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## PREVALENCE OF HYPERTENSION AND ASSOCIATED VARIABLES IN PAID WORKERS IN ILORIN, NIGERIA

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### ABSTRACT

**Background:** The enormous burden of hypertension worldwide and in Africa, informed the decision to measure the blood pressure pattern in salaried workers in Ilorin, Nigeria. These were selected, as they resemble closely those that are likely to be affected by western style living.

**Methods:** It was a cross-sectional study that involved staff of both government and a private organisation in Ilorin, Nigeria. Two hundred and eighty one subjects, comprising of 211 males and 70 females were recruited into the study. Systolic blood pressure (SBP), diastolic blood pressure (DBP), body mass index (BMI) and fasting plasma glucose (FPG) were determined.

**Results:** The prevalence of hypertension was 27.1% in the population, being 28.4% in males and 22.9% in females. Mean SBP and DBP were significantly higher in females (SBP; 139.59mmHg  $\pm$  20.84, DBP; 86.92mmHg  $\pm$  10.96) than in males (SBP; 127.39mmHg  $\pm$  19.55, DBP; 82.16mmHg).  $P < 0.05$ . The prevalence of hypertension increased with age and BMI. Age was correlated to SBP, ( $r = 0.355$ ,  $P < 0.01$ ) DBP, ( $r = 0.322$ ,  $P < 0.01$ ) and BMI ( $r = 0.143$ ,  $P < 0.05$ ). Obesity prevalence was 13.2% consisting of males (5.3%) and females (7.8%). Prevalence of diabetes mellitus was similar in both sexes at 1.5%.

**Conclusion:** There is a high prevalence of hypertension among salary earners in Ilorin, Nigeria and this is commoner among males. The degree of increase in BP is worse in female workers. Obesity is on the upward climb in our society and should be addressed early in order to curtail its associated morbidities.

**Key Words:** Hypertension, Paid Workers, Nigeria.

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### INTRODUCTION

Hypertension, though a world-wide problem, is said to be having a great toll on the health of sub-Sahara Africa where it is now recognised as a major cause of cardiovascular disability and mortality.<sup>1</sup> Community and hospital based studies in Africa suggest that 5-15% of people die from cardiovascular diseases resulting from hypertension<sup>1,2</sup>.

In Africa and other parts of the world, the prevalence of hypertension is higher in urban than in rural area. A predominant portion of these urban residents are salary earners. Some workers have noted that not only is hypertension experiencing a graded increase in Africans,<sup>3,4</sup> it is particularly worrisome in working class persons<sup>5</sup>.

Among possible factors for this phenomenon are increased body weight, adoption of western style-diet and sedentary living. In addition to these, work place stress has been found to increase the blood pressure of some groups of workers<sup>6</sup>.

The essence of this study was to examine the pattern of blood pressure (BP), hypertension and other

variables, in this group of Nigerians vis-à-vis the general population.

### MATERIALS AND METHOD

In conjunction with the health services department of a soft drink manufacturing company and Federal Secretariat Complex, in Ilorin, Nigeria, a screening was organized for the detection of hypertension among the members of staff. These members of staff were properly briefed on the essence of the programme and the need to come fasting on the day they were to be screened. Employees who were less than one year on the job were excluded from the study. The subjects had their BP measured after a 5-10 minutes rest, in the sitting position without crossed legs. Blood pressure was taken using a mercury sphygmomanometer, in both arms in order to rule out significant inter-arm difference. Hypertension was defined as BP = 140/90mmHg according to the World Health Organisation/International Society of Hypertension (WHO/ISH) guidelines. In subjects that had values diagnostic of hypertension on first reading, they were re-evaluated the next day after which they were considered hypertensive if BP reading was still = 140/90mmHg.

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All the subjects who fasted had 5 millilitres of venous blood taken from them on the first day of screening and put into fluoride oxalate bottles. This blood sample was used for the measurement of fasting plasma glucose (FPG).

The weights of the subjects were taken with minimal clothing, using a WHO Balance Beam Scale, supplied to the Department of Chemical Pathology & Immunology, University of Ilorin Teaching Hospital, Ilorin, Nigeria. Subjects' height values were taken from measuring scale drawn against the wall of their respective clinics. In measuring their heights, the subjects who were barefooted, stood against the marked wall with their Achilles, gluteus and occiput touching it. Body mass index (BMI) was calculated from the values of weight in kilograms and height in metres. Normal BMI was taken as 20-24.9kg/m<sup>2</sup>, overweight (25.0-29.9kg/m<sup>2</sup>) and obesity was defined as BMI ≥30kg/m<sup>2</sup>. The means of the variables in the whole population and gender groups were determined. The differences in means were compared using the Student t-Test. Percentages of some of the variables in the different age groups and sexes were determined. These were compared using Chi Square statistics.

## RESULTS

Two hundred and eighty-one (281) subjects were recruited from the two establishments involved in the study, out of which 207 were males. The balance of 70 subjects was female, thus constituting a male to female ratio of 3:1. About 27% (76) of the subjects had hypertension; this was made up of 60 males (28.44%) and 16 females (22.86%). The mean systolic BP (SBP) and diastolic BP (DBP) of the whole study population were 130.43mmHg ± 20.53 and 83.34mmHg ± 11.99 respectively. The males had a mean SBP of 127.39mmHg ± 19.55 and mean DBP of 82.16mmHg ± 12.10. These values were significantly lower than those of females (SBP; 139.59mmHg ± 20.84, DBP; 86.92mmHg ± 10.96). P < 0.05 (Table 1)

The percentage of subjects with high SBP and DBP rose with increase in age. In the 20-29 years age group subjects, only 6.7% of them had high SBP and this rose to 35.4% in those 50 years and above. Similarly, those with high DBP increased from 4.4% in 20-29 years age bracket to 26.2% in the 40-49 years bracket, after which there was a slight dip to 25% in those = 50 years. (Table 2) Age was correlated to SBP (r = 0.332, P < 0.01) and DBP (r = 0.355, P < 0.01). The rise in percentages of those with high SBP and DBP increased as BMI increased. In normal weight individuals, 18.1% of them had high SBP and this rose to 37.8% in obese persons. In the same vein, 13.6% of those with normal BMI had high DBP and this increased to 29.7% of the obese subjects. (Table 3).

The mean BMI in the whole population was 24.35kg/m<sup>2</sup> ± 4.76. This was similar to the mean BMI in both the males (24.26kg/m<sup>2</sup> ± 4.86) and females (24.61kg/m<sup>2</sup> ± 4.45). However, elevated BMI index became obvious in the females when the percentage of those with overweight and obesity were compared in both sexes. While 21.8% of males were overweight, it was 30% in the females. Similarly, 7.11% of the male subjects had value consistent with obesity, and this was 31.43% in the females. The problem of weight increases with age in this study. Overweight was the predominant problem in the study as 23.8% of them were affected. About 13% of the subjects were obese. Prevalence of male obesity in the study was 5.3% and that of females was 7.8%. The age bracket 40-49 years had the highest number of persons who were overweight (32.1%). The peak percentage of obese persons was 20% and this occurred in those subjects aged 30-39 years. Age was correlated to BMI (r = 0.143, P < 0.05)

Mean fasting plasma glucose level did not differ significantly in the males (4.02mmol/L ± 3.15) and females (3.72mmol/L ± 1.27), though it was slightly higher in the males.

About 1.5% of male and female subjects whose FPG was measured had values greater than 7.0mmol/L.

Table 1: Means of Variables in the Whole Population and the Gender Differences

Variables	Whole Population		Males		Females	
	No of Subj.	Mean(SD)	No Of Subj.	Mean (SD)	No of Subj.	Mean(SD)
AGE(YRS)	281	40.34 (9.58)	211	36.62 (6.99)	70	51.56 (7.31)*
BMI(Kg/m <sup>2</sup> )	280	24.35 (4.76)	210	24.26 (4.86)	70	24.61 (4.45)
SBP(mmHg)	281	130.43 (20.53)	211	127.39 (19.55)	70	139.59 (20.84)*
DBP(mmHg)	281	83.34 (11.99)	211	82.16 (12.10)	70	86.92 (10.96)*
FPG(mmol/L)	267	3.90 (2.58)	201	4.02 (3.15)	66	3.72 (1.27)

SUBJ= SUBJECTS

SD = STANDARD DEVIATION

YRS = YEARS

\* = Difference is statistically significant at P < 0.05

**Table 2: Subjects with High SBP and DBP in the Different Age Groups**

Age Group (Years)	Systolic Blood Pressure (SBP)		Diastolic Blood Pressure (DBP)	
	High N (%)	Normal N (%)	High N (%)	Normal N (%)
20-29	3.0 (6.7)	42.0 (93.3)	2.0 (4.4)	43.0 (95.5)
30-39	14.0 (17.3)	67.0 (82.7)	8.0 (9.9)	73.0 (90.1)
40-49	31.0 (29.0)	76.0 (71.0)	28.0 (26.2)	79.0 (73.8)
=50	17.0 (35.4)	31.0 (64.6)	12.0 (25.0)	36.0 (75.0)

Chi square for age and SBP = 14.51

Degree of freedom = 3

P value = 0.00228

Chi square for age and DBP = 15.80

Degree of freedom = 3

P value = 0.00124

**Table 3: Subjects with High SBP and DBP in the Different BMI Groups**

BMI Groups (Kg/M <sup>2</sup> )	Systolic Blood Pressure (SBP)		Diastolic Blood Pressure (DBP)	
	High N (%)	Normal N (%)	High N (%)	Normal N (%)
Normal (20.0-24.9)	32.0 (18.1)	145.0 (81.9)	24.0 (13.6)	153.0 (86.4)
Overweight (25.0-29.9)	19.0 (28.4)	48.0 (71.6)	15.0 (22.4)	52.0 (77.6)
Obesity (=30.0)	14.0 (37.8)	23.0 (62.2)	11.0 (29.7)	26.0 (70.3)

**Table 4: The Distribution of Males and Females in the Various BMI Classifications.**

BMI Groups (Kg/m <sup>2</sup> )	Male N (%)	Females N (%)	Total N (%)
Normal (20.0-24.9)	149.0 (70.95)	27.0 (38.57)	176.0 (62.86)
Overweight (25.0-29.9)	46.0 (21.91)	21.0 (30.0)	67.0 (23.93)
Obesity (= 30.0)	15(7.14)	22.0 (31.43)	37.0 (13.21)
<b>Total</b>	210 (100)	70 (100)	280 (100)

**Table 5: The Distribution of the BMI Classifications in Different Age Groupings**

BMI Groups (Kg/m <sup>2</sup> )	Age Groups in Years				
	20-29 N (%)	30-39 N (%)	40-49 N (%)	=50 N (%)	Total
Normal (20.0-24.9)	41.0 (89.10)	49.0 (61.30)	55.0 (51.90)	31.0 (64.58)	176.0 (62.86)
Overweight (25.0-29.9)	4.0 (8.70)	15.0 (18.80)	34.0 (32.10)	14.0 (29.17)	67.0 (23.93)
Obesity (= 30.0)	1.0 (2.20)	16.0 (20.00)	17.0 (16.0)	3.0 (6.25)	37.0 (13.21)
<b>Total (%)</b>	46.0 (100.0)	80 (100.0)	106 (100.0)	48.0 (100.0)	280.0 (100.0)

## DISCUSSION

As is commonly observed in most establishments in Nigeria, there were more males in the places of work concerned in this study. Apart from this study, another one conducted in urbanized workers in Ibadan, Nigeria<sup>7</sup> showed a similar trend with a male-to-female ratio of 2:1. This could have some effects on the statistical deductions of some parameters compared by gender.

The overall prevalence of hypertension in this study was 27.1%. This is higher than what was found in an India urban population in the northern part of the country (23.7%) using the same cut-off value according to WHO/ISH guidelines<sup>8</sup>. In another study in western India, researchers found values as high as 30% in males and 33% in females which were clearly higher than what was found in this study. Some studies done earlier in Nigeria<sup>3,9</sup> on the general population and in salaried workers<sup>7</sup> used the old WHO criteria of BP cut-off of 160/95mmHg. An Indian study<sup>8</sup> that compared the prevalence rate of hypertension using the old criteria of 160/95mmHg and the recent BP cut-off of 140/90mmHg, found that the rate due to the old criteria was approximately half of that due to the new criteria. When this is extrapolated to the Nigeria studies, prevalence rates of hypertension in the non-communicable diseases in the Nigeria Survey<sup>3</sup> and in urbanised workers in Ibadan<sup>7</sup>, will be 22.4% and 18.6%. If this was correct, it will reiterate the position that the value in our study population is high. Application of the same assumption to a study in Harare, Zimbabwe with a prevalence rate of 26% at 160/95mmHg will suggest that they have the highest rate of hypertension in salaried workers in Africa, according to data available to the authors. What this means is that, workers in various part of Nigeria should undertake further epidemiological studies of hypertension using the recent BP cut-off. This will help to give proper appraisal of the current situation, with regard to the prevalence of hypertension in different parts of the country. Caution must therefore be taken to accept the position of some workers in Nigeria that the prevalence of hypertension was similar over four decades<sup>7</sup>. Hypertension was commoner in males (28.44%) than in females (22.9%) in this study.

Gender difference in hypertension prevalence varies from place to place. In Nigeria, some studies<sup>7,11</sup> have shown higher prevalence of hypertension in males while others<sup>12</sup> noted the reverse. Another study in Nigeria<sup>9</sup> did not find any gender difference in the prevalence of hypertension. This varied position was not restricted to Nigeria. In India, some studies<sup>8,13</sup> noted higher prevalence of hypertension in males and in another study<sup>14</sup> it was higher in females. Still, another study<sup>15</sup> in India found no gender difference in the prevalence of hypertension. The mean SBP and DBP were significantly higher in females in this study. This is not in agreement with other studies<sup>7,8,9</sup> that found higher values in males. Though some workers<sup>12,14</sup> found slightly higher prevalence in females like in the present study, it was however not significantly so. It should be noted that except in one study<sup>7</sup>, the other studies so compared were not conducted strictly among paid workers. It is suspected that women in salaried jobs in the part of the world where this study was conducted, might be more prone to developing hypertension. Researchers have suggested that women, especially married ones with children, are exposed to all day stress from work place to their homes hence have higher SBP and DBP<sup>6</sup>. This position was strengthened by the Framingham study where such women had the highest incidence of coronary heart disease<sup>16</sup>. In addition to this, the higher mean age of women in this study could contribute to their mean higher mean SBP and DBP, since BP is related to age even in this study.

The increase in BP with increasing age noted in this study is a consistent finding in both developing<sup>7,9,14,15</sup> and developed countries<sup>17</sup>. Similarly, as the BMI increase the proportion of those with elevated SBP and DBP also increased. This relationship between BP and BMI has been previously noted in other studies in Nigeria<sup>3,7,9</sup> and in the MONICA project that involved 41 countries<sup>18</sup>. Weight gain has been argued to be partly responsible for the increase of BP that occurs with aging<sup>6</sup>. The environment of this study seems to be experiencing a progressive trend in the prevalence of overweight/obesity in the country. Obesity prevalence in earlier studies in Nigeria<sup>9,11,19</sup> ranged from 2-8%. The prevalence of obesity of 13.2% in this study is therefore high and uncomfortable, giving the enormity of the problem in developed world. In particular, females were more affected, as 7.8% of them were obese compared to 5.3% males affected in the whole population. So many workers have acknowledged the greater problem of obesity in females<sup>9,11,19</sup>. In the present study, the greatest burden of overweight was in the 40-49 years age bracket while the highest prevalence of obesity occurred in the 30-39 years age bracket.

This age bracket also had the highest number of cases of obesity in another study<sup>20</sup> that was evaluating another health issue. This should be considered by health planners in their designing of programs geared towards improving weight status of our people. Since weight loss is the most effective non-pharmacologic means of lowering BP<sup>21</sup>, it should be commenced early in the lives of Nigerians, especially in a depressed economy.

Fasting hyperglycaemia occurred in only 1.5% of the subjects in this study and this was lower than that found (3.0%) in another study<sup>11</sup>, but similar to yet another (1.7%)<sup>19</sup>. About 5.6% of the whole population had borderline fasting plasma glucose (> 7mmol/L). This suggests that the prevalence of diabetes among this set of people in the Ilorin area of Nigeria, still has a diabetes mellitus prevalence that is tolerable.

In Ilorin, Nigeria paid workers have a high prevalence of hypertension and this is worse among the males. But the degrees of increase of mean blood pressure values are higher in the female subjects. This was in addition to the higher prevalence of overweight and obesity in this group. It is therefore advised that attention should be paid by clinicians, to the problem of overweight/obesity in hypertensive adult Nigerians, especially in those in paid employment. This is particularly so, as weight management is an effective non-pharmacologic therapy in obese hypertensives.

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