



Evaluation of laboratory profiles of hemodialysis patients in Zawia Kidney Center

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ABSTRACT

Background Chronic kidney disease (CKD) defined as sustained damage of renal parenchyma leading to a chronic deterioration of renal function that may gradually progress to end-stage renal disease (ESRD). Kidney disease is now considered as a global public health epidemic that leads to increase incidences of morbidity and mortality.

Aim: This study aimed to evaluate the kidney function parameters of CKD patients including uric acid, creatinine, urea, protein, and Glomerular filtration.

Materials and Methods: Data from medical records of the 54 patients' follow-up attending the dialysis department, Zawia Kidney Centre during the period of the study included both demographic data & laboratory test. Demographic data including age, gender, blood group, and comorbidity disorder were obtained from the patients. Biochemical parameters including hemoglobin, creatinine, uric acid, serum total protein and potassium were also investigated.

Results: The majority of patients with CKD (35.5 %) were within the (36-46) age group. (53.7%) of them have blood group O+ followed by 18. 5% of the A+ blood group. The prevalence of CKD in females (70%) more than males (30%) in this study. The result also found that 32.7 % of patients have diabetes and 17.2% have hypertension whereas 20.6% suffers from both. Hemoglobin level was significantly lower (8.318 g/dL) ($p < 0.05$) whereas, creatinine, uric acid and serum total protein levels were higher (6.407 mg/dL, 6.106 mmol/L, 5.759 g/dL) respectively).

Conclusions: Patients on maintenance dialysis have a high incidence and prevalence of diabetes, hypertension and anemia. A Large proportion of the patients have O+. These patients also have abnormal laboratory tests. Therefore, special care needs to be taken to improve the health of dialysis patients.

Keywords: Hemodialysis, chronic kidney disease, creatinine, blood group

1. INTRODUCTION

Chronic renal disease is also known as chronic kidney disease (CKD) is a global world problem and presents a major cause of morbidity and mortality (Miftari *et al.*, 2017). It is characterized by persistent damage of renal parenchyma leading to a chronic deterioration of

renal function that may gradually progress to end-stage renal disease (ESRD) (Akchurin, 2019). It is currently classified based on a patient's estimated glomerular filtration rate (eGFR) and urinary albumin excretion rate (AER) (Wouters *et al.*, 2015). Abnormalities of urinary sediment or organ structure can be used as indication markers to diagnose the disease in people with glomerular filtration rate (GFRs of ≥ 60 mL/min/1.73 m²) for more than three months (Wouters *et al.*, 2015). GFR is a measure of kidney function which is defined as the amount of plasma filtered by the kidneys during a certain period (usually one minute) (Akchurin, 2019 & Levey *et al.*, 2015). Several risk factors are associated with the development of chronic kidney failure including diabetic kidney diseases, chronic glomerulonephritis, hypertensive nephropathy, and congenital/hereditary disease. The most frequent co-morbidities are hypertension, obesity, and metabolic syndromes (Bukhatwa *et al.*, 2019). Anemia and heart disease are common complications of chronic renal disease and are associated with an increased risk of morbidity and mortality (Gafer-Gvili *et al.*, 2019). The treatment of CKD and ESRD executes substantial societal costs (Ben Saoud & Aklifa., 2017). Patients required methods that substitute for kidney function to ensure patient life; these methods include peritoneal dialysis, hemodialysis, and other extracorporeal purifying procedures, or kidney transplantation (Cibulka & Racek., 2007). Regular assessment of laboratory parameters is an important manner to reduce the risk of mortality in patients with chronic kidney disease (Bukhatwa *et al.*, 2019). The purpose of this study is to evaluate the biochemical parameters in patients with CKD.

2. Data collection

Cross-sectional study included all files of patients diagnosed having CKD aged ≥ 25 years follow-up attending dialysis department, Zawia Kidney Centre from July to October 2021. The total number of patients included in this study was 54. Collected data from medical records of the 54 during the period of the study included both demographic data & laboratory test results. Demographic data for age, sex, medical history for diabetes and hypertension were collected. Blood and serum parameters such as blood group, serum creatinine, uric acid, hemoglobin, protein, and potassium were also investigated.

3. Statistical analysis

Statistical analysis was performed by using Graph-pad prism 7 Software package. Descriptive analysis, Student t-test were used whenever appropriate, *P* value less than 0.05 were considered as significant.

4. Results

4.1 Demographic and clinical characteristics

In this study, a total of 54 patients with chronic kidney disease, were randomly selected. Patients' age groups were divided into five distinct 10 years' periods, starting from 25 to (69-79) years. Our finding showed that there were more patients 19 (35.5 %) within the (36-46) age group of this study. It is interesting that the numbers of patients 13 (24%) within (47-57) y and (58-68) age groups are similar (Fig 1). According to the current study, females were more affected by kidney disease than males (Fig 2). Furthermore, in the respect of comorbidity of the patients, there is 19 (35.1%) of patients are diabetics whereas 10(18.5%) have hypertension and 12(22.2%) suffer from both diseases (Fig 3).

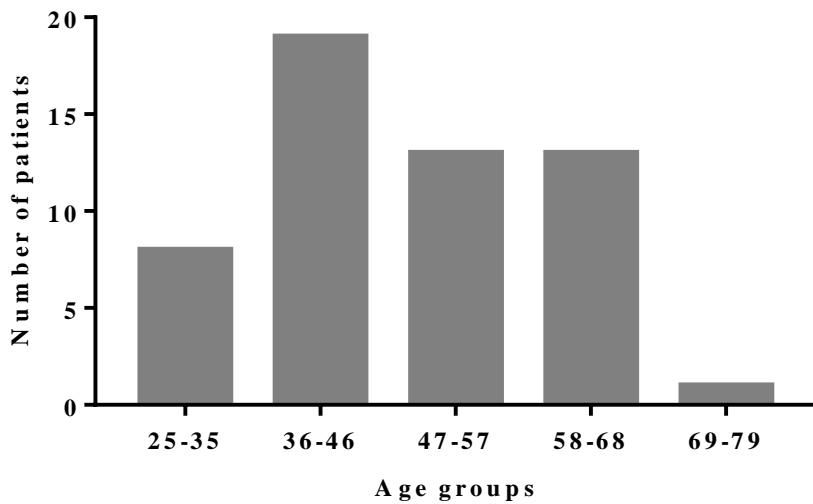


Fig.1: Distribution of study sample over different age periods.

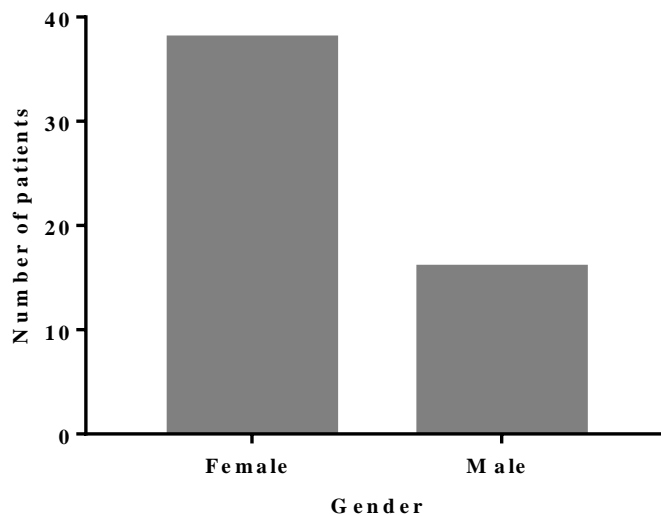


Fig.2: Gender variations among patients with CKD

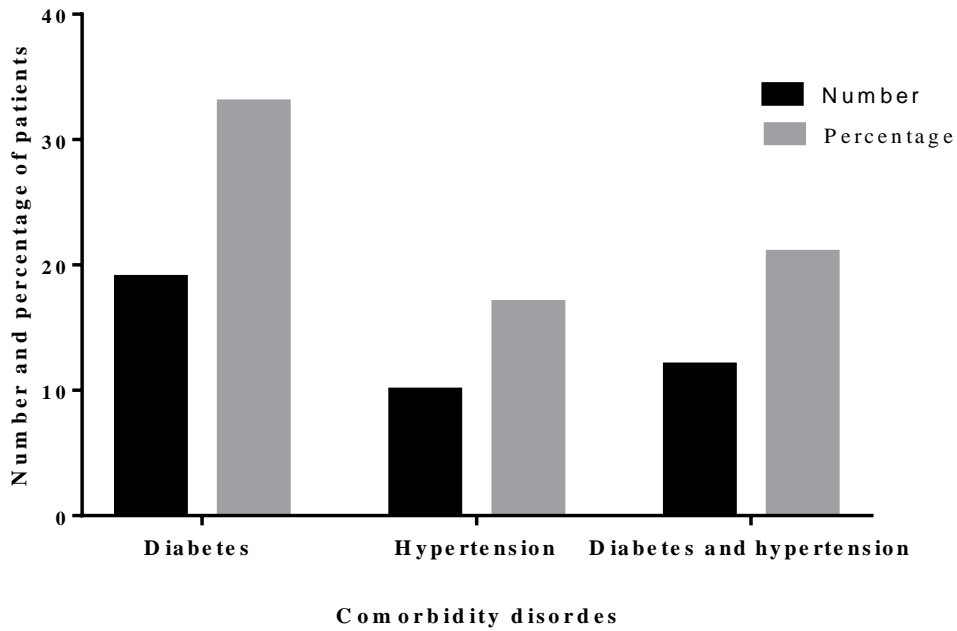


Fig.3: Comorbidity disorder in CKD patients

In this study, blood groups were also investigated in order to find out if there is any relationship between CKD and blood groups. The result showed that the highest proportion of patients with blood group O+ (29) (53.7%) followed by A+ (10) 18.5%, whereas the lowest proportion was patients with blood group B- (1) (1.85%) (Fig 4).

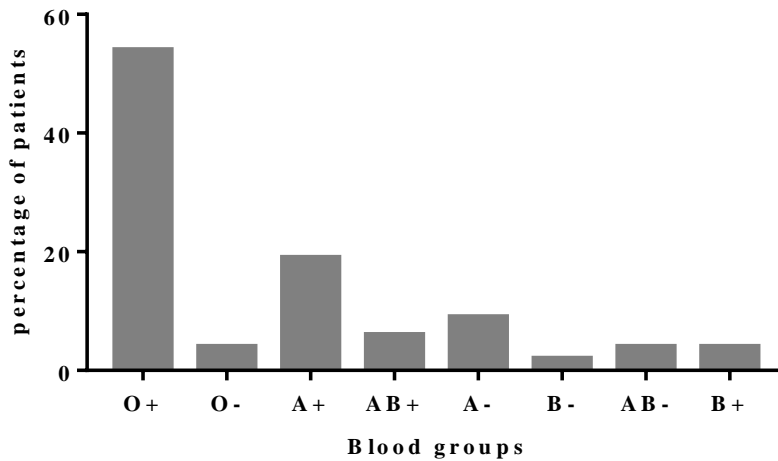


Fig.4: blood groups in patients with CKD

4.2 Clinical parameters

Table (1) presents the parameters of blood tests in patients with CKD. Blood tests were conducted for all patients after admission to the Centre. The results were compared to the normal ranges since data from healthy controls were not available. In the current study patients with CKD had significantly lower hemoglobin level (8.318 g/dL) compared to the normal range ($P < 0.001$). In contrast, creatinine uric acid and serum total protein (6.407 mg/dL) (6.106 mmol/L) and (5.759 g/dL) respectively were significantly higher in patients with CKD ($p < 0.001$).

Table1: Biochemical parameters of study group

Clinical indicator	CKD patients Mean± SEM Total N(54)	Reference value	P-value
Hemoglobin (Hb)	8.318±0.191	12.5-18 g/dL	$P < 0.001$
Creatinin	6.407±0.521	0.70-1.20 mg/dL	$p < .001$
Uric acid	6.106±0.207	0.24-0.51 mmol/L	$p < 0.001$
Potassium	4.590 ±0.114	3.5- 5.0 mmol/L	$p > 0.05$
Serum total protein	5.759±0.166	6.0 - 8.3 g/dL	$p < 0.001$

Discussion

This study included 54 patients with renal disease, 16 (29.6%) males and 38(70.3%) females. So females were more affected by kidney disease compared to males. It has been shown that the prevalence of CKD is higher in women than men (Habas et al., 2016). Our finding is in line with previous research revealed a high prevalence of CKD among women (Singh et al., 2013 & Stack et al., 2014). In the present study, the largest proportion with the renal disease was in the age group of (36-46) years of this study. A previous study found that there were more patients within the (40-49) age group with renal disease (Bukhatwa et al., 2019). This is suggested that the prevalence of renal disease at younger age needs more investigation. The study also found the highest proportion of patients with blood group O+ (n 29) (53.7%) followed by (n 10) (18.5%) patients in type A+. Blood type O/A has been identified as a risk factor for the progression of IgA nephropathy (IgAN). The latter is an autoimmune disease based on the findings of increased levels of both glyctose-deficient IgA1 and its antibody in patients' kidney tissue and serum. It has been found that 20-50% of patients with

IgA1 developed to end-stage renal disease (ESRD) (Yang et al., 2017). In the present study, we analyzed and summarized the results of the laboratory examination of samples from CKD patients. Hemoglobin level was significantly reduced compared to the normal range ($p < 0.05$). Iron deficiency anemia is a common complication of chronic kidney disease. This is due to the increased rate of blood loss during dialysis. The frequent phlebotomies, and the remaining blood in the dialysis tubing, contribute to the iron loss (Gafer-Gvili et al., 2019). Amplified iron losses, estimated at 1–3 g per year in hemodialysis patients, due to chronic bleeding from uremia-associated platelet dysfunction (Babitt & Lin, 2012). Furthermore, iron deficiency in patients with CKD can be a result of deficiency of erythropoietin hormone. Shortened of red blood cell survival also contributes, as demonstrated by radioisotope labeling studies (Babitt & Lin., 2012). Our study also showed the concentration of creatinine and uric acid in blood serum of patients with chronic renal failure was significantly elevated compared to the normal range ($p < 0.05$). Chronic renal failure, characterized by a progressive decline of glomerular filtration rate followed by an increased the level of creatinine and urea in serum (Kamal, 2014). Previous studies found that serum uric acid is a predictor of renal dysfunction in both non-diabetic and diabetes patients. The elevated level of serum uric acid is associated with higher risks of incident CKD, and end-stage renal disease (Gu et al., 2017). Uric acid (UA) is the final product of purine metabolism and is mainly eradicated in the urine, thus the level of uric acid will increase in kidney disease due to the impaired UA clearance (Gu et al., 2017). It has been suggested that impairment of renal function in patients with kidney disease is either due to reduction of GFR or obstruction that interferes with urinary excretion. Similarly, creatinine levels were increased due to kidney damage leading in a reduced glomerular filtration rate. Therefore, a strong association has been found between blood uric acid and serum creatinine level with a renal disorder (Kamal, 2014). It is interesting in this study the mean potassium level was in the normal range (4.59 mmol/L). It may be these patients were in the earlier stage of kidney disease as reported by the National kidney Foundation.

5. Conclusion

In conclusion, our findings showed that the prevalence of CKD was higher in females compared to males. Patients with blood type O⁺ are more likely to develop chronic kidney disease. Low level of hemoglobin but higher levels of creatinine, uric acid, and proteins were found among the patients. These parameters are widely accepted to assess the renal functions

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