Some Cardiovascular Risk Factors in Volunteers for health checks: A Study Of Rural And Urban Residents In The Northeast Nigeria

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Abstract

The prevalence rates of cardiovascular disease risk factors are increasing rapidly globally and especially so in the middle and low income countries where the adoption of Western lifestyles are considered to be responsible for the change. Our study population is drawn from sub-Saharan African communities that are also classified as low income by the WHO. In this cross sectional study we sought to use simple low cost examinations of community based individuals to determine the health burden attributable to the major cardiovascular risk factors. We studied a total of 224 volunteers of whom 102 lived in the city and 122 resided in the rural area. The male to female ratio of the study population was approximately 2:1 at the urban and 1.5:1 at the rural surveys that involved adults 18 years and older. The mean ages of the participants were 37.6 years for the urban residents and 42.8 years at the rural area. The majority did not smoke and self reported that they were involved in exercises. We identified prehypertension, hypertension, overweight and obese states, proteinuria and diabetes as the modifiable cardiovascular risk factors that occurred at high frequencies and most of which were previously undiagnosed. The prevalence rates of the risk factors were prehypertension 48 % versus 39%, hypertension 40 % versus 27 %, overweight and obese 44% versus 28 % in the urban and rural areas. There is an urgent need to combat by preventive and intervention strategies the heavy burden of cardiovascular risk factors at the community level in the Northeast of Nigeria.

INTRODUCTION

Cardiovascular disease is the leading cause of deaths worldwide and it was projected to account for the mortality of 17.5 million individuals globally in the year 2005 ([1]). Furthermore cardiovascular mortality has been projected to exceed 20 million by 2015 if the present trend in cardiovascular risk profile prevalent in the low and middle income countries is not stopped ([2]). Cardiovascular risk factors are rapidly expanding from the original list of the so called traditional factors such as smoking of cigarettes, male sex, high blood pressure and diabetes and cholesterol to include the more recently added ones like chronic kidney disease ([3,4,5]). According to Chobanian et al ([6]), the major cardiovascular risk factors include hypertension, older age of 55 and 65 years for men and women respectively, diabetes mellitus, elevated low density and total cholesterol concentrations. The other cardiovascular risk factors include estimated glomerular filtration rate less than 60 ml/min indicative of chronic kidney disease stage 3, microalbuminuria, obesity and cigarette smoking. The common explanation for the rising tide of cardiovascular disease worldwide is the adoption of the Western lifestyles with the resultant increase in the prevalence rates of diabetes and hypertension. Hypertension alone was responsible for 7.6 million deaths (or 13.5% of total) and 92 million or 6% of global total of Disabilty Adjusted Life Years (DALY) in the year 2001 ([7]). Cardiovascular disease burden is greater in developing than the developed countries where those affected are the relatively younger individuals who do not get to receive the benefit of recent advance in treatments of those conditions. Our aim in this pilot study was to use the simple, non high technology methods to determine the prevalence rates of the cardiovascular risk factors such as hypertension, proteinuria, obesity and diabetes in the urban residents who were predominantly white collar workers and to compare them with the situation prevalent in the rural dwellers who were mostly peasant farmers.

METHODS

Cross sectional health surveys were conducted at two different locations after prior announcements of the upcoming free medical check exercises for consenting

adults. The urban setting was Maiduguri while the rural setting was a remote village approximately 200 kilometers from the capital city of Borno State Nigeria. In the urban setting we made the announcements over the television service while the rural dwellers got their announcement through their ward chiefs and person to person communication. On the morning of the screening exercise, volunteers assembled at designated locations where their demographic characteristics were recorded by face to face interviews and then their blood pressure and anthropometric measurements were carried out on site. Universal specimen containers were distributed at the venue of the screening exercise to the volunteers who used them to collect on the spot urine for dipstick urinalysis test for glucose and protein. Anthropometric characteristics and blood pressure measurements were done by medical students at the rural setting while student nurses took the measurements of the volunteers in the urban area. Blood pressure measurements were carried out using the mercury sphygmomanometer (Accosson England) whereas the weight and heights were taken using a portable analog combined weight and height meter. The total numbers of the volunteers for the exercises were 102 for the urban residents and 122 for the rural residents. In both surveys we focused on adults 18 years and older and tested the blood for glucose in only those that had positive glucose in the urinalysis examination. We presented the results of this descriptive study in means and percentages.

RESULTS

DEMOGRAPHIC CHARACTERISTICS

We examined a total of 102 urban residents and another 122 who lived in the rural settlement. The ages of the study participants ranged from 18 years to 65 years in the urban and up to 80 years in the rural residents with their mean ages being 37.63 and 42.86 years for the urban and rural residents respectively. At the urban survey site 67 male versus 35 female volunteers participated in the study with a male: female ratio of approximately 2:1 while in the rural survey there were 73 male and 49 female participants with a M:F ratio of 1.5:1 indicating a fairer representation of the women at the village exercise.

Figure 1

Table 1: Characteristics of the Participants according to location

Feature	Urban(102)	Rural(122)
Age		
Mean	37.63	42.86
Range	18-65	18-80
SD +/-	11.0	16.49
Sex		
Male	67	75
Female	35	47
Height		
Mean	166.6	163.56
Range	148-182	125-187
Weight		
Mean	70.75	63.77
Range	39-118	42-98
SD+/-	14.73	11.25
BMI		
Mean	25.53	23.79
Range	17.3-38.6	16.6-47.3
SD+/-	4.99	4.12
SBP		
Mean	124.65	125
Range	90-170	86-200
SD+/-	16.17	21.95
DBP		
Mean	82.74	79.65
Range	60-140	46-140
SD+/-	13.28	13.52

SOCIAL AND FAMILY CHARACTERISTICS

Smoking of cigarettes and use of alcoholic beverages were uncommon in both the rural and urban populations. There were 3 male but no female smoker in the urban survey compared to non in the rural setting. Seventy-seven (75%) of the urban versus 112 (91.8%) of the rural volunteers affirmed that they were involved in some forms of exercise. Family history of hypertension was present in 32% while 22.5 % had some knowledge of their previous blood pressure measurement. Twenty percent of the urban volunteers were

receiving antihypertensive medications.

PHYSICAL EXAMINATION FINDINGS

The means, the minimum and maximum heights and weights of the participants are shown on table 1. On the average the urban residents out weighed and were taller than the rural residents with 6.98 kg and 3.04 cm respectively. The average urban resident was overweight with a mean body mass index of 25.53 kg/m2 and 44% of them had a BMI equal or greater than 25 kg/m2. The rural dwellers on the average had normal BMI of 23.79 with 28.6% of them being overweight or obese (Table 2).

Figure 2

Table 2: Body mass index distribution

Category	BMI range	Urban residents (%)	Rural dwellers (%)
Underweight	< 20	10 (9.8)	15 (12.2)
Normal	20 – 24.9	47 (46.0)	72 (59.0)
Overweight	25 – 29.9	23 (22.5)	26 (21.3)
Obese	> 30	22 (21.5)	9 (7.37)
Total		**102**	**122**

The patterns of the systolic and diastolic blood pressures are shown in Tables 3 & 4. Pre-hypertension (120/80 to 139/89 mmHg) was observed in 48 % versus 39.3% of the urban and rural volunteers respectively while hypertension stages 1 & 2 (>140/90 mmHg) was present in 40% of the urban compared to 27.8% of the rural participants (Table 4). Taken together pre-hypertension and hypertension occurred in the majority of the participants at both the rural and urban settings.

Figure 3

Table 3: Systolic blood pressure pattern

Description	SBP range	Urban(%)	Rural (%)
Optimal	< 120	31 (30.39)	49 (40.16)
Pre-hypertension	120-139	49 (48.0)	48 (39.3)
Stage 1	140-159	15 (14.7)	13 (10.65)
Stage 2	> 160	7 (6.8)	12 (9.8)
Total		**102**	**122**

Figure 4

Table 4: Diastolic blood pressure measurements at the surveys

Description	Range	Urban	Rural
Normal	< 80	28 (27.9)	56 (45.9)
Pre-hypertension	80-89	33 (32.0)	32 (26.2)
Stage 1	90-99	24 (23.5)	23 (18.8)
Stage 2	> 100	17 (16.5)	11 (9.0)
Total		**102**	**122**

LABORATORY INVESTIGATION RESULTS

The results of the urinalysis test showed that 6(6.2%) out of the tested 96 urban residents had glycosuria and 5(5.2%) had proteinuria by positive dipstick urinalysis for protein (Table 5). In the rural area out of the 54 who had urinalysis 2 (3.7%) and 10 (18.5%) were positive for glucose and protein respectively (Table 5). The volunteers who had positive glycosuria test were later confirmed to have diabetes in keeping with the American Diabetic Association criterion of fasting plasma glucose of 7.0mmol/L. All of the diabetic patients except for one (7 out of 8 , 87.5% study participants) were previously undiagnosed but detected for the first time during the survey.

Figure 5

Table 5: Dipstick urinalysis result of one spot urine sample of the volunteers

Dipstick test	Urban (%)	Rural
Glucose		
Glycose +ve	6 (6.2%)	2 (3.7%)
Glucose –ve	90 (93.7%)	52 (96.3%)
Protein		
Protein +ve	5 (5.20%)	10 (18.51%)
Protein –ve	91 (94.79%)	44 (81.48%)

DISCUSSION

In this study we observed that the majority of the volunteers for screening exercises to examine for the presence of cardiovascular disease risk factors had either pre-hypertension, hypertension or were overweight or obese while a relatively smaller percentage had diabetes or proteinuria. It is important to highlight the high prevalence of pre-hypertension in the light of the recent evidence that it not only progresses with time to more severe forms of elevated blood pressure but that the state of pre-hypertension on its own predisposes to adverse vascular outcomes ($_6$). That Joint National Committee- 7 report ($_6$) concludesd that individuals in the pre-hypertension stage should be advised to embark on lifestyle changes to reduce blood pressure and the risk of developing cardiovascular diseases. Approximately 40 % of the rural dwellers and 48 % of the urban residents had pre-hypertension in our study. Esteghamati et al in Iran recently reported the results of a nation wide survey in 2005 of non-communicable disease and noted that the prevalence of hypertension in the 25-64

age group was approximately 25% when the cut off value of 140/90mmHg was applied ([8]). In addition 46% of the adults had pre-hypertension with systolic blood pressure being in the range 120 to139 and or diastolic blood pressure 80-89 mmHg.

The prevalence of hypertension shows wide variations when different geographical and ethnic populations are compared. Cooper et al reported a range of prevalence rate that varied between 14-44% in Blacks and 27-55% for Whites and further suggested that there are White populations in which the prevalence of hypertension are comparable to those in Black populations ([9]). Overweight and obese states are known modifiable cardiovascular risk factors in all ethnic groups and as such offer veritable intervention targets. Muntner et al computed an age, gender and race adjusted relative risk equal to 1.25 of a major coronary heart disease that can be attributable to an increase in BMI of 5 kg/m2 ([10]). In this study 44% of the urban residents and 28 % of the rural population had BMI of 25 or more kg/m2 thereby indicating an increase in cardiovascular risk profile due to weight issues when we compared urban versus rural residence. In a study of adults 18 years and older in an urban population of Karachi, the prevalence rate of being overweight or obese was 52.2% which compares well with the rate of 44% that we are reporting in this study ([11]). Incidentally in that same Karachi study the reported prevalence rate of hypertension was 38.5% which is comparable to the rate of 40% among urban residents in our study. The high rate of overweight and obesity prevalent in the Northeast portend great health problems to our study populations especially when those facts are viewed against the backdrop of poorly developed health care systems in those localities. Whereas the overweight and obesity rates of the urban residents in our study are similar to those of the Asian population, the US figures from National Health and Nutrition Examination Survey (NHANES) are even more worrisome. Coresh et al reported BMI of 25 kg/m2 or more in 65 % of their community based study population ([12]). Diabetes is a cardiovascular disease risk factor which is increasing in its prevalence globally especially in the Asian and sub-Saharan African countries. In our study we noted that the prevalence of diabetes in the urban population was approximately twice the rate in the rural community. In the NHANES 2004 conducted in the US, the self reported prevalence rate of diabetes was 6.8% which was similar to the prevalence rate of 6.2% in the urban setting in the Northeast of Nigeria. Albuminuria has become a well recognized cardiovascular disease risk factor from the outcome of several large studies ([13]). In this study we employed the use of dipstick urinalysis to make qualitative estimation of proteinuria; which is a method that has several limitations including its inability to quantify the exact amount of protein in urine. The more accurate methods of determining the rate of urinary protein excretion require the more tedious 24 hour urine collection or the high tech albumin creatinine assays which were beyond the scope of this study. In our study the participants in the rural area were more likely than their urban counterparts to have proteinuria with the prevalence rates of 5.2 % in the urban and 18.5% in the rural area. The US NHANES of 2004 estimated macro and microalbuminuria and reported an overall prevalence rate of 9.5% for elevated urinary protein excretion rate. The results of our study call for further and more extensive research and interventions at the level of the community with the aim of curbing the highly prevalent cardiovascular risk factors in the populations of the Northeast of Nigeria

CONCLUSION

Hypertension is the most important cardiovascular risk factor in this study with high prevalence rates in both the urban and rural areas. There is an unacceptably high rate of previously undiagnosed hypertension and diabetes in the Northeast of Nigeria which is an indication of a poor primary health care system. A greater percentage of the people in the urban population than the rural community were overweight or obese. Community based intervention programmes aimed at lowering the average blood pressure, mean body mass index and proteinuria rates are urgently needed. There is also the need for more extensive health education on the lifestyle modification and healthy practices in order to curtail the increasing burden of non communicable vascular diseases.

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