. However, the association was not statistically significant ( $\chi^2 = 6.31$ , p-value = 0.097)

#### Logistic regression analysis of risk of developing diastolic blood pressure on selected variables

Table 5 shows the logistic regression analysis of risk of developing diastolic blood pressure on selected

**Table 5:** Logistic regression analysis of risk of developing diastolic blood pressure on selected variables

Variable	Odd Ratio	95% CI	p-value
<b>Age (years)</b>			
34 and less	0.265	0.083 – 0.848	0.025*
35 to 44	0.672	0.252 – 0.1791	0.427
45 to 54	0.820	0.644-2.467	0.350
55 and above	1		
<b>Exercise</b>			
Poor	1.415	0.693- 2.890	0.341
Good	1		
<b>Salt intake</b>			
Low	0.606	0.209 – 1.757	0.356
High	1		

\*Significant at 5% level of significance

variables. After adjusting for other variables, the predictor of risk of developing diastolic blood pressure was age of respondents.

Respondents within the age range from 45 to 54 years were about 1.2 times less likely to develop diastolic hypertension compared with respondents who were 55 years old and above (OR= 0.82; 95%CI= 0.644-2.467).

Respondents, age 35 to 44 years, were about 1.5 times less likely to develop diastolic hypertension compared with respondents 55 years and above (OR= 0.672; 95%CI= 0.252 – 1.791).

Respondents, age 34 years and less, were about 4 times less likely to develop diastolic hypertension compared with respondents 55 years and above (OR= 0.265; 95%CI= 0.083 – 0.848).

Respondents who had poor exercise were about 1.4 times more likely to develop diastolic hypertension compared with respondents who practice good exercise. (OR= 1.415; 95% CI= 0.693 -2.890 ).

Respondents who had low salt intake were about 1.7 times less likely to develop diastolic hypertension compared with respondents who had high salt intake. (OR= 0.606; 95% CI = 0.209 -1.757).

## DISCUSSION

There has been an increase in prevalence of hypertension worldwide attributed mainly to lifestyle changes. In this study, the prevalence of hypertension was found to be 29% at a Secondary Health care facility in a Semi-urban town of South-Western Nigeria. This is in contrast to what was reported by Suleiman in a study conducted in a Semi-urban community of South-South Nigeria in which he found 15% prevalence of hypertension among the participants.<sup>8</sup>

The prevalence of hypertension in this study was higher than 13.6% reported by Asekun-Olarinmoye and colleagues from their study conducted in a rural community in South-West Nigeria.<sup>9</sup> Cappuccio *et al*, Iwelunmor *et al* and Adediran *et al* also reported that the prevalence of hypertension is higher in Semi-urban than in rural areas.<sup>17,18,19</sup> The prevalence of hypertension of 29% found in this study showed that it is higher than the findings in most rural areas. It was found that a significant number of respondents who were obese had systolic hypertension. This finding was similar to the report of Daniel and colleagues in a study conducted in Lagos.<sup>12</sup>

In this study, it was found that the prevalence of hypertension increases with age and there was a strong association between age and hypertension, the older respondents are more likely to develop hypertension than the younger respondents. This was similar to the findings of a systematic review by Sarki and others who reported that age was related to hypertension status of the respondents.<sup>13</sup>

## CONCLUSION

Obesity, age and education were found to be risk factors for developing systolic hypertension. However, after adjusting for other variables, the predictor of risk of developing diastolic blood pressure and systolic blood pressure was age of respondents. A prevalence of 29% for hypertension at the State Hospital Oyo is very significant. Therefore it is highly recommended that routine blood pressures should be done for all adult patients attending hospitals in Oyo State to prevent complications like heart failure, renal failure and stroke.

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