



DETERMINANTS AND PATTERNS OF KIDNEY DISEASES AT THE EL-JOMAIH CENTER FOR DIALYSIS

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ABSTRACT

Background and objective: Non-communicable diseases (NCDs) have become a significant public health burden. Kidney disease is one of these diseases, requiring careful planning to provide appropriate medical care. This study aimed to investigate the determinants and patterns of kidney diseases in the El-Jomaih Center for Dialysis, El-Obeid Hospital Teaching, North Kordofan State, Sudan. **Materials and Methods:** A Retrospective cross-sectional descriptive an institution-based study of medical records of patients admitted from 2013 to 2018. It was implemented for 15 months. Data were entered and analyzed using the Statistical Package of Social Sciences (SPSS) version (23.0) and Microsoft Excel Worksheet (2010) software. **Results:** There were (61.1%) males and (38.9%) females. The male to female ratio was 1:0.65. Admissions aged (46 – 60) years seriously suffered from kidney disease. Admissions seriously suffered from chronic kidney failure (CKD), acute kidney failure (AKD), and End-stage kidney disease (ESKD); (83%), (12.6%) and 4.4%, respectively. Chronic kidney disease was predominant whereas ranging (83.6% – 81.3%). CKD reached its peak of (83.3%) among females. There was a highly significant relationship between gender and the etiological diagnosis ($p < 0.001$). Also, CKD reached its peak of (83.9%) in the (15 – 30) age group and (83.3%) in the middle age (25 – 45 years). There was a highly significant relationship between age and the etiological diagnosis ($p < 0.001$). **Conclusion:** The necessity of early diagnosis and detection of comorbidities, providing records containing all factors required, and should take care to write down all the information needed.

KEYWORDS: Kidney Diseases, Chronic diseases, Etiological diagnosis, El-Jomaih, North Kordofan.

INTRODUCTION:

Kidneys are two bean-shaped organs, each about the size of a fist. They are located just below the rib cage. They are mainly responsible for filtering waste products, excess water and other

impurities out of the blood. [1]. The kidneys are exposed to many problems that affect them and their functions. Among the diseases that affect them is kidney failure, which is called renal insufficiency [2]. Kidney failure is

divided into “acute kidney failure” and “chronic kidney failure”. Kidney diseases are a growing worldwide problem and one of the major public health threats [3]. The level of kidney function tends to decline progressively over time in most patients with chronic kidney diseases [4]. There are currently over 1.4 million patients receiving renal replacement therapy worldwide. One way to reduce the economic burden of chronic kidney disease would be early intervention [5].

Kidney failure is associated with many factors, including behavioral and clinical factors. Diabetes is the main cause, as well as high blood pressure, glomerulonephritis, genetic diseases such as kidney cysts, chronic bacterial urinary tract infections, some medications such as painkillers and some antibiotics when taken in excess without medical advice. Also, traditional medicines that contain unknown substances are usually toxic and harmful to the kidneys [6]. Whether acute or chronic, the progressive increase in prevalence is related to modifications in life style [3]. Chronic kidney disease is a worldwide public health problem. In the United States, there is a rising incidence and prevalence of kidney failure, with poor outcomes and high cost [4].

The Quality and Outcomes Framework (QOF) register indicates that, in 2009–10, 1,817,871 adults in England had stages 3–5 CKD, a diagnosed prevalence rate of 4.3% of the population over the age of 18. The Health Survey for England (HSE) 2010 report estimated that 6% of men and 7% of women (aged ≥ 16 years) had stage 3–5 CKD [7]. The major outcomes of chronic kidney disease are loss of kidney function, leading to

complications and kidney failure, and development of cardiovascular disease. Earlier stages of kidney disease can be detected through laboratory testing. Measurement of serum creatinine and estimation of GFR can identify patients with reduced kidney function [4]. Early diagnosis and treatment of renal disease could lead to the timely treatment and prevention of CKD in pediatric population [8]. Adverse outcomes of chronic kidney disease can often be prevented or delayed through early detection and treatment. Earlier stages of chronic kidney disease can be detected through routine laboratory measurements.

Therapeutic interventions at earlier stages of chronic kidney disease are effective in slowing the progression of chronic kidney disease. The major therapeutic strategies that have been tested include strict blood glucose control in diabetes, strict blood pressure control, angiotensin-converting enzyme (ACE) inhibitors and angiotensin-receptor blockers, and dietary protein restriction [4].

MATERIALS AND METHODS

A retrospective cross-sectional descriptive hospital-based study of all admissions who had kidney disease (KD) admitted to the El-Jomaih Center for Dialysis at the El-Obeid teaching hospital from 2013 to 2017. It aimed to study factors associated with renal failure. *El-Obeid Teaching Hospital* was established in the forties of the last century and is one of the oldest hospitals in Sudan since the era of the first colonialism. It was established in the year 1992. The area of the hospital is 66 thousand meters. The hospital has about 40 wards that differ in their clinical capacity. El-Obeid Teaching

Hospital is the first public hospital located in the centre of El-Obeid city. It has a dedicated emergency room and receives referrals from all Kordofan States of Western Sudan [9,10].

Al-Jomaih Kidney Dialysis Center was opened on 10/4/2015 in the presence of Sheikh Hamad bin Abdulaziz Al-Jomaih. The center is an addition to the health sector and provides services to the citizens of the state and neighboring states. It has 42 kidney dialysis machines, and a laboratory technician to examine and follow up the patients. It has a sensitive scale to help patients monitor their weights continuously. The center has (4) wards with different bed capacities. The center lacks a sewage network. Liquid waste is disposed of in ground basins that are emptied when full. Al-Jomaih Kidney Dialysis Center has a staff of health and non-health workers estimated at (72) workers [11].

Sampling and Sample techniques:

The study included (n=247) patients who had suffered from kidney diseases during the period from 2013 to 2017. This study is based on secondary data; researchers have classified and sorted all hospital records for collect data based on age group, gender, marital status and clinical factors; hypertension, diabetes, prostate dilation, heart disease and pyelonephritis), indications for admission, date of admission, diagnosis, and treatment. They have reviewed all the records carefully.

Data collection:

During the study period, we used the in-patient register (secondary resources) of the department to identify all patients with a discharge diagnosis of diseases of the kidney and urinary tract. For this purpose, the investigators prepared a

closed-coded form and checked for consistency. It was used to collect data on basic information about patterns of kidney disease. The final copy of the form consisted of information about demographic characteristics, including age group and gender. In addition, the final copy included information relating to kidney disease; admission date, the indications for admission and the etiological diagnosis, others.

Data processing and analysis:

Taking samples and filling in the form, the data were analyzed using the Statistical Package of Social Sciences (SPSS) version (23.0) software. Microsoft Excel Worksheet (2010). Chi-square (X²-test) was used to verify a possible association between different variables. Values were considered to be statistically significant when the p-value obtained was less than (0.05).

RESULTS:

Total KD patients during the period from 2013 to 2018 were 247. Out of them 151 (61.1%) of KD patients were males and 96 (38.9%) were females. Their age range from 15 to older than 90 as; (15 – 30), (31- 45), (46 – 60), (61 – 75), (76 – 90) and more than 90 was (14.4%), (17.2%), (28.5%), (27.4%), (11.3%) and (1.2%); respectively (Figure 1).

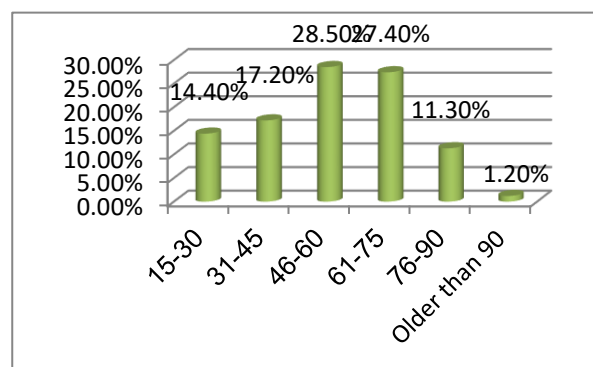


Fig.1: Distribution of KD patients according to age groups.

The total KD patients admitted during the years 2013, 2014, 2015, 2016, 2017 and

2018 were 1.2%, 22.3%, 17.8%, 20.2%, 32% and 6.5%, respectively (Figure 2).

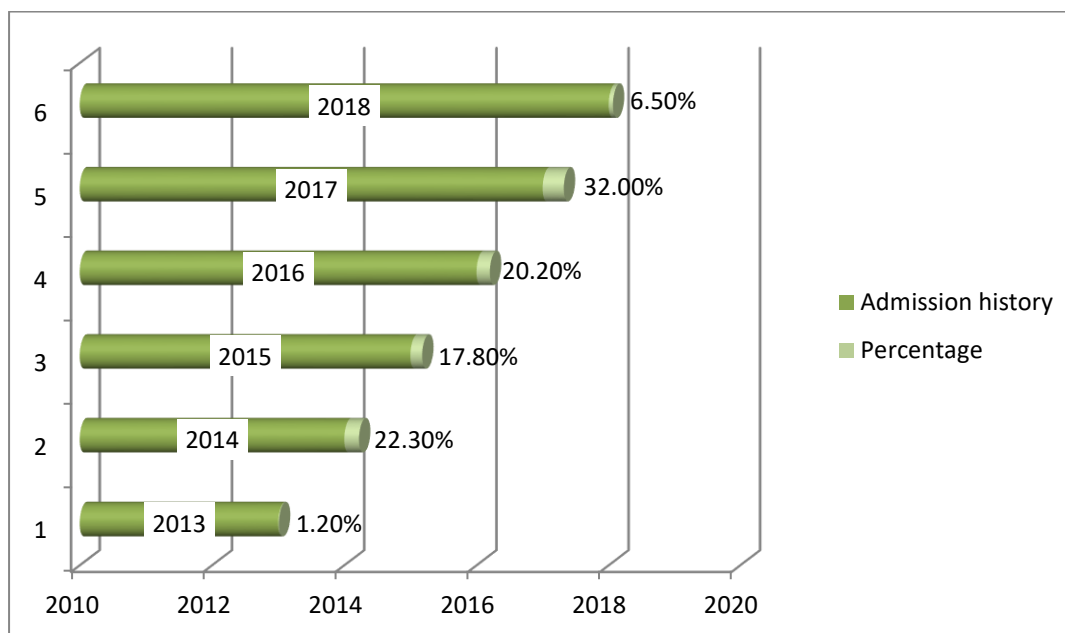


Fig. 2: Distribution of KD patients during (2013–2018).

Admissions of seriously suffered patients from chronic kidney disease (CKD), acute kidney disease (AKD), and end-stage kidney disease (ESKD); (83%), (12.6%) and 4.4%, respectively (Figure 3).

chronic kidney disease (CKD), (13%) of them had an acute kidney disease (AKD) and (4%) of them in end-stage kidney disease (ESKD) (Table 1).

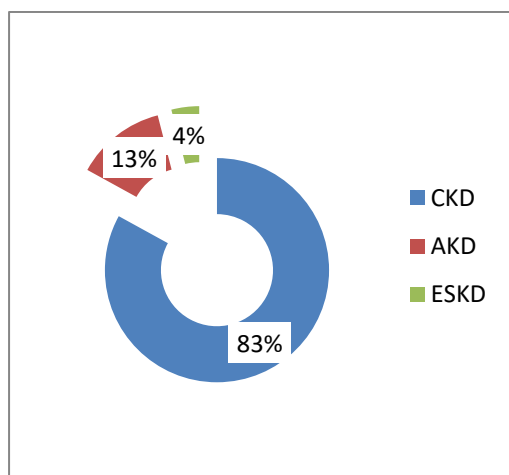


Fig.3: Distribution of KD patients according to the etiological diagnosis (n= 247).

According to the pattern of KD, (83%) of KD patients had suffered from

Table 1: Patterns of kidney diseases according to gender

KDs	Gender		Total/%
	M	F	
AKD	20	12	32/13
CKD	125	80	205/83
ESKD	6	4	10/4
Total	151	96	247/100
$X^2= 36.895;$			$df=2;$
			$p-$ $value= < 0.001$

The indications for admission were CCF, anemia, fever, HTN, malaria, (SOB and vomiting), hypertension

(HTN) and other; (5.6%), (10.9%), (10%), (6.4%), (4.8%), (6.3%), (3.2%) and (46.5%). It was found that patients who had CKD, (13.2%) had diabetes

and blood pressure, (18.3%) had HIV/AIDS & SOB, (16.1%) had asthmatic, anemia and edema, (35.1%) had HTN (Table 2).

Table 2: Patterns of kidney diseases according to comorbidities

Comorbidities	Patterns of kidney diseases			Total
	AKC	CKD	ESKD	
Diabetes and High blood pressure	7.6	49	2.4	59/23.9%
HIV/AIDS and SOB	2.9	18.3	0.9	22/8.9%
Ulcer, Renal stone, Toxic, Chest pain, AKI, and IBD	3.9	24.9	1.2	30/12.1%
UTI, PNH, DM, IHD and HHD	2.7	17.4	0.9	21/8.5%
Asthmatic, anemia and edema	4.3	27.4	1.3	33/13.4%
HTN	10.6	68.1	3.3	82/33.2%
Total	32/13%	205/83%	10/4%	247

Table 3 illustrates that chronic kidney disease (CKD) was predominant among KD patients with 83% followed by acute kidney disease was (13%). CKD reached its peak of (83.3%) among females. There was a highly significant relationship between gender and the etiological diagnosis ($p < 0.001$). Also, CKD reached its peak of

(83.9%) in (15 – 30) age group, (83.3%) in the middle age (25 – 45 years), followed the (61 - 75) age group, the adult age (46 - 60 years), (31 – 45) and (76 – 90) age group were (82.1%), (81.7%) and (81.5%). There was a highly significant relationship between age and the etiological diagnosis ($p = 0.000$).

Table 3: Total admissions of KD according to socio-demographic factors

Variables	The etiological diagnosis			Total	X ²	p-value
	AKD	CKD	ESKD			
Gender						
Male	20/13.2%	125/82.8%	6/4%	151/61.1%	36.895	< 0.001
Female	12/12.5%	80/83.3%	4/4.2%	96/38.9%		
Total	32/13%	205/83%	10/4%	247/100%		
Age group						
15 – 30	5/13.5%	31/83.9%	1/2.7%	37/15%	321.090	< 0.001
31 – 45	5/11.9%	35/83.3%	2/4.8%	42/17%		
46 – 60	9/12.7%	58/81.7%	3/4.2%	71/28.7%		
61 – 75	9/13.4%	55/82.1%	3/4.5%	67/27.2%		
76 – 90	4/14.8%	22/81.5%	1/3.7%	27/10.9%		
> 90	-	3	-	3/12%		
Total	32/13%	205/83%	10/4%	247/100%		

Regarding the percentage of admission of KD cases to the total number of KD cases per year was (12%), (22.3%), (17.8%), (32%) and (6.5%); in 2014,

2015, 2016, 2017 and 2018. CKD was predominant during the period from 2014 to 2018 whereas ranging (83.6% – 81.3%) (Table 4).

Table 4: Admission history of KD patients

Variables	The etiological diagnosis			Total	X ²	p-value
	AKD	CKD	ESKD			
2013	-	3	-	3/12%	274.522	< 0.001
2014	7/12.7%	46/83.6%	2/3.6%	55/22.3%		
2015	6/13.6%	36/81.8%	2/4.5%	44/17.8%		
2016	7/14%	41/82%	2/4%	50/20.2%		
2017	10/12.7%	65/82.3%	4/5%	79/32%		
2018	2/12.5%	13/81.3%	1/6.3%	16/6.5%		
Total	32/13%	205/83%	10/4%	247/100%		

The correlation between the etiological diagnosis and indication for admission

are shown in table number 5.

Table 5: Total number of KD patients and Indication for admission

Indication for admission	The etiological diagnosis			Total
	AKD	CKD	ESKD	
CCF	2	12	-	14/5.7%
Anemia	4	22	1	27/10.9%
Fever	3	21	1	25/10.1%
HTN	2	13	1	16/6.5%
Malaria	1	10	1	12/4.9%
SOB	2	12	1	15/6.1
Vomiting	2	12	1	15/6.1%
Blood pressure	1	7	-	8/3.2%
Others diseases	15	95	4	115/46.6%
Total	32	205	10	247
X ² = 203.935; df=16 ; p-value < 0.001				

It was found that diabetes and hypertension were the main comorbidity recorded in (23.9%)

patients whereas 59 (8.9%) patients had SOB and HIV infection (Table 6).

Table 6: History of chronic diseases among total number of KD patients according to gender

Comorbidities	Gender		Total
	Male	Female	
Diabetes and hypertension	36	23	59/23.9%
HIV and SOB	13	9	22/8.9%
Ulcer, Renal stone, Toxic, Chest pain, AKI, and IBD	18	12	30/12.1%
UTI, PNH, DM, and HHD	13	8	21/8.5%
Asthmatic, anemia and edema	20	13	33/13.4%
HTN	50	32	82/33.2%
Total	151.0	96.0	247
$X^2 = 180.247$; $df = 8$; $p\text{-value} < 0.001$			

DISCUSSION:

This study indicated that (83%) of KD patients had suffered from chronic kidney disease (CKD), (13%) of them had an acute kidney disease and (4%) of them had End-stage kidney disease (ESKD). A similar study conducted in Cameroon showed that the patterns of kidney diseases were (61.8%) CKD and (38.2%) AKD [7].

The current study found that HTN and PTA were the main comorbidities recorded in (33.2%) patients, followed by diabetes and blood pressure in (23.9%) patients, and asthmatic, anemia and edema in (13.4%) patients. A study carried out in Cameroon found that hypertension was the main comorbidity recorded in 142 (63.1%) patients, whereas 26 (11.6%) patients had HIV infection [7]. Kazancioglu reported that an uncontrolled diabetic and/or hypertensive patient can easily and quickly progress to an end-stage kidney

disease patient [12]. Alkhaqani reported that the natural risk factors associated with CKD development are diabetes and hypertension, known as hypertensive nephrosclerosis (severe type) [13].

The present study illustrated that chronic kidney disease (CKD) was predominant among KD patients with 83%. The overall prevalence of chronic kidney disease was 21.4% [14]. A study conducted in China revealed that CKD was confirmed in (10.7%) participants [15].

The current study illustrated that chronic kidney disease (CKD) reached its peak of (83.3%) among females. CKD among US adults, CKD is slightly more common in women (14%) than men (12%) [16].

This study showed that patients who had CKD reached their peak of (83.9%) in the (15 – 30) age group, (83.3%) in the middle age (25 – 45 years), followed

by the (61–75) age group, the adult age (46–60 years), (31 – 45) and (76 – 90) age group were (82.1%), (81.7%) and (81.5%). A similar study showed that all CKD stages were more prevalent in persons aged ≥ 60 y.o. (39.4%) than in those aged 40–59 y.o. (12.6%) or 20–39 y.o. (8.5%) [17]. CKD is common among US adults; 14% are estimated to have CKD. CKD is more common in people aged 65 years or older (34%) than in people aged 45–64 years (12%) or 18–44 years (6%) [16].

The current study showed that patients who had CKD, (13.2%) had Diabetes and hypertension, (18.3%) had HIV & SOB, (16.1%) had asthmatic, anemia and edema, (35.1%) had HTN and PTA. A similar study conducted in Tanzania, revealed that among those who had CKD, (43.8%) had hypertension, (30.4%) had diabetic mellitus, (10.0%) had chronic glomerulonephritis, (8.8%) had hypertension and diabetes mellitus, (4.8%) had HIV/AIDS, and (2.1%) had hepatitis B [18]. Diabetes and high blood pressure are the more common causes of CKD in most adults. Having CKD increases the chances of having heart disease and stroke [16]. A study conducted in China revealed that the three most prevalent self-reported diseases were hypertension (55.4%), dyslipidemia (27.7%), and diabetes (15.3%) [15]. A similar study conducted in East Amhara Region, Ethiopia, showed that among the study participants, (35.4%) had DM, (36.9%) had hypertension and (33.1%) were diagnosed with HIV/AIDs [19]. A retrospective study conducted in East Amhara Region, Ethiopia, appeared that chronic glomerulonephritis (25.9%), hypertension (22.3%) and diabetes

(20.1%) were the main etiological factors of CKD [7].

CONCLUSIONS

The study showed that the majority of patients suffer from chronic kidney disease, and most of them are male. Diabetes and high blood pressure are the most common comorbidities. Therefore, we recommend regular check-up for early detection of chronic diseases. The hospital lacks an advanced registration system that would help build a reliable database.

RECOMMENDATIONS

Therefore, a system must be developed to ensure the accuracy of all patient-related data, and further studies on this health problem must be conducted to study aspects not covered.

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ETHICAL CONSIDERATIONS

The procedure was approved by the Research Committee of the Health and Environmental Health Program after approving the study proposal. Before starting the data collection process for the study, the Medical Director of El-Obeid Teaching Hospital was officially contacted and approval was obtained to review the patients' records. The final report will be submitted to University of Kordofan, Ministry of Health and El-Obeid Teaching Hospital. Also the

findings will be available through Publication in journals.

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