ORIGINAL ARTICLE

Spot assessment of chronic kidney disease risk factors in a market population in Benin City

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Access this article online

Website: www.ajmhs.org

Quick Response Code:

ABSTRACT

Background: Chronic kidney disease (CKD) is a public health problem world-wide and its management puts a huge financial burden on persons with the disease and those responsible for their treatment. Early identification of CKD risk factors and prevention of its progression is the best option. **Objective:** The objective of the following study was to determine the prevalence of some CKD risk factors in a population of traders in Benin City. **Materials and Methods:** Traders in Oba market Benin City were invited for CKD screening on world Kidney Day 2012. Information obtained from participants included age, sex, weight, height; body mass index and blood pressure. Their urine was tested for protein while capillary blood was tested for glucose. Data obtained were analyzed using SPSS 16.0 (Chicago SPSS Inc). **Results:** A total of 176 persons comprising 83 men and 93 women participated in the study. Their mean age was 42.6 ± 13 years. The prevalence of hypertension (HTN), obesity, proteinuria and hyperglycemia in the study population were 33.5%, 18.2%, 5.7% and 1.7% respectively. **Conclusion:** HTN and obesity were the most common CKD risk factors in the study population.

Key words: Chronic kidney disease, hypertension, obesity, risk factors

INTRODUCTION

Chronic kidney disease (CKD) is a public health problem world-wide and is described as the presence of a glomerular filtration rate (GFR) less than 60 ml/min/1.73 m^2 for more than 3 months with or without signs of kidney damage.[1] The prevalence of CKD is on the increase world-wide. In the United States of America, the number of patients being treated for end stage renal disease (ESRD) increased from 1 in 3,450 persons in 1980-1 in 575 persons as at 2009.[2]

The true prevalence of CKD in Nigeria is not known but earlier hospital based studies done in the 1970s and 1980s showed a prevalence of 8-10% among hospital admissions.[3,4] More recently, Afolabi *et al.*[5] reported a prevalence of 10.4% in a family practice population while Abioye-Kuteyi *et al.*[6] reported a 19.9% prevalence of undetected renal disease following screening of a rural population in Nigeria.

A history of diabetes, hypertension (HTN) or cardiovascular disease confers the highest risks for developing CKD.[7] Other risk factors for CKD include hyperlipidemia, obesity, metabolic syndrome, human immunodeficiency virus infection, hepatitis C infection, positive family history of kidney disease and the use of potentially nephrotoxic drugs.

The most common causes of CKD among Nigerians are glomerulonephritis, HTN, diabetes and obstructive

Cite this article as: Okaka EI, Adejumo OA, Ojeh-Oziegbe OE, Olokor AB, Iyawe IO. Spot assessment of chronic kidney disease risk factors in a market population in Benin City. Afr J Med Health Sci 2013;12:10-4.

uropathy[3] but in the US and in some developed countries of the world, diabetes ranks first as the most common cause of CKD.[8]

HTN is an important cause of CKD among Nigerians and some researchers have reported HTN as the number one cause of CKD in Nigeria. The prevalence of HTN among Nigerians was reported as 22% by Ekwunife and Aguwa[9] following a meta-analysis of population based studies on prevalence of HTN in Nigeria from 1990 to 2009.

Diabetes mellitus is fast becoming an important cause of kidney disease in developing countries like Nigeria due to the gradual adoption of the western diet in these countries. A national survey in 1992 by the Non-communicable Disease Expert Committee of the Federal Ministry of Health in Nigeria reported a prevalence of diabetes among Nigerians of 2.2%.[10]

The treatment of ESRD is capital intensive and most sufferers of ESRD in Nigeria haven to pay for their treatment with personal funds. Thus, prevention of CKD is paramount in reducing the morbidity and mortality from CKD.

As part of activities of the 2012 World Kidney Day, we set out to screen a market population in Benin City for the presence of risk factors of CKD.

MATERIALS AND METHODS

This was a cross-sectional observational study that involved a market population in Benin City, Edo State Nigeria. The study was carried out among traders in Oba market and environs in the Ring Road area of central Benin City on March 8th 2012 as part of the World Kidney Day activities for the year 2012. Oba market is the biggest market in Benin City, easily accessible due to its location in the city center and hence a good representative of the market population in Benin City and environs.

Permission was obtained from the relevant authorities of Oba Market Benin City and the traders given adequate notification of the proposed screening exercise for risk factors of CKD. The town hall (Urhokpota) and its environs were used as the venue for the screening exercise having obtained permission for its use from the Oredo Local Government Council.

The traders were given a health talk on the risk factors, common symptoms of and prevention of CKD. All consenting apparently healthy adults above 18 years of age were included in the study. Persons in obvious ill health were exempted from the study.

Parameters obtained from participants were age, gender, weight, height, body mass index (BMI), blood pressure, random blood sugar (RBS) and urinalysis.

Height was measured in meters using a stadiometer while weight was measured in kilograms using standard weighing scales. Blood pressure was measured using Accoson mercury sphgmomanoters in the right arm with the participant in sitting position and having being relaxed for at least 2 min. Participants with elevated blood pressure readings had their blood pressures measured again after 15 min to confirm the presence of HTN. Urinalysis was carried out on spot urine samples obtained from participants using Meditest Combi 2 dipsticks test strips (by Agary Pharmaceuticals). RBS in capillary blood was measured using Accu CHEK glucose meters and strips (Roche Diagnostics).

Data obtained were entered into SPSS version 16 and analyzed. Quantitative variables were expressed as means and standard deviations while qualitative variables were expressed as frequencies and percentages. Participants were grouped according to gender and their variables compared using independent *t*-test analysis. Chi-square analysis was used to determine association between categorical variables while associations between continuous variables were determined using Pearson correlation analysis. Participants with missing data were excluded from analysis.

Blood pressures above 140 mmHg systolic and 90 mmHg diastolic were considered as HTN and random blood glucose above 180 mg/dl considered elevated. BMI was classified as adopted by the World Health Organization,[11] into underweight (BMI <18.5 kg/m^2), normal weight (BMI of ≥ 18.5-24.9 kg/m^2), overweight (BMI of 25-29.9 kg/m^2) and obesity (BMI of ≥30 kg/m^2).

RESULTS

Out of 179 participants, 176 were included in the analysis having excluded 3 participants with missing data. Males made up 47.2% (83) while females made up 52.8% (93). Prevalence of HTN and obesity among participants was 33.5% and 18.2% respectively [Table 1].

There was no significant difference between the mean age, weight and blood pressure of male and female participants but their mean height and BMI were statistically different [Table 2].

When classified according to BMI, more female participants had obesity compared to the males [Figure 1]. The association

between BMI and gender was statistically significant with a Chi-square of 8.974 and $P = 0.011$ [Table 3].

Pearson correlation analysis showed significant association between age of participants and BMI, RBS and blood pressure while BMI significantly correlated with systolic and diastolic blood pressures (DBP) [Table 4].

DISCUSSION

The risk factors for CKD assessed in this study were HTN, hyperglycemia, obesity and proteinuria. HTN was the most prevalent risk factor in the study population with a prevalence of 33.5%. This figure is similar to the 37.7% prevalence of HTN reported by Fatiu *et al.*[12] in their study among traders in south west Nigeria. Ulasi *et al*. however found a higher prevalence of HTN (42.2%) among a population of traders in south east Nigeria.[13] Long standing HTN can lead to nephrosclerosis and hence CKD but HTN can also result from kidney disease. About 80-85% of persons with CKD have been shown to have HTN[14] and the prevalence of HTN among persons with kidney damage tends to increase with progressive reduction in GFR as occurs in CKD.[15] Factors that may contribute to increased prevalence of HTN in CKD patients include salt retention, increased sympathetic activity, secondary hyperparathyroidism and reduced nitric oxide synthesis from increased oxidative stress.[16-18]

The age of participants correlated positively with their systolic and DBPs. This finding agrees with the well-known fact that blood pressure tends to rise with increasing age.

The prevalence of obesity in this study population was 18.2% which was similar to the 18.5% prevalence of obesity reported by Akpa *et al.*[19] in their study among a variety of adult working Nigerians in Port Harcourt metropolis, south-south Nigeria. A higher prevalence of 22.6% was however reported

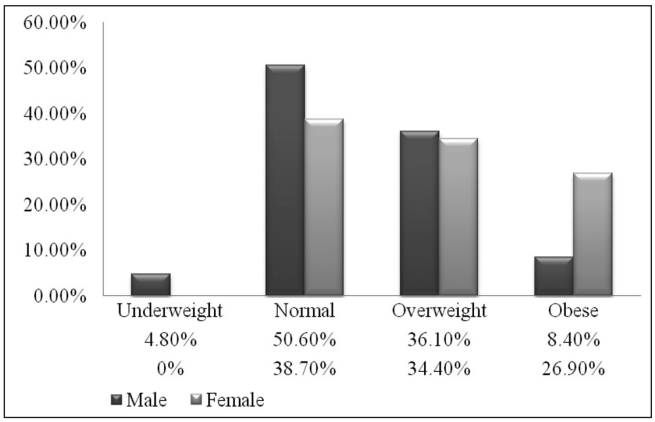

Figure 1: Body mass index of study participants ($N = 176$)

Table 1: Characteristics of study population ($N = 176$)

Variable	Frequency(%)/mean ± standard deviation
Gender	
Male	83 (47.2)
Female	93 (52.8)
Age	
Mean age	42.6±13.0
18-40 years	82 (46.6)
41-64 years	82 (46.6)
≥65 years	12 (6.8)
Weight (kg)	70.8±14.1
Height (m)	1.66±0.09
BMI (kg/m^2)	25.9±5.0
RBS (mg/dl)	108±30.4
SBP (mmHg)	132.7±21.6
DBP (mmHg)	89.2±14.4
HTN	59 (33.5)
Over weight	62 (35.2)
Obese	32 (18.2)
Elevated RBS	3 (1.7)
Proteinuria	10 (5.7)

BMI: Body mass index; RBS: Random blood sugar; SBP: Systolic blood pressure; DBP: Diastolic blood pressure; HTN: Hypertension

Table 2: Comparison of parameters of male and female participants

Variable	Male ($n = 83$) (%)	Female (93) (%)	*P* value
Age	43.0±14.3	42.3±11.8	0.732
RBS	113.1±37.8	103.7±21.0	0.040
Weight	71.6±14.5	70.1±13.9	0.499
Height	1.71±0.08	1.61±0.06	<0.001
BMI	24.5±4.4	27.1±5.2	<0.001
SBP	131.8±20.1	133.4±23.0	0.632
DBP	89.7±12.9	88.9±15.7	0.703
HTN	24 (28.9)	35 (37.6)	
Over weight	30 (36.1)	32 (34.4)	
Obese	7 (8.4)	25 (26.9)	

P <0.05 are significant; RBS: Random blood sugar; BMI: Body mass index; SBP: Systolic blood pressure; DBP: Diastolic blood pressure; HTN: Hypertension

Table 3: BMI versus gender in study participants ($N = 176$)

BMI	Gender		Total
	Male	Female	
<24.9	46	36	82
25.0-29.9	30	32	62
30.0 and above	7	25	32
Total	83	93	176

Pearson $\chi^2 = 11.19$, $P = 0.004$; BMI: Body mass index

Table 4: Pearson correlation coefficients (*P* values) of association between parameters

Variables	Age	RBS	BMI	SBP	DBP
Age	–				
RBS	0.224 (0.003)	–			
BMI	0.163 (0.030)	0.055 (0.468)	–		
SBP	0.237 (0.002)	0.040 (0.601)	0.251 (0.001)	–	
DBP	0.171 (0.023)	0.044 (0.562)	0.312 (<0.001)	0.801 (<0.001)	–

P<0.05 are significant; RBS: Random blood sugar; BMI: Body mass index; SBP: Systolic blood pressure; DBP: Diastolic blood pressure

in a market population in south east Nigeria.[13] A systematic review of studies on obesity among adult Nigerians revealed a prevalence range of 8.1-22.2%.[20] Obesity has been found to be associated with proteinuria and CKD. Weight gain even when BMI is within the normal range also increases the risk of CKD.[21] Obesity related glomerulopathy has been described in persons with severe obesity and proteinuria which may be reversible following weight loss.[22] Excess weight leading to overweight and obesity occurs due to energy imbalance. The consumption of energy dense foods, increased food portions coupled with sedentary life styles, favors the development of obesity. In developing countries like Nigeria, economic growth and urbanization has led to a transition in nutrition from the traditional diet to a more western type diet, rich in sugar, fat and refined carbohydrates.[23] Traders in the average Nigerian market tend to be sedentary because they sit by their wares waiting for potential customers. There is also the temptation to purchase and consume fast foods from food vendors who hawk in the market place. There is a relationship between sex and obesity with more women being obese compared to their male counterparts. We found obesity in 26.9% of the women in this study compared to 8.4% in the men. This finding agrees with that of Desalu *et al*. who found a higher prevalence of obesity among female participants compared to males and also an association between female gender and obesity in their study among 810 Nigerians.[24]

We found a 5.7% prevalence of proteinuria in this study which was higher than that reported by Ulasi *et al*.[13] (4.3%) and Ayodele *et al*.[25] (3.8%). Persistent proteinuria is a sign of CKD and if unabated, hastens the progression of CKD.

This study was limited by its screening nature since participants found to have HTN and proteinuria were not screened again for persistence of the conditions.

CONCLUSION

HTN and obesity were the commonest CKD risk factors observed in this study. Nationwide screening of Nigerians for CKD on a large scale is required to confirm these findings. More public enlightenment and aggressive treatment of HTN and obesity will help to reduce the occurrence of and progression of CKD.

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Source of Support: Nil, **Conflict of Interest:** None declared.