

# Sex Differences And Relationship Between Blood Pressure And Age Among The Ibos Of Nigeria

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## Abstract

Studies have established relationship between age and blood pressure (BP). The present study was carried out to establish normal BP values for the various age categories of both sexes and also to examine sex differences in BP within the various age groups of the Ibos. A random sampling of 563 Ibos of Nigeria aged 20 to 89 years, mean age  $33.61 \pm 13.61$  were used for this study. The systolic blood pressure (SBP) and the diastolic blood pressure (DBP) were measured following standard protocol. The mean SBP and DBP of the study population was  $119.63 \pm 23.24$  and  $79.78 \pm 12.80$  respectively. When divided into seven age groups the analyses showed that both SBP and DBP increased with age. The lowest SBP was recorded in age 20 – 29 years in both sexes. The same was applicable for DBP. Generally men exhibited relatively high level of BP values, except for age groups 50 – 59 years and 60 – 69 years (SBP) where the mean BPs was slightly higher in the females. A significant difference was noted between DBP of males and females ( $p < 0.05$ ) but none in the SBP. There was significant positive correlation ( $p < 0.01$ ) of both SBP and DBP with age ( $r = 0.477$  and  $0.331$  respectively). Our result is consistent with the findings that BP increases with age, with significant difference between males and females.

## INTRODUCTION

Several literatures have documented elevated blood pressure as the leading cause of morbidity throughout the world, and also a major contributor to cardiovascular disease (CVD),<sup>1,2</sup>. This process may begin early in life<sup>3,4,5</sup> because retrospective studies have demonstrated a relationship between lower birth weight and blood pressure<sup>6,7,8</sup>. The contribution of CVD to the burden of disease is reported to be increasing, all socio-economic groups are vulnerable and CVD is said to inflict major economic and human cost<sup>1,9</sup>.

The blood pressure levels of a population have been seen to be influenced by a variety of biological, behavioral and socio-economic factors<sup>10,11,12</sup>. Several studies have reported influence on BP by marital status. Married individuals have been reported to have elevated blood pressure than the never married<sup>13,14</sup>. Also concordance in BP has been reported among couples<sup>15,16</sup>. Age has been noted to contribute significantly to the variance in BP<sup>17</sup>. Kusuma et al.<sup>1</sup> carried out a study on blood pressure levels among cross-cultural population of Visakhapatnam District, Andhra Pradesh, India and reported age to vary directly and significantly with BP, particularly systolic blood pressure (SBP). Rohrscheib et al.<sup>18</sup> also noted an increase in systolic BP with age in a general population which was in contrast to the increase in

those of the haemodialysis patients.

Racial differences in BP have been reported in many studies on adults<sup>19,21</sup>. Evidences suggest that in developing countries the problem of CVD is often perceived to be affecting only the rich, however it has been observed that as the CVD epidemic increases, its burden shifts from the rich and better educated to the poorer and less educated<sup>22</sup>.

The Ibos are one of the major ethnic groups in Nigeria but no data exist on variation of blood pressure with age and sex. This research is intended to establish normal blood pressure values and also the relationship between age and BP among the study population. It will also form the base for further study among the other ethnic groups in Nigeria.

## MATERIALS AND METHODS

### AREA AND PEOPLE

The Ibos command a population density of over 800- 1500 per square kilometer<sup>23</sup>. They are one of the three major ethnic groups (Ibos, Hausa and Yoruba) in Nigeria. Many have migrated to the Northern and Western parts of the country and a lot others are in diasporas in search of better economic opportunities, as well as better education.

## STUDY DESIGN

This was based on a random sampling of 563 subjects (324 males and 239 females) aged 20 to 89 years of the Ibo ethnic group of Nigeria. The study covered a period of ten months as follows: eight months for data collection and two months for data analysis. This study was approved by Faculty of Medicine Ahmadu Bello University, Zaria, Nigeria. The various Ibo communities used for this study were first communicated through the community heads after which focused group discussions were held for the various groups and participants and the importance of the study explained to them. With the consent of the participants, BP measurement was taken. Pregnant women and hypertensive patients were excluded from the measurement.

## BLOOD PRESSURE MEASUREMENT (BP)

BP measurements were carried out by two trained nurses using aneroid sphygmomanometer and Littman stethoscope to the nearest 0.1mmHg. Participants were directed not to smoke, chew tobacco, take tea or coffee or do vigorous work, during the preceding 30 minutes before the blood pressure measurements were carried out. The participants were allowed to sit for a minimum of five minutes. Seated BP was then measured with the cuff on the right arm of the subject. The stethoscope was used to establish systole as the initiation of korotkov sound (phase 1) and diastole as the cessation of korotkov sound (phase 5). The BP was measured three times with the cuff completely evacuated and recovery allowed between readings. The average of the readings was used as the dependent variable, systolic and diastolic BP.

## STATISTICAL ANALYSES

Data were expressed as mean  $\pm$  standard deviation. Differences in the means of systolic BP (SBP) and diastolic BP (DBP) between females and males were tested using Student's t-test. Pearson correlation co-efficient was used to establish relationship between age and BP. Sigma Stat 2.0 for windows (Systat Inc., Point Richmond, CA) was used for the statistical analyses.

## RESULTS AND DISCUSSION

Table 1 gives the mean and corresponding standard deviation for SBP by age and sex of the study population. The lowest mean SBP was recorded in age group 20-29 in both sexes while the highest was recorded in age group 80-89 in both sexes. Table 2 shows the mean DBP of the population by age and sex. The lowest and highest were recorded in age groups 20-29 and 80-89 respectively. The

age distribution of mean SBP and DBP of the males and females (see figures 1 and 2), shows that BP rises with increasing age. Regarding sex differences, the means of SBP and DBP were relatively higher in males than in females, except at age 50-59, where the mean BPs were slightly higher in the females. Correlation analysis indicates that both SBP and DBP increases with age ( $r = 0.477$  and  $0.331$  at  $p < 0.001$ ). The result also shows that as SBP increases DPB increases also ( $r = 0.768$  respectively at  $p < 0.01$ ).

In the comparison of the means of the SBP, DBP, and ages of population using the paired t-test, significant difference was between DBP of males and females [ $t(2.13) = 236$ ,  $p < 0.05$ ] but not in the SBP.

**Figure 1**

Table 1: Summary of the systolic blood pressure of the Ibo males and females by age.

Age	N	Males SBP $\pm$ SD	N	Females SBP $\pm$ SD
20-29	37	115.94 $\pm$ 13.04	37	104.67 $\pm$ 10.61
30-39	98	115.65 $\pm$ 12.30	95	109.73 $\pm$ 14.73
40-49	50	122.24 $\pm$ 21.50	50	114.05 $\pm$ 19.70
50-59	26	125.57 $\pm$ 23.04	26	129.41 $\pm$ 29.76
60-69	18	136.12 $\pm$ 27.40	18	140.65 $\pm$ 37.53
70-79	8	154.80 $\pm$ 54.92	8	154.08 $\pm$ 25.67
80-89	5	155.33 $\pm$ 39.06	5	154.08 $\pm$ 21.19

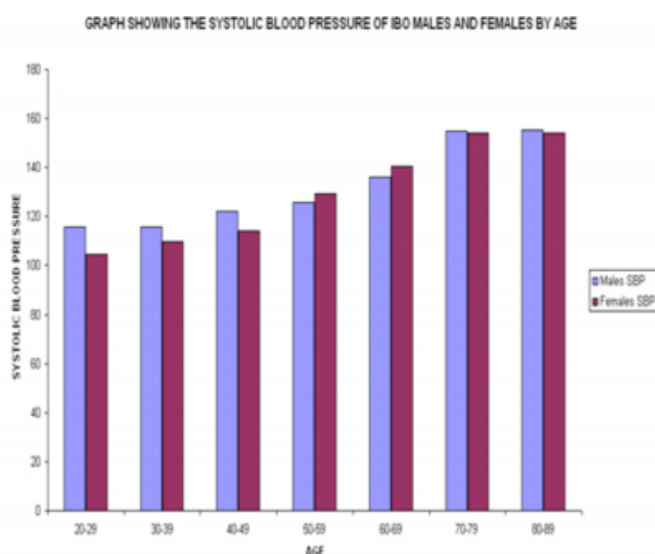
**Figure 2**

Table 2: Summary of diastolic blood pressure of Ibo males and females by age.

Age	N	Males DBP $\pm$ SD	N	Females DBP $\pm$ SD
20-29	28	77.35 $\pm$ 11.65	37	72.10 $\pm$ 9.07
30-39	143	78.11 $\pm$ 9.82	95	74.78 $\pm$ 10.98
40-49	77	83.81 $\pm$ 12.54	50	77.56 $\pm$ 12.93
50-59	36	85.64 $\pm$ 15.61	26	85.89 $\pm$ 15.91
60-69	24	88.54 $\pm$ 13.47	18	86.67 $\pm$ 15.34
70-79	10	86.60 $\pm$ 15.43	8	83.33 $\pm$ 15.53
80-89	6	90.00 $\pm$ 18.71	5	90.00 $\pm$ 21.60

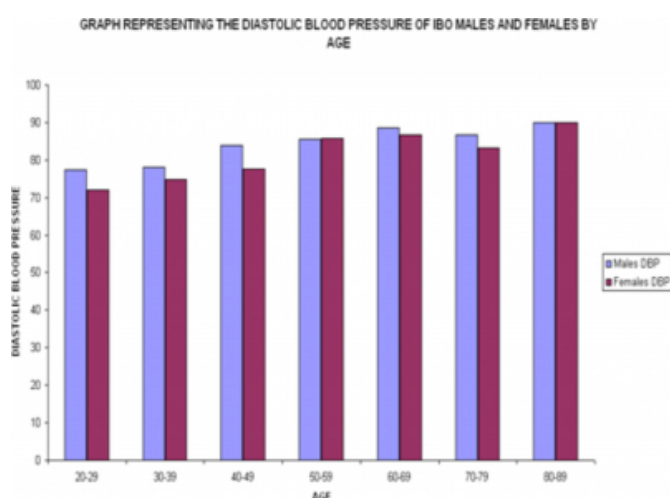
**Figure 3**

Figure 1. The relationship between age and SBP of both males and females



**Figure 4**

Figure 2. The relationship between age and DBP of both males and females.



## DISCUSSION

In the present study, differences in BP were observed between males and females. These sex differences were noted with males having higher SBP and DBP than the females. This is in agreement with the report of Kusuma et al.<sup>1</sup> that in general, men possess higher BP levels (either systolic or diastolic BP) than females. Smith and Rinderknecht<sup>24</sup> reported sex differences in BP independent of body mass index (BMI) in younger children (5-8 years) and older (9-18 years), where the older boys had significantly higher SBP and DBP than the girls. Other researchers<sup>25,26</sup> have also reported sex differences in BP

with males having elevated BP than the females during adolescent and early adulthood. Schall<sup>27</sup> reported lower mean BP for women than men and suggested that women were less responsive to the effects of modernization than men. This “buffering” effect for women against environmental stress may extend to young girls making them more resilient to the pressures of urban dwelling; however our study indicated that at age 70-79 years and 80-89 years, the mean SBP and DBP were the same for the different sexes respectively.

Age related increase in SBP and DBP was observed among men and women. The tables and graphs depict that mean SBP tend to rise from the fourth decade of age in both sexes. This is contrary to the work by Kusuma et al.<sup>1</sup> in which the rise was only observed in the mean SBP of the females. The relationship between age and DBP tend to be linear in the general population. However this does not agree with the report by Rohrscheib et al.<sup>24</sup> in which the relationship between age and DBP in the general population is inverted “U”-shaped but agrees with their report on BP. Gardner and Poehlman<sup>28</sup> in their work on predictors of the age-related increase in blood pressure in men and women concluded that after the influence of the predictor variables of mean arterial pressure (MAP) were controlled, the relationship between MAP and age persisted in women beyond 62 years of age, but not in women younger than age 62 or in men of any age. In agreement with the work of Mukhopadhyay et al.<sup>29</sup> on the blood pressure profiles of the Lepchas of the Sikkim Himalayas, age has been noted to have a significant effect on both SBP and DBP in both sexes of the Ibos.

The increasing prevalence of obesity and hypertension in developing countries<sup>30,31</sup> and the widespread speculation that Africans may be having higher possibilities of susceptibility of blood pressure to excessive adiposity than the Western population<sup>32</sup> and will be severely affected<sup>33</sup> have made the normal documentation of blood pressure within the various age categories and its relationships with factors such as sex, geographical, socio-cultural, anthropometric etc very pertinent within the various ethnicities of Africa. The increase of BP with age has been noted to be more rapid amongst blacks with Western lifestyle<sup>32</sup>.

This work has established normal BP values for various age categories of males and females of the Ibo ethnicity. It has also considered the relationship of BP with sex, age and also compared findings with similar researches in other

ethnicities of the world.

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