

**EFFECT OF HAEMODIALYSIS ON SOME METABOLIC PRODUCTS
OF CKD PATIENTS IN LIBYA****Khaled M. D¹., A. Faiz², A. T. Abdelgader², S. Bioprabhu*³ and E. I. Elshafie⁴**¹Academy of Graduate Studies, Tripoli, Libya.²Dept. of Urology, Faculty of Medicine, Al-khoms, Libya.³Dept of Microbiology, Faculty of Medicine, Al-khoms, Libya.⁴Dept.of Parasitology, Faculty of Medicine, Al-khoms, Libya.Article Received on
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Author****S. Bioprabhu**Dept of Microbiology,
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khoms, Libya.**ABSTRACT**

Chronic kidney disease (CKD) represents lose of kidneys normal function over 1/3 for more than three months. Sometimes kidney disease leads to kidney failure, which requires dialysis or a kidney transplant to keep people alive. More often kidney function worsens over a number of years. Objective of this cross sectional study is to assess the level of different metabolic (carbohydrate, Proteins and minerals) end products of CKD of Pre-Haemodialysis and Post Haemodialysis patients at Al-khoms teaching hospital, Al-khoms, Libya. Total of 71 (42 male and 29 female) cases of CKD with Haemodialysis (HD) are included in the study. Blood samples are

collected and centrifuged to take serum. Blood sugar, Urea and Uric acid, different Proteins and different minerals are analysed from the serum of CKD patients before and after HD using latest equipments. Blood sugar and Urea concentrations of some patient show alarming level than the normal level. Uric acid level is also in highest level but not exceeded the normal value. Total Protein, Albumin and Creatinine amounts are in dangerous level (above the normal amounts) in most of the patients. But the level of Blood sugar, Urea, Uric acid and Total protein are controlled in Post HD cases. Amount of Albumin in females are more than the male. Blood sugar and albumin levels are increased with an increase of age. Minerals like Ca levels are more in Post HD cases than the Pre-HD cases. Other minerals like K, Na and P levels are decreased by HD. Calcium level in the blood is also increased with an increase of age. Blood sugar, Urea, Uric acid, Total protein, Albumin and Creatinine levels are increased significantly than the normal or show highest level reveals that the patients involved in the

study have CKD ($p < 0.05$). Male cases have more levels of Blood Urea, creatinine and Phosphorus than the female.

KEY WORDS: Haemodialysis, Metabolic products, CKD, Libya.

INTRODUCTION

Chronic kidney disease (CKD) is defined as kidney disease that has been present for months to years. Chronic renal disease (CRD), chronic renal failure (CRF), and chronic renal insufficiency refer to the same condition. CKD is not a single disease. Renal diseases in Africa are more prevalent and seem to be more severe form than in western countries. Dialysis and renal transplant are poor in Africa. In North Africa, the incidence of CKD is more than western Africa. The principal cause of CKD in Africa is due to interstitial nephritis (14-32%), glomerulonephritis (11-24%), diabetes (5-20%) and nephrosclerosis (5-25%). Obstructive or reflex nephropathy, attributed to urinary scistosomiasis is common in Egypt (7%) and Libya and southern Algeria (Barsoum, 2003).

All kidney diseases progress to terminal renal failure relatively independent of the initial disease (Remuzzi *et al.*, 2002). A primary disease leads to secondary glomerular injury and the nephron loss are clinically characterized by proteinuria and hypertension, which leads to inflammation and scarring which in turn cause renal failure and ultimately elevation in the plasma creatinine concentration and a gradual decline in GFR (Jacobson, 1991). Apparently, the excessive protein filtration, caused by the glomerular hypertension, might because of toxic effects on the kidneys and increases the rate of progression. Hyper filtration is observed in diabetic and obesity and in any conditions associated with a reduced number of nephron (Brenner *et al.*, 1996).

People with improved blood glucose, control the risk of early kidney disease was reduced. Sustained lowering of blood glucose levels will be beneficial to patients in the early stages of CKD (NKUIDC, USA, 2014). In chronic renal failure, there is a steady and continued decrease in renal clearance or glomerular filtration rate (GFR), which leads to the gathering of urea, creatinine and other chemicals in the blood. In stage five level of serum creatinine is greater than 5.0 mg/dl in men, and greater than 4.0 mg/dl in women (Couchoud *et al.*, 1999). Reduced kidney function is associated with a variety of biochemical abnormalities which includes serum concentration of sodium, potassium, calcium and phosphorus (Hsu and Chertow, 2000).

These leads to assess the level of different metabolic (carbohydrate, proteins, minerals) end products of CKD of Pre-Haemodialysis and Post Haemodialysis patients at Al-khoms teaching hospital, Al-khoms, Libya.

MATERIALS AND METHODS

The research work was conducted at Al-khoms teaching hospital, Libya between June 2014 and May 2015. Total of 71 (42 males from the age of 13 to 77 years old and 29 females from the age of 16 to 68 years old) cases of CKD with HD were included in the study. Blood samples were collected and centrifuged to take serum.

Sugar, Urea and Uric acid were analysed using Auto analyser (Beckman, USA). Sugar was analysed with Beckman Glucose analyser 2 and Urea was analysed with Beckman BUN Analyser. Total Protein and Albumin were analysed using Beckman Master 2000, Eudutium, Italy. Creatinine was analysed by Beckman coulter Creatinine Analyser 2 equipment. Calcium, Phosphorus, Potassium and Sodium were analysed using Easylyte Plus, USA.

RESULTS AND DISCUSSION

Blood Sugar, Blood Urea and Blood Uric acid level in CKD patients at before and after

HD: Blood Sugar level shows (Fig.1a) most of the patients of Male and Females are diabetic. Numbers of diabetic patients are more in Male than Females and the number of patients increasing significantly with the age of the patients. After Haemodialysis, sugar levels have come down. This might have helped the patients to relieve certain extent from diabetic effect. Highest sugar level was observed from the Male patients (average 190.83mg/dl) of ages between 61 and 80 years old and Female (average 172.14mg/dl) of ages between 21 and 40 and 61 and 80 years old. More blood sugar levels damage the Kidneys by damaging the blood vessels of kidneys, nerves of urine bladder, increase the UTI infection, increase the albumin, total protein and BUN in the urine (National Kidney foundation, New York, 2005). Mean and standard deviation (Mean \pm SD) of Blood Sugar during Pre-Haemodialysis is 132.34 \pm 70.26 higher than the Post Haemodialysis is 93.06 \pm 29.75 (Table A). Paired test t-value 5.69(70) and the p=0.001 (Table A). Significant result is observed.

Blood Urea accumulation is higher in all patients (Male and Female) of Pre-Haemodialysis (average of 100mg/dl of 41-60 years old). Accumulation of Blood urea is more in male patients than the female patients (Fig.1b). Levels of Blood Urea have drastically reduced by Haemodialysis procedure. This more Blood urea is one of the alarming signal of CKD. This

raise in Blood urea is due to diabetic problem also. Present result is also in support of Noor ul amin *et al.*, (2014). The reason for Blood Urea is may be due to more dietary protein intake, hypertension, diabetes or some age related changes.

Table A. Statistical Analysis: Paired T-test, Differentiation (df) and Significance:

Paired Samples Test

Parameters		Paired differences					t	df	Sig (2-tailed)
		Mean	Std Deviation	Std Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre_Suger Post_Suger	39.28169	58.20240	6.90735	25.50541	53.05797	5.687	70	000
Pair 2	Pre_TP Post_TP	97887	57988	06882	84162	1.11613	14.224	70	000
Pair 3	Pre_AlB Post_AlB	59296	36226	04299	50721	67870	13.792	70	000
Pair 4	Pre_Urea Post_Urea	56.21127	18.50399	2.19602	51.83145	60.59109	25.597	70	000
Pair 5	Pre_Creatinin Post_Creatinin	6.41972	1.81097	21492	5.99107	6.84837	29.870	70	000
Pair 6	Pre_Uric_acid Post_Uric_acid	1.35493	59276	07035	1.21462	1.49523	19.260	70	000
Pair 7	Pre_Ca Post_Ca	21549	17700	02101	25739	17360	- 10.259	70	000
Pair 8	Pre_Phos Post_phos	2.23944	1.49833	17782	1.88479	2.59409	12.594	70	000
Pair 9	Pre_K Post_K	2.02535	4.96265	58896	85071	3.19999	3.439	70	001
Pair 10	Pre_Na Post_Na	3.54930	2.58451	30672	2.93755	4.16104	11.572	70	000

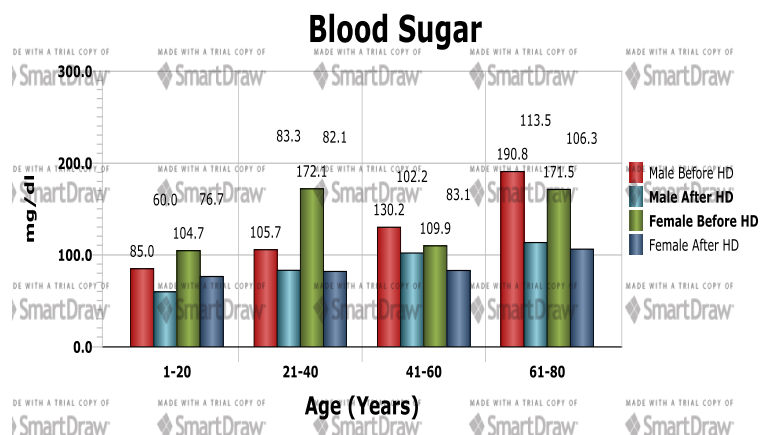


Fig. 1a: Blood sugar levels in CKD patients (Normal value-70-120mg/dl).

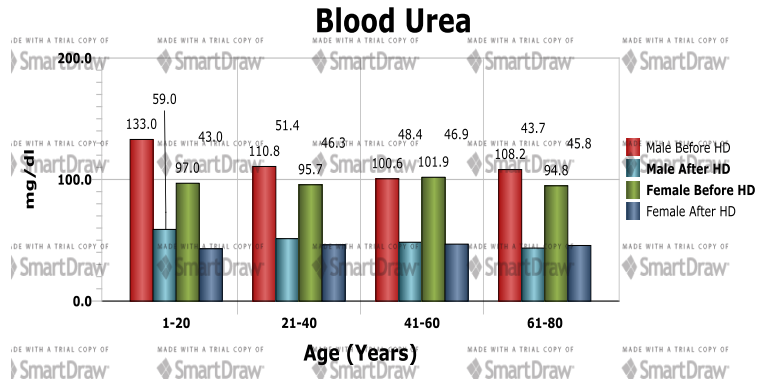


Fig. 1b: Blood Urea levels in CKD patients (Normal value-10-50mg/dl).

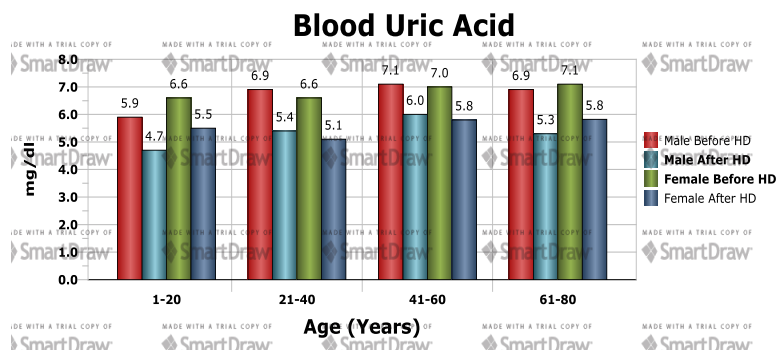


Fig.1c: Blood Uric Acid levels in CKD patients (Normal value-3-7mg/dl).

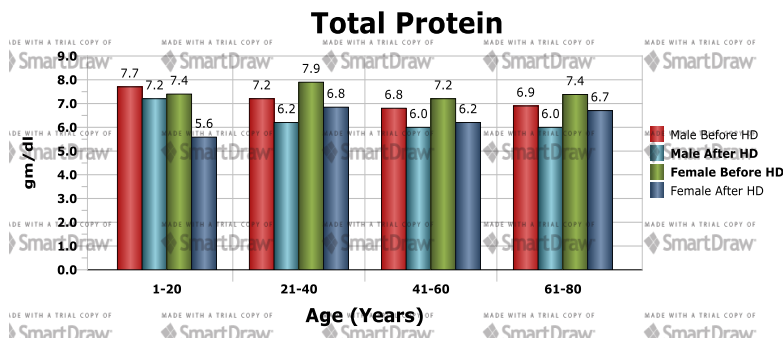


Fig.2a: Total Protein levels in CKD patients (Normal value-6.2-8mg/dl)

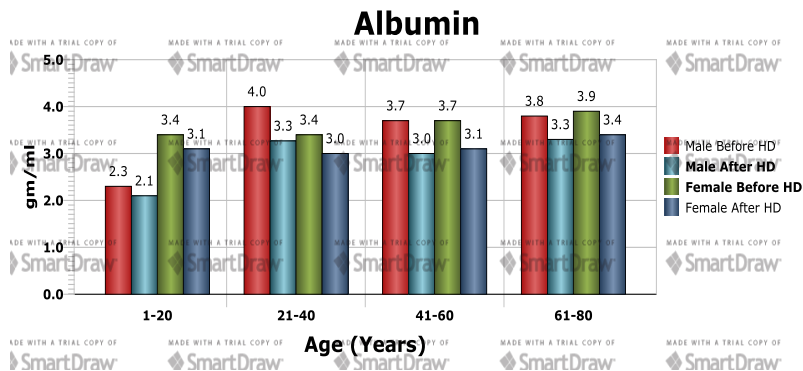


Fig.2b: Albumin levels in CKD patients (Normal value-3.4-4.8gm/dl)

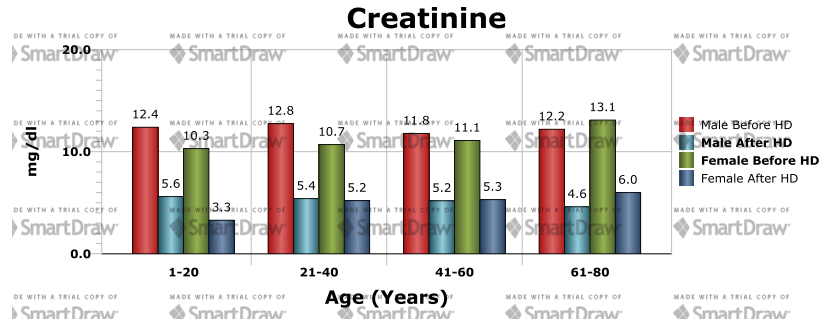


Fig. 2c: Creatinine levels in CKD patients (Normal value-0.7-1.4mgg/dl).

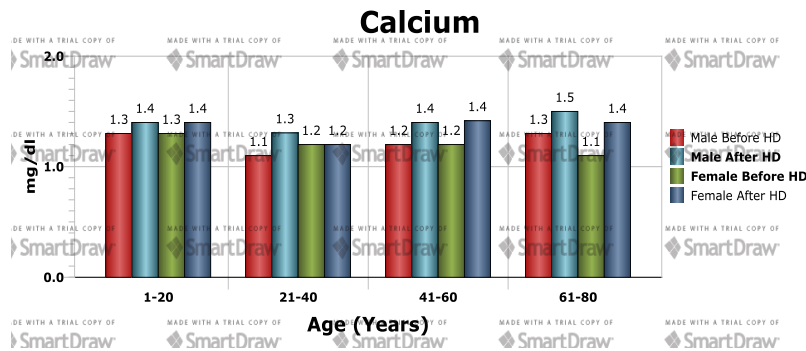


Fig.3a: Calcium levels in CKD patients (Normal value-1.6-2.5mg/dl).

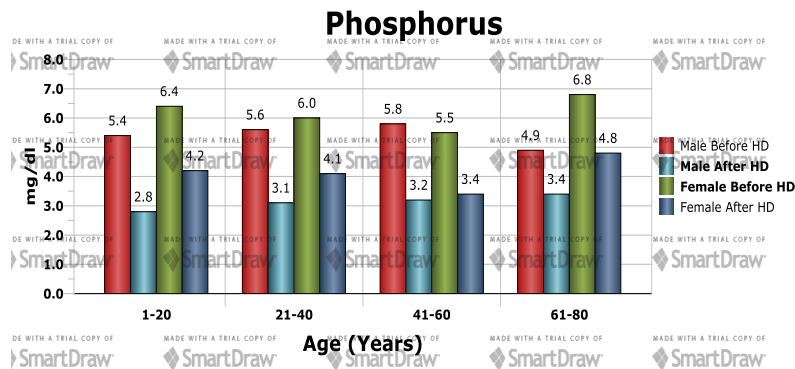


Fig.3b: Phosphorus levels in CKD patients (Normal value2.5-5.0mg/dl)

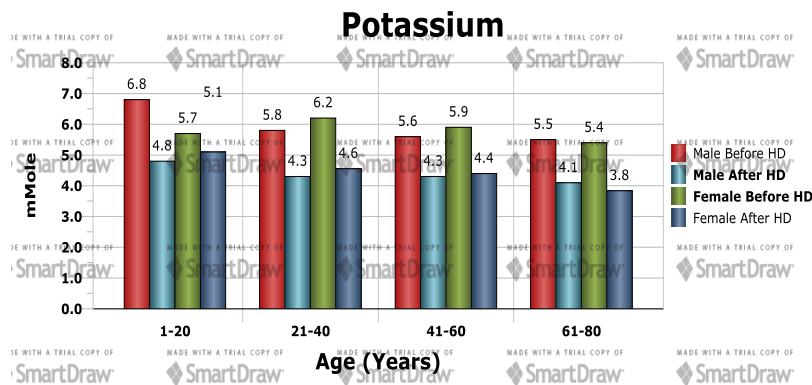


Fig.3c: Potassium levels in CKD patients (Normal value-3.5-5.3mMole).

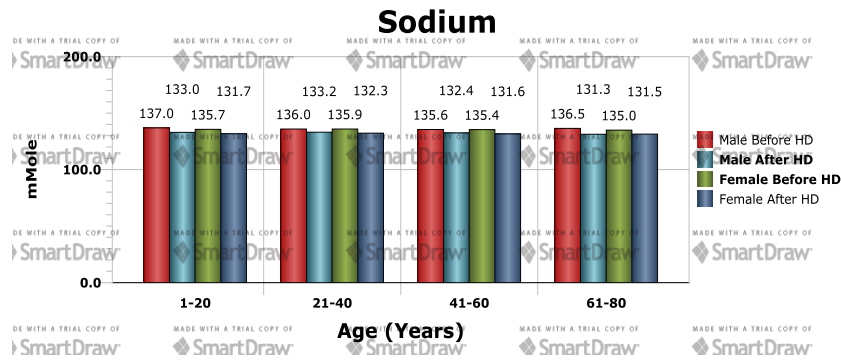


Fig.3d: Sodium levels in CKD patients (Normal value-138-145mMole).

Mean and standard deviation (Mean±SD) of Blood Urea during Pre-Haemodialysis is 103.87 ± 21.89 higher than the Post Haemodialysis is 47.66 ± 8.86 (Table A). Paired test t-value revealed a significant to (t-test=25.60, $p=0.001$) (70) and the $p=0.001$ (Table A). Significant result is observed.

Presence of Blood Uric Acid in this study is higher in both male and female patients. Post Haemodialysis data shows some reduction in the levels of Blood Uric acid (Fig.1c). Generally Uric acid accumulation in the blood is due to Nitrogenous bases degradation of CKD patients. Results of Johnson et al., (2013) also matching with the present study. Raising uric acid level can induce glomerular hypertension and renal disease as noted by the development of arteriosclerosis, glomerular injury and tubulointerstitial fibrosis. The greatest assumption was that the mechanism by which uric acid would cause kidney disease would be via the precipitation as crystals in the kidney, similar to the way it causes gout. Mean and standard deviation (Mean±SD) of Blood Uric Acid during Pre-Haemodialysis is 6.92 ± 1.25 higher than the Post Haemodialysis is 5.57 ± 1.11 (Table A). Paired test t-value 19.26 (70) and the $p=0.001$ (Table A). Significant result is observed.

Different proteins level in CKD patients at before and after HD

Total protein levels of the present experiment in male and females are equal to the normal (6.2 – 8gm/dl). In male, the concentration of total protein level is decreasing with an increase of age (Fig.2a), but in female, no such variation. There is a reduction of total protein in the patients of Post Haemodialysis. The total protein is the sum of two proteins in the blood, albumin and globulins. High total protein levels may be seen during dehydration and inflammation also. Mean and standard deviation (Mean±SD) of Total Protein during Pre-Haemodialysis is 7.15 ± 0.99 higher than the Post Haemodialysis is 6.17 ± 0.79 (Table A). Paired test t-value 14.24 (70) and the $p=0.001$ (Table A). Significant result is observed.

Albumin level of some patients in this study (Fig.2b) is lesser than the normal. This result is confirming the expectations that patients with higher serum albumin levels and better general condition reported better quality of life than patients with lower albumin levels. The difference was more significant in the scales focusing on physical domains of quality of life (Barotfi, 2005). Mean and standard deviation (Mean±SD) of Albumin during Pre-Haemodialysis is 3.71 ± 0.71 higher than the Post Haemodialysis is 3.11 ± 0.68 (Table A). Paired test t-value 13.79 (70) and the $p=0.001$ (Table A). Significant result is observed.

Creatinine levels of majority of patients of Pre-Haemodialysis is higher (maximum of 16.7 mg/dl) (Fig. 2c) than the normal value (0.7 – 1.4 mg/dl). The levels of Creatinine are even higher in Post Haemodialysis patients. This level in females show the amount is increasing with an increase of age. But in male slight variation occur in Pre-Haemodialysis patients where as gradual decrease in the concentration with an increase of age in Post haemodialysis patients. This finding is similar to the finding of Noor ul Amin et al., (2014). Removal of waste during dialysis also depends upon proper timing of dialysis, dietary habit of patients. It is generally observed that leafy green vegetables and meat might lead to increase the burden on kidneys and cause increase in blood creatinine (Kaysen et al., 2012). Mean and standard deviation (Mean±SD) of Creatinine during Pre-Haemodialysis is 11.57 ± 2.28 higher than the Post Haemodialysis is 5.15 ± 1.24 (Table A). Paired test t-value 29.87 (70) and the $p=0.001$ (Table A). Significant result is observed.

Different minerals level in CKD patients at before and after HD

Calcium (Ca) levels in the blood of both male and females of CKD of Post Haemodialysis patients are increased slightly than the Pre-Haemodialysis patients (Fig 3a). The amounts of Calcium levels (average of 1.2 mg/dl of aged 41-60 years old) are lower than the normal (1.6 – 2.5 mg/dl). This increase of calcium is due to changes in the bone retention and PTH metabolism. Mean and standard deviation (Mean±SD) of Calcium during Pre-Haemodialysis is 1.17 ± 0.18 lower than the Post Haemodialysis is 1.38 ± 0.25 (Table A). Paired test t-value is 10.26 (70) and the $p=0.001$ (Table A). Highly Significant result is observed.

Amount of Phosphorus (P) in Post Haemodialysis is again lesser than the Pre-Haemodialysis. Some patients of Pre-Haemodialysis result show that the value is higher than the normal value (Fig.3b). Mean and standard deviation (Mean±SD) of Phosphorus during Pre-Haemodialysis is 7.15 ± 0.99 higher than the Post Haemodialysis is 6.16 ± 0.79 (Table A). Paired test t-value is 14.22 (70) and the $p=0.001$ (Table A). Significant result is observed.

Potassium (K) levels of male and female patients also show highest level of normal value. There is a reduction in the level after Haemodialysis (Fig.3c). Mean and standard deviation (Mean±SD) of Potassium during Pre-Haemodialysis is 6.31 ± 4.84 higher than the Post Haemodialysis is 4.28 ± 0.78 (Table A). Paired test t-value is 3.44 (70) and the $p=0.001$ (Table A). Significant result is observed.

Sodium (Na) concentration of male and female of pre-Haemodialysis result is always higher than the post Haemodialysis (Fig.3d). Mean and standard deviation (Mean±SD) of Sodium is during Pre-Haemodialysis is 135.70 ± 0.39 higher than the Post Haemodialysis is 132.15 ± 0.44 (Table A). Paired test t-value is 11.57 (70) and the $p=0.001$ (Table A). Significant result is observed.

Potassium and sodium level are decreased with an increase of age of the patients. Whereas Phosphorus level shows slight increase in the age between 41 – 60 years old of male and 61-80 years old of female. Reduced Kidney function is associated with a variety of biochemical abnormalities such as electrolytes. This causes a reduction in sodium retention and potassium excretion through urine. Present study result is also in the confirmation of Poudel *et al.*, (2011) and Hakim and Lazarus (1988). Increase of Potassium, Sodium and Phosphorus level in Pre-Haemodialysis study cases show there is a reduction in kidneys function with mild to moderate CKD.

CONCLUSION

CKD patients of Pre-Haemodialysis have higher Blood sugar and Blood Urea, Blood Uric acid, different Protein levels and different minerals. These higher levels lead to other dangerous diseases. Haemodialysis help to decrease the above parameters in the blood may decrease the burden on Kidneys. Different parameters like Blood sugar, Urea, Uric acid, Total protein, Albumin and Creatinine levels are increased than the normal or show highest level reveals the patients involved in the study have CKD. Male cases have more levels of Blood Urea, Creatinine and Phosphorus than the female. A comprehensive health education campaign and screening of the general populace are needed in order to detect CKD early. These measures will ensure appropriate and timely institution of proven measures to halt or reduce the progression of CKD in Libya.

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