Original Article

Prevalence and Determinants of Hypertension in an Agrarian Rural Community in Southeast Nigeria

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Abstract

Background: Hypertension is a cardiovascular disease of increasing global burden with prevalence in Nigeria ranging from 8% to 46.4%. **Aim:** To determine the prevalence and determinants of hypertension in Igbeagu, a rural community in South-Eastern Nigeria. **Subjects and Methods:** Consenting residents aged 18 years and above participated in this survey. A structured questionnaire was administered on the participants in their native dialect. Blood pressure (BP) and anthropometric parameters of the participants were measured using standard techniques. Hypertension was defined as systolic BP ≥ 140 mmHg and diastolic BP of ≥ 90 mmHg. **Results:** Two hundred and sixty-seven participants had their BP and data completed satisfactorily. Sixty-two persons were hypertensive, giving a prevalence rate of 23.2% (62/267). Age, consumption of red meat, body mass index (BMI), and the number of children in the family were associated with hypertension. Regression analysis showed that only BMI and age were independent risk factors for hypertension. **Conclusion:** Although the prevalence of hypertension in this study and their associated risk factors were in agreement with studies done previously in Nigeria, the association between number of children in the family and hypertension is yet to be understood. Efforts are needed to curb the high prevalence of hypertension in this community.

Keywords: Body mass index, Hypertension, Prevalence, Rural community

Introduction

Hypertension is a major public health problem with three-quarters of the burden speculated to be in economically developing countries by the year 2025.[1,2] African descent has been associated with higher prevalence of hypertension and its complications.[3] It was responsible for more deaths than malaria in Africa in the year 2000.[2] In Nigeria, hypertension ranks first among cardiovascular disease with its complications constituting about 25% of emergency medical admission in urban hospitals in the country.[4] Some risk factors for hypertension include age, sex, race, physical inactivity, and economic class.[5,6] Treatment of this condition reduces the risk of stroke and myocardial infarction by about 40% and 15%, respectively.[5,7] However, the cost of treatment can be overwhelming even for developed economies. For instance, the estimated direct and indirect cost of high blood pressure (BP) in 2009 in the United States of America was $51.0 billion.[8] This high financial burden is very difficult if not impossible for developing countries like Nigeria to cope with. There is, therefore, the need to take proactive measures in curbing the increasing epidemic trend of this disease by having accurate scientific data of the prevalence and risk factors with a view at designing preventive measures. It is in the light of this that the present study to survey the prevalence and determinants of hypertension in this rural community was undertaken. It also provided an opportunity to create awareness about hypertension in the community.

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Subjects and Methods

Study population and design

This study took place in Igbeagu Community of Ebonyi State, South-Eastern Nigeria. It is one of the eight autonomous communities in Izzi Local Government Area of Ebonyi state which has a population of 234,072 persons; 110,072 males and 124,000 females.[9] The key occupation of the people is farming with preference in crops such as rice, yam, cassava, pepper,

maize and some other economic crops.[10] The staple food is locally processed cassava, rice, and yam with stream, well and borehole as the primary sources of water. The community has one mission hospital, two public hospital, a dispensary, two private hospitals, and a few maternity homes.

Data collection

A cross-sectional descriptive study design was used with the objective of creating awareness about hypertension and offering a free screening for volunteers. All members of the community age 18 years and older constituted the study population. First, advocacy about the study was made. The leaders of the different churches and trade unions were consulted, and the rational for the screening exercise communicated to them. Some churches allowed members of the study team to address the congregation on the need for the proposed study, while others relayed the message as explained to them with members of the study team on hand to ascertain the clarity of the information passed. The various village heads and councils were notified, and news passed across to their subjects during their town meetings. At all these meetings, eligible community members were encouraged to come out at a designated central location on a set date for the screening exercise with an assurance that every eligible volunteer will be screened at no cost. To facilitate coverage, three centers were mapped out, and volunteers were free to attend any of the centers nearest to them. This study lasted 3 weeks, 1 week for each center.

At each of the study centers, those in attendance were given a health talk on hypertension by the doctors. The rational and study objectives were explained to the subjects and consent requested thereafter. Volunteers gave written consent to participate in the study. Socio-demographic data of participants and risk factors for hypertension were collected using a structured questionnaire administered by an interviewer in the native language (Izzi) of the participants. Pregnant women were excluded from the study. BP was measured on the left arm using mercury sphygmomanometer and stethoscopes (Kris-Alloy®, Wuxi Medical Instrument Factory, Wuxi City Jiangsu, China) which was pretested on known non-hypertensives and known hypertensives and found to be precise. To ensure accuracy of reading, an appropriate-sized cuff (cuff bladder encircling at least 80% of the arm) was used and the measurement done after the subject has been in a sitting resting state for 5 min. High BP was defined as systolic blood pressure (SBP) ≥140 mmHg and/or diastolic blood pressure (DBP) ≥90 mmHg.[7] Participants with SBP ≥ 140 nnHg and/or DBP ≥ 90 nnHg were measured again after at least 30 min interval for confirmatory purpose. Height and weight measurements were taken with the subjects in light clothing without shoes, caps or head tie on using a standard calibrated meter rule affixed to a wall perpendicular to a flat smooth surface floor, while the body weight was measured using a digital weighing scale (Seca, Harmburg, Germany). The body mass index (BMI) was calculated as the ratio of the weight in Kg and of height in m^2.[11]

Ethical consideration

Ethical approval to conduct the study was obtained from the Research and Ethics Committee of Federal Teaching Hospital, Abakaliki, Ebonyi State. The approved study protocol was strictly adhered to. Subjects having high BP were referred to the mission hospital or to the Federal Teaching Hospital, Abakaliki for further assessment and management.

Data analysis

The data were analyzed using the Statistical Package for Social Sciences (Illinois, USA) version 16 for descriptive and inferential statistics. A two-tail level of significance of 0.05 was used at 95% confidence limit.

Results

Two hundred and seventy-one subjects participated in this study; 68.3% (185/271) females and 31.8% (86/271) males [Table 1] with mean and standard deviation (SD) age of 41.9 (18.8) years and mean (SD) BMI of 23.9 (4.4) Kg/m^2. However, complete data was available for 98.5% (267/271) participants while data was incomplete for four; 1.5% (4/271) subjects.

Of the 267 participants that had their BP measured and recorded, 23.2% (62/267) were hypertensive with a mean (SD) DBP and SBP of 95.1 (11.5) mmHg and 147.3 (19.5) mmHg respectively.

Table 1: Prevalence of hypertension based on socio demographic characteristics

Characteristics	Number examined (%)	Number hypertensive (%)	95% CI
Educational level			
None	101 (39.0)	31 (30.7)	21.8-40.2
Primary	95 (36.7)	14 (14.7)	7.5-21.9
Secondary	41 (15.8)	8 (19.5)	7.1-31.9
Tertiary	22 (8.5)	5 (22.7)	5.0-41.0
Total	259 (100)	58 (22.4)	16.9-27.1
Occupation			
Civil servant	17 (6.7)	3 (17.6)	–0.6-36.6
Artisan	43 (17.1)	8 (18.6)	6.7-30.5
Farming	192 (76.2)	48 (25.0)	18.8-31.2
Total	252 (100)	59 (23.4)	23.3-23.5
Age groups			
18-25	36 (13.5)	6 (16.7)	4.3-29.1
26-35	62 (23.3)	6 (9.7)	2.2-17.2
36-45	64 (24.1)	10 (15.6)	6.5-24.7
46-55	54 (20.3)	21 (38.9)	25.6-52.2
>55	50 (18.8)	19 (38.0)	24.2-51.7
Total	266 (100)	62 (23.3)	18.1-28.5
Sex			
Male	85 (31.8)	24 (28.2)	18.4-38.0
Female	182 (68.2)	38 (20.9)	14.9-26.9
Total	267 (100)	62 (23.2)	18.0-28.4

CI: Confidence interval

Table 1 shows the prevalence of hypertension based on sociodemographic characteristics of the subjects. While the prevalence of hypertension was significantly ($P = 0.02$) higher in subjects without formal education in comparison to other groups, there seems to be increase in hypertension prevalence with advancement in educational status such that participants with tertiary education had significantly higher prevalence of the disease in comparison with those with primary education; 22.7% (5/22) versus 14.7% (14/95), ($P = 0.03$).

With regards to occupation, prevalence of hypertension was comparable between the civil servants and the artisan; 17.6% (3/17) versus 18.6% (8/43) but significantly ($P = 0.04$) higher prevalence was observed in subjects that has farming as their major occupation; 25.0% (48/192).

Among the age groups, prevalence of hypertension was significantly higher among the older age groups of 46–55 ($P = 0.02$) and >55 ($P = 0.02$) years; 38.9% (21/54) and 38.0% (19/50), respectively in comparison to other age groups. Similarly, comparable prevalence was observed in age groups 18–25 and 36–45 years; 16.7% (6/36) and 15.6% (10/64), respectively. However, least prevalence of hypertension was observed in the age group 26–35 years 9.7% (6/62).

The males had a higher prevalence of hypertension in comparison to their female counterparts; 28.2% (24/85) versus 20.9% (38/182).

For the social and dietary characteristics [Table 2], smokers, those with more than three children in the family and those who consume red meat had significantly ($P = 0.03, 0.03, 0.00$, respectively) higher prevalence of hypertension. However, there was comparable prevalence of hypertension among those who consume alcohol and those who do not and among the snuffers and non-snuffers.

Correlation analysis showed a significant positive correlation between BMI and DBP ($r = 0.16$, $P = 0.00$) and SBP ($r = 0.20$, $P = 0.00$). Regression analysis showed a significant relationship between BMI and SBP ($P = 0.001$) and DBP ($P = 0.01$), while age was significantly related to SBP ($P = 0.00$) but not to DBP ($P = 0.12$).

Table 2: Prevalence of hypertension based on social characteristics of subjects

Characteristics	Number examined (%)	Number hypertensive (%)	95% CI
No of children in family			
1-3	28 (12.4)	2 (7.1)	–2.6-16.8
>3	198 (87.6)	51 (25.8)	19.6-32.0
Total	226 (100)	53 (23.5)	17.9-29.1
Cigarette smoking			
No	254 (97.7)	59 (23.2)	17.9-28.5
Yes	6 (2.3)	2 (33.3)	–5.4-71.4
Total	260 (100)	61 (23.5)	18.2-28.8
Snuffing of tobacco			
No	210 (79.8)	47 (22.4)	16.7-28.2
Yes	53 (20.2)	14 (26.4)	14.3-38.5
Total	263 (100)	61 (23.2)	18.0-28.4
Alcohol consumption			
No	151 (56.8)	33 (21.9)	15.2-28.6
Yes	115 (43.2)	29 (25.2)	17.1-33.3
Total	266 (100)	62 (23.3)	18.1-28.5
Dietary habit			
Red meat	27 (10.1)	11 (40.7)	21.8-59.6
Fish	240 (89.9)	51 (21.3)	16.0-326.6
Total	267 (100)	62 23.2)	18.0-28.4

CI: Confidence interval

Discussion

The 23.2% hypertension prevalence observed in the present study is in agreement with the documented prevalence interval of 8–46.4% in Nigeria.[12] Although this is much lower than 42.2% recorded in the neighboring state of Enugu, Nigeria, it is much higher than that in two rural communities in western Nigeria.[11-14] The high prevalence of hypertension in our study follows a global trend of increase in hypertension prevalence that has been associated with life-style changes and population growth. Community-based studies in Nigeria have shown a steady rise in prevalence of hypertension from 8.9% (1970–1979), 15% (1990–1999) to 22.5% from 2000 to 2009.[13] Increase in population growth and ageing has seen a number of people with uncontrolled hypertension rise from 600 million in 1980 to nearly 1 billion in 2008.[15]

Risk factors for hypertension identified in this study were red meat intake, age, BMI, and the number of children in the family. In a study of the market population in Enugu, Nigeria, Ulasi *et al.*[11] observed that processed high-salt food and calorie-dense food were risk factors for the high prevalence of hypertension found in that study. Part of the explanation given by the authors of that study was the difference in educational status of the study populations. Although we found a significant association between red meat intake and hypertension, association between food intake and hypertension was not determined. Expectedly, the more educated the population, the more likely they are to adopt a western lifestyle including access to polish and "*fast*" foods. This means that without proper health education, this population is at risk of a similar outcome with the ever increasing urbanization.

The low prevalence of cigarette smoking 2.3% (6/260) and tobacco snuff use 20.2% (53/263) in this study may also account for the lower prevalence of hypertension observed compared to that in Enugu, Nigeria.[11] Alcohol intake in our study population was 43.3% (115/266) but only about 8% (9/115) of these consumed more than two units of alcoholic beverages/day. Other studies have found similar low prevalence

of smoking and alcohol use and reported lower prevalence of hypertension.[16,17] While a positive health seeking behaviour may account for the low prevalence of smoking and alcohol intake in those other studies, poor socioeconomic status explains the finding in this study. Bearing in mind the burden of cost of treatment for hypertension among this poor population coupled with inability to seek healthcare due to poor education, it is imperative that intensive health campaign be put in place to reduce this epidemic.

The most significant determinant of hypertension in this study was age. Virtually every study agrees with this, and it is not different from that reported in Nigeria.[12] BP increases with age.[18] The most affected was the 46–55 years age group with 39.7% of hypertensives being in the age group 18–25 years. This is much higher than the prevalence of 2.4% in the age group 21–30 years reported in south-western Nigeria.[19]

The importance of increased BMI especially visceral fat and obesity in the pathophysiology of hypertension has been documented.[3,5,16] Even in study populations with lean body mass as in the present study, BMI has been correlated with high BP.[20] Manual effort involved in farming in this population would account for the observed BMI. This may also explain the non-significant association between gender and hypertension in this study because participation in farming using crude implements by both sexes involves vigorous and often exhausting body activity.

It is not clear the effect the number of children in the family has on hypertension as found in this study and elsewhere.[19] Early age at marriage, low earning capacity and poor prospect for improved socioeconomic status in a setting of multiple children may predispose these adults to prolonged anxiety state, sleep loss and unpleasant work conditions with its attendant health implications. Indeed, psychosocial hypothesis has been proposed as a risk factor for hypertension though this is difficult to measure.[6] Further studies are needed to explore this relationship.

Conclusion

The prevalence of hypertension in this study is high for a rural agrarian community having a predominant lean body mass amongst the population. Occupation that involves vigorous physical activity is protective while much red meat intake is detrimental even as the association between the number of children in the family and hypertension needs further probing. With efforts been made at educating the rural populace and increasing urbanization, the hitherto silent risk factors may become overwhelming if vigorous health education is not undertaken to help them adopt healthy lifestyle. Therefore, the relevant agencies of health and education including religious bodies and community/Institution leaderships should begin now to address this issue.

Limitation to the Study

An inherent limitation of this study was in its design. Being a cross-sectional study, some eligible members of the population were not reached. Government collaboration may be required to boost the confidence of the rural populace in participating in such studies in the future.

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