Evaluate some biochemical changes associated with chronic renal failure patients undergoing hemodialysis in al najaf al ashraf governorate.

A.L Furqan M. Auda, A.L Basim M. Ali, A.L Maha S.R, Hassan Mohammed Marhoon

Department of Chemistry, College of Science, Al-Kufa University, Iraq.

Abstract- This study was conducted in AL-Hakeem hospital in al najaf al ashraf city during the period from May 2014 to September 2014. To assess serum lipid profile ,albumin and Hb in renal failure patients on hemodailysis , it included 77 patients , 53were males and 24 were females and their age range from 21 to 65 years.

The patient was diagnosed as having renal failure for both sex based on the history, clinical examination and taking renal function test . The control groups were 50, they were collected from medical staff and relatives who were free from signs and symptoms of renal disease , lipid disorders, diabetes mellitus and hypertension . 30 were males and 20 were females, and their ages range from 22 to 66 years.

Blood samples were taken from the patients (8-12) hours after night fasting , the study shows the following results ,a significant change in most variables (TC, LDL, VLDL, TG, Hb, PCV, GOT, GPT, Urea, Uric acid& Albumin) except HDL was not significant , in addition the results appears a significant correlation between duration of CRF disease and the following variations (Uric acid and Urea) while there is no any change in the rest of parameters (TC, LDL, VLDL, TG, Hb, PCV, GOT, GPT, Albumin& HDL) in the other hand the anova analysis of statistical expose the important correspondence between number of dialysis in patients with CRF and the following items (Hb, PCV, TG, VLDL) finally the relationship among the items shows the following (Urea &Uric acid ,, PCV &Uric acid ,, PCV & Albumin ,, PCV& Hb% ,, GOT& Uric acid,, VLDL & TG ,, Hb% & TG ,, Hb% & VLDL ,, LDL & HDL), From the present study it can be concluded that Patients with chronic renal failure show abnormal haematological parameters and TG is frequently elevated in patients with CRF.

I. INTRODUCTION

Renal failure refers to a condition where the kidneys lose their normal functionality, which may be due to various factors including infections, auto immune diseases, diabetes and other endocrine disorders, cancer, and toxic chemicals. It is characterized by the reduction in the excretory and regulatory functions of the kidney[(1)], research that shows with the improvement in conservative management and dialysis, the life span of patients with chronic renal failure (CRF) has been increased. As the patient's survival has approached in the last century, there is an increasing indication that accelerated atherosclerosis may remain a major unresolved problem threatening the longevity of CRF patients[(2)], study expose the Chronic renal failure (CRF) is a permanent and major lessening in glomerular filtration rate, or chronic irreversible damage of kidney tissue[(3)]. It is characterised by a wide variety of biochemical disturbances and many clinical symptoms and signs[(4)], the normal renal function is very important for homeostasis, in addition , that situations in which renal functions are impaired can be life threatening. Diseases of the kidneys are among the most important causes of death and disability in many countries throughout the World[(5)].in the other hand the alteration includes **haematologic** abnormalities, cardiovascular problems, gastrointestinal disturbances, neurologic disorder, osteodystrophy, skin disorder and altered sexual function[(6)].the author explain the renal diseases are associated with a variety of haemopoietic changes. Anemia parallels the degree of renal impairment and its most important ause is failure of renal erythropoietin secretion. Other factors include chronic blood loss, hemolysis and bone marrow suppression by retained uremic factors[(7)], so the RBC survival is decreased in uremic patient's in proportion to the blood urea nitrogen concentration and, it improves significantly after intensive hemodialysis. Uremic plasma increases the expression of phosphatidylserine on the outer cell surface in red blood cells. This enhances the recognition of damaged red blood cells by macrophage, leading to their subsequent destruction and decreased survival[(8)].

In the other way Lipoprotein metabolism is changed in most patients with renal deficiency. **Dyslipidaemia** develops early in renal failure. The discrepancy between lipoprotein synthesis and degradation in prolonged renal disease results in a pronounced dyslipidemia[(9)], team of research were find the dyslipidemias is a very collective complication of Chronic Renal Failure (CRF). Disorders in lipoprotein metabolism are apparent even at the first stages of CRF and usually follow a downhill course that parallels the weakening in renal function. Recently published studies show that dyslipidemias in these patients may actively participate in the pathogenesis of Cardiovascular disease (CVD) as well as in the deterioration of renal function. The characteristic lipid abnormalities seen in CRF patients are elevated triglycerides, normal/reduced total cholesterol (TC), decreased High Density Lipoprotein (HDL), normal Low Density Lipoprotein (LDL). Progressive CRF not only leads to End stage renal disease (ESRD), but it is associated with high cardiovascular infection & mortality. In fact, patients with CRF are much more likely to die because of dyslipidemias than to progress to ESRD[(10)].

II. Materials and Methods

This study was conducted in AL-Hakeem hospital in al najaf al ashraf city (Iraq) during the period from May 2014 to September 2014. To assess serum lipid profile ,albumin and Hb in renal failure patients on hemodailysis , it included 77 patients , 53were males and 24 were females and their age range from 21 to 65 years.

The patient was diagnosed as having renal failure for both sex based on the history, clinical examination and taking renal function test . The control groups were 50, they were collected from medical staff and relatives who were free from signs and symptoms of renal disease , lipid disorders, diabetes mellitus and hypertension . 30 were males and 20 were females, and their ages range from 22 to 66 years.

Haematological parameters[(Packed cell volume (PCV) , Haemoglobin concentration (Hb %)] were estimated by using Beckman coulter automatic analyzer.

Exclusion criteria include diabetes mellitus, hypertension & ischemic heart disease, 5 ml of venous blood samples were collected in test tubes after an overnight fast. Subsequently collection, the samples were allowed to clot for half an hour following which the samples were centrifuged and serum was analyzed . Serum total cholesterol (TC), triglycerides (TG_s), HDL cholesterol ($HDL\text{-}_C$), LDL cholesterol, albumin, GOT, GPT, urea and uric acid , were measured colorimetrically using commercially available kits on fully auto analyzer of Clinical Biochemistry Laboratory. $VLDL_C$, ($LDL\text{-}_C$) concentration was calculated mathematically by using Friedewald's Formula[(11)] .

III. Statistical analysis

The data collated after biochemical analysis were subjected to statistical calculation using statistical software (Megastat). The mean, standard deviation of mean, F-distribution test were obtained. Critical value or test of probability less than 0.05 ($p< 0.05$) was regarded significant also we use Microsoft Excel (2010) and Minitab *v. 14* .

IV. Results

The evaluation of the data of our patients indicated that the enrolled patients were distributed according to different trends .They were distributed according to the sex (male = table 2) (female = 3) (anova gender table 8) , duration of disease (anova table 5) and no. of dialysis(anova table 7) .

The results in this study shows a significant increase in cholesterol, GPT , LDL_C conc. in patients with CRF as compared with their control groups this result shows in **table (1)** in addition the same table appears highly significant increase in level of TG, Uric acid, Urea, Albumin, $VLDL_C$ as compared with their control groups respectively, in the other hand the result in table (1) shows a highly significant decrease in level of Hb%& PCV in patients with CRF as compared with their control groups respectively .

The results in table (1,2&3) shows no significant change in level of HDL_C in patients with CRF as compared with their control groups respectively .

Table (1):revealed the biochemical parameters among control and CRF patients undergoing hemodialysis.

	Patient =77		Control =50		
parameter	mean	sd	mean	sd	P value
cholesterol mg/dl	120.42	42.87	103.12	23.24	0.0039586*
HDL (mg/dl)	39.427	18.434	43.42	11.62	0.1370823
TG (mg/dl)	130.53	57.15	103.24	21.51	0.0002458**
Uric acid	6.3565	1.5851	5.560	0.787	0.0002709**
Urea (mg/dl)	71.08	40.22	33.714	6.848	7.455E-12**
Albumin (g/dl)	4.0123	0.5632	4.326	0.439	0.0006234**
Hb	11.9566	1.5863	12.750	0.401	6.545E-05**
PCV	40.1891	5.9269	44.20	4.66	4.235E-05**
G OT (U/L)	27.75	6.15	24.30	4.51	0.0003942**
GPT (U/L)	28.23	8.03	24.20	6.70	0.0027267*
VLDL	26.106	11.431	20.648	4.302	0.0002458**
LDL	59.733	41.803	41.564	21.522	0.0016824*

The result in **table (2)** which is include 53 **male** patients and 30 **male** control group that shows a significant increase in level of cholesterol, TG, GOT, GPT, VLDL, LDL and Albumin in patients with CRF as compared with their control groups respectively, additionally a highly significant increase in Uric acid& Urea level as compared with their control groups in CRF patients correspondingly, in the same table appeared a significant decrease in Hb% & a highly significant decrease in level of PCV as compared with the standard group in patients with CRF.

Table (2):revealed the biochemical parameters among control and CRF male patients undergoing hemodialysis.

	Patient = 53		Control = 30		
parameter	mean	sd	mean	sd	P value
cholesterol mg/dl	115.42	37.38	95.70	24.98	0.005257*
HDL (mg/dl)	39.926	20.606	42.450	13.317	0.500703
TG (mg/dl)	133.68	64.88	112.57	22.31	0.0346*
Uric acid	6.8168	1.5921	5.550	0.914	1.51E-05**
Urea (mg/dl)	75.25	39.08	31.457	4.981	7.5E-11**
Albumin (g/dl)	4.0491	0.5504	4.357	0.427	0.005977*
Hb	12.0700	1.6093	12.530	0.099	0.042974*
PCV	41.4372	5.0420	46.60	3.48	4.82E-07**
G OT (U/L)	28.04	6.58	25.33	3.55	0.017243*
GPT (U/L)	29.11	9.05	24.93	6.43	0.016773*
VLDL	26.736	12.975	22.460	4.223	0.031023*
LDL	55.818	38.749	38.407	24.235	0.013888*

The result in **table (3)** which is consist of 24 **female** patients and 20 **female** control group that shows a significant increase in level of cholesterol, Urea, GOT, GPT, LDL and Albumin in patients with CRF as compared with their control groups respectively, additionally a highly significant increase in TG & VLDL level as compared with their control groups in CRF patients correspondingly, in the same table appeared a significant decrease in Hb% & PCV level as compared with the standard group in patients with CRF

Table (3):revealed the biochemical parameters among control and CRF female patients undergoing hemodialysis.

	Patient = 24		Control = 20		
parameter	mean	sd	mean	sd	P value
cholesterol mg/dl	131.46	52.24	108.90	14.22	0.052614*
HDL (mg/dl)	38.32633	12.68975	44.670	8.929	0.059327
TG (mg/dl)	123.58	34.71	89.65	13.74	0.00012**
Uric acid	5.3400	1.0024	5.380	0.675	0.875764
Urea (mg/dl)	61.88	42.00	38.30	5.86	0.011981*
Albumin (g/dl)	3.9313	0.5942	4.330	0.427	0.013429*
Hb	11.7063	1.5378	13.125	0.370	0.000175*
PCV	37.4329	6.8618	40.65	3.22	0.04887*
G OT (U/L)	27.13	5.12	23.25	5.51	0.021346*
GPT (U/L)	26.29	4.73	22.50	6.27	0.032506*
VLDL	24.717	6.941	17.930	2.748	0.00012**
LDL	68.3808	47.6053	46.300	16.086	0.041671*

Table (3) shows patient frequency for every period of duration as shown as male number , female no. & total .

Table (4): Distribution of the studied sample according to duration of CRF disease.

Duration	Period interval	Male no.	Female no.	Total no.
Duration 1	>36 month	15	3	18
Duration 2	24-35 month	11	5	16
Duration 3	13-23 month	14	5	19
Duration 4	1-12 month	13	11	24

The result in **table (5)** were done by tukey simultaneous comparison (anova one way) which is exposed no significant change in all biochemical variation in patients with CRF except highly significant increase in Urea level and then significantly increase with Uric acid concentration .

Table (5):exposed the biochemical parameters <u>according to duration</u> of CRF patients undergoing hemodialysis.

	Duration 1		Duration 2		Duration 3		Duration 4		**Anava one way**	
variation	**Mean**	**sd**	**Mean**	**sd**	**Mean**	**sd**	**Mean**	**sd**	**F**	**P value**
cholesterol mg/dl	113.4	33.5	121.7	41.4	121.4	42	124	52	**0.22**	**0.22**
HDL (mg/dl)	40.2	14.9	45.1	24	37.3	19.7	36.8	15.8	0.77	0.52
TG (mg/dl)	135.6	70.7	121.7	49.7	126.9	58.2	135.5	52.2	0.25	0.9
Uric acid	7.23	1.6	6.24	1.5	6.45	1.7	5.7	1.3	3.53	0.019*
Urea (mg/dl)	132.4	25.54	79.8	10.8	52.5	7.24	33.9	4.6	5.75	1.90E-7**
Albumin (g/dl)	3.9	0.6	3.96	0.63	4.6	0.54	4.01	0.5	0.62	0.61
Hb	11.9	1.8	12.3	1.66	11.9	1.51	11.8	1.3	0.41	0.75
PCV	41.7	6.27	37.9	6.3	40.5	6.1	40.2	5.9	1.24	0.3
G OT (U/L)	27.7	5.06	28.6	8.62	29.05	6.05	26.2	4.92	0.92	0.44
GPT (U/L)	27.8	4.18	28.75	6.95	30.4	13.19	26.5	5.03	0.88	0.46
VLDL	27.1	14.14	24.34	9.93	25.39	11.64	27.1	10.45	0.25	0.86
LDL	51.7	38.16	60.7	36.6	63.2	44.16	62.14	47.5	0.28	0.84

<u>Table (6)</u> shows patient frequency for all times number of dialysis as shown as male no. , female no. & total for any step of dialysis .

Table (6): Distribution of the studied sample <u>according to dialysis no.</u> of CRF disease.

Dialysis	**Dialysis no.**	**Male no.**	**Female no.**	**Total no.**
Step 1	>6 time	15	5	20
Step 2	4-5 time	14	4	18
Step 3	3 time	15	8	23
Step 4	1-2 time	9	7	16

The result in **<u>table (7)</u>** were completed by tukey simultaneous comparison (anova one way) which is exposed a significant increase TG& VLDL level in other wise a highly significant decrease in Hb% additionally a significant decrease PCV level in patients with CRF in the other hand no significant change in the rest of variation in CRF patients.

Table (7):exposed the biochemical parameters <u>according to dialysis no.</u> of CRF patients .

	Step 1		Step 2		Step 3		Step 4		**Anava one way**	
variation	**Mean**	**sd**	**Mean**	**sd**	**Mean**	**sd**	**Mean**	**sd**	**F**	**P value**
cholesterol mg/dl	124.6	39.2	109.7	24.81	113.5	42.8	137.44	58.63	1.52	0.22
HDL (mg/dl)	38.3	13.8	36.14	19.2	43.5	24.95	38.6	10.5	0.59	0.62
TG (mg/dl)	103.4	45.03	118.9	44.96	135.5	60.2	170.3	59.2	5.1	0.003*
Uric acid	6.99	1.4	6.013	1.32	6.2	1.86	6.15	1.6	1.5	0.22
Urea (mg/dl)	75.35	43.35	77	49.15	70.22	34	60.3	34.5	0.58	0.63
Albumin (g/dl)	4.12	0.4	4.06	0.5	3.9	0.72	3.99	0.53	0.55	0.65
Hb	9.73	0.87	11.44	0.37	12.47	0.22	13.9	0.8	8.6	9.5E-13
PCV	38.003	7.46	37.7	4.96	41.75	3.099	43.4	5.9	5.06	0.003*
G OT (U/L)	28	4.51	26.7	4.42	28	5.89	28.3	9.53	0.86	0.25

GPT (U/L)	27.45	5.3	30.8	13.38	26.9	5.82	28.25	5.25	0.87	0.46
VLDL	20.68	9	23.8	8.99	27.1	12.04	34.1	11.8	5.1	0.0029 *
LDL	66.1	42.7	51.5	32.7	56.5	40.9	65.38	52.26	0.52	0.67

Table 8 in this study exposed the simultaneous comparison between the tow genders its show no significant different in all parameters except a highly significant difference in Uric acid level and a significant difference between male and female patients with CRF .

Table (8):exposed the biochemical parameters according to gender of CRF patients undergoing hemodialysis.

	Male = 53		Female = 24		**Anava one way**	
variation	**Mean**	**sd**	**Mean**	**sd**	**F**	**P value**
cholesterol mg/dl	115.4	37.38	131.5	52.24	2.36	0.13
HDL (mg/dl)	39.93	20.6	38.33	12.69	0.12	0.7
TG (mg/dl)	133.68	64.88	123.58	34.7	0.51	0.48
Uric acid	6.82	1.59	5.34	1.002	17.4	0.000079**
Urea (mg/dl)	75.25	39.08	61.875	42.003	1.85	0.18
Albumin (g/dl)	4.05	0.55	3.93	0.59	0.72	0.399
Hb	12.07	1.61	11.71	1.5	0.87	0.355
PCV	41.44	5.042	37.43	6.86	8.26	0.0053*
G OT (U/L)	28.04	6.58	27.125	5.12	0.36	0.55
GPT (U/L)	29.1	9.05	26.29	4.73	2.066	0.155
VLDL	26.74	12.98	24.7	6.9	0.5	0.48
LDL	55.82	38.75	68.38	47.61	1.5	0.22

The results in **table 9** appears the relationship among all parameters which is implicate in this study , the statistical analysis shows a positive correlation between the following ((Urea &Uric acid ,, PCV &Uric acid ,, PCV & Albumin ,, PCV& Hb% ,, GOT& Uric acid ,, VLDL & TG ,,)) in the same way a negative relation between these items((Hb% & TG ,, Hb% & VLDL ,, LDL & HDL)) in the other hand there is no relationship between the rest parameter .

Table (9) shows the correlation among biochemical parameters in CRF patients undergoing hemodialysis.

r / **P-value**	cholesterol	HDL (mg/dl)	TG (mg/dl)	Uric acid	Urea (mg/dl)	Albumin (g/dl)	Hb	PCV	G OT (U/L)	GPT (U/L)	VLDL
HDL (mg/dl)	0.079-										
	0.493										
TG (mg/dl)	0.151	0.191									
	0.19	0.096									
Uric acid	-0.008	0.145	-0.030								
	0.944	0.208	0.798								

Urea (mg/dl)	-0.141	0.127	0.005	0.305							
	0.220	0.270	0.963	0.007*							
Albumin (g/dl)	0.150	0.126	-0.117	0.181	-0.094						
	0.192	0.275	0.310	0.116	0.415						
Hb	-0.101	-0.005	-0.454	0.107	0.159	0.006					
	0.384	0.967	0.000*	0.353	0.166	0.958					
PCV	0.046	0.062	-0.093	0.303	0.085	0.323	0.396				
	0.688	0.590	0.422	0.007*	0.463	0.004*	0.000*				
G OT (U/L)	-0.077	0.025	0.034	0.248	0.082	-0.081	-0.003	0.139			
	0.503	0.831	0.770	0.030*	0.480	0.484	0.976	0.227			
GPT (U/L)	-0.055	-0.155	-0.069	0.007	0.006	0.128	-0.011	0.031	0.064		
	0.636	0.180	0.550	0.953	0.957	0.269	0.927	0.791	0.581		
VLDL	0.151	0.191	1.000	-0.030	0.005	-0.117	-0.454	-0.093	0.034	-0.069	
	0.190	0.096	*	0.798	0.963	0.310	0.000*	0.422	0.770	0.550	
LDL	0.904	-0.362	-0.072	-0.054	-0.149	0.092	-0.014	-0.017	-0.103	-0.001	-0.072
	0.000	0.001*	0.531	0.640	0.197	0.426	0.901	0.881	0.371	0.993	0.531

V. Discussion

The biochemical parameters in 77 chronic renal failure patients compared with 50 age and sex matched controls. In the current study , it has been observed that the PCV & Hb% level are decreased as shown as in ***Table 1*** in chronic renal failures. This result is agree with (Suresh M. et al) who are described that a most important cause of decrease PCV & Hb% level in chronic renal failure is reduced erythropoietin production and other factors which destroy marrow erythropoiesis and shortened red cell life[7], *(Michael & Glader 2004)*were explained that RBC survival is decreased in uremic patient's in ratio to the blood urea concentration and, it expands significantly after severe hemodialysis. Uremic plasma increases the appearance of phosphatidylserine on the outer cell surface in red blood cells. This enhances the recognition of smashed red blood cells by macrophage, leading to their subsequent damage and diminished survival. This study is agreed with our current results as in ***table 1*** significant decrease in level of Hb & PCV in addition the current statistical analysis in ***table 7*** which is shown highly significant difference in Hb level and than a significant change in percent of PCV so these results are describe whensoever increase hemodialysis the level of Hb & PCV are decrease[8], The hemoglobin concentration and hematocrit generally provide an accurate reflection of the extent to which the circulating red cell mass is reduced. In chronic renal disease because of impaired erythropoietin secretion, increased destruction of red blood cells, leads to a fall in red blood cell count, which reduces the hemoglobin concentration and hematocrit. A decrease in hematocrit is apparent even among patients with mild to moderate renal insufficiency[12], *Aigner et al(2000)*. were reported that anemia of chronic illness traditionally encompassed any inflammatory, infectious, or malignant disease of a long-standing nature. The modern definition includes ***chronic renal failure***, rheumatoid arthritis, severe trauma, heart disease, and diabetes mellitus. In these conditions, there is primarily a decreased availability of iron, relatively decreased levels of erythropoietin, and a mild decrease in the lifespan of RBCs to 70-80 days (normally 120 days)[13], all these investigates which are written by Aigner et al & Emmanuel et al are approved with our current study.

Chronic renal failure mainly affects the metabolism of (HDL) and (TG)-rich lipoproteins[14], the CRF is associated with premature atherosclerosis and increased incidence of cardiovascular morbidity and mortality. Several factors contribute to atherogenesis and cardiovascular disease in patients with CRF, the notably among all is dyslipidemias The characteristic dyslipidemias observed in CRF patients hemodialysis in this study are shown in ***table 1,2,3,7*** which were also reported by Dr. Dipika(2013), who is also demonstrates that

in CRF patients treated by intermittent dialysis, long-term hemodialysis fails to correct dyslipidemias generated by CRF. This study is closed agreement with our results[10]. Our current study is differs from those of some authors who found that lipid and lipoprotein compositions did not appear to be influenced by dialysis in CRF patients[15][16], the statistical appears the comparison for the lipid profile levels between male and female patients. Both male and female patients were equally affected by dyslipidemias of CRF as shown as in ***tables 1,2,3,8***. Amin *et al* (2006) also described identically[17], so Nzere et al (2012) said that reduced catabolism of lipoprotein rich in TG is an early fundamental disturbance of lipoprotein metabolism in renal. In this study it was observed that TG rich lipoprotein (VLDL and LDL-C) and TG itself were significantly higher ($p<0.05$) in CRF in both males and females. This suggested that renal disease (CRF) affects the metabolism of TG, VLDL-C and LDL-C, and this predisposes the patient to cardiovascular disease[9]. The results of our study is the same which is appear in ***tables 1,2,3,8***

VI. Conclusion

From the present study it can be concluded that Patients with chronic renal failure show abnormal haematological parameters. It has been proposed that in chronic renal failure so hematuria and gastrointestinal blood loss may play a role in decrease red blood cell count, haemoglobin% and hematocrit.

TG is frequently elevated in patients with CRF. This Elevation is accompanied by increased plasma conc. and reduced clearance of VLDL, total cholesterol and LDL-c conc. are frequently elevated because heavy proteinuria alone or in combination with chronic renal insufficiency.

VII. Recommendations

- The modifications in routine can have a progressive effect on raising HDL levels, further Prospective study with along follow up is recommended.
- Exercise for the prevention of some dangerous diseases as CRF & CHD
- Diets to suit the need of the body within the age group for each person

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Authors

First Author – A.L Furqan M. Auda, Department of Chemistry, College of Science, Al-Kufa University, Iraq.
Second Author – A.L Basim M. Ali, Department of Chemistry, College of Science, Al-Kufa University, Iraq.
Third Author – A.L Maha S.R, Department of Chemistry, College of Science, Al-Kufa University, Iraq.
Fourth Author - Hassan Mohammed Marhoon, Department of Chemistry, College of Science, Al-Kufa University, Iraq.

Correspondence Author – A.L Furqan M. Auda College of Sciences, Al-Kufa University, Iraq. E-mail: furqan.chmala@uokufa.edu.iq