



STATUS OF RENAL BIOCHEMICAL PARAMETERS OF PEOPLE LIVING IN SUSPECTED AREA (BULUMKUTTU WARD, MAIDUGURI) OF CHRONIC KIDNEY DISEASE.

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ABSTRACT

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Background: Chronic kidney disease (CKD) is a growing health problem worldwide especially in developing and underdeveloped countries, with adverse outcomes of kidney failure, cardiovascular disease, and premature death. Kidney disease (KD) has few symptoms and is frequently unrecognized. Several people self-medicate either by orthodox or traditional medicine to treat its outcomes. Therefore, we sought to undergo community-based screening for the status of renal function test of people living in a suspected area of CKD in Bulumkuttu.

Methodology: A total of two hundred and three (203) subjects comprising of one hundred (100) females and one hundred and three (103) males were recruited for this study by using Stratified sampling technique. Serum urea, creatinine, and uric acid were analyzed using auto chemistry analyzer Hitachi (Roche) Cobas C311. Proteinuria, Glucosuria, and Hematuria were analyzed using standard Reagent Strips for Urinalysis ComboStik 11.

Results: The renal biochemical parameters were found to be an elevated insignificant number of the study populations. Urea concentration was found to be significantly ($p=0.000$) elevated ($>5.8\text{mmol/L}$) in 31(15.3%) females and 30(14.7%) males. Creatinine was found to be significantly ($p=0.000$) elevated ($>132\mu\text{mol/L}$) in 20(9.85%) and 20(9.85%) for females and males respectively. Also 12(5.3%) females and 15(7.4%) males were found to significantly ($p=0.000$) elevated serum uric acid ($>416\mu\text{mol/L}$). Proteinuria ($\geq 1+$) was also found in 30(14.8%) and 13(6.4%) for females and males respectively. High blood pressure with SBP $>139\text{mmHg}$ and DBP $>90\text{mmHg}$ was also found in 46(22.7%) females and 38(18.7%) males. Hematuria was also found in 9(9%) females and 6(5.8%) males. Significantly higher levels of uric acid are found in both males and females; 7.4% and 5.3% respectively.

Corresponding author*	<p>Conclusion: This study shows elevated renal biochemical parameters among the subjects' indicative of renal damages, the cause of which was not investigated. However, this study found HTN, high BMI and significant prevalence of subjects both females (14%) and males (6.79%) who admitted for habitual self-medication of orthodox as well as herbal medicine. Also 1.89% of males who admitted to smoke at least five sticks of cigarette per day.</p>
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INTRODUCTION

Chronic kidney disease (CKD) is a progressive loss of kidney function over a period of time (month or years). CKD is a growing health problem worldwide [1, 6] especially in developing and underdeveloped countries, with adverse outcomes of kidney failure, cardiovascular disease and premature death [1, 4].

Early kidney disease has no symptom until the disease progresses to CKD which has few and unspecific symptoms. It is, therefore, most often unrecognized until when the patient is screened and investigated. Several population-based screening programs were performed in developed countries [8-9]. However, community screening to determine the prevalence and associated factors of kidney diseases in an underdeveloped country like Nigeria, especially in Borno state are limited.

Hypertension (HTN), Diabetes mellitus (DM) which are chronic Non- Communicable Diseases (NCDs) are the major cause of CKD worldwide [1]. Chronic glomerulonephritis (CGN) and interstitial nephritis caused by Communicable Diseases (CDs) such as bacterial, parasitic, and viral infections are the major cause of CKD in developing countries [1]. The prevalence of these risk factors in the developing countries of the world such as Nigeria has increases [1].

In Nigeria lack of national registry network and a coordinated national program on kidney disease have restricted efforts toward the effective planning and control of the renal disease [2]. However, in 2012, Augustine projected an annual growth rate of 6-8% kidney failure in Nigeria [7]. This projected growth rate is evidence in some part of this country (Nigeria). In a similar report from

medical records of University of Maiduguri teaching hospital kidney center it shows that from 2009-2013, about 250 patients presented at the center with kidney diseases and more than 70% of these patients are diagnosed of CKD. The study also shows that the majority of the patients had at least HTN, DM, or established heart disease. The social lifestyle of the patients indicates 14% are drug abusers, 9.2% smoke cigarette, 6.8% were alcoholics [5].

Also, in another study in Maiduguri on the etiology of CKD, the author reported various etiology of CKD. These include HTN in 35% of the patients, GCN in 28% and DM in 12%, pyelonephritis 4%, polycystic kidney disease 3%, Alport's syndrome and obstructive uropathy 3% each while Sickle Cell Nephropathy (SCN) and medullary sponge kidneys accounted for 1% and 9% had CKD of uncertain cause [3]. Hence the need for community screening especially in suspected areas.

MATERIALS AND METHODS

RESEARCH DESIGN

This is a cross-sectional population-based study on the status of renal biochemical parameters of people living in the suspected area (Bulumkuttu ward Maiduguri, Borno state) of chronic kidney disease.

STUDY AREA

The study area is Bulumkuttu ward, a cosmopolitan part of Maiduguri. Maiduguri is the capital city of Borno state, one of the north-eastern states of Nigeria which is bordered to Niger Republic, Chad and Cameroon.

STUDY POPULATION

All the subjects recruited for this study are people living in the study area for at least up to five (5) years. 203 subjects who met the inclusion criteria were recruited for the study.

A verbal and written informed consent was sought from each subject participating in the study.

ETHICAL CLEARANCE

Ethical clearance was obtained from the Ministry of Health, Research and Ethical committee, Maiduguri, Borno state.

METHODOLOGY

Each subject completed a questionnaire by documenting his/her sociodemographic status (e.g. age, sex), family health history (e.g. hypertension, diabetes, and kidney disease) and lifestyle behavior (e.g. smoking, drug abuse). History of self- medications with renal side-effects (e.g. non-steroids, anti-inflammatory drugs and herbs containing) were also investigated. Anthropometric measurements (e.g. height and weight) for all the participants were done using a calibrated scale. The body mass index (BMI) was calculated as weight (in kilograms) divided by height (in square meters). Indicators of kidney damage (e.g. serum urea, creatinine, and uric acid and proteinuria) and possible risk factors for CKD (e.g. HTN and DM) were then examined.

Serum urea, creatinine, and uric acid were analyzed using auto chemistry analyzer Hitachi (Roche) Cobas C311. Proteinuria, Glucosuria, and Hematuria were analyzed using standard Reagent Strips for Urinalysis ComboStik 11.

HYPERTENSION STATUS.

Blood pressures were measured according to the guidelines presented in the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood pressure (JNC 7) ^[10]. Three readings were taken at 5 min intervals. Means of the three readings were calculated unless the difference between the readings was >10 mmHg, in which case the mean of the two closest of the three measurements was used. Hypertension was defined as systolic blood pressure (BP) =139mmHg or diastolic BP =90 mmHg, or use of anti-hypertensive medications irrespective of the BP.

DIABETES STATUS.

Patients were screened for glucosuria.

STATISTICAL ANALYSIS

The data obtained were analyzed using the statistical package for social sciences (SPSS) version 20.0 for windows pc. Other descriptive statistics (mean, standard deviation, frequency, and percentages) were computed. Students-t-test was used to test for the differences between the data obtained. The level of significance was set at 95% ($p<0.05$) confidence interval.

RESULTS

A total of two hundred and three subjects participated in this study all of which were from Bulumkuttu area of Maiduguri, Borno state. One hundred (49.3%) were females and one hundred and three (50.7%) were males. The age range of the subjects was 13-80years. 78 (38.42%) of the study population were between the age of 13 and 30yrs, 78 (38.42%) were between the age of 31 and 50yrs, 41 (20.19%) were between the age of 51 and 70yrs, and 6 (2.95%) were between the age of 71 and 80yrs.

Table 1 shows sociodemographic as well as anthropometric characteristics of the study population.

None of the subjects has a family history of CKD, HTN, or DM. However, there was a significant number of subjects who admitted for habitual self-medication of orthodox as well as herbal medicine. The Mean±SD of both heights and weights of the subjects were 1.59±0.1m and 62.7±12.57kg respectively. The Mean±SD of BMI of the subjects was 24.73±4.62Kg/m² with females having Mean±SD of BMI 25.66±4.97 Kg/m² and males having Mean±SD BMI of 23.83±4.08 Kg/m². 21 subjects (14 females and 7 males) constituting about 10.34% of the studied population were found to have habitual self-medication of both orthodox as well as traditional medicine (herbs). Only 2(1.94%) of the studied population who were males' smokes at least five sticks of Cigarette daily.

Table 1 Sociodemographic Characteristics of the Screening Population

variables	FEMALE n=100(49.3%)	MALE n=103(50.7%)	TOTAL N=203(100%)
Ages (year)			
13-30	29 (29%)	49 (47.5%)	78 (38.42%)
31-50	45 (45%)	33 (32.04%)	78 (38.42%)
51-70	23(23%)	18 (17.48%)	41 (20.19%)
71-80	3 (3%)	3 (2.91%)	6 (2.95%)
FAMILY HISTORY OF CKD	NILL	NILL	NILL
FAMILY HISTORY OF HTN	NILL	NILL	NILL
FAMILY HISTORY OF DM	NILL	NILL	NILL
SELF MEDICATION			
Drugs(Analgesics)	14(14%)	7 (6.79%)	21(10.34%)
Herbal medicine	0(0%)	1 (0.97%)	1(0.49%)
Cigarette Smoke	0(0%)	2(1.94%)	2(0.98%)
HIHGT	1.57±0.09	1.62±0.11	1.59±0.10
WEIGHT	62.98±12.80	62.35±	62.7±12.57
OBESITY			
BMI>24.0Kg/m ²	25.66±4.97	23.83±4.08	24.73±4.62
SBP mmHg	138.28±23.8	137.05±17.99	137.66±21.02
DBP mmHg	82.62±13.13	83.93±11.91	83.78±12.50

Table 2. Shows the Prevalence (%) of Indicators of Kidney Damage. A total of 61(30.0%) of the study subjects had significantly elevated urea value (>5.8mmol/L), out of which 31(15.3%) were females and 30(14.7%) were males (p=0.000). A total of 40(19.7%) of the subjects had significantly elevated creatinine concentration (>132µmol/L) with Mean±SD concentration of 130.4± 74.2µmol/L (p=0.000). Serum uric acid was also found to be significantly elevated (>416) with Mean±SD 314±109.1 in

27(13.3%) of the study subjects (p=0.000). Nine (4.4%) out of the 203 study subjects were found to have elevated urea and creatinine concentrations, and proteinuria. Dipstick urinalysis indicates that out of the 203 studied population, 43(21.2%) subjects had proteinuria (≥1+), 5(2.5%) had glucosuria (≥1+), and 15(7.4%) had hematuria (≥1+). 84(41.4%) out of the 203 had elevated SBP>139mmHg with Mean±SD of 137.66±21.02mmHg and an elevated DBP >90mmHg with Mean±SD of 83.78±12.50mmHg.

Table 2. Prevalence (%) of Indicators of Kidney Damage

INDICATORS	FEMALE n=100(49.3%)	MALE n=103(50.7%)	TOTAL N=203(100%)	MEAN±S.D	P-value
Urea (>5.8mmol/L)	31 (15.3%)	30 (14.7%)	61 (30.0%)	5.5±3.2	0.000
Creatinine (>132µmol/L)	20 (9.85%)	20 (9.85%)	40 (19.7%)	130.4±74.2	0.000
↑Urea↑Creatinine with Proteinuria	6 (2.9%)	3 (1.5%)	9 (4.4%)		
Uric acid (>416 µmol/L)	12 (5.3%)	15 (7.4%)	27 (13.3%)	314.8±109.1	0.000

Proteinuria Neg(-) ≥1+	70 (34.5%) 30 (14.8%)	90 (44.3%) 13 (6.4%)	160 (78.8%) 43 (21.2%)		
Glucosuria NEG(-) ≥1+	98 (98%) 2 (2%)	100 (97.1%) 3 (2.9%)	198(97.5%) 5 (2.5%)		
Hematuria ≥1+	9 (9%)	6 (5.8%)	15 (7.4%)		
BMI > 24.0Kg/m ²	15 (7.4%)	10 (4.9%)	25 (12.3%)	24.73±4.62	
SBP > 139mmHg	46 (22.7%)	38 (18.7%)	84 (41.4%)	137.66±21.02	
DBP >90mmHg	29 (14.3%)	25 (12.3%)	54 (26.6%)	83.78±12.50	

Reference values in our area

Urea = 7.0-16.25mg/dl (2.5 – 5.8 mmol/L)

Creatinine = 0.5-1.49mg/dl (44 -132µmol/L)

Uric Acid = 2.39-6.99mg/dl (142 - 416µmol/L)

DISCUSSION

Chronic kidney disease (CKD) is a growing health problem worldwide [1, 6] especially in developing and underdeveloped countries, with adverse outcomes of kidney failure, cardiovascular disease and premature death [1, 4]. Early kidney disease has no symptom until the disease progresses to CKD which has few and unspecific symptoms. It is, therefore, most often unrecognized until when the patient is screened and investigated. Several population-based screening program were performed in developed countries [8, 9]. However, community screening to determine the prevalence and associated factors of kidney diseases in an underdeveloped country like Nigeria, especially in Borno state are limited. Therefore, this study was undertaken to look into the status of renal biochemical parameters of people living in the suspected area (Bulumkuttu ward, Maiduguri) of chronic kidney disease with the aim of establishing the prevalence of indicators of renal damage and the risk factors of renal diseases in this area. The Mean renal biochemical parameters such as serum urea, creatinine and uric acid in this study were 5.5 ± 3.2 mmol/L, 130.4 ± 74.2 µmol/L and 314.8 ± 109.1 µmol/L respectively which indicate renal damage when compared to the reference values of these parameters in this area.

In this study 30.0% and 19.7% of the subjects had elevated urea 24.4mg/dl (8.7mmol/L) and creatinine 2.31mg/dl

(204.6µmol/L) respectively. This is lower than the prevalence reported by Patel et al [11] where 96% and 36% of the subjects had BUN >20mg/dl (> 7.1mmol/L) and creatinine > 5mg/dl (442µmol/L). However, the prevalence of these nitrogen-containing waste metabolic products in our study is similar to the report of a study conducted by Awobusuyi [12] where the mean urea and mean creatinine values was 25.94mg/dl (9.26mmol/L) and 1.59mg/dl (140.56µmol/L).

In our study also, persistent proteinuria was reported in 21.2% of the study population with females constituting 14.8% and males 6.4% and hematuria were also reported in 7.4% of the study population with females 9% and males 5.8%. This is similar to a report of Awobusuyi [12] where proteinuria was reported in 30.37% and hematuria was reported in 4.9% of the participants. However, only 4.4% of the study population in our study had both elevated urea and creatinine with proteinuria.

Our study also reported hyperuricemia (with mean uric acid of 423.9µmol/L) in 13.3% of the study population.

HTN (Mean SBP of 158.68mmHg and Mean DBP of 96.28mmHg) was observed in 41.4% of SBP and 26.6% DBP in this study with females 22.7% and males 18.7%. This report is similar to one reported by Patel et al [11] and Awobusuyi [12]. Metabolic Syndrome of BMI > 24.0Kg/m² was also reported in 12.3% in this study which is lower than BMI reported by Awobusuyi [12]

Risk factors such as drug abuse (10.34%) and habitual use of herbal medicine (0.49%), and cigarette smoking (0.98%) were also reported in our study. This is similarly reported by Afolabi *et al* ^[13]. From our study, therefore the abnormal renal biochemical parameters observed could be majorly due to the high prevalence of risk factors such as HTN, high BMI, high prevalence of drug abuse and to lesser extent due to habitual intake of herbs and cigarette smoking. This is also similar to report by Afolabi *et al* ^[13] on risk factors for CKD.

CONCLUSION

This study shows elevated renal biochemical parameters among the subjects' indicative of renal damages, the cause of which was not investigated. However, this study found HTN, high BMI and significant prevalence of subjects both females (14%) and males (6.79%) who admitted for habitual self-medication of orthodox as well as herbal medicine. Also 1.89% of males who admitted to smoke at least five sticks of cigarette per day.

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