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RESEARCH ARTICLE

BLOOD PRESSURE PATTERN OF ADULTS IN A RURAL COMMUNITY OF KONDUGA, BORNO STATE, NIGERIA.

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Abstract

Background: Hypertension is a common non communicable disease that is associated with a lot of morbidity and mortality worldwide. Different lifestyles and anthropometric indices have been linked with increased risk of hypertension in different parts of the world. The motivation for this study was to determine the blood pressure pattern in adults of predominantly Kanuri ethnicity in a Konduga community.

Methodology: This is a cross sectional descriptive study in which Residents of Konduga town was sampled for the study aimed at detecting hypertension using a multistage/cluster sampling methods. All of the consenting adults aged 18 years and above who presented at the designated sites of the examinations constituted the study population. Those that were less than 18 years old were excluded from the study. The instrument was a self-administered questionnaire that had questions on their demographic characteristics. Physical measurements of blood pressures were recorded for each of the participants. Data generated were analyzed using SPSS version 16 software and tests of significance at $p < 0.05$ were done.

Results: Three hundred and thirty-two adults who were made up of males (179 (53.9%) and females (153 (46.1%) participated in the study. The ages of the participants ranged from 18 to 74 years with a mean age of 33.9 ± 12.7 years. The study group had a mean body weight of 68.5 ± 15.1 kg, mean height of 1.65 ± 13.1 meter, and mean body mass index of 25.7 kg/m². Hypertension was detected in 74 (22.2%) individuals with males having a higher percentage. The study group had a mean systolic and diastolic blood pressure of 127 ± 20.1 mmHg and 83.1 ± 12.8 mmHg respectively, while prehypertension was detected in 121(36.5%)

Conclusion: Hypertension was highly prevalent among the adults in Konduga community of predominantly Kanuri ethnic group.

Recommendations: Preventive measures such as the maintenance of normal body mass index by calorie restriction should be encouraged. Dietary salt restriction in the general population should be encouraged. Health education efforts that emphasize the reduction of the risk factors of hypertension should be implemented.

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Introduction:-

Blood pressure in the community is a continuous variable. It ranges from low through normal to high. The frequency of hypertension is more in Africans than the Caucasians, increasing in prevalence as age increases, with males having higher values than females especially during the reproductive age.¹

Hypertension or high blood pressure (HBP) is said to exist if the blood pressure exceeds systolic of 140 and or/ diastolic of 90 mmHg (JNC VII). Normal blood pressure is blood pressure below 120/80.²

Hypertension is like many other cardiovascular diseases, which are nutritional-hygienic conditions, the seed of hypertension lies in physical inactivity, obesity, high caloric intake, and excessive dietary sodium consumption as well as alcohol consumption. Genetic predisposition to hypertension remains ill-defined; however, environmental exposures of gene-environment interactions can be favorably influenced by manipulation of lifestyle choices.¹

Rates of many diseases are generally a lot higher in developing than in developed countries. For example, age specific stroke rates in Tanzania are about three to six times higher than those in the UK.³ Cardiovascular disease also typically occurs at an earlier age in developing than in developed countries leading to early death.⁴ Studies done in the 1940s showed virtual absence of hypertension in the rural areas of Africa, but recent studies in Nigeria, Jamaica and US revealed a steep gradient in prevalence from 15% through 26% and 33 %.⁵

Hypertension tends to progress silently, as a result of this; new cases are found incidentally when a patient visits health personnel for a different reason or during a community outreach program. Achieving acceptable control of hypertension is a problem due to lack of patient compliance, probably only 1 out of 5 patients has their blood pressure controlled to the level of 140/90.⁶

The prevention and management of hypertension are major public health challenges. If the rise in blood pressure with age could be prevented or reduced, much of hypertension and other chronic medical diseases such as stroke and cardiovascular diseases might be prevented. A population approach that decreases the blood pressure level in the general population by even modest amounts has the potential to substantially reduce morbidity and mortality. It has been estimated that a 5mmHg reduction of systolic blood pressure in the population would result in a 14% overall reduction in mortality due to stroke, a 9% reduction in mortality due to coronary heart disease and a 7% decrease in all causes mortality.⁷

One in every 10 Nigerians is hypertensive, the blood pressure rises with age in most Nigerian communities, in women it is usually more marked after 50 years of age.⁸ The prevalence of hypertension in adults is 8-10% in rural areas and 10-12% in urban communities.⁸ There are pockets of populations in Nigeria, as it is in other parts of Africa in which the blood pressure does not appear to rise with age. Such places include some villages in Kaduna state and Koma in Adamawa state.⁸

There appears to be dearth of data from community based survey blood pressure from the North Eastern part of Nigeria.

Types Of Hypertension:-

Pre-hypertension is systolic blood pressure that is between 120-139mmHg and or diastolic BP between 80-90mmHg, White coat hypertension occurs when the individual has normal blood pressure during normal activities but has high blood pressure in the clinic setting or the physician's office, Accelerated-malignant hypertension is severely elevated blood pressure and the funduscopy findings of Keith-Wagner grades 3 or 4 hypertensive retinopathy, Resistant hypertension is the failure to reach blood pressure control in compliant patients with a combination of three appropriate drugs (including a diuretic) at maximum doses.¹

Aim:-

To determine the blood pressure pattern of adults in Konduga using the JNC7 classification

Research Hypothesis:-

There is no difference in prevalence of hypertension among those with the risk factors and those without risk factors.

Materials And Methods:-

Study Area:-

Konduga is a community in Borno State of Nigeria and the head quarter of a Local government area of the same name. It is located 25 kilometers southeast of Maiduguri on the Maiduguri Bama road. The local government came into existence following the creation of Borno State in 1976; it lies within the Sahel Savannah covering an area of approximately 78,500 square kilometres.⁹ Konduga local government shares boundary with Jere Local Government (Maiduguri) to the north, Bama and Kaga Local Governments to the south, Mafa to the South-east, Damboa to the South-west. It has an estimated population of 500,000 (while the Konduga town inhabits about 13,000 people) and a population density of about 50 persons per square kilometre.⁹

Majority of the inhabitants are subsistent farmers with earnings below \$20 per annum, crops grown include millet, guinea corn, beans and rice. Others include fishermen, petty traders, blacksmiths and a few civil servants. Most people do not have access to potable water or electricity and have no formal education but Islamic education only.⁹

The climate is dry and cold between November and February. The hottest months are from April to June, while the rains fall from June to October with an average rainfall ranging from 60 to 95mm per year.⁹ The health facilities are General hospital, Maternal and Child Health center. There are no tertiary institutions and no industries sited in Konduga.

The primary languages in Konduga are Kanuri, Shuwa Arabic, Wandala/Malgwa, others are Marghi, Fulani, Hausa, Bura and Mafa. The major religion is Islam, followed by Christianity, and a few traditionalists. Konduga is the one of the communities that has been ravaged by the Boko Haram insurgency activities.

Study Population:-

The study population included all consenting adults of both sexes aged 18 years and older who fitted into the inclusion criteria.

Inclusion criteria:-

All the individuals who reported that they were aged 18 years and above and signed the consent forms at the venue of the examinations were included.

Exclusion criteria:-

Those individuals who were below 18 years were excluded. Also excluded were all non-consenting individuals. The subjects who had debilitating illnesses severe and persons with deformity whose height and weight could not be measured. Pregnant women were not included. Athletes were also excluded.

Study Design:-

This was a cross sectional descriptive study.

Sample Size:-

Sample size was determined based on the best estimate of the prevalence of hypertension in a similar population from literature review using the formula.

$$n = \frac{Z^2 pq}{d^2}$$

d^2

n = the desired sample size when population is greater than 10,000

Z = the standard normal deviate, usually set at 1.96 (or simply 2), which corresponds to 95% confidence interval.

P = the proportion in the target population estimated to have a particular characteristic, if there is no reasonable estimate then use 50% (i.e., 0.50), here p = 20.¹⁰

q = 1.0-p

d=degree of accuracy desired is set at 0.05.¹¹

$$n = \frac{(1.96)^2 (0.2) (0.8)}{(0.05)^2}$$

$$n = 245$$

This was rounded up to 300 to allow for no response.

Method:-**Sampling:-**

The choice of the residential area of investigation was by the simple multistage sampling technique. Stage one was the selection of Konduga Local Government out of the existing 27 Local Government in Borno State through a simple random sampling technique by balloting.

Stage two was a purposive selection of Konduga town which was divided into the pre-existing urban wards, these served as the sampling frame and a ward served as a sampling unit.

Stage three was the selection of five wards using the simple random sampling methods and all the wards were studied. Every participant who presented at the study site and was eligible was included until the sample size was attained.

Data collection:-**Study instruments:-**

The instruments used for the study included; a structured interviewer administered questionnaire, three sphygmomanometer (two accusson's and one digital), three stethoscope, a weighing scale (Health life), a height rule, three measuring tape and writing materials.

Training Of Research Assistants:-

Three trained nurses and three community health officers who volunteered to be field workers were trained on the administration of the questionnaires and in the measurement of blood pressure, height, weight, waist and hip circumference.

Advocacy Mobilisation:-

There was a first advocacy visit to Konduga Local Government Chairman, Primary Health care coordinator and ward heads (Bulamas) to inform them about the study. A second visit was done just a day before the intended date of data collection to serve as a reminder. Town announcers went round with the view to mobilize participants a day before data collection.

Procedure:-

All participants were assessed at a central location which was a maternal and child health care center, participants gathered up to three times in the course of the data collection, they were asked to sit down before completing the questionnaires. The data was collected on weekends (Saturdays), so it took three Saturdays to complete the process. Questionnaires which were developed based on the guidelines of the STEPS instruments on non-communicable diseases risk factors by W.H.O.¹² Firstly participants completed the culture sensitive structured questionnaire based interview. The questionnaires consisted of questions on demography of subjects and **measurements** were done to ascertain blood pressure status and anthropometry of all participants.

Secondly the participants had their blood pressure measurement taken. Physical measurements were made on all participants as planned in the proforma as follows: Data pertaining to the measurement of blood pressure in individuals equal to or greater than 18 years was used.

Blood pressure measurements were taken and expressed in millimetre of mercury (mmHg), three consecutive reading of blood pressure were taken on the arm according to the WHO/ISH guidelines on hypertension with the participant in a sitting and standing position⁹. The mean of the mercury and automated electronic sphygmomanometers were used. The participant was rested for at least 3 minutes in a sitting position with the arm rested on a table and the measurements undertaken with a view to carrying out the procedure in standard conditions. Tight clothing was removed from the arm; systolic blood pressure corresponded to the first Korotkoff sound while the diastolic blood pressure coincided with the disappearance of all sounds corresponding to the 'fifth Korotkoff' the mean of 3 measurements was used for the purpose of study analysis.

Data Analysis:-

The data generated from the study were analyzed using the SPSS version 16 software program for frequency distribution and cross tabulations. Test for statistical significance were done using Chi-Square test for categorical data, the stepwise regression and student t-test for quantitative data using bivariate correlation to determine the

significance between factors. Confidence interval at 95% level significant for population surveys was use, and p-values of < 0.05 are considered to be statistically significant in this study.

Ethical Consideration:-

Ethical approval was obtained from the Ethics Committee of University of Maiduguri Teaching Hospital. All subjects gave verbal and written informed consent before they were enrolled to partake in the study. The principles of the Declaration of Helsinki on biomedical research on human subjects were followed.

Limitations:-

1. Data collection took place during the raining season; this might have led to selection bias against farmers.
2. Socio cultural issues peculiar to the study area placed limitation to house to house survey.

Results:-

Demographic characteristics of the study population:-

A total of 332 individuals with a male: female ratio of 1.3:1 (179 males and 153 females) was Studied .The ages of respondents ranged from 18 to 74 years with a mean of 33.9 + 12.7 years. Over 87% of the study participants were from the ethnic groups of Borno State of which the Kanuri tribe is the majority. The tribes from the States of the Northeast, Nigeria namely Borno, Yobe, Adamawa, Bauchi, Taraba and Gombe constituted 97% of the study population.

Table 1:-Demographic and social characteristics of the study population

Characteristic	Frequency	(%)
Sex		
Male	179	53.3
Female	153	46.0
Marital status		
Monogamous	173	52.4
Polygamous	22	6.6
Single	126	38
Divorced	2	0.6
Education		
Quaranic/Illiterates	142	45.5
Primary	12	3.5
Secondary	63	19.8
Diploma	85	26.7
University	28	4.1
Occupation		
Student	125	37.8
Business	16	4.8
Housewife	19	5.7
Labourers	10	3
Farmers/C/Ser	142	43.5

Table 1 shows the demographic and the social characteristics of the study population. An analysis of the marital status showed that 173 (52.4%) individuals among the study participants were married and 126 (38%) were single, fifty four percent of the study population had some form of education whereas 45% did not have any formal education, 40% were students and the other categories such as businessmen, laborers and house wives constituted 15% of the total.

Prevalence rate of hypertension:-

There were 74 hypertensive subjects in the study population there by giving a prevalence rate of hypertension in this cross sectional survey of 22.2% (Fig. 1). Among the 74 hypertensive subjects were 41 men and 33 women who constituted 55.6% and 44.4% of the hypertensive population.

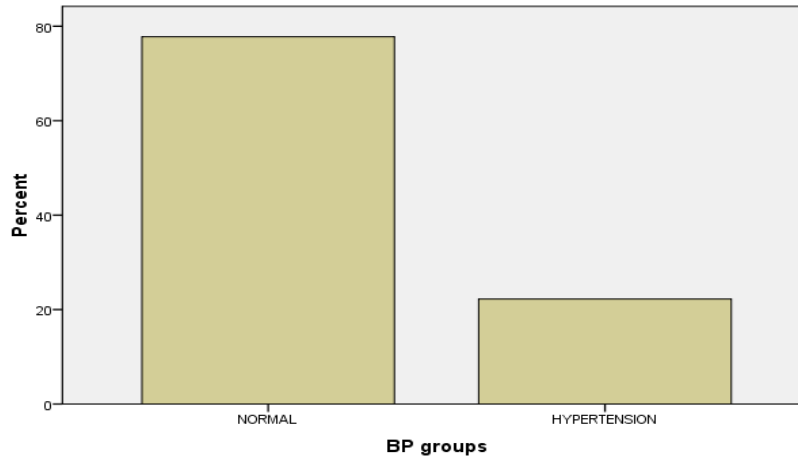


Table 2:-Categories of blood pressure amongst participant

Blood pressure	
Frequency	Percent
Normal	135 41.0
Pre hypertension	121 36.5
Stage1 hypertension	51 15.3
Stage2 hypertension	23 6.9
Total	332 100

Categorization of the study population into the JNC 7 blood pressure groups showed that 41% were normotensive, 36.5% participants had pre hypertension, and 15.3% had stage 1 hypertension while 6.9% had stage2 hypertension. In the pre hypertensive group there were twice as many males (62.8%) as there were females (37.2%) (Table2).

Table 3:-Prevalence of hypertension by Sex of participant.

Blood Pressure			
	Normal Frequency (%)	Hypertensive Frequency (%)	Total (%)
Sex			
Male	138 (77.0)	41(23.0)	179(54)
Female	120 (78.4)	33 (21.6)	153(46)
Total	258(78.0)	74(22)	332

$X^2 = 0.97$, $df 1$, $P > 0.05$, (Not significant).

A cross tabulation of the blood pressure status of the male and female genders of the study participants showed that there were 40 (22.5%) hypertensive individuals among the 179 males while there were 32 (21.1%) females who had hypertension out of a total number of 153 females (Table 3). Chi-Square tests on the influence of gender on the prevalence of hypertension indicated that the difference in prevalence rates between the sexes was not significant ($p = 0.756$, $p > 0.05$, not significant). Consequently the risk estimate as it related to gender was $OR = 0.92$ (CI; 0.54 to 1.55).

Table 4: Prevalence of hypertension by Age

Blood Pressure			
Age	Normal Frequency (%)	Hypertensive Frequency (%)	Total (%)
15-24	86(94.5)	5(5.5)	91(28)
25-34	77(85.0)	14(15.0)	91(28)
35-44	55(72.4)	21(27.6)	73(23.1)
45-54	33(56.9)	25(43.1)	58(18)
55-64	4(36.4)	7(63.6)	11(3.3)
>64	1(50)	1(50)	2 (0.6)

Total	256(78)	73(22)	332
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$X^2 = 44.9$, $df = 5$, $p < 0.05$ (Significant)

The frequency of hypertension among the age groups showed a progressive increase from 5.5% in the < 25 years old age group to peak at 63.6% in the 55 - 64 years age group (Table 6). Applying the Linear by Linear association in this study showed a direct relationship between increasing age up to the age of 64 years and the prevalence of hypertension ($p=0.000$).

Discussion:-

This cross sectional community based descriptive study has shown that hypertension, a non communicable disease is common in adults especially in the middle aged individuals of both sexes in the Northeast, Nigeria. In this study, the prevalence rate of hypertension was 22 % while that of pre hypertension was 36.7%. Those figures are similar to the rates previously reported elsewhere by other researchers as follows. It was reported that the prevalence rate of hypertension was 20.2% in two rural communities in Edo State, Southern Nigeria¹⁰. A recent study in a north western State of Nigeria reported that among ethnic Hausa and Fulani men and women, pre hypertension and hypertension were prevalent at 58.7% and 24.8 % respectively¹³. The application of the JNC VII guidelines on detection of hypertension appears to account for the difference in rates between this and other recent studies in Nigeria on the one hand and the much earlier reports on the other hand, in which hypertension was defined as blood pressures exceeding 160/90 mmHg. Consequently another study in an Ibadan, Southwest, Nigerian study in which the older definition was applied the, prevalence of hypertension was put at 10.3% (CI, 8.4%, 12.2%)¹⁴. Considerations of location, racial and ethnic composition in addition to the period of study are important in appropriately comparing prevalence rates of hypertension. In the USA for example there has been an increase in the prevalence of hypertension in the general population between the 1988- 94 and 2000 sessions of the ongoing National Health and Nutrition Examination Survey (NHANES). Whereas the rate was 23.9% in 1988-94, by 2007-8 it had risen to 29%.¹⁵ In the USA where a lot of research has been done in that area, it has been reported that Americans of African descent have higher rates of hypertension than their white counterparts. Whereas the prevalence rate in the black Americans is 34% in the white Americans and Hispanics the rates are 29% and 21% respectively.¹⁶ In this study the mean systolic blood pressure was 127mmHg while the mean diastolic blood pressure was 83 mmHg. In comparison the average systolic blood pressure and the average diastolic blood pressure in the NHANES were 120.9mmHg and 70.6mmHg respectively. The figures reported in this study are higher than that of the general population in the USA where the white and Hispanics who constituted the majority of that study population have significantly lower blood pressures than their African American counterpart.

There was a consistent and statistically significant decrease in the proportion of participants of this study whose blood pressures were classified as normal from almost 60% in those under 25 years to less than 20% in the age group 55-64 years and 0% in those older than 65 years. It is now a well-documented fact borne out of several studies those blood pressures in the general population increase with age.¹ In the USA for example; the NHANES study showed that prevalent hypertension was greater in the age groups older than 60 years and 40 to 59 years than for those in the age 18 to 39 years.¹⁶ As a consequence of the relationship between age and the prevalence of hypertension studies on the frequency of hypertension involving older person would expectedly report higher rate than those like this study than has a substantial portion of the study population belonging to the age group less than 25 years. It is no wonder then that a large population of adult Chinese numbering over 40,000 adults aged 35 years and older reported a prevalence rate of about 44%.¹⁷

This study did not show any sex bias in the prevalence of hypertension in the general population. A comparison of the prevalence rates of hypertension between this study and a similar report from Sokoto, Northwest, Nigeria shows that whereas hypertension occurred in 22% of the males and 21 % of the females in the Northeast the corresponding figures were 25% and 23% for men and women respectively in the Northwest. Similar non sex bias reports of the prevalence of hypertension in the general population have come from the USA.¹⁵ thus going on to support the finding in this study that hypertension occurs equally between the genders.

Conclusion:-

Hypertension was common among the residents of this community based study of predominantly Kanuri ethnicity. Hypertension is currently a public health problem that has the potential of getting worse with the increasing adoption of sedentary lifestyles.

Recommendations:-

In view of the high prevalence rate of hypertension, it is hereby recommended that there should be regular blood pressure measurements of all adults by health personnel to facilitate early diagnosis of hypertension which along with treatment will greatly reduce the risk of the dreaded complications of hypertensive heart failure, stroke, blindness and kidney failure.

Efforts should be geared towards health education by health personnel in schools through health talks on the preventive measures against hypertension.

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