

Original Research Article

ASSESSMENT OF RENAL FUNCTIONS AND DETERMINANT RISKS OF CHRONIC KIDNEY DISEASES AMONG HEALTH WORKERS IN NORTHERN NIGERIA

ABSTRACT

Background: Chronic kidney disease (CKD) is a global public health challenge, particularly in underdeveloped and developing nations. The 2021 World Kidney Day (WKD) exercise held in this study area presented a fantastic chance to assess renal functions and identify risk factors predisposing health workers to kidney diseases.

Methods: Subjects were recruited from among hospital staff during the 2021 WKD exercise. Questionnaires were administered to consented subjects to obtain demographic data, BMI, blood pressure, and cholesterol levels were among the characteristics examined. Blood samples were obtained for serum creatinine and fasting plasma glucose and Urine was collected for protein and glucose. Glomerular Filtration Rate (GFR) was estimated using the MDRD equation. Data were analyzed using SPSS version 21.0

Result: Alcohol use was observed in 2.3% and tobacco use in 5%; significantly higher in men (8.7%) than women (0%). Use of herbal drugs was seen in about one-quarter (24.2%) of the population and significantly higher in men than women (31.7% vs 14.0%), p-value = 0.002. Similarly, high BMI was observed in 35.6% of participants, higher in women (47.3%) than men (27.0%), p-value = 0.003. However, the history of hypertension was higher in men compared to women (25.4% vs 19.4%, p-value = 0.331). Mean Serum Creatinine was significantly higher among men (84.6 ± 22.9 mg/dl) than women (72.4 ± 14.0 mg/dl), p-value < 0.001.

Conclusion: The incidence of chronic kidney disease is rising across the country and some significant risk factors were identified in this study group. There is a need for periodic assessment of renal functions to forestall the full blow of kidney diseases among health workers.

Keywords: Chronic kidney disease, renal diseases, kidney health, health workers, katsina Nigeria.

Introduction

Chronic kidney disease (CKD) has emerged as a serious public health concern worldwide, particularly in developing countries, with a particularly high prevalence in Sub-Saharan Africa¹. This is largely due to the increased rise in other disease conditions such as type 2 diabetes, hypertension, and obesity are all common risk factors. The HIV pandemic, with its massive cost implications for treatment, as well as its impact on cardiovascular and renal morbidity and mortality all added to the burden.

The disease primarily affects economically productive people who are usually of younger age groups.^{1,2} Several hospital-based studies have been conducted in Nigeria, and an estimated frequency of CKD has been reported to be between 1.6 and 12.4 percent a range of various studies have found a significant incidence of risk factors among various age groupings.³⁻⁵

The early stages of CKD are usually asymptomatic, the disease's burden is mainly undiagnosed and difficult to quantify and these are the stages where many healthy individuals belong. When more than half of the renal functional mass has been lost, that is when the symptoms begin to appear.⁶ As a result, most patients present late at the hospital, frequently in advanced disease states requiring salvage dialysis.

Early identification of risk factors by routine screening is critical in the prevention of CKD and this gives room for early treatment, reduces high morbidity and mortality resulting in end-stage renal disease (ESRD) and increases the cost of care. As part of the world kidney day (WKD) activities of 2021, this study aimed to identify CKD risk factors among health workers in a tertiary health institution in Nigeria's North-western region. Findings in this study would contribute to the increased awareness of health resources and dissemination of knowledge of CKD risk and prevalence of early stages of CKD among health care workers in the Northwestern region of the country.

The theme of the year was living well with kidney disease and the study was to access the knowledge and prevalence of risk factors of CKD among health care workers in Federal Teaching Hospital, Katsina in order to educational awareness about effective symptoms management and patient empowerment with the ultimate goal of encouraging life participation in diseases management.⁷

Methodology

Study Area and Population

The study was carried out among the health workers of the Federal Medical Centre Kastina, Kastina State Nigeria. Katsina is a Local Government Area and the state capital of Katsina State, in northern Nigeria. Katsina is located some 260 kilometres east of the city, of Sokoto and 135 kilometres northwest of Kano, close to the border with Niger, Republic.

Study Design

The study was a cross-sectional cohort design conducted among volunteer health workers at a health institution in North-Western Nigeria.

Study Procedure

During the 2021 World Kidney Day exercise held on Thursday 8th March 2021, following a session of health education on kidney health, each participant gave verbal and written informed consent.

Clinical assessment was done including general history, clinical examinations, blood pressure, body mass index (BMI). The BMI was computed by dividing the body weight in kilograms by the square of the height in meters according to WHO criteria, obesity is defined as a BMI of ≥ 30 kg/m².⁷, a major risk factor for renal diseases.

The study utilized the average of two blood pressure readings taken five minutes apart. SBP 140mmHg and/or DBP 90mmHg were used to characterize hypertension.⁸ SBP of ≥ 140 mmHg was considered as elevated, and DBP of ≥ 90 mmHg was defined as elevated.

Each subject's creatinine was measured using a sample of five milliliters (5mls) of venous blood collected and promptly sent to the chemical pathology laboratory department in lithium heparin bottles. Blood samples were centrifuged, plasma obtained were kept at -20°c and creatinine were determined using modified Jaffe's method using the spectrophotometer. Creatinine $>$ or $= 1.5$ mg/dl and EGFR less than 90mls/1.73 were considered abnormal.

Proteinuria, albuminuria and glycosuria were measured quantitatively in the urine specimens collected in universal bottles using a combi-12 dipstick.

The presence of 1+ protein, 1+ microalbumin and 1+ glucose on a dipstick was characterized as proteinuria, albuminuria and glucosuria respectively. The Accucheck Glucometer was used to measure random blood sugar levels and the findings were expressed in mmol/l. Random blood glucose \geq 11.1mmol/l (>200 mg/dl) was considered as hyperglycemia in the presence of signs and symptoms of Diabetes Mellitus. The Cockcroft-Gault equation⁹ was used to calculate the glomerular filtration rate, with body surface area correction (BSA) by using DuBois and DuBois formular¹⁰ was used to calculate body surface area.

Data Analysis

The statistical package for social sciences (SPSS) version 21.0 analytic software was used to analyze the collected data. The independent samples T-test was used to compare continuous variables, and the Chi-square test was utilized to analyze categorical variables. The link between variables was investigated using Pearson correlation.

Ethical approval

Approval was given by the Ethical review committee of the Federal Medical Center Kastina.

Result

Characteristics of study participants

A total of 219 healthcare workers consented to participate in this study. There was a male preponderance with a female-to-male ratio of 1:1.35. The mean age was 39.01 ± 10.25 years and did not differ between male and female participants, p -value = 0.029. Predominant level of education was tertiary (84%) and higher among women (90.3%) than men (79.4%), p -value = 0.005. Alcohol use was seen in 2.3% and tobacco use in 5%; significantly higher in men (8.7%) than women (0%). Use of herbal drugs was seen in about one-quarter (24.2%) of the population, and significantly higher in men than women (31.7% vs 14.0%), p -value = 0.002. Similarly, high BMI was seen in 35.6% of participants, higher in women (47.3%) than men (27.0%), p -value = 0.003. However, History of hypertension was higher in men compared to women (25.4% vs 19.4%, p -value = 0.331).

Mean Serum Creatinine was significantly higher among men (84.6 ± 22.9 mg/dl) than women (72.4 ± 14.0 mg/dl), p -value < 0.001. For kidney function stage, 77.6% had stage 1 (eGFR > 90), 19.2% were at stage 2 (eGFR; 60 – 90), and 3.2% had stage 3 (eGFR; 45 - 59). Further, stage kidney function stage differs by gender ($p=0.042$) (Table 1).

Table 1: Characteristics of study participants

Characteristics	Overall	Men	Women	P-value
N (%)	219 (100)	126 (57.5)	93 (42.5)	-
Mean Age (SD)	39.01 ± 10.25	38.25 ± 10.09	40.02 ± 10.45	0.209
Level of education				
Primary	2 (0.9)	0 (0.0)	2 (2.2)	*0.005
Secondary	33 (15.1)	26 (20.6)	7 (7.5)	
Tertiary	184 (84.0)	100 (79.4)	84 (90.3)	
Alcohol Use	5 (2.3)	1 (0.8)	4 (4.3)	0.166
Tobacco Use(Male)	11(5.0)	11 (8.7)	0 (0.0)	*0.002
Use of Herbal drugs(Female)	53 (24.2)	40 (31.7)	13 (14.0)	*0.002
BMI >= 25(Female)	78 (35.6)	34 (27.0)	44 (47.3)	*0.003
Mean SBP, mmHg (SD)	116.4 (19.7)	118.9 (21.2)	112.8 (16.9)	*0.023
Mean DBP, mmHg (SD)	75.2 (12.8)	76.4 (13.4)	73.6 (11.6)	0.108
Any Hypertension	50 (22.8)	32 (25.4)	18 (19.4)	0.331

History of Diabetics	3 (1.4)	1 (0.8)	2 (2.2)	0.576
Mean serum Creatinine (SD)Albumin Negative	78.9 (20.4)	84.6 (22.9)	72.4 (14.0)	*<0.001
1+	169 (77.2)	101 (80.2)	68 (73.1)	0.482
2+	32 (14.6)	16 (12.7)	16 (17.2)	
Stages of Kidney function > 90 (Stage 1)	18 (8.2)	9 (7.1)	9 (9.7)	
60 – 90 (Stage 2)	170 (77.6)	102 (81.0)	68 (73.1)	*0.042
45 – 59 (Stage 3)	42 (19.2)	18 (14.3)	24 (25.8)	
	7 (3.2)	6 (4.8)	1 (1.1)	

*p-value < 0.05 indicates significance

Prevalence of Albuminuria, and reduced kidney function

Of the 219 participants under study, prevalence of reduced eGFR and albuminuria and CKD were 3.2% and 22.8% respectively. While there was no difference in the mean age of participants with and without reduced eGFR, mean age of participants was higher among participants with albuminuria, p-value = 0.027. Reduced eGFR and presence of albuminuria was not also associated with gender, p-value > 0.05. Reduced eGFR and albuminuria were not associated with level of education, alcohol use, tobacco use, use of herbal drugs and history of diabetics, p-value > 0.05. Reduced eGFR was evident in 12% of participants with hypertension, and 7.7% of participants with high BMI (≥ 25) (Table 2).

Table 2: Reduced eGFR, and albuminuria by characteristics of participants

Variables	Reduced eGFR			Albuminuria		
	Yes	No	p-value	Yes	No	p-value
Mean age \pm SD	43.3 \pm 9.4	38.8 \pm 10.1	0.277	41.9 \pm 10.7	38.1 \pm 9.9	*0.027
Sex						
Male	6 (4.8)	119 (95.2)	0.243	25 (19.8)	101 (80.2)	0.255
Female	1 (1.1)	92 (98.9)		25 (26.9)	68 (73.1)	
Level of education						
Primary	0 (0.0)	2 (100)	0.622	0 (0.0)	2 (100)	0.101
Secondary	0 (0.0)	32 (100)		3 (9.1)	30 (90.9)	
Tertiary	7 (3.8)	177 (96.2)		47 (25.5)	137 (74.5)	
Alcohol Use	0 (0.0)	5 (100.0)	1.000	0 (0.0)	5 (100.0)	0.591
Tobacco Use	0 (0.0)	11 (100.0)	1.000	2 (18.2)	9 (81.8)	1.000
Use of Herbal drugs	1 (1.9)	51 (98.1)	1.000	10 (18.9)	43 (81.1)	0.573

Family History of Diabetics	0 (0.0)	3 (100.0)	1.000	0 (0.0)	3 (100.0)	1.000
Any Hypertension	6 (12.0)	44 (88.0)	*0.001	15 (30.0)	35 (70.0)	0.183
BMI >= 25	6 (7.7)	72 (92.3)	*0.009	18 (23.1)	60 (76.9)	1.000
Total	7 (3.2)	212 (96.8)		50 (22.8)	169 (77.2)	

*p-value < 0.05 indicates significance

Prevalence of Chronic Kidney Disease (CKD)

The prevalence of CKD among participants was 26%. Participants with CKD (42.1 ± 10.5) were significantly older than participants without CKD (37.9 ± 9.9), p-value = 0.008. Proportion of participants with CKD did not differ by gender, and prevalence of CKD was higher among participants with tertiary education (29.3%) compared to secondary (9.1) and primary education (0%), p-value = 0.024. CKD was not associated with alcohol use, tobacco use, herbal drug use, history of diabetics and high BMI, p-value > 0.05. However, CKD was associated with hypertension, p-value = 0.006.

Table 3: CKD by characteristics of participants

Variables	CKD		p-value
	Yes	No	
Age	42.1±10.5	37.9 ± 9.9	*0.008
Sex			
Male	31 (24.6)	95 (75.4)	0.641
Female	26 (28.0)	67 (72.0)	
Level of education			
Primary	0 (0.0)	2 (100)	*0.024
Secondary	3 (9.1)	30 (90.0)	
Tertiary	54 (29.3)	130 (170.7)	
Alcohol Use	0 (0.0)	5 (100.0)	0.330
Tobacco Use	2 (18.2)	9 (81.8)	0.732
Use of Herbal drugs	11 (20.8)	42 (79.2)	0.371

History of Diabetics	0 (0.0)	3 (100.0)	0.569
Any Hypertension	21 (42.0)	29 (58.0)	*0.006
BMI \geq 25	24 (30.8)	54 (69.2)	0.265
Total	57 (26.0)	162 (74.0)	-

*p-value < 0.05 indicates significance

UNDER PEER REVIEW

Discussion

The topic for WKD 2021 is High-Quality Life with Kidney Disease, which aims to enhance education and knowledge about appropriate symptom management as well as empower patients, the people who help them and health care provider. With Patient involvement as the ultimate goal of fostering life engagement. Empowerment allows you to have more influence over your decisions. Behaviors that have an impact in their health.²² Increasing patient participation in clinical trials and enhancing health literacy communication between people relies on decision-making and healthcare providers will help in improving the quality of life and reduce progression of the disease. In this study female preponderance was noted which is contradicting the findings in study done by Okaka et al in south eastern region of Nigeria where male preponderant was found.

There was no much difference between the age of male and female participant in this study and the mean age is also similar in both male and female but this is lower as compared to the study done by Okaka et al whose mean age was 47.52 ± 15.24 as opposed 39.01 ± 10.25 . Majority of the participants in this study group were well educated 90.3%. The CKD risk factors considered in this study were hypertension (HTN), diabetes (DM), obesity and overweight (BMI = 25kg/m^2), proteinuria, use of herbal drugs, tobacco use and alcohol use. The prevalence of HTN among study participants was 22.8% which was much lower compared to 47.1% by Okaka 37.6% by Isara and Okundia (CKD4) among rural dwellers in southern Nigeria. These could be as a result of most of the participants are healthcare workers and majority of them too are elites and they have access to regular medical check-ups. Ge-zawe et-al 32.3% north-eastern Nigeria, Ajayi et-al south-western Nigeria were 32.3% among urban slums they both have higher prevalence. A probable reason for the lower HTN prevalence in this study compared to all aforementioned might be due to more awareness of good health education about kidney health and majority of the participants had tertiary education.

Male participants had higher mean systolic blood pressure 21.2%, diastolic blood pressure of 16.9% While the female counterpart had lower mean SBP vs DBP (13.4% vs 11.6%) preponderance of HTN in men compared to women can be linked to preference of sex hormones. This is supported by Ninios et.al who reported a higher prevalence of HTN among post-menopausal women than elderly males.

Obesity and overweight were seen in 78(35.6%) male: female 34(31.7) vs 44(47.3%), there is higher proportion of female than male, this was confirmed by the study done by Okaka and was also reported to be within reported range by a systematic review of obesity and overweight in Nigeria.¹⁸ Female gender, increasing weight and high socioeconomic status has been reported to be associated with obesity and overweight among Nigerians.¹⁹

Proteinuria and albuminuria were seen among 50 (22.8%) participants and coincidentally hyperglycemia was also observed among the same categories of patients. Therefore, the mild renal impairment can be explained by background DM nephropathy which has not been diagnosed among these set of people.

The mean serum creatinine in this study was elevated among male 84.6(22.96) and female 72.4(14.00) P-value <0.000. The Prevalence of CKD among participants was 26% which was seen in majority of elderly patient and people with tertiary education, this was higher than study done by Oluyombo et al who reported it to be 11–18.8%, although tobacco use, alcohol use and use of herbal dugs were also seen in most of the elderly participant in the study.²⁴ The study was limited by its cross-sectional nature and recruitment for selection of participants were not randomly done. The awareness of kidney disease was also self-reported and concern of recall is of importance for good outcome in patient management.

In conclusion, increasing age and hypertension was associated with more CKD risk factors among selected participants. We recommend mandatory yearly CKD screening among all healthcare workers in FTH, katsina and other people in the community so as to ensure early and appropriate intervention for the treatment of CKD and its risk factors. Also, in view of the cross-sectional nature of our study, we suggest that future prospective studies about the association between the knowledge and progression of renal function could be done.

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