Prevalence and Pattern of Blood Pressure and Anthropometric Measurements: A comparative cross-sectional study in Kwara Central, North-Central Nigeria

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Summary

BACKGROUND

The elderly are usually prone to different age-related chronic non-communicable diseases like cardiovascular diseases (CVDs). CVDs cause mortality, particularly in the elderly, and hypertension and obesity are important risk factors in their development. This study assessed the prevalence and pattern of blood pressure and anthropometric measurements among the elderly in rural and urban areas of Kwara Central, North-Central Nigeria

MATERIALS AND METHODS

This study was a cross-sectional analytical (comparative) study among 300 elderly people in the rural and urban communities in Kwara Central, North-central, Nigeria. Respondents were selected through a multi-stage random sampling technique. Data was collected through the use of pre-tested semi-structured interviewer-administered questionnaires. Analysis was carried out using IBM Statistical Package for Social Sciences (IBM-SPSS) version 20. Data were presented in tables and charts. The level of significance was predetermined at a p-value of less than 0.05 at a 95% confidence level.

RESULTS

The mean age of the elderly in the rural community was 76 ± 11.6 years compared to 74 ± 10.4 years for the urban community. The proportion of the female respondents was higher than males in both rural group 96 (64.0%) and urban group 84 (56.0%). The waist circumferences and waist-to-hip ratios were significantly higher among the elderly in the urban communities (20.0%, 20.7%) than in the rural communities (11.3%, 16%) (p= 0.039). Similarly, there were significantly more overweight and obese elderly in the urban communities (18.0%, 16.0%) than those in the rural communities (12.7%, 4.7%) (p= 0.003). The proportion of those with elevated blood pressure in the urban group was significantly higher than those in the rural group (p =0.038).

CONCLUSION

The blood pressure pattern and anthropometric indices that portend an increased cardiovascular risk among the elderly were more prevalent in the urban than in the rural communities.

Keywords: *elderly, blood pressure pattern, cardiovascular risk, north-central Nigeria communities*

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Introduction

Health problems usually tend to increase with advancing age. However, very often these problems are aggravated by poor economic status, neglect, social deprivation and inappropriate dietary intake. Individuals aged 60 years and older constitute about 12.3% of the world's population and this figure is projected to increase to approximately 22% by 2050.[2] Sub-Saharan Africa has a smaller population of old people but is projected to be doubled by 2030.[2]

Old persons are usually prone to different age-related chronic non-communicable diseases. [3] The leading cause of mortality and morbidity in developing countries is cardiovascular diseases (CVDs). [4] The rate is expected to increase over the next few years as there is a dramatic increase in the prevalence of CVD risk factors in low-and middle-income African countries, particularly in urban areas. [4]

The complications of CVDs are more pronounced in the elderly. [5] Hypertension, as a major risk factor, for the development of CVD and the main cause of morbidity and mortality worldwide, increases with age. [6] According to the World Health Organization, hypertension is defined as a condition in which the blood pressure is persistently high. [7] Over the years, with the ageing of the population, the prevalence of obesity has been increasing in older people. Obesity is the most important risk factor for several lifestyle-related diseases including hypertension, type 2 Diabetes Mellitus and CVD in the elderly population as well as in the middle-aged population. [8]

Studies on the blood pressure pattern, waist circumference (WC), Waist/Hip ratio (WHR) and body mass index (BMI) among the elderly are sparse in the North Central part of Nigeria. The few studies available are either hospital-based or were carried out in either urban or rural areas. There is a dearth of studies on the rural-urban differences among the elderly hence this study. Care for the elderly is a major need and should be prioritized in health and social policies. [9]

This study assessed and compared the prevalence and pattern of blood pressure and anthropometric measurements among the elderly in rural and urban areas of Kwara Central, North-Central Nigeria.

Materials and Methods

Study area

Kwara State is one of the 36 states in Nigeria. It has three senatorial districts, namely, Kwara Central Senatorial District, Kwara South Senatorial District and Kwara North Senatorial District. Kwara Central Senatorial District was the study area and it is made up of four Local Government Areas (LGAs), namely, Asa, Ilorin East, Ilorin West and Ilorin South LGAs with their headquarters at Afon, Oke-Oyi, Wara-osin area and Fufu respectively.

Study design

The study was a cross-sectional analytical (comparative) study among the elderly in rural and urban settings in Kwara Central Senatorial District in North-Central Nigeria.

Study Population

The study population consisted of the elderly in rural and urban communities in Kwara Central Senatorial District.

Inclusion Criteria

The elderly in rural and urban communities in Kwara Central Senatorial District, who were permanent residents for at least 6 months in the communities at the time of the study, were included in this study.

Exclusion criteria

The elderly who could not communicate through any means or those without sufficient cognitive ability to answer the study questions and those very ill who could not give consent were excluded from the study.

Sample size determination

The minimum sample size was determined using the formula for comparison of two proportions [10] and after adjustment for non-response was done with an anticipated non-response rate of 10%, a total of 300 respondents were interviewed in both rural and urban areas of Kwara Central senatorial district.

Sampling technique

A multistage sampling technique was used for the selection of respondents for this study. Kwara Central Senatorial District has 4 LGAs. Two LGAs were selected; Asa, a rural LGA and Ilorin East, an urban LGA through simple random sampling by balloting. Two wards were randomly selected by simple random sampling by balloting from each of the urban and rural LGAs selected. The list of the communities in the 4 wards selected was generated. Two communities were selected by the use of a table of random numbers from each of the selected wards, giving 4 urban and 4 rural communities (a total of 8 communities). Then proportionate allocation was used to allocate questionnaires to each of the selected communities based on their populations. A systematic random sampling technique was used to select the households to be sampled using the sampling frame and where there was more than one eligible elderly person, a simple random sampling technique by balloting was used to select one eligible elderly. When there was no elderly person in the household, the next household was visited until an eligible respondent was found, but still maintained the sampling interval.

Data collection/Study instruments

Interviewer administered, semi-structured, pretested questionnaires were used to obtain data on socio-demographic characteristics, availability of support systems, self-reported morbidities and anthropometric measurements of the respondents.

The waist circumference (WC) was measured at a level parallel to the floor, the midpoint between the top of the iliac crest and the lower margin of the last palpable rib in the mid-axillary line. [11] The hip circumference (HC) was measured at a level parallel to the floor, at the widest circumference of the buttocks. [11] The blood pressure (BP) was measured twice at an interval of at least 2-3 minutes, using an OMRON M6 Comfort Automatic Blood Pressure Monitor Device. The respondents were asked to sit comfortably on a chair with their feet flat on the floor and arms resting on a table such that their arm cuff was at their heart level. Thereafter, the cuff was securely applied to the upper arm using the fabric fastener strip. The BP was taken from the left arm after at least 10 minutes of rest using the appropriate cuff size. While their blood pressures were being measured, the respondents were told to remain calm and silent.

Data Management

Analysis was done using the statistical package for social sciences (SPSS) version 20.0. Respondents with a WC >94-102cm for males and >80-88cm for females were classified as increased risk of cardio-metabolic complications while WC >102cm for males and >88cm for females were classified as substantially increased risk of cardio-metabolic complications.[11]The waist/hip ratio was obtained by dividing the WC by the HC. Waist/hip ratios of $\geq$ 0.90 for males and $\geq$ 0.85 for females were classified as those with increased risk of cardio-metabolic complications. [11]

The body mass index (BMI) was calculated by dividing the weight in kilogram (to the nearest 0.1Kg) by the square of the height in metres (to the nearest 0.01 metres). The results were categorized as follows: BMI <18.5Kg/m^2 - Chronic energy deficiency (CED), 18.5-24.9 Kg/m^2- Normal, 25.0-29.9 Kg/m^2 - Over Weight, $\geq$ 30Kg/m^2– Obese.[11,12]

The mean of the BP readings was obtained and classified based on the JNC VII

guidelines. [13] The classification was with systolic and diastolic as follows: Normal <120/<80 mmHg, Pre-hypertensive, 120-139/80-89 mmHg, Stage I 140-159/90-99 mmHg, Stage II ≥160/≥100 mmHg.

The independent variables included data collected on socio-demographic characteristics such as sex, age, religion, income per month, employment status, education level, marital status and source of social support. Information was also collected on self-reported morbidities. The dependent variables were the profile of morbidities, BP pattern, WC, waist/hip ratio and BMI.

Data collected was presented in prose, frequency tables, charts and graphs; and other relevant summary statistics were generated. The Chi-square test was used to determine the statistical significance of observed differences in cross-tabulated variables. A confidence limit of 95% was used in this study and a p-value of less than 0.05 was considered significant.

Ethical considerations

Ethical approval (reference number ERC PAN/2016/1606) to conduct the study was obtained from the Ethical Review Committee of the University of Ilorin Teaching Hospital before the commencement of the study. Written informed consent was obtained from each respondent before the administration of the questionnaire.

Table 1:
***Socio-Demographic Characteristics of Rural and Urban Elderly Respondents χ^2: Chi-square test, *: p value< 0.05 (Statistically* Significant)**

Variable	Rural	Urban	χ^2	Student's t -test p-value
	n (%) N=150	n (%) N=150		
Age group (years)				
60 – 69	51 (34.0)	62 (41.3)	7.383	0.061
70 – 79	39 (26.0)	50 (33.3)		
80 – 89	34 (22.7)	22 (14.7)		
≥90	26 (17.3)	16 (10.7)		
Mean ± SD	76.04 ± 11.587	73.83 ± 10.44	1.738	0.083
Sex				
Male	54 (36.0)	66 (44.0)	2.000	0.157
Female	96 (64.0)	84 (56.0)		
Religion				
Christianity	5 (3.3)	71 (47.3)	76.762	**<0.001***
Islam	145 (96.7)	79 (52.7)		
Marital Status				
Married	75 (50.0)	89 (59.3)	2.636	0.104
Widowed	75 (50.0)	61 (40.7)		
Type of Family				
Monogamy	55 (36.7)	93 (62.0)	19.257	**<0.001***
Polygamy	95 (63.3)	57 (38.0)		
Educational Level				
No formal education	133 (88.7)	71 (47.3)	61.310	**<0.001***
Primary education	11 (7.3)	31 (20.7)		
Secondary education	2 (1.3)	9 (6.0)		
Tertiary Education	4 (2.7)	39 (26.0)		
Employment status				
Employed	108 (72.0)	81 (54.0)	10.425	**0.001***
Unemployed	42 (28.0)	69 (46.0)		

Subjects' participation in this study was voluntary, confidentiality was maintained and they were given the liberty to withdraw at any stage of the study if they wished.

Results

Table 1 shows the distribution of the socio-demographic characteristics of respondents. A higher proportion of the urban, 62 (41.3%), than the rural respondents, 51 (41.3%) were aged 60-69 years. The mean age of respondents in the rural group (76 ± 11.6 years) was greater than that of the urban group (74 ± 10.4 years) and this difference in mean age was not statistically significant (p= 0.083). The proportion of the female respondents was higher than males in both rural group 96 (64.0%) and urban group 84 (56.0%). The differences in the religion (p <0.001), type of family (p <0.001), educational status (p <0.001) and employment status of the respondents (p= 0.001) in the rural and urban areas were statistically significant.

In Table 2 self-reported prevalence of asthma showed little disparity between rural and urban respondents. While no respondents from the urban group reported having cancer, respondents from the rural group did. The proportion of those with visual impairment was higher in the urban 9 (6.0%) than in the rural group 8 (5.3%).

There was a marked difference between the numbers of respondents with self-reported hypertension, with the urban being 47 (31.3%) and the rural group 15 (10.0%). This difference was statistically significant (p<0.001). Likewise, more respondents in the urban group 14 (9.3%), reported a history of diabetes mellitus than in the rural group 2 (1.3%). This difference was also statistically significant (p=0.002).

Table 2:
Self-Reported Morbidities among Rural and Urban Elderly Respondents X^2: Chi-Square Test, ^{Y}: Yates Corrected, *: P Value< 0.05 (Statistically Significant)

	Rural	**Urban**	χ^2	***p*-value**
Variable	**n (%) N=150**	**n (%) N=150**		
Arthritis				
Yes	29 (19.3)	33 (22.0)	0.325	0.568
No	121 (80.7)	117 (78.0)		
Visual impairment				
Yes	8 (5.3)	9 (6.0)	0.062	0.803
No	142 (94.7)	141 (94.0)		
Cancer				
Yes	2 (1.3)	0 (0.0)	0.503 ^{Y}	0.478
No	148 (98.7)	150 (100.0)		
Diabetes				
Yes	2 (1.3)	14 (9.3)	9.507	0.002*
No	148 (98.7)	136 (90.7)		
Hypertension				
Yes	15 (10.0)	47 (31.3)	20.819	<0.001*
No	135 (90.0)	103 (68.7)		
Hearing impairment				
Yes	0 (0.0)	1 (0.7)	0.000 ^{Y}	1.000
No	150 (100.0)	149 (99.3)		
Peptic Ulcer disease				
Yes	6 (4.0)	5 (3.3)	0.094	0.759
No	144 (96.0)	145 (96.7)		
Asthma				
Yes	4 (2.7)	3 (2.0)	0.000 ^{Y}	1.000
No	146 (97.3)	147 (98.0)		

In table 3, a higher proportion of the urban 13 (20.0%) than rural 17 (11.3%) respondents had increased risk of cardiovascular risk by the measured waist circumference. This difference was statistically significant (p= 0.039). Also, the waist to hip ratio measure of the urban 31 (20.7%) than rural 24 (16.0%) respondents showed increased cardiovascular risk. However, the difference was not statistically significant (p=0.296). Similar to the waist circumference, the respondents in the urban group had more overweight and obese proportion (18.0%, 16.0%) than those in the rural group (12.7%, 4.7%). These differences were statistically significant (p= 0.003). The proportion of those with elevated blood pressure in the urban group 87 (58.0%) was higher than in the rural group. The difference was statistically significant (p = 0.038).

Figures 1 and 2 showed that a higher proportion of the elderly in the urban group than the rural group had blood pressure in the region of grade I and grade II hypertension.

Discussion

In this study, respondents aged 60-69 years accounted for the age group with the highest proportion of the elderly. The proportion of the elderly decreased with increasing age in both rural and urban groups. This trend is similar to what was obtained in other studies in Nigeria. [12, 14]

With regards to the self-reported health problems by the respondents, the five most frequently reported health problems were: osteoarthritis, hypertension, diabetes, visual problems (Cataract and Glaucoma) and peptic ulcer disease.

The prevalence of osteoarthritis was slightly higher among urban elderly than rural elderly. This difference was not statistically significant.

This finding was similar to that reported by Abegunde *et al*. in Nigeria, where the prevalence of osteoarthritis was higher in urban than rural elderly. [12] This could be attributed to the hustling and the heightened day to day activities in the urban cities which involved a lot of strenuous walking thereby putting strain on the joint. Also, the sedentary lifestyle can cause obesity which puts a lot of pressure on the joints, particularly the knee joint.

Table 3:
The pattern of Anthropometric Indices and Blood Pressure among Rural and Urban Elderly Respondents

Variable	Rural	Urban	χ^2	*p*-value
	n (%) N=150	n (%) N=150		
Waist circumference				
Normal	133 (88.7)	120 (80.0)	4.264	0.039*
Increased risk of CVD	17 (11.3)	30 (20.0)		
Waist hip ratio				
Normal	126 (84.0)	119 (79.3)	1.091	0.296
Increased risk of CVD	24 (16.0)	31 (20.7)		
BMI				
Chronic Energy Deficiency	36 (24.0)	25 (16.7)	13.907	0.003*
Normal	88 (58.7)	74 (49.3)		
Overweight	19 (12.7)	27 (18.0)		
Obese	7 (4.7)	24 (16.0)		
Blood pressure				
Normal	81 (54.0)	63 (42.0)	4.327	0.038*
Elevated	69 (46.0)	87 (58.0)		

*** χ^2: Chi-square test, *: *p* value< 0.05 (statistically significant)**

However, in a study conducted in India, it was observed that the prevalence was less in the urban than in the rural area.[15]Hypertension was significantly higher in the urban compared with the rural group with a proportion of 31.3% and 10% respectively. The difference was statistically significant ($p<0.001$). This finding is in keeping with the findings of a study conducted in Oyo State, where the prevalence of hypertension was also higher in the urban area compared with the rural area.[12] This higher prevalence of hypertension in the urban location compared with the rural could be attributed to the effects of urbanization on the lifestyle of the people in the urban location such as increased dietary fat and sedentary lifestyle.[12] In addition to lifestyle, also, as earlier stated, the hustling, stress and noise pollution are more in the urban than rural. However, a study in India found that the prevalence of hypertension was slightly higher among the elderly in rural than in urban areas. [15]

Self-reported prevalence of Diabetes Mellitus was higher among respondents in the urban group than in the rural group. This finding was similar to that reported by Thakur *et al* and Makwana *et al* in India where the prevalence of Diabetes Mellitus was higher among respondents in the urban group than the rural group.[15, 16] This could be a result of the dietary habit and lifestyles of those in the urban group.

The self-reported prevalence of visual impairment was higher in the urban than in the rural group. This was similar to what was reported in another study conducted in Oyo State, Nigeria which also reported a higher prevalence in the urban than in the rural group.[12]

In this study, the majority of the respondents in both rural and urban groups had waist circumferences and waist-hip ratios that were normal. For those that had increased cardiovascular risk, urban respondents had a higher prevalence for the two than the rural group. The nutritional statuses of respondents in the rural group and urban groups were determined by calculating the BMI of the respondents.

It was found that more than one-third of those in the rural group compared with approximately a quarter of those in the urban group had chronic energy deficiency (CED).

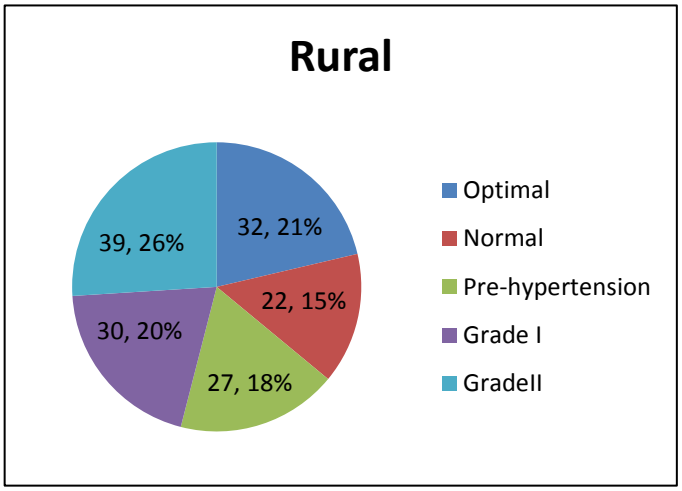

Figure 1

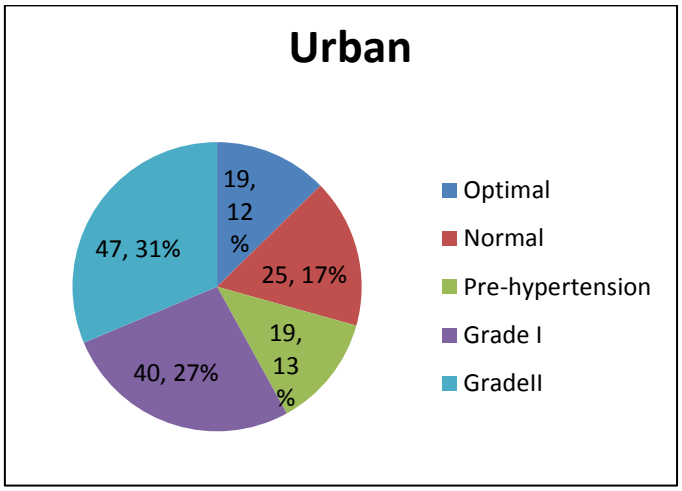

Figure2

Figures 1 and 2:
Showing the BP Classifications Based on the JNC VII Guidelines among the Elderly in both Rural and Urban Areas

This was similar to other studies in Oyo and Borno States that also reported that more of the rural than urban dwellers had CED. [12, 14] The proportion of those who were overweight and obese was higher among those in the urban group than those in the rural group in this study and this difference was statistically significant. This was also similar to the other studies that reported more overweight and obese elderly among urban than rural dwellers.[12,14] The reason for the higher proportion among urban dwellers may be a result of higher intake of high western diets rich in fat and low in fibre and also a sedentary lifestyle.

In this study, those with elevated blood pressures were significantly higher in the urban than rural areas. This was in keeping with the prevalence of self-reported hypertension in this study, which as earlier mentioned, was higher in the urban than in the rural areas. Similar studies have shown that there is a higher prevalence of elevated blood pressure among the elderly who dwell in the urban than rural areas. [17, 18]

Limitations

The study was cross-sectional in design so could not conclude that all those with elevated blood pressure patterns were hypertensive, especially for those without prior history of hypertension. However, data on self-reported morbidities was gotten. Therefore, future studies could focus on longitudinal studies so that the previously undiagnosed hypertensive elderly could be determined. Also, being a cross-sectional study, causal associations cannot be established.

Conclusion

The blood pressure pattern and anthropometric indices that portend an increased cardiovascular risk among the elderly were more prevalent in the urban than in the rural communities. The elderly who were overweight/ obese and who had higher waist circumferences, waist/hip ratios and elevated blood pressures were more in the urban compared to the rural areas. Therefore, the government should target urban areas first before the rural areas in any programmes on reduction of the prevalence of hypertension and its risk factors among the elderly. This should also include hypertension and diabetes mellitus control/management programmes.

Conflict of Interest

None to declare

Sources of funding - Nil

Author Contributions

Conceptualization- Fasiku MM, Akande TM
Research Design - Fasiku MM, Bojuwoye MO, Durowade KA, Bolarinwa OA,
Data collection and analysis - Fasiku MM, Bojuwoye MO, Durowade KA, Bolarinwa OA, Fasiku OK, Adaramola SO
Manuscript preparation -Fasiku MM, Bojuwoye MO, Durowade KA, Bolarinwa OA, Fasiku OK, Adaramola SO, Akande TM

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