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Health assessment of Gwoza residents in Borno State, Nigeria: A Case Study

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ABSTRACT

The awareness of blood pressure (BP), weight, height, genotype, sickle cell disease (SCD) and blood group in most rural communities of Nigeria is low. The community survey and assessment was carried out on 150 healthy adult (age 18 and above) individuals, out of which 138 were male and 12 were female at Gwoza, Borno State, Nigeria in September 2010. Eligibility is dependent on six-minute-walk distance, ensuring that patients are moderately but not too severely functionally impaired, thereby maximizing the likelihood of detecting a favorable response to questionnaire and BP measurement. The assessment showed that 62.67 % and 2.66 % of the sample population had normal and stage 2 hypertensions respectively. The age distribution showed that 64 % were between 18-29 years old and nobody was above 60 years. The percentage of underweight, normal weight, over weight and obese people were 9.33 %, 72 %, 16 % and 2.67 % respectively. A 37.34 % and 58.67 % of the people were of blood group A with Rh^+ and blood group O with Rh^+ respectively while 13.33 % of the respondents had SCD. The study was able to establish the extent of awareness and prevalence of BP, body mass index (BMI), genotype, SCD and blood group in the community.

INTRODUCTION

The importance of health and political stability of any country's economy cannot be overemphasized. Owing to the turbulent political history of Nigeria, many works have been dedicated to the importance of political stability as far as the success of the nation's ailing economy is concerned (Udu and Agu, 1999), however no efforts have been made to ascertain the health status of the citizenry. Hypertension is an increasingly important medical and public health issue. Blood pressure is usually classified based on the systolic and diastolic blood pressures. Systolic blood pressure is the blood pressure in vessels during a heartbeat and diastolic blood pressure is the pressure between heartbeats. A systolic or the diastolic blood pressure measurement higher than the accepted normal values for the age of the individual is classified as prehypertension or hypertension. The age-related rise in systolic blood pressure is primarily responsible for an increase in both incidence and prevalence of hypertension with increasing age (Franklin et al. 1997). The prevalence of hypertension increases with advancing age to the point where more than half of people aged 60 to 69 years old and approximately three-fourths of those aged 70 years and older are affected (Burt et al. 1995). Hypertension has several sub-classifications, including hypertension stage I, hypertension stage II and isolated systolic hypertension. Isolated systolic hypertension refers to elevated systolic pressure with normal diastolic pressure and is common in the elderly. These classifications are made after averaging a patient's resting blood pressure readings taken on two or more office visits.

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Individuals older than 50 years are classified as having hypertension if their blood pressure is consistently at least 140 mmHg systolic or 90 mmHg diastolic. The first figure is the systolic blood pressure, the pressure in the arteries when your heart is contracting and the second or lower figure is the diastolic blood pressure, which is the pressure in your arteries between heart beats. High blood pressure is anything above 140/90 mmHg. Patients with blood pressures higher than 130/80 mmHg with concomitant presence of diabetes mellitus or kidney disease require further treatment, (Chobanian et al. December 2003). Hypertension is also classified as resistant if medications do not reduce blood pressure to normal levels, (Chobanian et al. December 2003). Normal blood pressure is at or below 120/80 mmHg, (PubMed Health, 2011). High blood pressure is anything above 140/90 mmHg and hypertension is the opposite of hypotension. Hypertension can also be classified as either primary (essential) hypertension or secondary hypertension; about 90–95% of cases are categorized as "primary hypertension," which means high blood pressure with no obvious medical cause, (Carretero OA, 2000) and the remaining 5–10% of cases; secondary hypertension are caused by other conditions that affect the kidneys, arteries, heart or endocrine system (Mayo Foundation, 2008)**.** Worldwide prevalence estimates for hypertension may be as much as 1 billion individuals and approximately 7.1 million deaths per year may be attributable to hypertension (WHO, 2002). A number of important causal factors for hypertension have been identified, including excess body weight; excess dietary sodium intake; reduced physical activity; inadequate intake of fruits, vegetables, and potassium and excess alcohol intake (Stamler, et al. 2002; Whelton, 2002).

Obesity can be defined as an excess of body fat. A surrogate marker for body fat content is the (BMI), which is calculated as:

$$\text{BMI} = \text{Weight in kg/Height } m^2$$

In clinical terms, a BMI between 25 and 29.9 kg/m^2 is called overweight and a BMI greater than 30 kg/m2 is called obese. BMI is not a direct estimate of adiposity and does not take into account the fact that some individuals have a high BMI due to a large muscle mass. A better way to define obesity is to actually measure the percentage of total body fat. Obesity is usually defined as 25 per cent or greater total body fat in men and 35 per cent or greater in women. BMI is a measure of body fat based on height and weight that applies to adult men and women.

BMI Categories are

- Underweight = <18.5
- Normal weight = 18.5–24.9
- Overweight = 25–29.9

Obesity = BMI of 30 or greater

The current National Institutes of Health (NIH), guidelines recommend a decrease in caloric intake of 500 kilocalories per day for overweight and moderately obese persons (BMI greater than 25 but less than 35 kg/m^2) to achieve a weight loss of approximately 1 pound each week. A more aggressive energy deficit of 500 to 1000 kilocalories per day is recommended for persons with BMIs greater than 35 kg/m^2. The current National Institutes of Health (NIH, 1998), guidelines recommend a decrease in caloric intake of 500 kilocalories per day for overweight and moderately obese persons (BMI greater than 25 but less than 35 kg/m^2) to achieve a weight loss of approximately 1 pound each week. A more aggressive energy deficit of 500 to 1000 kilocalories per day is recommended for persons with BMIs greater than 35 kg/m^2.

Human blood groups are genetically determined antigens express on the surface of blood cells. The antigens may also be found in body fluids of secretors; urine, saliva and amniotic fluid. Blood groups may also be express on other organs cellular surfaces. The membranes of the red blood cells of most individuals contain one blood group substance of type A, type B, type AB, or type O. Individuals of type A have anti-B antibodies in their plasma and will thus agglutinate type B or type AB blood. Individuals of type B have anti-A antibodies and will agglutinate type A or type AB blood. Type AB blood has neither anti-A nor anti-B antibodies and has been designated the universal recipient**.** Type O blood has neither A nor B substances and has been designated the universal donor. The explanation of these findings is related to the fact that the body does not usually produce antibodies to its own constituents. Thus, individuals of type A do not produce antibodies to their own blood group substance, A, but do possess antibodies to the foreign blood group substance, B, possibly because similar structures are present in microorganisms to which the body is exposed early in life. Since individuals of type O have neither A nor B substances, they possess antibodies to both these foreign substances. The above description has been simplified considerably; eg, there are two subgroups of type A: A1 and A2. The genes responsible for production of the ABO substances are present on the long arm of chromosome 9. There are three alleles, two of which are co-dominant (A and B) and the third (O) recessive; these ultimately determine the four phenotypic products: the A, B, AB and O substances (Hirszfeld and Hirszfeld, 1919), showed the frequencies of blood groups A and B differ between populations. Their observations raised fundamental questions regarding the causes of these differences which were eloquently summarized by (Mourant et al., 1978) " were the differences the result of random genetic drift and founder effects, in small populations which later multiplied and stabilized the original, fortuitous, frequencies or were they the result of natural selection, arising from differences in fitness between the various blood groups, fitness which themselves depended upon locally determined features of the external environment. The Rhesus blood group antigens are fully developed in-utero. Rhesus blood groups are only express on red cells. There are 5 Rhesus antigens (D, C, c, E & e). A fetus who inherits any of these antigens from the father where the mother is negative for the same antigen could sensitize the mother and the commonest and most potent is Rhesus D.

Sickle cell disease is a common genetic disorder in the tropics and remains a major cause of morbidity and mortality especially in children (Olanrewaju DM , 1988; Oyedeji DA, 1990; Omotade et al, 1983; Kaine WN, 1983; Knox-Macauly HHM, 1982; Maharajan et al, 1983; Abhulimhen-Iyoha et al, 2011).

Sickle cell anemia (MIM 141900) is sequence of codon 6 of the β chain changed from GAG in the normal gene to GTG in the sickle cell gene, resulting in substitution of valine for glutamic acid. It is an important haemoglobinopathy in West Africa with associated variant of health complications including impaired growth and development with associated distorted body image. It affects both physical and sexual development and subjects were demonstrated to exhibit deficits in height and weight as well as in skeletal maturation.

Mortality from the disease is highest in the first five years of life, with approximately 50 % of death occurring in the second half of infancy and for most affected children, the parents are usually unaware of the presence of the disease; the diagnosis is sometimes being made post mortem (20) [Abhulimhen-Iyoha et al, 2011]. The awareness of phenotypes of sickle cell disease in communities is low and majority of the couples in our environment are unaware of their haemoglobin phenotypes; thus they are unaware of the risk of their children inheriting sickle cell gene (Abhulimhen-Iyoha et al, 2011; Goyea et al, 1997).

All humans and many other primates can be typed for the ABO blood group. There are four principal types: A, B, AB and O. The specific combination of these four components determines an individual's type in most cases. There are two antigens and two antibodies that are mostly responsible for the ABO types. The blood type is established before an individual is born, by specific genes inherited from the parents, one gene from the mother and one from the father; these two combine to establish the individual's blood type. These two genes determine the blood type by causing proteins called agglutinogens (a-GLOO-tin-a-gins) to exist on the surface of all of the red blood cells.

The purpose of the present review is to provide an overview of our current understanding of the health status of rural dwellers in Gwoza community.

METHODOLOGY/STUDY DESIGN

A simple sample survey was employed**.** Because the people in both areas were characterized by both literate and illiterate people with poor educational background, non-testing instrument of questionnaires and direct observation were applied. Simple and clarified questions were asked in a systematic but informal manner thereby creating a relaxed atmosphere for the respondents.

Direct measurement of blood pressure was done with sphygmomanometer, BMI was determined after measuring the height with tape and weight with weighing balance. The blood group and genotype was determined with Anti-A and Anti-B sera while the Sickle cell anaemia was monitored by direct observation of the respondents.

Informed consent

The human experimental protocols were approved by our institution's human Ethics Committee of the Faculty of Pharmaceutical Sciences, University of Nigeria, Nsukka and and in compliance with the Federation of European Laboratory Animal Science Association and the European Community Council Directive of November 24, 1986 (86/609/EEC) (EEC, 1986). The patients who agreed to participate were explained the nature and objective of the study and informed consent was formally obtained. The information about the patient's identity was not included with other data and only the principal investigator had access to this information and no reference to the patients' identity was made at any stage during data analysis.

Sample size

The community survey and assessment was carried out on 150 healthy adult (age 18 and above) individuals, out of which 138 were male and 12 were female.

Inclusion and exclusion parameters

Only participants that reached 18years and above were used for survey. Not few numbers of responses were obtained as the survey was conducted in the village square though some people refused supplying any information to the researcher.

Analysis of data

The data collected were analyzed statistically using Tables and Bar chats with percentage representations included and also entered into the Statistical Package for Social Sciences (SPSS) version 16 and descriptive statistics were generated.

The blood pressure distribution

The blood pressure distribution among the people is as illustrated in Table 1.

The study showed that 2.66 % of the population had Stage 2 hypertension which is not significantly high in the area. This may be attributed to low life style of the villagers and enough physical exercise as most of the people are peasant farmers.

Table. 1: Blood pressure distribution among the residents

BP Classification	SBP	DBP	Percentage (%)
Normal	⍰ 120	and ⍰ 80	62.67
Prehypertension	120-139	or 80-89	28.00
Stage 1 hypertension	140-159	or 90-99	6.67
Stage 2 hypertension	≥ 160	or ≥ 100	2.66

Age distribution

The percentage age distribution of the people was as shown in Table 2 below.

Table. 2: Percentage age distribution of the people

Age in years	Percentage (%)
18-29	64.00
30-39	21.34
40-49	13.33
50-59	1.33
60 and above	Nil

BMI and the distribution among the individuals

The BMI values and the number of people are shown in Table 3.

The percentage of people with obesity was low (2.67 %) owing to probably increased energy expenditure as most of the villagers had normal weight which might be due to the nature of their job; subsistence farming making them to engage on manual labor year in year out thereby having less fat accumulation in the body.

Table. 3: The BMI values and the number of people are shown in Table 3

BMI values	Categories	Percentage (%)
<18.5	Under weight	9.33
18.5–24.9	Normal weight	72
25–29.9	Over weight	16
30 or greater	Obesity	2.67

Blood groups, Rhesus factors and genotypes

The blood groups and genotypes of the people were as shown in Table 4 and 5.

Table. 4: Relative frequencies of Blood groups and Rhesus factor among the group of people

Blood group	Rhesus factor	Percentage (%)
A	Positive	37.34
A	Negative	1.33
B	Positive	1.33
B	Negative	Nil
AB	Positive	Nil
AB	Negative	Nil
O	Positive	58.67
O	Negative	1.33

Table. 5: Relative frequencies of Blood groups and genotype among the group of people

Blood group	Genotype	Percentage (%)
A	AA	21.34
A	AS	13.33
A	SS	4.00
B	AA	1.33
B	AS	Nil
B	SS	Nil
AB	AA	Nil
AB	AS	Nil
AB	SS	Nil
O	AA	28.00
O	AS	22.67
O	SS	9.33

RESULTS AND DISCUSSION

The A and O blood groups were highly significant among the people with percentages of 38.67 % and 60 % respectively. It is obvious from these percentages that the O and A genes occur frequently, whereas the B gene is infrequent. From the blood group and genotype result obtained the number of sickle cell patients were really significant (13.33 %). The reason might be that most of the individuals in the community are illiterate who do not believe and had refused to accept that AS and AS should be discouraged from marriage or had no access to health awareness program which would have impacted positively through reduction in AS couple marrying each other. Healthy People 2010 had identified the community as a significant partner and vital point of intervention for attaining healthy goals and outcomes (US department of health and human serv., 2003). Owing to the poor knowledge of BP, BMI, SCD and blood grouping there is need for education programme of the public using the mass media and health talks in health facilities to enlighten villagers on the prevalence as well as the available preventive options coupled with simple and cost effective medical care can positively influence the clinical outcome of BP, BMI, SCD in an otherwise environmentally hostile African setting. The present study had provided an ample opportunity for counseling parents and the rural dwellers. The high incidence of SCD showed a high level of intermarriages between carriers in spite of the fact that some churches in Nigeria insist that couples present their haemoglobin phenotype results before being granted permission to marry. Goyea et al (Goyea et al, 1997) reported that 16.7 % of the mothers of SCD patients claimed that a fore knowledge of their own haemoglobin phenotypes or that of their spouses would not have prevented them from marrying the same spouses meaning that pre-marital screening does not appear to be a hundred percent effective in achieving this.

CONCLUSION

The prevalence of high blood pressure and obesity were not rampant in the community based on the number of people sampled for the study owing to physical exercise and feeding habit of the people. Also poor health awareness initiative and illiteracy must have contributed to high incidence of SCD among the people and high calorie and protein supplement with general good health measures are advocated for subjects with SCD to reduce psychiatric complications to the barest minimum.

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