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**Characterization of patients with chronic kidney disease admitted at Edward Francis Small Teaching Hospital in the Gambia: a descriptive cross-sectional study**

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## Abstract

***Introduction:*** *chronic renal failure is a devastating problem for patients and their families. This situation is worse in most developing countries where ESRD constitutes a death sentence as renal replacement therapy is often unavailable or unaffordable. This study aimed to determine the socio-demographic characteristics and risk factors for progression CKD. Settings and Design: a descriptive study was conducted among patients admitted in the haemodialysis and medical wards from September to November 2019.* ***Methods:*** *the sample included all the patients with CKD. A structured questionnaire and medical record books were used to collect relevant information. The primary causes of renal disease were assessed based on history, physical examination, and laboratory investigations. Data obtained were analysed with SPSS v 22.0. The data were presented as frequencies and proportions. Chi-square test or Fisher´s exact test were used to examine the differences in proportions at 95% CI.* ***Results:*** *a total of 52 patients were included in the study, of which 23 were males with a mean age of 37.8 years. About 11.5% were smokers, 17.3% had a family history of CKD and 82% had history of anaemia. Also, 36.3% were users of non-steroidal anti-inflammatory drug and 46.2% self-reported used of traditional herbs. The most frequent cause of CKD was hypertension 71% followed by DM 13.5%.* ***Conclusion:*** *CKD was more prevalent in female and the younger population with hypertension being he commonest cause. Awareness should be created to minimize the late presentation of the disease seen in almost all the participants of the study.*


## Introduction

The kidney plays a vital role in the human body. It controls a lot of functions in the human body ranging from maintaining acid-base balance, fluid regulation, detoxification of toxic substances and many more. All of which are essential for normal functioning of the human system, hence if the kidney loses its function a lot of other organs like the heart, brain, lungs and bones become affected [1]. Chronic kidney disease (CKD), is irreversible damage that results in an inability of the kidneys to perform its vital homeostatic, excretory and synthetic functions [2,3]. CKD is a worldwide public health problem; it is estimated that the overall prevalence is 8%-16% globally. This corresponds to nearly 500 million affected individuals, of whom 78% (387.5 million) reside in low-income to middle-income countries (LMICs) [4]. The incidence of patients with terminal chronic kidney disease in The Gambia was reported to be 46 per million populations [5]. However, the incidence of this disease in The Gambia might be much higher, since the study only dealt with the patients diagnosed in a hospital situated in the capital city [6]. Although the incidence of CKD in developed countries shows signs of levelling off, no such trend is seen in developing countries or minority populations [7]. Current projections indicate that, by 2030, the global population of End-stage renal diseases (ESRD) patients living on dialysis may exceed 2 million and more than 70 percent of these patients are estimated to be living in low income countries such as in sub-Saharan Africa [8,9]. Surprisingly, there is an equal rise in modifiable risk factors like obesity, sedentary lifestyle, smoking, all of which contribute to the burden [10]. While CKD predominantly affects the middle aged and elderly populations in developed countries, it picks out the young adults in their prime of life and the most economically productive years in Sub Saharan Africa [11]. In most developing countries, ESRD constitutes a death sentence as renal replacement therapy is often unavailable or unaffordable [12]. The picture is the same in The Gambia, CKD remains an important cause of morbidity and mortality in our hospital as there are few nephrologists, delayed diagnosis, increased number of patients requiring dialysis coupled limited resources available for the management of end stage renal disease [13]. In order to develop effective strategies to identify such individuals at risk and delay or prevent disease progression, a comprehensive understanding of the complex interplay between risk factors influencing the

disease process is required. This study is set out to determine the socio demographic characteristics, determine risk factors for progression and causes of chronic kidney disease in patients admitted over a 3-month period.

## Methods

**Study design:** the research was a cross-sectional descriptive study. It included all patients admitted with CKD from September 2019 to November 2019.

**Sample selection:** a convenience sampling method was used. The sample included all the patients with chronic kidney disease admitted between September 2019 and November 2019. All patients with chronic kidney disease aged 15 and above who consented were included in the research. All patients less than 15 years and all those who did not consent to the research were excluded.

**Data collection:** a structured questionnaire and medical record books were used to collect relevant information from the patients. CKD was defined as the presence of kidney damage, manifested by abnormal albumin excretion or decreased kidney function, quantified by measured or eGFR that persists for more than three months. In the absence of previous data on eGFR or markers of kidney damage, chronicity was inferred from clinical presumption of kidney disease for >3 months. Proteinuria was defined as normal (urine dipstick negative), mild (urine dipstick reading trace or 1+), or heavy (urine dipstick reading greater than or equal to 2+). Hypertension was defined as the presence of a persistently elevated systolic blood pressure ≥ 140mmHg and/or diastolic blood pressure ≥ 90mmHg in patients aged 15 years and above, and/or the use of antihypertensive drugs and/or past medical history of hypertension. Diabetes mellitus (DM) was defined as a random blood glucose level of 11.1mmol/L or greater, and/or fasting blood glucose level of 7.0mmol/L or greater, and/or use of insulin or an oral hypoglycaemic agent. Anaemia was defined as haemoglobin (Hb) level < 11 g/dL.

**Clinical investigations:** the determination of the primary cause of renal disease was based on history, physical examination, and laboratory investigations such as ultrasonography, urinalysis, blood chemistry, and serology. Histological documentation of the primary renal disease was not done since renal biopsies were not part of this study. Diabetic nephropathy (DN) was diagnosed if patient had a long history of diabetes mellitus, 5 years and above. Hypertensive Nephropathy (HTN) was diagnosed in patients who had a long-time history of hypertension.

**Data analysis:** data obtained were analysed with IBM Statistical Package for the Social Sciences (SPSS) version 22.0. The data were presented as frequencies and proportions for both continuous and discrete variables. Chi-square test or Fisher´s exact test was used appropriately to examine the differences in proportions among categorical data. A p value < 0.05 was considered as significant in this study.

## Results

**Socio-demographic characteristics:** Table 1 shows the socio-demographic data of the study participants. A total of 52 patients were included in the study of which 23/52 (44.2%) were males and 29/52 (55.8%) were females. The study involved participants aged between 15 and 75 years with mean age of 37.82 years. Preponderance of the patients (30/52, 57.7%) were in the age groups of 15-39 years. Exactly 23/52 (44.2%) of the patients had no formal education and the majority 32/52 (61.5%) of the patients were married.

**Attributable cause of CKD:** the most frequent attributable cause of CKD was hypertension (37/52, 71%) followed by DM (7/52, 13.5%). Glomerulonephritis and obstructive uropathy contributed 1.9% (1/52) each of the cases and 11.5% (6/52) of CKD had unknown cause as shown in Table 2.

**Association between causes of CKD and socio-demographic characteristics of patients:** hypertension still remained the commonest cause of CKD in ages 15-39 (21/52, 40.4%) and 40-60 (15/52, 28.8%). However, diabetes was the commonest (2/52, 3.8%) cause seen in patients above 60 years. A statistically significant relationship was found between the causes of CKD and age with P=0.001 (Figure 1). It was also observed that hypertension was the most prevalent cause of CKD in female patients (25/52, 48.1%) compared with males (12/52, 23.1%), however diabetes caused CKD equally in both genders (3/52, 5.8%). There was an association between the cause of CKD and gender (p=0.006) (p=0.006) (Figure 2).

**Risk factors for chronic kidney disease progression:** it was found out that 6/52 (11.5%) were smokers. Exactly 9/52 (17.3%) had family history of CKD and the majority, 43/52 (82%) had previous history of anaemia. Among all the patients, 19/52 (36.3%) were users of non-steroidal anti-inflammatory drug and 24/52 (46.2%) self-reported used of traditional herbs (Figure 3). Using the KIDGO classification for CKD it was found that most (48/52, 92.0%) of the patients were predominantly in the late stage of CKD (V) and 8.0% (4/52, 8.0%) were in CKD (IV) stage.

**Ethical consideration:** we followed strictly "Declaration of Helsinki-Ethical Principles for Medical Research" throughout the study. This study was approved by Institutional review board of University of the Gambia. The eligible participants were duly informed of the objectives of the study, and they consented to it before participation. Participants were assured of the confidentiality of the data provided as their responses were anonymous.

## Discussion

Globally, the number of patients suffering from CKD is on the rise. This is seen especially in developing countries of which the Gambia is part of. Although a lot of effort has been put in place to combat this problem there is still need for improvement as a great number of patients still die or suffer complications of the disease. The epidemiology of CKD differs from region to region and from country to country. In addition, it seems that not much research has been done about CKD in the Gambia; therefore, a study like this is important. Hence this study aimed at characterizing CKD according to the socio demographic factors, identify the causes and risk factors for CKD progression. This would help to identify the group at risk and help in the design of appropriate interventions. The study finds the mean age of participants to be 37.8 years with a higher percentage of individuals in the age group of 15 to 39 years. This is similar to studies conducted in Nigeria which showed incidence of ESRD peak among persons between ages 30S and 50S [14]. Individuals within these age ranges are the most productive years, often the sole wage earners of families with multiple dependents, making the economic, social and developmental impact of the disease more alarming [7]. Furthermore, females were seen to be mostly affected by the disease constituting 55.8% of the study population. In a meta-analysis comprising of six studies the male to female ratios of the prevalence of CKD were 1: 9, 0.8: 1, 1: 1.6, 1: 2, 1: 1.8 and 1: 1.4 respectively [7,15-18]. Most of the patients in this study were found to have no formal education or stopped at the primary level of education and only a few of the respondents had tertiary education. Likewise, a cross sectional study done in Kenya purported that 65.2% had a low level of education (primary school), with 8.7% only having attended college level education [19]. The increased numbers of patients with no formal education could be an explanation for the late presentation of the disease seen in almost all the participants of the study.

The most attributable cause of CKD in this study was found to be hypertension followed by diabetes. In Africa, it has been reported that hypertension dominates the spectrum of causes of CKD, responsible for 45.6% of cases in South Africa especially in black patients [11], 29.8% in

Nigeria [20], 48.7% in Ghana [21] and 39.1% in Senegal [22]. The increased percentage of hypertension as a cause of CKD seen in this study could be attributed to late presentation of patients who suffer from hypertension or poor adherence to treatment. It is important that all patients treated for hypertension be educated on the importance of adherence to medication and regular medical check-ups to avoid adverse outcomes like CKD. This study was able to establish that 1% of the respondents got the disease as a result of a previous bout of glomerulonephritis which developed to CKD. Similar to this small but important figure in this finding is a study by the US department of renal data that showed the incidence of ESRD at 23.7 persons per million populations in their 2009 annual report [12]. Furthermore, this study found that the cause of CKD was unknown in 13.5% of the study participants which is entirely different from the findings in a study conducted in Nigeria wherein the cause of CKD was unknown in more than half of the respondents [17].

Diabetic nephropathy, as one of the causes attributed to CKD in this study was found to be equally distributed between the male and female group. On the other hand, hypertensive nephropathy was seen more in the younger age group and affected more females than males. However, this was different from findings from a 5-year retrospective study conducted in Malaysia which showed that diabetic nephropathy was seen more in women than men and hypertension was seen in the older age group and majorly affected men [23]. Exactly 11.5% of the study respondents were found to be smokers. Smoking has been established to be an important risk factor for CKD as shown in a prospective cohort study wherein study participants who smoke were found to be more than twice likelier to suffer from CKD. In the same prospective cohort study, anaemia was also shown to be strongly linked to progression of CKD [10]. This study was able to establish that a whopping 86% of the participants had history of anaemia which is a cause for alarm considering the potential adverse outcome of compounding the CKD problem. Moreover, this study also found that 17.3% of the respondents had a family history of CKD. This number was far more than that found from a cross-sectional survey in Egypt which reported to have only 1.1 % of the study population to be having family history of the disease [24]. In this study 36.3% of the respondents were known to have used NSAID. This figure is slightly lower than that reported in a 5-year retrospective study conducted in Malaysia wherein the percentage of NSAID users made up 23% of the total respondents [23].

The increased numbers of respondents who use NSAIDs is not surprising as this is the practice of most patients in The Gambia. Instead of reaching the hospitals or health centres for appropriate treatments, most patients resolve into self-medication and prefer buying over the counter medications (eg NSAIDs) to treat their ailments. About 46% of the patients in this study were traditional herbs users. The use of traditional herbs is common in most parts of the world especially in sub-Saharan Africa of which The Gambia is inclusive. It was reported by Luyckx et al. (2017) that the numbers of people who resorted to traditional remedies reached over 80% of the population in many regions [25]. Many of the patients seen were in the late stage of the disease as also seen in studies conducted in low- and middle-income countries [26] and in Malaysia [23]. This could be explained by the poor health seeking behaviour seen in most African countries. Most people prefer consulting herbalists and only come to the hospital when all hope seems lost. This study was not without limitation, the study was conducted in EFSTH which is the only referral hospital in the country meaning only high-risk patients were recruited as study participants and the results of the finding may not be a true representation of the total population. To get an accurate picture of the findings of the study, it would be necessary to decentralize the research to include the various facilities in the country. It is recommended that longer time duration would be

needed for subsequent study, this way it would enable the investigator to recruit a larger population size which would make the results substantial.

## Conclusion

The results from this study showed that females were mostly affected with the disease and hypertension was the commonest cause of CKD, followed by unknown causes as noticed in patients admitted in medical wards and haemodialysis unit from September 2019 to November 2019. The burden of the disease was seen more in the younger population accounting for two thirds of the population sample. Those that had low level of education constituted the majority and those who were married were more than the single population. Anaemia was noticed to be the most occurring risk factor seen among the respondents. There was a significant association between age, gender and causes of CKD with P=0.001 and 0.006 respectively.

***What is known about this topic***

- *Chronic kidney disease (CKD) is a public health challenge worldwide;*
- *The prevalence and burden on developing countries;*
- *In the Gambia the estimated incidence of patients with terminal chronic kidney disease is reported as 46 per million populations.*

***What this study adds***

- *Provides a preliminary data on the sociodemographic distribution of CKD;*
- *Provides information on the causes and risk factors of CKD within The Gambian populace;*
- *Provides confirmatory data on late presentation of CKD in The Gambia, as seen in other parts of developing countries.*

## Competing interests

The authors declare no competing interests.

## Authors' contributions

Authors JWJ and FA conceived, designed and participated in the data collection. Authors DS and OJCRP analysed and interpreted the data. Authors FA and SD, wrote the protocol and the first draft of the manuscript. All authors critically reviewed, revised and approved the final manuscript.

## Tables and figures

**Table 1**: socio-demographic characteristics
**Table 2**: attributable causes of chronic kidney disease
**Figure 1**: causes of chronic kidney disease and age
**Figure 2**: causes of chronic kidney disease and gender
**Figure 3**: risk factors for chronic kidney disease progression

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**Table 1**: socio-demographic characteristics

| **Characteristics** | **Number (n)** | **Percentage (%)** |
|---|---|---|
| Gender | | |
| Females | 29 | 55.8 |
| Males | 23 | 44.2 |
| Age (Years) | | |
| 15-39 | 30 | 57.7 |
| 40-60 | 18 | 34.6 |
| >60 | 4 | 7.7 |
| Formal Education | | |
| None | 23 | 44.2 |
| Primary | 2 | 3.8 |
| Secondary | 22 | 42.3 |
| Tertiary | 5 | 9.6 |
| Marital status | | |
| Married | 32 | 61.5 |
| Single | 20 | 38 |

| **Table 2:** attributable causes of chronic kidney disease | | |
|---|---|---|
| **Causes** | **Frequency (n)** | **Percent (%)** |
| Hypertension | 37 | 71.2 |
| Diabetic | 7 | 13.5 |
| Unknown | 6 | 11.5 |
| Glomerulonephritis | 1 | 1.9 |
| obstructive uropathy | 1 | 1.9 |

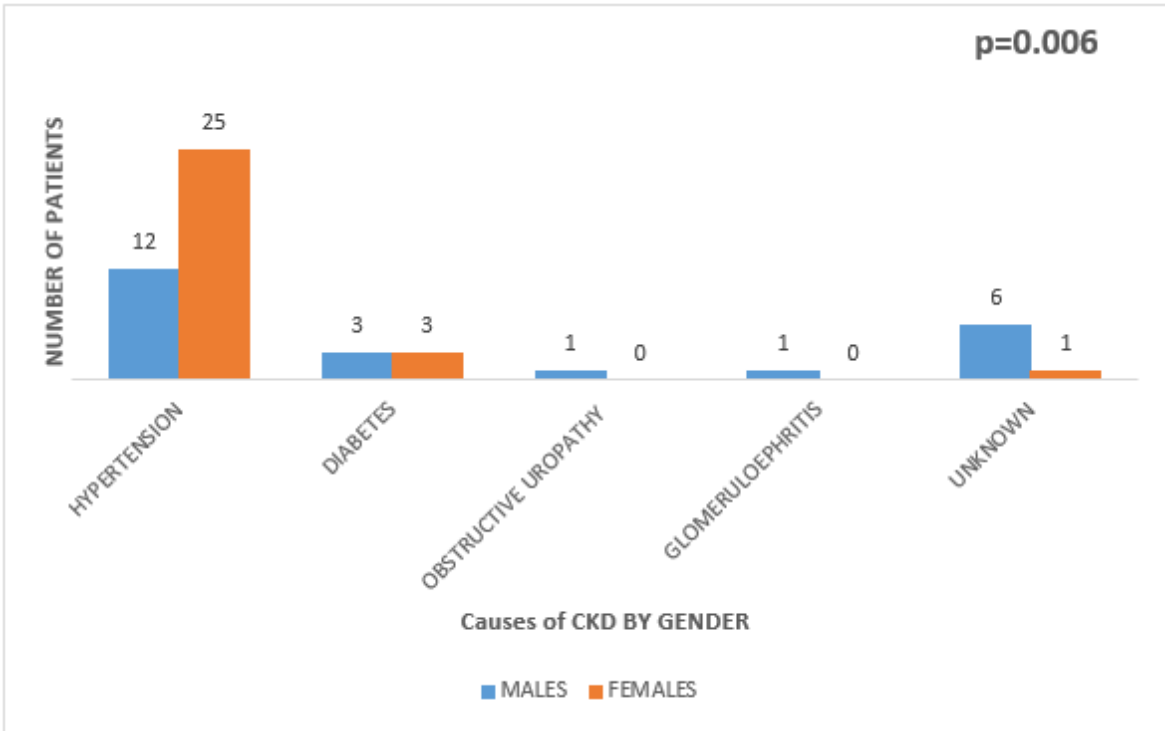


**Figure 1:** causes of chronic kidney disease and age

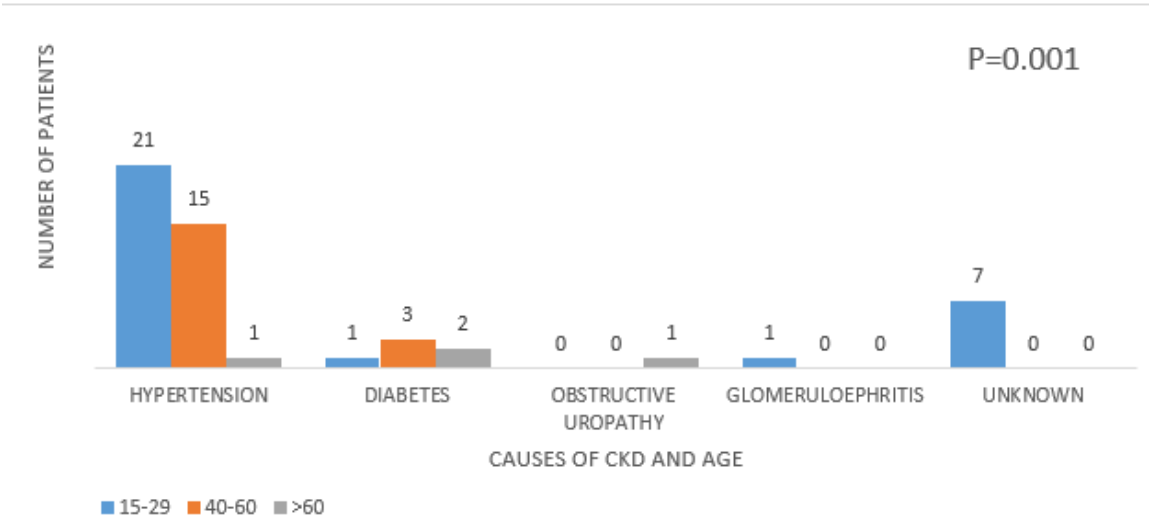


**Figure 2**: causes of chronic kidney disease and gender

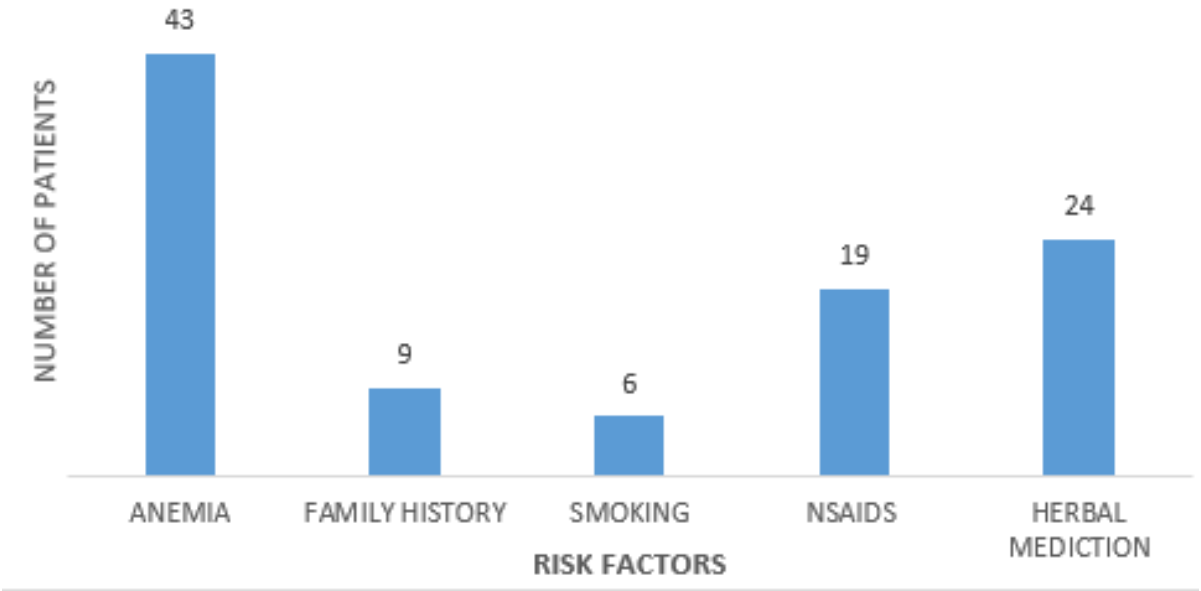


**Figure 3**: risk factors for chronic kidney disease progression