Blood Pressure Pattern in Barako - A Rural Community in Rivers State, Nigeria.

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ABSTRACT:

Background: The last and only national blood pressure survey in Nigeria was carried out over a decade ago in 1997, using 160/95mmHg as hypertension cut off level. The overall prevalence of hypertension recorded was 11.2%.
In recent times however isolated rural and urban blood pressure studies in parts of Nigeria, using 140/90mmHg (JNC-7) cut of level have reported prevalence rates ranging from 17.5% to 31. 5%. This indicates a higher and increasing burden of hypertension in the country. It is on this background that we report the pattern and distribution of blood pressure in another rural community in Rivers state as a further contribution to an updated blood pressure trends data in Nigeria.

Methods: The survey was a cross sectional surveys of adult volunteers during a one day health out-reach in a rural community of Rivers state. Blood pressure, BMI, random blood sugar and urine testing were done in accordance with standard protocols. JNC-7 guidelines were adopted for the determination and grading of hypertension.

Results: They were 60 males and 92 females (M/F =1:1.5) with a mean age of 48.9 ± 14.8years. The subjects were mostly farmers (53.9%) with female predominance. Their mean BMI was 24.8 ± 4.8kg/m^2, with 30% of the subjects in pre-obesity level and 15.7% with obesity.

The mean systolic blood pressure (SBP) was 129.9 ± 24.3mmHg, while the mean diastolic blood pressure (DBP) was 76.9 ± 13.1mmHg. SBP was significantly higher in males than in females (p<0.001), no significant gender difference was observed for DBP. For SBP, Pre hypertension was observed in 55(36.2%), hypertension grade -1 in 30(19.7%) and hypertension grade - 2 in 19(12.5%) of the subjects. The overall systolic hypertension prevalence rate was 32.2 percent. For diastolic pressure, Pre-hypertension was observed in 49(32.2%) of subjects, hypertension grade1 in 21(13.8%) and hypertension grade 2 in 15(9.8%) with an overall diastolic hypertension prevalence rate of 23.6%. The aggregate hypertension prevalence rate in the subjects was 27.9%.

Significant protenuria was observed in 26.9% of subjects. Correlates of elevated diastolic blood pressure were increasing blood sugar and BMI.

CONCLUSION: The aggregate prevalence of hypertension of 27.9% and Pre-hypertension of 34.2% found in Barako a rural community of Rivers state is high. In addition the prevalence hypertension and cardiovascular risk factors such as obesity was high and significantly associated with elevated blood pressure. In view of the increasing prevalence of hypertension in rural communities in Nigeria, there is need for proper blood pressure and cardiovascular risk awareness, detection and control campaign in Nigerian rural and urban communities using community based screening and surveys.

Key words: Blood pressure pattern; Barako; rural community; Nigeria.

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INTRODUCTION

Essential hypertension is a major risk factor for cardiovascular, cerebrovascular and renal related morbidity and mortality, in both developed and developing countries, such as Nigeria[1-2].

In recent times, these complications of poorly controlled hypertension such as stroke, hypertensive heart failure and chronic kidney disease constitute the commonest non-communicable disease indications for adult medical hospitalization and mortality in Nigeria and most sub-Saharan African countries[1-3].

The increasing burden of hypertension and its related complications in sub-Saharan Africa and Nigeria has been largely attributed to lifestyle changes[3-5]. Earlier studies in Africa, before the turn of the 20th century reported low prevalence of hypertension in most parts of Africa, especially among the rural communities[6]. This pattern has however progressively changed in the last few decades in Africa, with reports of increasing prevalence of hypertension in Africa[1,2,5].

The only and most recent National blood pressure survey in Nigeria by the Non-Communicable Disease (NCD) expert group[7] in 1997, estimated the average prevalence of hypertension in Nigeria at 11.2%, with an urban area prevalence of 10-12% and rural area prevalence of 8-10%. This survey was however carried out using 160/95mmHg as the hypertension cut- off level. Recent reports of isolated studies of hypertension prevalence, in some rural and urban communities in Nigeria, using the WHO/JNC-7 cut-off criteria of 14/90mHg have found hypertension prevalence rates ranging from 17.3- 31.9 %[5,8-11.].

It is on this background that this blood pressure survey in Barako, a rural community in Gokana local government area of Rivers State was carried out with the objective of determining the prevalence and pattern of blood pressure

elevation and associated its risk factors. It is expected that this report will contribute to the growing data base of recent blood pressure trends in Nigeria.

SUBJECTS, MATERIAL AND METHODS

This was descriptive cross sectional study done in Barako, a rural village located about 50 kilometers north-east of Port Harcourt, the capital city of Rivers state, in the Niger delta region of Nigeria. The inhabitants of Barako community are predominantly subsistence farmers, petty traders, artisans, local government workers, retired public servants and house wives. The study subjects were members of Barako community who responded to community mobilization for a one-day free health outreach by a Rotary club. All subjects who presented voluntarily for the outreach exercise who were aged = 15 years were recruited following explanation of the study objectives and procedure in Pidgin English and the local dialect (Ogoni) after obtaining of informed consent. Subjects were recruited for this survey by simple random sampling of all consecutive subjects who gave informed consent to participate in the study. The research group comprised of consultant physicians, registrars in internal medicine, house officers, medical students, pharmacists, ophthalmology registrars, optometrists and nurses.

The materials used include, bathroom weight scale for weight measure graduated in kilograms (0 to 150 kilograms). For the determination of height a straight height measure graduated in centimeters and meters (from 0 to 10meters) was used. A standard Accosson's mercury sphygmomanometer graduated in mmHg (from 0-300mmHg), standard Littman's stethoscopes with bell and diaphragm, universal specimen bottles for urine collection, Medi-test combi-2 urine analysis test strips, ACCU-CHEK glucose meters as well as ophthalmoscopes' and snellen visual acuity charts.

All subjects who were recruited were subsequently registered and bio-data obtained after informed consent. Thereafter each subject was issued with a labeled universal specimen bottle to collect spot sample of their urine. Each subject was then called in turn for height and weight measurement, blood pressure measurement, urine testing and random blood glucose estimation.

Urine was tested for the presence of glucose and protein with the dip-sticks. The results for protenuria were recorded as either negative, trace, 1+ (30mg/dl), 2+(100mg/dl) and 3+ (=500mg/dl) respectively. Significant protenuria was taken as urinary protein level greater than1+ (30mg/l). Results for glycosuria was recorded as negative, 1+ (50mg/dl), 2+ (100mg/dl), 3+ (500mg/dl) and 4+ (≥1000mg/dl) respectively. The random blood glucose measurement was done using the accuchek glucometer and results recorded in mmol/l. Subjects capillary blood sample were obtained by finger prick under aseptic condition. The random blood glucose levels of the subject were categorized in accordance with the WHO guidelines[12] for the diagnosis of diabetes using

2-hr post-prandial blood glucose levels. Random blood glucose levels less than 11mmol/l were considered as within normal limits, while values = 11mmol/l was diagnostic of diabetes mellitus. Self-reported cases of diagnosed diabetes on treatment were also considered diabetic irrespective of their random blood glucose reading.

Blood pressure determinations were performed by doctors. Blood pressures were taken with the subject sitting after being rested for 5minutes. The cuff was applied about 1.5 centimeters above the right decubital fossa. Systolic blood pressure was first determined by palpation method, and then the systolic and diastolic pressures were determined by the auscultator method. The systolic pressure was recorded at the first appearance of the Korotkov's sound while the pressure reading at the final disappearance of the Korotkov's sound was recorded as the diastolic pressure. Blood pressures were categorized according to JNC-7 guidelines[13]. The body mass index (BMI) of the patients was calculated using the formula BMI=Body weight in kilograms/height in meter squared and classified based on the WHO International classification of adult underweight, overweight and obesity according to BMI[14].

All the data obtained were entered on to a purpose designed data acquisition sheet for subsequent analysis. Data was analyzed using the SPSS for windows version 15 and Epi-info statistical packages. Results are presented as mean ± standard deviation. Student t-test was used in the analysis of comparative variables with significant levels set at p<0.05. Pearson's correlation coefficient (r) was used to analyze relationship between dependent variables. Tables and graphs were used as appropriate.

Limitations of the study:

The study was not a full scale community blood pressure survey in which every household was sampled. Only those who responded to the health out reach community mobilization were studied. This limits the size of the population studied and may have introduced some selection bias.

RESULTS:

A total of 162 subjects turned out for the health outreach programme. Out of these ten subjects who were less than 15 years of age and were excluded from the survey.

Age distribution:

The age range of the 152 subjects was 15 85 years, with a mean of 48.9±14.8 years. Subjects in the 40- 49 years and 50 59years age groups constituted the majority of subjects, 72% of the study population (Table 1).

Gender distribution:

There were 60 males and 92 females, with a male to female ratio of 1:1.5.

Occupation of subjects:

The study subjects were predominantly farmers (53.9%). The proportion of the other occupational groups is as follows, local government workers (20.4%), teachers (5.9%), traders (5.2%), artisans (4.6%), students (3.3%), businessmen (4.6%) and motorcycle operators (1.9%) respectively.

Body Mass Index:

Their body mass index (BMI) ranged from 11.1 - 40.9 kg/m^2 with a mean of 24.8 $\pm$ 4.8 kg/m^2. Fifty two percent of the subjects had BMI values less than 24.9kg/m^2, 30% had BMI values 25-29.9kg/m^2(Pre-obese), while 15.7% had BMI values =30 kg/m^2(obese).

Blood pressure:

The distributions of the systolic and diastolic blood pressures are shown in table 2. The systolic blood pressures of the subjects ranged from 100-220mmHg with a mean of 129.9 $\pm$ 24.3mmHg ,while the values for the diastolic blood pressures ranged 50-110 mmHg with a mean of 76.9 $\pm$13.1 mmHg respectively.

The mean systolic blood pressure for males was 132.7 $\pm$24.1mmHg, while that for females was 122.7 $\pm$ 17.6mmHg .There was a statistically significant difference between the means (p <0.001).

The mean diastolic blood pressures for males and females were 78.2 $\pm$16.3mmHg and 72.8 $\pm$ 15.5 mmHg respectively. The difference in the means was not statistically significant.
Table 3 shows the distribution of the subjects in accordance with JNC-7 criteria for grading of hypertension. For systolic blood pressures 48(31.6%) subjects had blood pressures within the normal range, 55(36.2%) had pre-hypertension, 30(19.7%) had grade- I hypertension, 19(12.5%) had grade II hypertension. A total of 49(32.2%) subjects had systolic blood pressures within the hypertension range.

The distribution of diastolic pressures showed that 67(44%) of subjects had normal blood pressures, 49(32.2%) had pre-hypertension, 21(13.8%) had grade I hypertension and 15(9.8%) had grade II hypertension respectively. A total of 36(27.9%) subjects had diastolic blood pressures within hypertension range.

The aggregate hypertension prevalence rate of the subjects in this community was 27.9%.

Urine studies:

One hundred and eight out of the 152 subjects (71.0%) provided urine samples for analysis. Seventy nine (73.2%) did not have proteinuria, while 29(26.9%) had proteinuria. The results of the proteinuria grading, were trace 18(16.7%), [+]30mg/dl - 5(4.6%), [++]100mg/dl - 3(2.8%) and [+++]500mg/dl - 3(2.8%) respectively. Glycosuria was not detected in any of the 108 of the 153 subjects tested.

Glycaemic profiles:

Random blood glucose (RBS) levels were determined in 122 (80.3%) of the subjects.
None of the subjects had random blood glucose levels above 11.0 mmol/l.
The mean RBS level was 6.6 $\pm$ 2.3 mmol/l with a range of 4.2-9.8 mmol/l.

Correlations:

Diastolic blood pressure correlated significantly and positively with BMI [r = .461, p =.001] and random blood

Table 1. Age and sex distribution of survey subjects

Age group	male	female	total	percentage
10-19	1	0	1	0.6
20-29	3	7	10	6.5
30-39	8	14	22	14.5
40-49	24	21	45	29.6
*50-59	10	18	28	18.4
*60-69	4	24	28	18.4
70-79	9	7	16	10.5
> 80	1	1	2	1.3
	60	2 9	152	100.0

Mean age = 48.9 + 14.8(85) years M/F = 1:1.5, * Peak age groups.

Table 2: Blood pressure distribution by age group in males and females

Males

Age group(years)	Systolic blood pressure(mmHg)		Diastolic blood pressure(mmHg)	
	Range	mean$\pm$ sd	Range	mean$\pm$sd
10-19	110.0	110.0	70.0	70.0
20-29	110.0	110.0	60.0	60.0
30-39	100-150	130.8$\pm$ 23.9	70-100	86.7$\pm$12.7
40-49	100-220	135.2 $\pm$ 27.3	70-110	78.0$\pm$ 21.2
50-59	110-170	137.3 $\pm$ 21.0	70-110	81.7$\pm$11.9
60-69	120-170	147.3$\pm$25.2	76-80	76.0 $\pm$ 8.0
70-79	110-180	137.5 $\pm$ 23.1	60-90	74.4 $\pm$ 27.4
> 80				

Females

Age group(years)	Systolic blood pressure(mmHg)		Diastolic blood pressure(mmHg)	
	Range	mean$\pm$sd	Range	mean$\pm$sd
10-19	nil	nil	Nil	nil
20-29	110-140	120.0$\pm$ 12.9	69-80	78.1 $\pm$13.0
30-39	100-150	123.0$\pm$ 17.3	60-90	64.4 $\pm$27.6
40-49	110-170	127.2 $\pm$ 13.1	60- 110	79.0 $\pm$ 15.5
50-59	110-150	119.2$\pm$ 13.1	60-90	71.6 $\pm$10.7
60-69	110-160	132.9$\pm$ 15.1	60-100	74.7 $\pm$ 10.6
70-79	100-120	113 .3$\pm$ 11.5	60	60.0
> 80	--	Nil	--	Nil

Table 3.
Blood pressure distribution by JNC -7 criteria.

Blood pressure Category(mmHg)	Systolic blood pressure				Diastolic blood pressure			
	Male	female	total	%	Male	female	total	%
NORMAL SBP<119 DBP<80	17	31	48	31.6	24	43	67	44.0
PREHYPT SYS(120-129) DBP(80-89)	20	35	55	36.2	18	31	49	32.2
HYPT-1 SBP(140-159) DBP(90-99)	13	17	30	19.7	9	12	21	13.8
HYPT-2 SBP(≥ 160) DBP(≥ 120)	10	9	19	12.5	9	6	15	9.8
	60	92	52	100.0	60	92	152	100.0

Table 4: Prevalence of hypertension in recent isolated Nigerian population studies.

Authors	Location	Population size (N)	BP.cubff (mmHg)	Hypt.prev. (%)	Pre-hypt prev. (%)
NCD(1997)	National Survey. (Urban&rural)		160/95	**11.2**	Not stated.
Ekere et-al.(2006)	Asira (Ak.Ibom) Rural	400	140/90	**17.3**	Not stated
Omueme et-al (2007)	Udo (Edo state) Rural.	590	140/90	**20.2**	Not stated
Wokoma et al.(2007)	Okobo (Rivers state) Rural	165	140/90	**31.9**	36.7
Adefuye et-al. (2009)	Sagamu (Ogun state) Semi-urbal)	1008	140/90	**22.6**	Not stated
Index study Alasia et-al. (2010)	Barako Rivers state (Rural)	152	140/90	**27.9**	34.2

sugar [r =.293, p = .035] respectively.

DISCUSSION

The population characteristic of this rural community of Rivers state is similar in every respect to rural populations in most parts of Nigeria. The age and occupational groupings were similar to other observations of similar rural blood pressure surveys in Nigeria [15,16].

The predominance of females (almost twice as men) may be a reflection of rural-urban drift of able bodied men in search of job opportunities in the cities and local government head quarters. Resultantly the women, children and the elderly are left behind in the rural villages. The predominance of female farmers (2:1) over males may be further evidence to this fact as in most rural communities in Nigeria in contemporary times; farming seems to have been increasingly left to women and children.

Thirty percent of the subjects were pre- obese while fifteen percent were obese, thus forty-five percent of the population had overweight problems. Overweight and obesity are established risk factors for hypertension and other cardiovascular morbidities such as diabetes and chronic kidney disease[17-19]. The subjects in this community are thus at risk of the cardiovascular morbidity associated with overweight and obesity as shown in other studies[4]. Furthermore the correlation between BMI and diastolic blood pressure observed in this study conforms to the already established association between obesity and hypertension. Recent reports in Nigerian urban and suburban populations have shown a steady increase in the prevalence of overweight and obesity in children, adolescents and adults in Nigerian urban communities.[4,20,21]. The situation has been attributed to the increasing western lifestyles and the fast food culture prevalent in the urban cities of Nigeria.

The pattern of distribution of blood pressures in this population is also in keeping with previous local and global observations.[13,22,23], with increased blood pressure associated with increasing age and male gender.

The study reveals that hypertension was common among subjects in this rural community. The prevalence of hypertension of 27.9% is almost three folds the prevalence rates recorded in the 1997 Nigerian National hypertension survey report [7] of 8-10 percent in the rural areas and 10-12 percent in the urban areas. Our figure however falls within recent hypertension prevalences observed form isolated cross sectional studies in communities mostly in the southern part of Nigeria [8-11] ranging from 17.2 - 31.9%. Whereas, the NCD report used a higher hypertension cut-off level of 160/95 mmHg the recent studies, including this index study, used the JNC-7 recommended criteria for the grading and staging of hypertension. Adjusting for the disparate hypertension cut-off levels between the NCD and the recent studies would still likely show a trend towards increasing prevalence of hypertension in Nigerian communities in recent times.

These observations establish the need for a new National blood pressure and hypertension survey in the Nigeria, using the JNC-7($\geq$140/90mmHg) hypertension cut-off levels so as to determine the true hypertension prevalence rate in Nigeria as the 1997 NCD prevalence values seem to underestimate the magnitude of the burden of hypertension in Nigeria. The higher prevalence of pre-hypertension (34.2%) in the community is an indication of a large reserve of potential future hypertensives in the community. A similar study in another rural community of Rivers state [10], showed pre-hypertension prevalence of 36.7 %. In both instances the prevalence of pre-hypertension was higher than the prevalence of hypertension. A similar pattern was observed in the JNC-7 report [13].

Pre- hypertension is risk factors for hypertension as over one third of pre-hypertensive persons develop hypertension in the future[13]. It is also an independent risk factor for left ventricular hypertrophy and other cardiovascular events[13]. There is need therefore to keep the pre-hypertensive population under close medical surveillance with the introduction of lifestyle modification measures for early intervention.

The finding of significant proteinuria was 5.6% percent in the study subjects, all of whom were hypertensive. Proteinuria is risk factor for left ventricular hypertrophy, other cardiovascular out comes, as well as chronic kidney disease.[24,25].

The prevalence of diabetes or impaired glucose intolerance (IGT) was relatively low in this community. None of the random blood glucose values of the subjects was within impaired glucose tolerance or diabetic levels. Only two subjects (1.2%) volunteered history of being previously diagnosed diabetics and were receiving treatment at a nearby secondary health facility at the local government head quarters. Their blood glucose control were however sub-optimal. The prevalence of diabetes in this population of 1.2 % is however in keeping with the 0.9 to1.7% prevalence of diabetes reported in some population based studies in Nigeria.[26,27].

The findings from this study and other recent studies of the prevalence of hypertension in Nigerian communities clearly indicate an increasing prevalence of hypertension in both rural and urban Nigerian populations[5,8-11]. Emerging trends indicate that the hitherto existing urban-rural gap in hypertension prevalence is also being gradually eroded[5,8-11]. Recent observations of the dominance of complications of hypertension such as hypertensive- cerebrovascular events, hypertensive heart failure and hypertensive kidney failures as the commonest indications for medical admissions and mortalities in Nigerian hospitals[1-3]; is a clear indication of the burden associated with hypertension in Nigeria evidenced by increasing prevalence as documented in this study. Though hypertensive ischaemic heart disease is still thought to be less prevalent in Nigeria as compared with Europe and North America, the incidence has also been documented to be on the increase[28,29] recently.

The findings of this and earlier studies[5,8-11](table 4), which show an increasing prevalence of hypertension in Nigeria is a reflection of low hypertension awareness , poor compliance with treatment and attendant poor blood pressure control[30,31].

There is the urgent need for rigorous hypertension awareness and control campaign in Nigeria through properly articulated strategies which need to be implemented Nationwide with the Federal Ministry of health and the hypertension society of Nigeria providing the needed leadership. These strategies should incorporate proper blood pressure and cardiovascular risk awareness detection and control campaign in Nigerian rural and urban communities using community based screening and surveys. Finally an updated National hypertension survey using the current WHO/JNC hypertension classification guidelines as well as meta-analysis of various recent surveys on hypertension prevalence in Nigeria is recommended.

Conflict of interest: None

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