Prevalence and Correlates of Hypertension Among the Ibibio/Annangs, Efiks and Obolos: A Cross Sectional Community Survey in Rural South-South Nigeria

Joseph J. Andy, MD, FWACP; Etete J. Peters, FWACP; Udeme E. Ekrikpo, MBBS, MSC; Ndanyongmong A. Akpan, MBBS, FMCP; Bernard C. Unadike, MBBS, FMCP; John U. Ekott, MBBS, FWACP

Objective: The objective of the study was to assess the public health burden of hypertension in the rural communities in southeastern Nigeria (Niger Delta region of Nigeria).

Design/setting: The study was a cross-sectional study in three rural communities in the Cross River and Akwa Ibom States of Nigeria. Demographic, anthropometric information, prior history of hypertension or stroke in each participant or their parents was obtained with a questionnaire. Height, weight, systolic blood pressure (SBP), and diastolic blood pressure (DBP) of respondents were measured by standard methods, and body mass index calculated.

Result: The *N* of respondents was 3869; 1608 (41.6%) males, 2261 (58.4%) females; 1120 (29.0%) Efiks, 1877 (48.5%) Ibibio/Annangs, and 872 (22.5%) Obolos. Mean SBP and DBP were significantly higher in males than in females ($P<.001$). Prior awareness of hypertension was 2.8%. The overall prevalence of hypertension was 914 (23.6%); 31.2% males and 18.1% females ($P<.001$). The prevalence of hypertension in the ethnic groups was 479 (25.5%) among Ibibio/Annangs; 287 (25.6%) among the Efiks and 130 (14.9%) among the Obolos. Prehypertension occurred in 17.2% of total population, 17.5% males and 16.9% females ($P=.66$).

Conclusion: Hypertension is already a major public health burden in rural communities of these two states, despite a very low incidence of obesity and cigarette smoking. (*Ethn Dis*. 2012;22[3]:335–339)

Key Words: Rural, Hypertension, South-South Nigeria

From Department of Medicine, Faculty of Clinical Sciences, College of Health Sciences, University of Uyo, A K S, Nigeria

Address correspondence to Joseph J. Andy, MD, FWACP; Dept of Medicine, Faculty of Clinical Sciences, College of Health Sciences; University of Uyo; A K S, Nigeria; (234)8022912859; andyumanah @yahoo.com

Introduction

Hypertension is an important global public health challenge and a major predisposing factor for heart failure, kidney failure and stroke in sub-Sahara Africa.[1–5] It is also a major predisposing factor for coronary artery disease, which is currently evolving in sub-Sahara Africa.[1–5] Uncomplicated essential hypertension is often an asymptomatic ailment, and affected persons in rural sub-Sahara Africa, where poverty and illiteracy are widespread, are often not aware of having hypertension.[5] Such patients in sub-Sahara Africa usually present for the first time in hospitals with major complications. Although some studies on the prevalence of hypertension have been reported from a number of sub-Sahara African countries,[6,7] the magnitude of the hypertension challenge is yet to be fully determined in many remote rural communities.

The tendency for blood pressure and prevalence of hypertension to increase with increasing age in Nigeria and Africa has been documented.[1–3] In Nigeria and many sub-Saharan African Countries the blood pressure levels and the prevalence of hypertension are usually significantly lower in rural than urban dwellers.[1,2] As globalisation, modern education and other modernising influences penetrate these rural areas, the blood pressure (and hypertension) moderating influences of rural living in sub-Sahara Africa may disappear.[6,7] In addition, the increasing migration of people from rural to urban areas in pursuit of education and jobs is likely to increase the overall prevalence of hypertension in this region.

Our study, using the more recent criteria for the diagnosis of hypertension, was planned to document the burden of hypertension in rural communities of Akwa Ibom and Cross River States. This area also forms part of the Nigeria's Niger Delta region, which is the major oil bearing belt of Nigeria. The area has been politically turbulent in the recent past from real or perceived poor infrastructural development. The response of the federal and local governments to this turbulence gives hope that major developments are likely to occur and, thus, the baseline data of hypertension prevalence will be needed.

Participants and Method

A cross-sectional survey of rural dwellers aged ≥15 years from three local government areas (one in southern Cross River State and two in Akwa Ibom State) at the southeastern extreme corner of Nigeria was carried out to determine the burden of hypertension and some important correlates

Our study, using the more recent criteria for the diagnosis of hypertension, was planned to document the burden of hypertension in rural communities of Akwa Ibom and Cross River States.

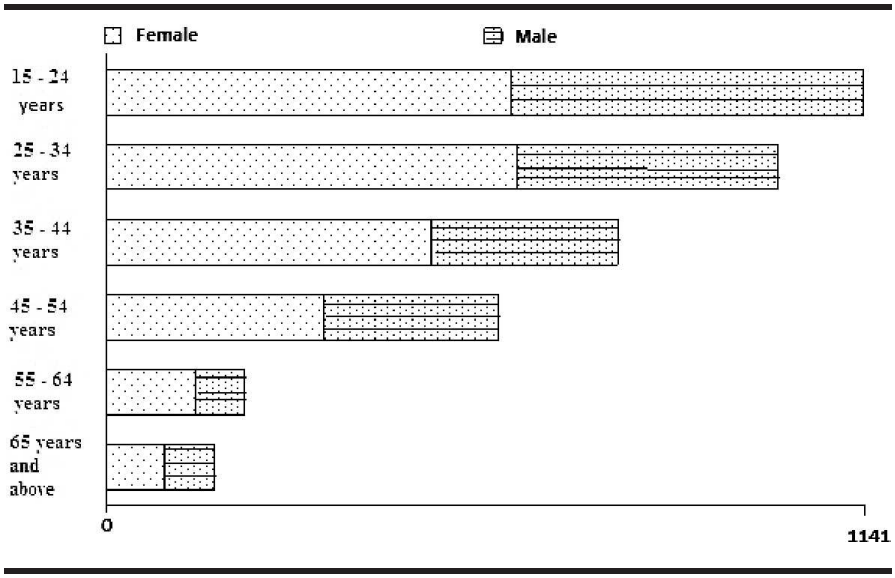

Fig 1. Age and sex distribution of study population

of hypertension among these rural populations. Rural Efiks of Southern Cross River State were studied from the selected village of Okoyong in Odukpani Local Government Area. Rural Obolos, in Akwa Ibom State were studied in select fishing settlements in Eastern Obolo Local Government Area. The rural Annangs/Ibibios of Akwa Ibom State were studied at select villages in Obot Akara, a predominantly agrarian community. At Okoyong there was a mixture of farmers, fishermen and petty traders. All persons domiciled in each location were assigned their claimed ethnicity. Of the three rural localities selected for study, Eastern Obolo fishing settlements in Akwa Ibom State were the most difficult to access, and access was made largely by engine boat.

Each participant was assisted in completing a questionnaire containing sociodemographic information and important medical history. The questionnaire was translated into the local languages, and was administered by trained assistants who were conversant with English and the respective local language. The parameters measured were height, weight, and blood pressure. Height and weight were measured without shoes and with simple working dress using a standardised scale. Conventional mercury sphygmomanometers with cuffs sizes appropriate for the arm circumference were used. Blood pressure recordings were made after each participant had rested for about 5 minutes. Korotkoff phase 5 sound was used to determine the diastolic pressure, and pressures were measured to the nearest 2 mm Hg. The second blood pressure measurement was recorded. Hypertension was classified according to the seventh report of the Joint National Committee on prevention, detection, evaluation and treatment of Hypertension (JNC 7).

The student *t* test (or its nonparametric equivalent) was used to compare continuous variables. A one-way ANOVA was employed in the comparison of blood pressures among the three ethnic groups and a multivariate logistic regression model was used to find predictors of hypertension among the study population. All data analysis was done using STATA 10, STATAcorp, Texas, US.

Ethical clearance for the study was obtained from the College of Medicine of the University of Calabar Nigeria's Ethical Committee. Consent was sought and obtained from respective village heads in council as well as individual informed consents.

RESULTS

A total of 3869 participants, 1608 (41.6%) males, and 2261 (58.4%) females participated in the study. The mean age of the study population was 34.3 ± 14.1 years, (34.0 ± 14.6 years for males and 34.4 ± 13.8 years for females, $P=.34$). The distribution of the study population by sex, and at different age groupings is shown in Figure 1. Efiks made up 1120 (29.0%); Ibibio/Annang 1877 (48.5%); and Obolos 872 (22.5%) of the study population.

In these rural populations, 27.4% had no formal education; 31.8% completed 4–6 years of primary education, and only 1.7% completed tertiary education. In respect to occupation, 76.1% were either petty-traders, peasant farmers or artisanal fishermen. Most of them (89.8%) had never smoked a cigarette, 2% were former smokers, and only 8.2% were current smokers. For those who smoked, the mean number of cigarettes smoked per day was 2.6. The majority of the population (93.7%) assessed themselves as being active to very active. Significant alcohol consumers constituted 58.3% of the study population with 37.3% having no history of alcohol consumption and 4.4% being former alcohol consumers.

Only 2.8% of the respondents knew they had hypertension, and 2% of these were on antihypertensive therapy. There was paternal history of hypertension in 4.8% and maternal history in 6.2% of respondents. There was a history of 18.4% paternal and 4.1% maternal stroke in the respondents' families.

The mean systolic (SBP) and diastolic blood pressures (DBP) for males and females as well as the mean pulse rate and the mean BMI for males and females are as shown in Table 1. There was no significant difference in mean BMI and in mean pulse rate of males and females; but mean SBP and DBP were significantly higher in males than females ($P<.001$) (Table 1). Among

Table 1. Blood pressure characteristics by sex, mean ± SD

	Male (*n*=1652)	Female (*n*=2217)	*P*
Systolic blood pressure, mm Hg	127.1 ± 17.7	121.4 ± 8.5	<.001
Diastolic blood pressure, mm Hg	74.6 ± 11.5	70.3 ± 11.2	<.001
Arterial blood pressure, mm Hg	92.1 ± 12.3	87.3 ± 12.3	<.001
Pulse rate, count/min	80.1 ± 8.7	80.3 ± 9.8	.55
Body mass index, kg/m^2	21.9 ± 4.4	22 ± 4.3	.66

the males, 1.6% were obese (BMI> 30kg/m^2) and 10.3% were overweight (BMI 25.1–29.9); and the corresponding proportions of overweight and obesity in females were 13.8% and 3.0% respectively.

The significant difference in mean SBP between males and female was seen at all age groups until the age of 44 years, after which the difference was no longer present. The difference in mean DBP between males and females remained significant in all age groups until the age of 64, after which the difference disappeared.

Prevalence of Hypertension

The overall prevalence of hypertension in the study population was 23.6% (95% CI 22.3–24.9%) with a prevalence of 31.2% in males and 18.1% in females. The proportion of hypertensive individuals with isolated systolic hypertension was 56.5%, diastolic hypertension 10.1% and mixed hypertension 33.4%. Pre-hypertension occurred in 17.2% of the total population (17.5% males, 16.9% females, *P*=.66). Altogether 706 (77.2%) of the hypertensive population studied had Stage 1 hypertension, 208 (22.8%) had stage 2 hypertension. The distribution of hypertension (and the different forms) at different age groups is shown in Table 2.

Univariate and multivariate model analysis showed that sex, age and BMI were the only factors that predicted hypertension after adjusting for other variables (Table 3); family history of hypertension, diabetes mellitus or alcohol use were not significant predictors of hypertension in these rural populations.

A one-way ANOVA analysis was employed to investigate differences in systolic and diastolic pressures of individuals who are of Efik, Ibibio/Annang and Obolo origin. The Efiks had a mean systolic pressure of 5.2 mm Hg (95% CI, 3.7–6.7 mm Hg) and a mean diastolic pressure of 4.5 mm Hg (95 CI, 3.6–5.4) higher than the Obolos (*P*<.001). The Ibibio/Annang had a mean systolic pressure 3.4 mm Hg (95% CI, 1.8–5.0) and a mean diastolic pressure of 4.4 mm Hg (95% CI, 3.4–5.4) higher than the Obolos (*P*<.001). The Ibibio/Annangs and the Efiks had similar mean DBP (*P*=.82); their mean SBP was 1.8 mm Hg (95% CI, 0.5–3.2) higher in the Efiks than the Ibibio/Annangs. The prevalence of hypertension was 479 (25.5%) among Ibibio/Annangs; 287 (25.6%) among the Efiks and 130 (14.9%) among the Obolos.

DISCUSSION

The level of awareness of hypertension in our rural populations (2.8%) was low, but the level of awareness (19.6%) of hypertension in our previous urban and suburban studies among more educated urban civil servants, factory workers and suburban plantation workers at Calabar in the Cross River State was much higher.[2] Also the number of respondents on any antihypertensive medication was low. This degree of low awareness of hypertension had occurred despite 18.4% paternal and 4.1% maternal history of stroke in the respondents' family. As 58.8% had either no formal education or 4–6 years of modern education, educating these populations on the importance of diagnosing and treating this largely asymptomatic ailment, before serious complications occur, presents more challenges than usual. These observations call for inclusion of blood pressure measurements in our public health programs, and for further expansion and improvements in educational and health care facilities of our rural communities. The introduction of free and compulsory education in Akwa Ibom State in the last two years is an appropriate response,

Table 2. Prevalence and percentages of hypertension by age group, *n* (%)

General population	Age 15–24 (*n*=1137)	Age 25–34 (*n*=1004)	Age 35–44 (*n*=768)	Age 45–54 (*n*=590)	Age 55–64 (*n*=207)	Age ≥65 (*n*=163)	Total (*N*=3869)
Pre HTN	179 (15.7)	214 (21.3)	129 (16.8)	80 (13.5)	29 (13.6)	33 (20.3)	664 (17.2)
Total HTN	161 (14.2)	175 (17.4)	205 (26.7)	229 (38.8)	92 (44.4)	52 (31.9)	914 (23.6)
ISH	110 (68.3)	94 (53.7)	103 (50.2)	121 (52.8)	59 (64.1)	29 (55.8)	516 (56.5)
IDH	28 (17.4)	23 (13.1)	22 (10.7)	14 (6.1)	3 (3.3)	3 (5.8)	93 (10.2)
Mixed HTN	23 (14.3)	58 (33.1)	80 (39.0)	94 (41.1)	30 (32.6)	20 (38.5)	305 (33.4)
Stage 1 HTN	146 (90.7)	148 (84.6)	161 (78.5)	165 (72.1)	63 (68.5)	23 (44.2)	706 (77.2)
Stage 2 HTN	15 (9.3)	27 (15.4)	44 (21.5)	64 (28.0)	29 (31.5)	29 (55.8)	208 (22.8)

ISH, isolated systolic hypertension; IDH, isolated diastolic hypertension.
The percentages of ISH, IDH, mixed hypertension, stage 1 and 2 hypertension are computed as proportions of the hypertensive individuals.

Table 3. Predictors of hypertension

	Univariate OR (95% CI), *P*	Multivariate OR (95% CI), *P*
Age, years	1.03 (1.02–1.04), <.001	1.04 (1.03–1.04), <.001
Female sex	.49 (.42–.57), <.001	.46 (.40–.54), <.001
BMI, kg/m^2	1.04 (1.02–1.05), <.001	1.04 (1.03–1.06), <.001

OR, odds ratio; BMI, body mass index; CI, confidence interval.

but adult education should also receive more attention.

The SBP of rural males was significantly higher than those of rural females up to age of 44; and the DBP of rural males was significantly higher than that of rural females up to the age of 64. The overall prevalence of hypertension of 23.6% (31.1% males and 18.1% females) in the total population already indicates a considerable burden of hypertension in our rural communities (Table 2). The relatively low maternal history of stroke, 4.1% females vs 18.4% males, is in keeping with the higher prevalence of hypertension in males. The similarities in prevalence of hypertension among the rural Efiks and rural Ibibio/Annangs, 25.6% and 25.5%, respectively, is reflected by the similarities in their level of mean SBP and DBP and the significant difference in hypertension prevalence between these two groups and the Obolos is also reflected in the difference in mean SBP and DBP of the Obolos vs the others.

The Obolos are linguistically and ethnically different from the Efiks and Ibibio/Annangs who speak different dialects of a common stem language and are probably more closely related. Of the three localities studied, Eastern Obolo fishing settlements were the most difficult to access and the least open to modernising influences. It is difficult to say whether the significant difference in mean blood pressure values and the significant difference in hypertension prevalence in the Obolos are due to ethnic differences, occupational differences or to less exposure to globalisation and other modernising influences. It is probably more related to the fact that these rural communities are at different stages of development and modernisation.

The overall prevalence of hypertension of 23.6% (31.1% males and 18.1% females) in the total population indicates a considerable burden of hypertension in our rural communities.

Other recent Nigerian studies documented a 20.8% prevalence of hypertension (BP $\geq$ 140/90) among rural Yoruba of South West Nigeria.[8] These findings from Western Nigeria and our findings in this study compare favorably with the prevalence of 22.5% in males and 22.6% females reported for rural Uganda,[9] but were lower than the prevalence of 30.5% reported for rural Rukungiri, Uganda.[10] The prevalence of hypertension reported from rural South Africa is 25.5% females and 21.6% males[11] and 22% (males/females) in another study.[12] In rural Ashanti villages of Ghana a prevalence of hypertension of 24.1% was recorded compared to 32.9% in semi-urban villages (P=.002).[13] Unlike in Uganda where the prevalence in males and females were similar, or in South Africa where hypertension was more common in females than males, our rural males at all ages had a greater prevalence of hypertension than our rural females. The South African females had a significantly higher BMI than the males but in our study there was no difference in mean BMI between males and females.[5] The prevalence of hypertension in our rural communities and indeed in other rural communities in Sub-Sahara Africa appear in general to be comparable with the prevalence among White Americans, Canadians and Jamaicans, but lower than the prevalence in Spaniards, Germans and Finns.[14] Hypertension in our rural communities is already a serious public health issue. The current exclusive focus of public policy on communicable and nutritional diseases can no longer be justified and should be changed.

The prevalence of obesity, cigarette smoking and quantity of cigarettes smoked are very low among these rural dwellers. Most of these rural people consider themselves as active to very active. As these rural areas become more easily accessible, and as educational attainment and industrialisation increase, and as more persons migrate to cities for work, they are likely to become more sedentary, more obese, smoke more and the overall magnitude of the hypertension and other cardiovascular problems are likely to get worse unless aggressive and sustained effective cardiovascular health education is started and sustained.[6,7,15] As shown in one study of a market population in the town of Enugu, southeastern Nigeria for instance, hypertension occurred in 46.3% males and 37.7% females (P<.022).[15] Only 29% of that population knew that they had hypertension and 22.6% were obese (BMI>30).[15]

Our study shows a high prevalence of hypertension already exists in rural Southeastern Nigeria and therefore it is a major public health concern. This prevalence and sequelae of hypertension may increase with modernization. Concerted efforts in promotion of cardiovascular health education should be ensured to prevent an epidemic.

ACKNOWLEDGMENTS

Partially supported by University of Calabar Senate Research Grant. The Ikot Abasi Local

Government provided us with an engine boat to allow access to some fishing settlements in eastern Obolo.

REFERENCES

1. Akinkugbe OO. *Non Communicable Diseases in Nigeria: Report of a National Survey*. The National Expert Committee on NCD; 1992.
2. Ekpo EB, Udofia O, Eshiet NF, Andy JJ. Demographic, life style and anthropometric Correlates of blood pressure of Nigerian urban civil servants, factory and plantation workers. *J Hum Hypertens*. 1992;6:275–280.
3. Pobee JOM. Epidemiological report from West Africa. In: Gross F, Strasser T, eds. *Mild Hypertension: Recent Advances*. New York: Raven Press; 1983;33–54.
4. Murray CJL, Lopez AD. Global mortality, disability and the contribution of risk factors: global burden of disease study. *Lancet*. 1997; 349:1436–1442.
5. Opie LH, Seedat YK. Hypertension in Sub-Saharan Africa populations. *Circulation*. 2005; 112:3562–3568.
6. Ekpo EB, Udofia O, Andy JJ. A disappearing urban/rural blood pressure difference in Nigerian children: an evaluation of possible determining factors. *Ann Trop Paediatr*. 1990;10:211–219.
7. Oviasu VO, Alakija W, Oyarebu KA. Differences in arterial pressure and body build in the first and second decades of life in urban and rural Nigerians. *Trop Cardiol*. 1981;7:161–165.
8. Oladapo OO, Salako L, Sodiq O, Shoyinka K, Adedapo K, Falase AO. A Prevalence of cardio-metabolic risk factors among rural Yoruba, south-western Nigeria population: a population-based survey. *Cardiovasc J Afr*. 2010;21(1):26–31.
9. Maher D, Waswal L, Baisley K, Karabarindel A, Unwin N, Grosshuth H. Distribution of hyperglycaemia and related cardiovascular risk factors in low income countries: a cross-sectional population-based study in rural Uganda. *Int J Epidemiol*. 2011;40:160–171.
10. Wamala JF, Karyabakabo Z, Ndungutse D, Guwatutudde D. Prevalence factors associated with hypertension in Rukungiri District, Uganda - a community based study. *Afr Health Sci*. 2009;9:153–160.
11. Alberts M, Urdal P, Steyn K, et al. Prevalence of cardiovascular diseases and associated risk factors. *Eur J Cardiovasc Prev Rehabil*. 2005;12(4):347–354.
12. de Ramirez SS, Enguobahrie D, Nyadzi G, et al. Prevalence and correlates of hypertension: a cross-sectional study among rural population in Sub-Sahara Africa. *J Hum Hypertens*. 2010;24(12):786–795.
13. Cappucio FP, Micah FB, Emmett L, et al. Prevalence, detection, management and control of hypertension in Ashanti, West Africa. *Hypertension*. 2004;43:1017–1102.
14. Cooper RS, Wolf-Maier K, Luke A, et al. An international comparative study of blood pressure in populations of European vs African Descent. *BMC Med*. 2005;3:1–8.
15. Ulasi I, Ijoma CK, Onwubere BJC, Arodiwe E, Onodugo O, Okafor C. High prevalence of hypertension in a market population in Enugu, Nigeria. *Int J Hypertens*. 2011 Jan 27; 2011;869675.

AUTHOR CONTRIBUTIONS

Design and concept of study: Andy, Peters, Ekrikpo, Akpan, Unadike, Ekott
Acquisition of data: Andy, Peters, Ekrikpo, Akpan, Ekott
Data analysis and interpretation: Andy, Ekott
Manuscript draft: Andy, Peters, Unadike, Ekott
Statistical expertise: Ekrikpo
Administrative: Andy, Peters, Ekrikpo, Akpan, Unadike, Ekott
Supervision: Andy, Ekott