

## Research Article

# Burden of Chronic Kidney Disease among Diabetics and Hypertensives in a Tertiary Hospital in the Gambia

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**Abstract**

**Background:** Chronic Kidney Diseases (CKD) is a progressive, irreversible loss of kidney function with great debilitations to the patient and the cost of health care for individuals, their families and a countries overall healthcare cost. The prevention and management of CKD involves the control of conditions that causes or aggravate the disease; prominent among such conditions are hypertension and diabetes. The burden of CKD is unknown in the Gambia and more so among those that are more likely to develop the disease, hence this aim of the study is to determine the burden of CKD among hypertensive and diabetic patients in the Gambia.

**Materials and Methods:** This was a retrospective study of hypertensive and diabetic patients, who have had more than 3months of follow up at the EFSTH Banjul, the Gambia. Those included had done a renal function test and hence eGFR in the period under review. CKD was defined as eGFR < 60 ml/L/1.73M<sup>2</sup>.

**Results:** The average age of participants was 59 years. The burden of CKD was 27.1%. Majority 45.8% of participants had both HTN and DM; 41% had only HTN and 13% had only DM. Controlled rates of systolic HTN and DM were 36.1% and 22.4% respectively. CKD was associated with the presence of HTN or DM.

**Conclusion:** More than 1 in 4 DM or HTN patient have renal impairment. CKD is associated with chronic medical conditions (HTN and DM).

**INTRODUCTION**

Chronic Kidney Disease (CKD) is a progressive, irreversible loss of kidney function-including haemostatic, excretory and synthetic functions or Glomerular Filtration Rate (GFR) < 60 mL/min/1.73m<sup>2</sup> for 3 months or more, irrespective of cause [1]. It is an increasing reason for decrease in quality of life, loss of family finance and family bankruptcy [2,3]. More worrying is that end stage renal disease is most of the time a death sentence in most countries in sub-Saharan Africa where renal replacement services (haemodialysis and kidney transplant) are scarcely available [4]. Chronic kidney disease is thought to affect more than 10% of the world's population or approximately 800million persons [5]. Furthermore, the burden and resultant death from CKD is higher in low and medium income countries where the burden averages 11.1% as oppose to 9.1% in high income countries [6]. In Nigeria a community survey reported an age adjusted prevalence of 12%, while a prevalence of 13.3% was reported in Ghana [7,8]. The worrying fact about these figures is that over 90% of them do not know they have the disease [9]. The burden of CKD has also being shown to be higher in the presence of other co-morbidities like Hypertension (HTN), Diabetes (DM) and obesity. Social

behaviours like smoking, alcohol abuse, and proteinuria are also linked to CKD. Other associating factors include increasing age, the female sex and ingestion of herbal concoctions. This was demonstrated, Nwachukwu, et al who had shown that the burden of CKD among hypertensives (29.8%) was approximately twice the prevalence among normo-tensive (15.3%) subjects [10]. Furthermore, Olanrewaju, et al had demonstrated that patients with diabetes were 6.4 times more likely to have CKD when compared to the general population [7]. Similarly, CKD has being shown to be attributed to hypertension and diabetes (especially of greater 5 years duration) in the Gambia.

This strong relationship between CKD and the two chronic medical conditions (diabetes and hypertension) warrants that regular screening for CKD be periodically carried out on patients with such conditions. This will avail an opportunity for early detection of CKD hence fore stalling the rapid progression to end stage kidney disease. Hence it became important to establish the baseline kidney function for these group of patients at the out-patient clinic of the Gambian teaching hospital. This was at the inception of training in the field of Family Medicine at the Edward Francis Small Teaching Hospital, Banjul and the end of a nurse led

out-patient health service provision at the centre. More so that almost a third (29%) and 1.9% of Gambian adult has being shown to be hypertensive and diabetic respectively.

## MATERIALS AND METHODS

### Study Site

The study shall be carried out at the Family Medicine' general out-patient clinic at EFSTH Banjul.

### Study Method

This shall be a retrospective descriptive study of patients with chronic medical conditions (namely hypertension and or diabetes mellitus). The folders of all patients attending the clinic shall be reviewed and the following data retrieved:

- ✓ Age in years (as at when recruited into the clinic).
- ✓ Sex (Male or Female).
- ✓ Diagnosis (hypertension or diabetes or both).
- ✓ Systolic and diastolic blood pressure at the date of recruitment
  - Usually measure with a pre-calibrated Maguja® Automated blood pressure machine (RN-032A model) placed 2-3cm above the cubital fossa.
- ✓ Fasting blood glucose at day of recruitment into the clinic
  - Usually measured with the aid of an accucheck glucometer using capillary blood after an 8 hour fast.
- ✓ Renal function test (creatinine in umol/L) done within the first 3 months following recruitment. (usually carried out in the hospital with the aid of a HumaStar 600 automated chemical analyser).

### Sampling Technique

A non-probability sampling technique shall be used. Patients' records that meet the inclusion criteria shall be conveniently included into the study.

### Inclusion Criteria

Hypertensives and/or diabetes mellitus patients who have being consistently followed up for at least 3 months and have done a renal function test during the period.

### Exclusion Criteria

Records of patients without any of the variables of interest listed above shall be excluded from the study.

### Diagnostic Criteria

- a) Hypertensive patient shall be defined as a person with persistently elevated blood pressure of greater than or

equal to 140/90mmHg, taken at least two occasions in a rested subject or a patient who require antihypertensive to maintain his/her blood pressure.

- b) Diabetes mellitus patients shall be patients who have fasting blood glucose of greater than 7.0mmol/L (126mg/dl) or requires hypoglycaemic medication to control their blood glucose.

### Data Collection Tool

The patients folders shall be reviewed and the required data shall be entered into an excel spread sheet. These shall include serial number, hospital number, and age of patient. Others shall include diagnosis, duration of disease, blood pressure, fasting blood pressure, and serum creatinine. Glomerular-filtration-rate (eGFR) shall be calculated using the CKD-Epi creatinine equation (2021).

### Data Analysis

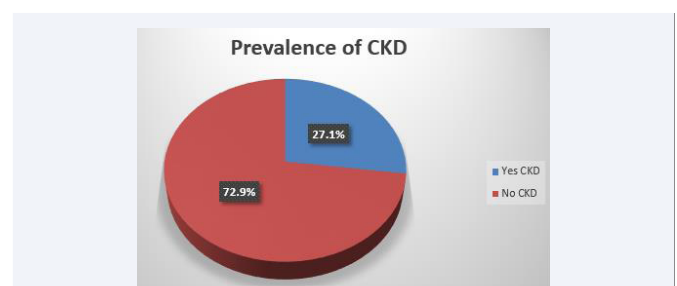
Data shall be imported into the Statistical Package for Social Sciences (SPSS) 20<sup>th</sup> edition. Continuous variables shall be summarized by measures of central tendency and dispersion. Categorical data shall be summarized into proportions. Relationships between variables shall be established using Chi-square test or the student T test for qualitative and quantitative variables respectively. All calculations shall be done at 95% confidence interval.

### Ethical Considerations

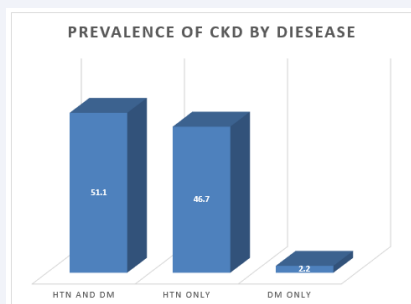
1. An ethical approval was obtained from the hospitals' research and ethical committee before data collection.
2. Patients' name or hospital numbers were not published. Hospital numbers were collected only for the purpose of a future follow up study.

## RESULTS

One hundred and sixty-six patient records were recruited into the study. Majority 133 (80.1%) were female and the average age of the patients was 59.2±10. More had both hypertension and DM (45.8%). Chronic kidney disease was associated with disease type, but not related with other bio-social characteristics (Table 1,2) (Figure 1,2).



**Figure 1** A pie chart showing the prevalence of CKD among the participants.



**Figure 2** A bar chart showing the burden of CKD by disease entity.

**Table 1:** Showing the bio-social demographic characteristics of participants.

Variables	Frequency	Percentage
<b>Age</b>		
Young (< 44years)	15	9
Middle age (45-59)	67	40.4
Elderly (> 59)	84	50.6
Mean: 59.2 ± 10.9years		
<b>Gender</b>		
Female	133	80.1
Male	33	19.9
<b>Chronic Disease</b>		
Hypertension only	68	41
Diabetes only	22	13.2
Diabetes and HTN	76	45.8
<b>Systolic Blood Pressure (N = 144)</b>		
Controlled	52	36.1
Uncontrolled	92	63.9
Mean: 146.8 ± 24.9 mmHg		
<b>Diastolic Blood Pressure (N = 144)</b>		
Controlled	81	56.3
Uncontrolled	63	43.7
Mean: 86.5 ± 14.1 mmHg		
<b>Diabetes Status (N = 98)</b>		
Controlled	22	22.4
Uncontrolled	76	77.6
Mean FBG 9.1 ± 5.44 mmol/L		
<b>CKD Stage (by eGFR)</b>		
Stage 1-2	121	72.9
Stage 3-5	45	27.1
Mean eGFR (74.12 ± 22.8)		

## DISCUSSION

The study revealed that over 50% of the participants were either in the elderly age category with the mean age of the participant being 59.2 years [11]. This is not alarming as the prevalence both diseases that characterized the study population (DM and HTN), are shown to be commoner with advancing age [12]. More so, that similar studies by Akpor OA, et al and Oluwademilade OJ, et al have reported similar age categories among hypertensive and diabetic populations at risk of CKD respectively [13,14]. It was however surprising that there was a wide difference between the proportion of male and female participants with male to female ratio of 1:5. (The reason for this discrepancy is not within the scope of this study, however, further

**Table 2:** Showing the bivariate analysis between CKD and Participants' characteristics.

Variable	Chronic Kidney Disease		Test Statistic	P-Value
	Yes	No		
<b>Age</b>				
Young (< 44yrs)	1	14	$\chi^2= 3.8$	$P = 0.149$
Middle age	18	49		
Elderly (> 59yr)	26	58		
<b>Sex</b>				
Male	9	24	$\chi^2= 0.0006$	$P = 0.981$
Female	36	97		
<b>Disease</b>				
HTN only	21	47	$\chi^2= 7.0$	$P = 0.03^*$
HTN and DM	23	52		
DM only	1	22		
<b>Diabetes Status</b>				
Controlled	4	18	$\chi^2 = 0.81$	$P = 0.37$
Uncontrolled	21	55		
<b>Systolic BP</b>				
Controlled	17	35	$\chi^2 = 0.175$	$P = 0.68$
Uncontrolled	27	65		
<b>Diastolic BP</b>				
Controlled	25	56	$\chi^2 = 0.0083$	$P = 0.93$
Uncontrolled	19	44		

**Appendix:** Data collecting table (tool).

S/N	HOSP. No	AGE	SEX (M/F)	HTN (Yes/No)	SYS. BP	DIA. BP	DM. (Yes/No)	FBG.	CRT
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Hosp No= Hospital Number; HTN= Hypertension, Sys= Systolic; Dia= Diastolic; BP= Blood pressure; FBG= Fasting blood glucose; CRT= Creatinine.

studies on gender as a factor in health seeking behaviour might be revealing). However, Osafo C, et al in Ghana recorded a similar disparity among the genders with 78.8% female participation in a similar study among hypertensive patients [15]. A slight female preponderance (M:F = 1:1.2) among patients with chronic medical conditions have also been reported by Oluwademilade OJ, et al in Nigeria [14].

The study also revealed that 45.8% of participants had both diabetes and hypertension, while 41% had only hypertension and 13.2% had only diabetes mellitus. This clearly demonstrated the co-habitation of these two medical condition in middle and old age and the fact that hypertension is commoner. Other studies have also shown that among patients studied for the presence of CKD; hypertension is more prevalent [13,15]. Systolic blood pressure was controlled in less than half (36.1%) of the participants while 56.3% had controlled diastolic blood pressures. Diabetes mellitus was controlled in 22.2% of participants. Given the records of the association of these medical conditions with end organ damage it is worrying that the level of control is low to moderate among the participants. Despite the low proportion of controlled hypertension among the study participants; these values are higher than those reported in the sub-region; more so that a demographic survey in Ghana reported a 23.8% BP control rate; while a BP control survey done at primary health care centres in Nigeria showed a control rate of 13.1% [16,17]. The prevalence of controlled BP in this study and of other in the sub-region (West Africa) are both lower than records in the USA; where Rana J, et

al reported a controlled prevalence of hypertension of 48.2% [18]. The reason for these differences can at best be speculative in the context of this study but whether economic indices of a country are linked to BP control levels is worthy of further study. The level of control diabetes was better than that recorded in a similar hospital based study in Ghana where the control rate was 13.6% but far less than the over 65% reported in India [18,19]. These differences could be emanating from the differences in populations and methodologies used in those studies.

This study also revealed that the prevalence of CKD defined by eGFR less than 60 ml/min/1.73m<sup>2</sup> among patients with diabetes and or hypertension was 27.8%. This demonstrates that more than 1 in 4 patients with DM and or HTN had CKD [20]. The results also showed that the burden of CKD was higher among those with both HTN and DM (51.1%) followed by those with hypertension only (46.7%) and then those with DM-2.2%. Furthermore, this difference is burden of CKD between patients with both disease and those with a single disease was significant ( $\chi^2 = 7.00, p = 0.03$ ). Other factors such as systolic BP, diastolic BP, diabetes status, age category and gender were not demonstrated to be associated with CKD. The burden of CKD and its distribution among the chronic medical condition in this study is similar to other reports in Nigeria. Where Akpor, et al and Oluwademilade, et al both showed that 57% and 50% (respectively) of CKD patient were hypertensive. Furthermore, as in this study Studies in Ibitoba, Akpor and Oluwademilade have all demonstrated an association between CKD and hypertension and diabetes [13,14,21].

## CONCLUSION

In Conclusion, the burden of CKD among the study population was high and it worthy (> 1:4) and presence of a chronic medical condition (DM and HTN) irrespective of their control, could be predictors to CKD.

## LIMITATIONS OF THE STUDY

Being a retrospective data, patients who could not do their required investigation were excluded from the study. This will affect the capacity of this study to accurately reflect the renal function among the study population. Furthermore, the associations alluded to in this study, lack temporal precedence hence causality should not be ascribed to them.

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