International Archives of Medical and Health Research

Original Article

Print ISSN: 2705-1420; Online ISSN: 2705-1439
DOI: https://doi.org/10.33515/iamhr/2019.004/4

Awareness and prevalence of risk factors of chronic kidney disease among civil servants in Sokoto, Nigeria

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ABSTRACT

Background: Chronic kidney disease (CKD) is a global public health problem with a high burden and cost of care, particularly in the developing countries. Prevention of CKD and its progression to end-stage renal disease is contingent on early detection of the risk factors of the disease through screening. **Aim**: This study was conducted to assess the awareness and prevalence of risk factors of chronic kidney disease among civil servants in Sokoto, Nigeria. **Materials and Methods:** A cross-sectional study was conducted among 400 civil servants (selected by systematic sampling technique) in Sokoto, Nigeria. Anthropometric measurements, blood pressure measurement, and estimation of fasting blood sugar were done for the participants, together with questionnaire administration. Data were analyzed using IBM SPSS version 20 statistical computer software package. **Results**: Only about half 203 (50.8%) of the 400 participants were aware of CKD, and less than a third (28.0%) were aware of its risk factors. The most prevalent risk factors of CKD among the participants were use of herbal medications (43.5%), frequent use of analgesics (26.8%), hypertension (13.8%) and overweight/obesity (11.3%). Hypertension and overweight/obesity were associated ($p < 0.05$) with the participants' age. **Conclusion**: This study showed low levels of awareness of CKD and its risk factors among civil servants in Sokoto, Nigeria; but the prevalence of some of its risk factors was high among them. These findings underscore the need for government and health workers to sensitize the public on CKD and also screen the populace for its risk factors periodically.

Keywords: Prevalence, awareness, chronic kidney disease, risk factors

INTRODUCTION

The kidneys are vital for excretion, and they are also central to fluid, electrolyte and acid-base homeostasis in humans. Renal damage therefore has serious implications for systemic functions, growth and existence.[1] Chronic Kidney Disease (defined by the National Kidney Foundation, Kidney Outcome Quality Initiative, as irreversible kidney damage for more than 3 months which could be structural or functional abnormalities of the kidney with or without decreased glomerular filtration rate),[2] is now recognized as a common condition that is associated with increased risk of cardiovascular disease and other complications[3]; and it is also associated with high fatality.[4]

Chronic kidney disease (CKD) is a global public health problem with a high burden and cost of care, particularly in the developing countries.[1] The prevalence of impaired kidney function was estimated to range between 10 and 20% of the adult population in most countries worldwide.[5,6] However, a recent study suggests that the incidence of CKD is increasing globally.[2] The National Kidney Foundation estimates that 20 million Americans have chronic kidney disease and at least a further 20 million people have an increased risk.[7] End-stage renal disease (ESRD) has reached epidemic proportions with more than 400,000 people affected in the United States and well over one million worldwide.[8]

The incidence of chronic kidney disease, especially diabetic related chronic kidney disease, is increasing rapidly in many populations throughout the world,[9] and since the early stages of the disease are generally asymptomatic, most patients present late at the hospital, usually in the advanced disease states and in need of salvage dialysis. Prevention of CKD and its progression to ESRD is therefore contingent on early detection of

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Received: 10-01-2019 Revised: 19-02-2019 Published: 28-02-2019

the risk factors of the disease through screening.
The general concern in sub-Saharan Africa is largely due to the rising prevalence of CKD and its risk factors (such as type II diabetes, hypertension, and HIV infection), the enormous cost implication of its treatment, its role in cardiovascular morbidity and mortality, and the fact that the disease largely afflicts the economically productive younger age groups with majority of those affected not being aware until they have developed end stage renal disease.[10-12]

In Nigeria, the prevalence of preventable renal diseases is not known, but the prevalence rates in hospital based studies across the country ranged from 8-45%[13,14]; and reports from previous studies conducted in Nigeria showed that the prevalence of impaired renal function has risen substantially over the years in the country. Whereas, Akinsola et al[15] reported that renal failure constituted 8% of hospital admissions in 1989, Abioye-Kuteyi et al.,[14] reported 19.9% prevalence of undetected renal diseases in a rural populace in Nigeria in 1999, while a study conducted in 2006 among patients on admission for hypertension in Maiduguri reported 45.5% prevalence of deranged renal function.[16] Also, similar to the situation in the other sub-Saharan African countries, hypertension and diabetes mellitus are among the leading causes of end-stage renal disease in Nigeria.[1]

A study conducted at the University of Maiduguri Teaching Hospital (UMTH) Kidney Center reported that more than 70% of the 250 patients seen from 2009 to 2013 presented with advanced CKD.[17] A recent study among patients on treatment for chronic kidney disease at the Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria by Awosan et al.,[18] reported that about two-thirds (66.9%) of the patients were at advanced stages of CKD, and the most common risk factors identified were hypertension (47.6%), chronic glomerulonephritis (22.6%) and obstructive uropathy (13.7%).

CKD is associated with high cost of treatment and long hospital stay, thus creating untold burden on the already insufficient financial resources of the patients.[19] It is believed that awareness and education on kidney disease impact on its effective management, and cause reduction in its economic and public health burden. Awareness of CKD and its risk factors is known to increase the perception of being at high risk; and this in turn influences the health seeking behavior.[20] A study conducted in India found that absence of community-based screening programs to identify CKD risk factors contributed to patients being diagnosed with CKD at advanced stages, and that early detection of kidney disease through community based screening for its risk factors might reverse the trend, by facilitating early intervention.[21]

Reports from studies conducted in many developing countries (including Nigeria) majorly showed low awareness of CKD, poor perception of risk, and high prevalence of its risk factors. The reports of a general chronic kidney disease awareness program applied to an urban population in a large Brazilian city showed that less than half of respondents (44.0%) were aware of CKD risk factors.[22] In another study among urban African-American by Waterman et al.,[23] only 26% of those with CKD risk factors (diabetes, hypertension, or family history of CKD) felt their risk of CKD was "higher than average," and, perhaps more disturbingly, while 52% felt their risk was "lower than average." A study conducted in a rural community in South-western Nigeria showed that only 27.1 and 16.8% of respondents were aware of CKD and its risk factors respectively,[20] while a screening program for CKD's risk factors in a community in Niger-delta Nigeria reported that 72.1 and 33.4% of participants that were aged 50 years and above had hypertension and family history of hypertension respectively.[24]

Prevention and control of CKD to a large extent depend on the awareness and early detection of the disease and its risk factors among "at risk" populations, as it is believed that with a better understanding of its risk factors, development of the disease and progression to end stage renal disease can be prevented.[25] This study was conducted to assess the awareness and prevalence of risk factors of chronic kidney disease among civil servants in Sokoto, Nigeria.

MATERIALS AND METHODS

Study Design, Population and Area

A cross-sectional study was conducted among Sokoto State civil servants working at the Usman Farouk and Ginginya secretariats, Sokoto, Nigeria, in November and December 2016. All consenting civil servants in the two secretariats were considered eligible for enrolment into the study.

Sample Size Estimation and Sampling Technique

The sample size was estimated at 401 using the statistical formula for calculating the sample size for descriptive studies,[26] a 54.3% prevalence of CKD risk factors among adults in a previous study,[27] a precision level of 5%, and an anticipated 95% response rate. The eligible participants were selected by systematic sampling

technique using the staff list in the secretariats to constitute the sampling frame. Proportionate allocation was done in the selection of participants from the respective secretariats (based on their staff strength). One of 8 civil servants was recruited over the period of the study until the required sample size of 401 was obtained.

Data Collection

The methods of data collection comprised of personal interview, physical and biochemical assessments. A structured, self-administered questionnaire was used to obtain information on the socio-demographic characteristics of the study participants, awareness of chronic kidney and its risk factors, and use of herbs and analgesics. Anthropometric measurement, blood pressure measurement, and estimation of fasting plasma glucose were also done for the participants. Weight was measured with shoes off to the nearest 0.5kg using a seca optimal scale; it was validated with a standard weight and corrected for zero error. Height was measured without shoes to the nearest 0.5cm using the HM230 wall mounted manual stadiometer (Charder Medical Designs and Manufacturer, Taiwan).

Blood pressure was measured using the Omron M2 sphygmomanometer (Omron Global, Japan) and stethoscope (Littman quality) with all tight clothing and other similar materials removed from the arm and in the sitting position. The first measurement was taken after the participant had rested for at least 10 minutes in a sitting position with the arm rested on a table such that the middle of the forearm was about the level of the heart. The second measurement was taken at the end of the interview; the mean of the 2 readings was used in the analysis to prevent error due to subject variation. Accucheck active glucometer (Roche Diagnostics, Switzerland) was used for blood sugar analysis; capillary whole blood was obtained from the participants early in the morning after an overnight fast. Five resident doctors, two nurses and two laboratory scientists assisted in data collection after pre-training on the objectives, selection of participants and use of survey instruments.

Operational definition of terms

Body mass index (BMI) was calculated as weight (kg) divided by height^2 (m^2) and used as marker for overweight and obesity[28]; overweight was defined as BMI of 25.0 to 29.9kg/m^2, while obesity was defined as BMI of 30.0kg/m^2 and above. Diabetes mellitus was defined using the WHO criteria[29] as fasting plasma whole glucose $\geq$ 6.1mmol/l (110mg/dl). Hypertension was defined using the World Health Organization and International Society of Hypertension criteria[30] as systolic blood pressure (SBP) $\geq$ 140mmHg and/or diastolic blood pressure (DBP) $\geq$ 90mmHg or both or self-reported antihypertensive medication during the past 1 week.

Data Analysis

Data were analyzed using IBM Statistical Package for the Social Sciences (SPSS) version 20.0 software. Frequency distribution tables were constructed; and cross tabulations were done to examine the relationship between categorical variables. The chi-square test was used to compare differences between proportions. All levels of significance were set at $p < 0.05$.

Ethical Consideration

Institutional ethical clearance was obtained from the Ethical Committee of Sokoto State Ministry of Health, Sokoto, Nigeria. Permission to conduct the study was obtained from the Head of Civil Service, Sokoto State, Nigeria; and informed written consent was also obtained from the participants before questionnaire administration.

RESULTS

Socio-demographic characteristics of participants

Four hundred out of the 401 questionnaires administered were adequately completed and found suitable for analysis, giving a response rate of 99.7%. The ages of the participants ranged from 18 to 70 years (mean = 39.7 $\pm$ 12.6). A larger proportion of participants (49.5%) were aged 31-50 years. Majority of participants were males (70.0%), married (71.8%), and were Hausa by tribe (73.8%). The most predominant religion was Islam (97.3%), and majority of participants (53.8%) had tertiary education (Table 1).

Awareness of chronic kidney disease (CKD) and its risk factors by participants

Only about half 203 (50.8%) of the 400 participants were aware of CKD and only 11 (2.8%) had friends or relatives that were diagnosed with the disease. Less than a third of participants (28.0%) were aware of the risk factors of CKD. Of these, the CKD risk factors most commonly known to them were use of herbal medications (17.5%), family history of CKD (11.0%), and hypertension (9.0%). Only a few participants knew the other risk factors of CKD as shown in Table 2.

Prevalence of CKD risk factors among participants

The most prevalent risk factors of CKD among the participants were use of herbal medications (43.5%), frequent use of analgesics (26.8%), hypertension (13.8%)

and overweight/obesity (11.3%). Only a few participants had the other risk factors of CKD as shown in Table 3.

Table 1: Socio-demographic characteristics of participants

Variables	Frequency (%) n =400
Age group (years)	
≤ 30	118 (29.5)
31-50	197 (49.5)
> 50	81 (20.3)
Sex	
Male	280 (70.0)
Female	120 (30.0)
Marital status	
Single	97 (24.3)
Married	287 (71.8)
Separated	2 (0.5)
Divorced	12 (3.0)
Widowed	2 (0.5)
Tribe	
Hausa	295 (73.8)
Fulani	74 (18.5)
Yoruba	13 (3.3)
Igbo	12 (3.0)
Others	6 (1.5)
Religion	
Islam	389 (97.3)
Christianity	11 (2.8)
Educational status	
Qur'anic only	12 (3.0)
Primary	66 (16.5)
Secondary	107 (26.8)
Tertiary	215 (53.8)

Factors associated with CKD risk factors among participants

Hypertension was found to be associated with the participants' age; the prevalence of hypertension rose progressively across the age groups (and the differences were significant). The prevalence of hypertension among participants that were aged ≤ 30, 31-50 and > 50 years were 5.9, 19.3 and 25.3% respectively (χ^2= 15.280, p < 0.001). Although, the prevalence of hypertension was higher among females (19.3%) as compared to males (15.4%), the difference was not significant (p > 0.05).

Similarly, overweight/obesity was found to be associated with the participants' age; the prevalence of obesity rose progressively across the age groups (and the differences were significant). The prevalence of overweight/obesity among participants that were aged ≤ 30, 31-50 and > 50 years were 5.2, 12.8 and 16.9% respectively (χ^2= 7.153, p = 0.028). Although, the prevalence of overweight/obesity was higher among males (12.1%) as compared to females (10.3%), the difference was not significant (p > 0.05).

Use of herbs was found to be associated with the participants' age and sex; it was significantly (p < 0.05) more prevalent among those that were aged 31-50 years as compared to those in the other age groups, and among males (50.4%) as compared to females (27.5%).

Table 2: Awareness of chronic kidney disease (CKD) and its risk factors by participants

Variables	Frequency (%) n = 400
Aware of CKD	
Yes	203 (50.8)
No	197 (49.3)
Had friends/relatives diagnosed with CKD	
Yes	11 (2.8)
No	389 (97.2)
Aware of the risk factors of CKD	
Yes	112 (28.0)
No	288 (72.0)
*Risk factors of CKD known to respondents	
Hypertension	36 (9.0)
Diabetes	18 (4.5)
Obesity	12 (3.0)
Family history of CKD	44 (11.0)
Passage of blood in urine	2 (0.5)
Use of analgesics	17 (4.3)
Use of herbal medications	70 (17.5)

Frequent use of analgesics was found to be associated with the participants' sex; it was significantly more prevalent among males (51.2%) as compared to females (45.0%) χ^2= 0.077, p = 0.048. Although, frequent use of analgesics decreased progressively across the age groups, the differences were not significant. The prevalence of frequent use of analgesics among participants that were aged ≤ 30, 31-50 and > 50 years were 59.3, 49.7 and 45.9% respectively (χ^2= 4.198, p = 0.123) as shown in Table 4.

Table 3: Prevalence of CKD risk factors among participants

CKD risk factors	Frequency (%) n = 400
Hypertension	55 (13.8)
Diabetes	11 (2.8)
Hypertension and diabetes	7 (1.8)
Overweight / obesity	45 (11.3)
Family history of CKD	6 (1.5)
Use analgesics frequently	107 (26.8)
Use herbal medications	174 (43.5)

Table 4: Distribution of CKD risk factors by participants' age and sex

CKD risk factors	Age group (years)			Sex	
	≤ 30 Frequency (%)	31 - 50 Frequency (%)	> 50 Frequency (%)	Male Frequency (%)	Female Frequency (%)
Blood pressure status					
Hypertensive	7 (5.9)	38 (19.3)	21 (25.3)*	43 (15.4)	23 (19.3)
Normal	111 (94.1)	159 (80.7)	62 (74.7)	236 (84.6)	96 (80.7)
		χ^2= 15.280, p < 0.001		χ^2= 0.377, p = 0.206	
BMI status					
Overweight/obese	6 (5.2)	25 (12.8)	14 (16.9)*	34 (12.1)	11 (10.3)
Normal	109 (94.8)	171 (87.2)	69 (83.1)	246 (87.9)	96 (89.7)
		χ^2= 7.153, p = 0.028		FEχ^2= 0.491, p = 0.276	
Use of herbal medications					
Yes	38 (32.2)	111 (56.3)*	25 (29.4)	141 (50.4)*	33 (27.5)
No	80 (67.8)	86 (43.7)	60 (70.6)	139 (49.6)	87 (72.5)
		χ^2= 26.217, p < 0.001		χ^2= 17.856, p < 0.001	
Frequent use of analgesics					
Yes	70 (59.3)	98 (49.7)	39 (45.9)	133 (51.2)*	54 (45.0)
No	48 (40.7)	99 (50.3)	46 (54.1)	127 (48.8)	66 (55.0)
		χ^2= 4.198, p = 0.123		χ^2= 0.077, p = 0.048	

*Statistically significant; FE: Fisher's exact

DISCUSSION

Whereas, the level of awareness of CKD among the participants in this study was average (50.8%), awareness of its risk factors was low among them (28.0%). These findings are in agreement with the generally low level of awareness of CKD and its risk factor in studies conducted in sub-Saharan Africa[20,31] despite the high burden of the disease across the continent; and they suggest gaps in awareness creation about the disease among the populace.

The emergence of use of herbal medications as the most commonly known risk factor of CKD among the participants in this study is not surprising in view of the fact that about 80% of people worldwide use traditional medicine practitioners to meet their healthcare needs.[32,33] Although, quite a number of herbal preparations have shown promising results with respect to their efficacy, safety concerns remain the major problem, as their use is poorly regulated and some of the herbal preparations have been found to typically cause reversible acute kidney injury which could progress to CKD if it is prolonged and untreated.[33,34]

Whereas, about a tenth (11.0%) of the participants in this study knew family history as a risk factor of CKD, just a few of them (9.0%) knew hypertension as a risk factor of the disease; this could be due to the fact that while people generally believed that diseases run in families as a result of genetic inheritance and shared environment, hypertension is generally perceived as being majorly associated with cardiovascular events such as stroke and coronary heart disease, as these disease conditions cause sudden deaths and are often reported. Hypertension is the most commonly reported cardiovascular disease in Nigeria, with a national prevalence between 12.4 and 34.8%.[35,36]

The prevalence of hypertension (13.8%), overweight / obesity (11.3%), and diabetes mellitus (2.8%) is substantially lower among the participants in this study as compared to the findings in a previous study conducted among adults aged 18 years and above in Sokoto metropolis, Nigeria,[37] that found 30.6, 36.5 and 9.6% prevalence of hypertension, overweight/obesity and diabetes mellitus respectively; and another study conducted in an urban community in the neighboring Kaduna State, Nigeria[38] that reported 55.9 and 23.2% prevalence of hypertension and diabetes mellitus respectively. These findings are interesting as they suggest a fall in the prevalence of these diseases in Sokoto, Nigeria, in recent years.

The association between hypertension and age among the participants in this study, with a progressive and significant increase in the prevalence of hypertension with advancement in age is consistent with the findings in similar studies conducted by Ulasi et al.,[39] and Erasmus et al.,[40] and this is believed to be due to the increased risk of artherosclerosis with aging. Similarly, the progressive and significant rise in the prevalence of overweight/obesity with advancement in age among the participants in this study is consistent with the finding in

a study by Okoye et al.,[11] and this could be related to the progressive reduction in physical activities with aging.

The high prevalence of use of herbal medications among the participants in this study (43.5%) is not surprising considering the tremendous increase observed in the use of herbal medicinal products and supplements over the past three decades with about 80% of people worldwide relying on them for some part of primary care.[33] The high prevalence of frequent use of analgesics among the participants in this study (26.8%) could be related to the poor awareness (4.3%) of the adverse effects of these drugs on the kidneys among the participants, and the prevalent self-medication practices ranging from 2 to 92% in different countries across the world, and with the most frequently self-medicated drugs being analgesics and antibiotics.[41] It is therefore necessary for government and health workers to periodically educate the public on the risks associated with these practices, particularly development of chronic kidney disease.

CONCLUSION

This study showed low levels of awareness of CKD and its risk factors among civil servants in Sokoto, Nigeria; but the prevalence of some risk factors of the disease was high among them. These findings underscore the need for government and health workers to sensitize the public on CKD and also screen the populace for its risk factors periodically.

Acknowledgments

The authors appreciate the Head of Civil Service, Sokoto State, Nigeria, and all the civil servants that participated in the study for their cooperation.

Source of support

Nil.

Conflict of interest

None declared.

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How to cite this article: Yusuf AA, Oche MO, Isah BA, Onankpa B. Awareness and prevalence of risk factors of chronic kidney disease among civil servants in Sokoto, Nigeria. Int Arch Med Health Res 2019; 1(1): 1-7.