ISSN NO. 2320-5407

Journal homepage: http://www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH

RESEARCH ARTICLE

Lipid profiles and kidney function in chronic renal failure Iraqi patient pre peritoneal dialysis or hemodialysis

Sahar A. H. AL-Sharqi, Enas W. SH. AL-Najar and Samal H. K. AL-Jaff
Dept. of Biology, College of Science, Al-Mustansiriyah University, Baghdad, Iraq

Manuscript Info

Manuscript History:

Received: 18 September 2015
Final Accepted: 22 October 2015
Published Online: November 2015

Key words:

chronic renal failure, lipid profiles, density lipoprotein cholesterol.

Corresponding Author

Sahar A. H. AL-Sharqi

Abstract

Chronic renal failure (CRF), also known as kidney failure or renal insufficiency, is a medical condition in which the kidneys fail to adequately filter waste products from the blood. Renal function is an indication of the state of the kidney and its role in physiology, and the glomerular filtration rate (GFR) describes the flow rate of filtered fluid through the kidney. The study included 50 blood samples collected from Iraqi patients with renal failure in Alkindy hospital from dialysis section and 50 blood samples from healthy persons as a control group. The results showed that, increased levels of uric acid ,creatinine and urea in the serum of patients with 9.32±1.50mg/dl ,7.51±3.20 mg/dl and 188.25±73.36 mg/dl respectively at ($p \leq 0.05$) in compare with the control 5.46±0.18 mg/dl ,0.87±0.44mg/dl and 29.37±5.62mg/dl respectively, as well as increased levels of serum cholesterol , triglyceride and LDL-C in patients 222.60±14.57mg/dl, 148.20±4.43mg/dl and 139.60±6.26mg/dl respectively at ($p \leq 0.05$) in compare with the control 165.20±4.43mg/dl, 108.60±11.48mg/dl and 108.00±15.28mg/dl respectively while the mean of HDL-C (39.40 ± 5.41 mg/dl) was decreased ($p < 0.05$) when compared with control (51.40 ± 3.64 mg/dl).

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 (Sathiyanarayanan *et al*., 2013 ; Rao *et al*., 2010). In chronic renal failure (CRF), kidney function deteriorates gradually and the associated problems accumulate over years. This condition generally cannot be reversed; its progression can only be slowed and symptoms of end-stage renal failure eventually develop (Vaziri and Norris, 2011). It shares some common risk factors, such as hypertension and diabetes, with cardiovascular diseases (Zhang *et al*., 2014).

Abnormalities in the lipid metabolism are found to be most common among end stage renal failure patients (Nagane and Jayshree, 2011). Among the lipid profile, triglycerides and high cholesterol plays a major role in occurrence of cardiovascular disease (Sandesh and Tilak, 2015 and Chen *et al*., 2013). High level of above mentioned components affects the blood circulating pool by forming fat plaque deposition on major blood vessels (Kumar *et al*., 2014).

Our study has been designed to evaluate the levels of lipid profile and kidney function in serum of CRF patients and compared with that of healthy control.

Materials and Methods

All samples collected from Al-kindy hospital during the period from November 2014 to February 2015.A questionnaire sheet was filled out for each subjects in the study included (name, age, suffered any chronic diseases

such as diabetic and hypertension, drink alcohol, smoke, taking any drag, allergy and history of family with chronic renal failure).

1- Study samples

The study included 50 patients with age range 52.50 ±14.96 year and 50 control subjects with ages range 53.94±17.72 year.

2- Blood Samples

From each patient and control, 5 ml of venous blood was drawn from a suitable vein. Blood was allowed to clot and serum was separated after centrifuging the samples at 1000 rpm for 5 minutes at room temperature and dispensed into sterile tightly closed eppendorf tubes and stored at -20°C until assayed. Biochemical parameters like urea, creatinine, uric acid and lipid parameters (cholesterol, triglycerides and HDL-C) were also analyses. All the parameters were estimated using commercially available kits on BIOLABO. Serum LDL-C was indirectly calculated:

LDL Cholesterol (mg/dl) = Total Cholesterol - HDL Cholesterol - Triglyceride /5.

3- Statistical analysis

All analyses were conducted using the statistical software SPSS version 22. The P value of differences < 0.05 were considered significant. Data were expressed as mean ± standard deviation (M ± SD) for each parameter examined.

Results

In Table 1(Figure 1,2), the mean values of uric acid (9.32±1.50 mg/dl), creatinine (7.51±3.20 mg/dl) and urea (188.25±73.36 mg/dl) in CRF patients were found to be significantly increased ($p < 0.05$) as compared to controls (5.46±0.18, 0.87±0.44 and 29.37±5.62 respectively). Table 2 (Figure 3) shows the mean of cholesterol (222.60±14.57mg/dl), triglyceride (148.20±4.43mg/dl) and LDL-C (139.60 ± 6.26 mg/dl) were significantly increased ($p < 0.05$) when compared with that of controls (165.20±4.43mg/dl, 108.60±11.48 mg/dl and 108.00 ± 15.28mg/dl) respectively. Similarly, the mean of HDL-C (39.40 ± 5.41 mg/dl) was significantly decreased ($p< 0.05$) when compared with control (51.40 ± 3.64 mg/dl).

Table.1: Serum uric acid, creatinine and urea in renal failure Patients and Control group.

Parameters	Mean ± SD		p-value
	Control (n = 50)	CRF (n = 50)	
Uric acid (mg/dl)	5.46±0.18	9.32±1.50	0.006
Creatinine (mg/dl)	0.87±0.44	7.51±3.20	0.012
Urea (mg/dl)	29.37±5.62	188.25±73.36	0.001

n= number of patients, Values are expressed as Mean ± Standard Deviation.

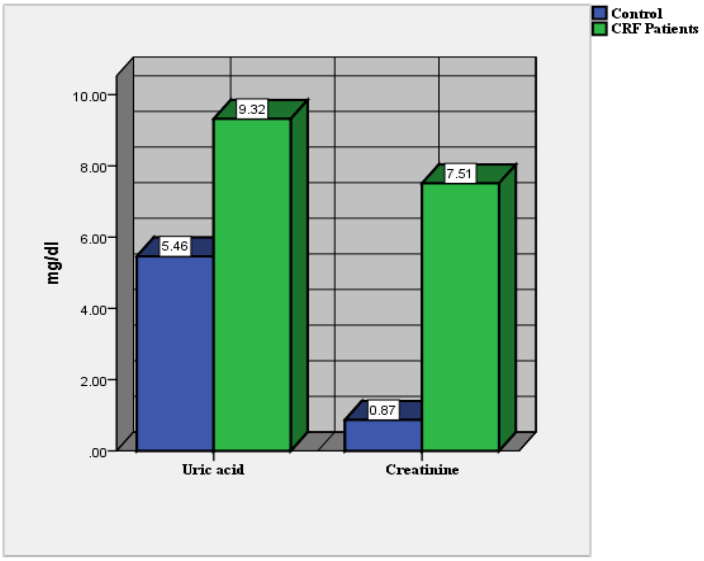

Figure .1: Level of Uric acid and Creatinine in CRF patients and control

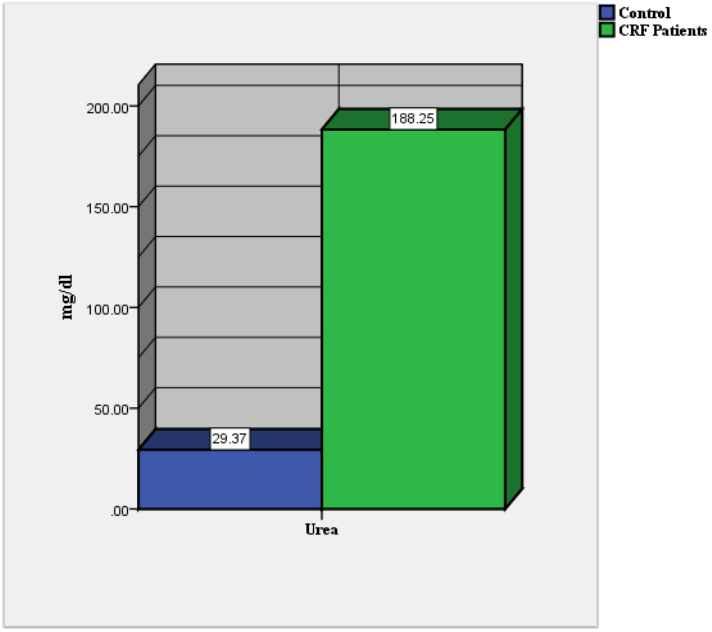

Figure.2: Level of Urea in CRF patients and control

Table.2: Lipid Profile and other lipid parameters in renal failure patients and controls

Parameters	Mean ± SD		p-value
	Control (n = 50)	CRF (n = 50)	
Cholesterol (mg/dl)	165.20±4.43	222.60±14.57	0.001
Triglycerides (mg/dl)	108.60±11.48	148.20±4.43	0.005
HDL -C (mg/dl)	51.40 ± 3.64	39.40 ± 5.41	0.018
LDL –C (mg/dl)	108.00 ± 15.28	139.60 ± 6.26	0.024

n= number of patients, Values are expressed as Mean ± Standard Deviation.

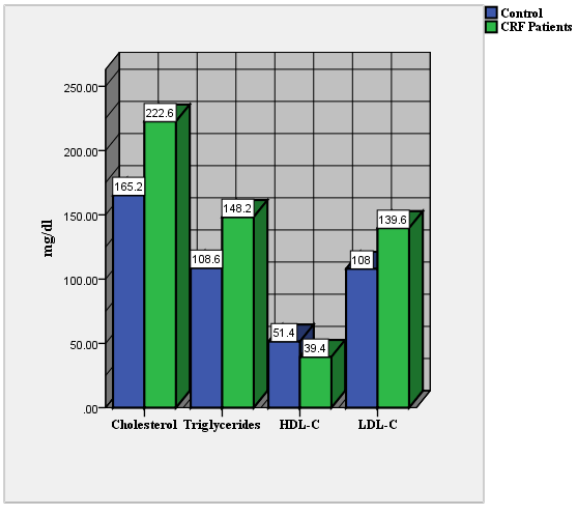

Figure.3: Level of cholesterol,Triglycerides,HDL-C and LDL-C in CRF patients and control

Discussion

Serum uric acid can correlate with decreasing renal function. Recent epidemiologic studies suggest that uric acid predicts the development of new-onset kidney disease and elevated levels of uric acid independently increase the risk for new-onset kidney disease. It can also serve as a cause of decreased renal function, so the rise of serum uric acid levels in patients due to chrionic kidney disease therefore; CRF may be more likely a cause of hyperuricemia (Lamb *et al*., 2005; Rudolf *et al*., 2008).

Accurate estimation of kidney function is central to the detection, evaluation, and treatment of CRF disease. Glomerular filtration rate (GFR) is widely accepted as the best overall measure of kidney function. Serum creatinine concentration is widely used as an index of renal function so a higher serum creatinine and urea concentration associated with a lower GFR or due to reduced GFR (Ul Amin *et al*., 2014).The GFR is the product of the filtration rate in single nephrons and the number of nephrons in both kidneys. Reductions in GFR can be caused by either a decline in nephron number (as in CRF) or by a decline in single nephron GFR (Lesley *et al*., 2005). Thus, the rising level in creatinine in the blood stream indicates a decline in the kidney's capacity to filter blood (Guyton and Hall, 2000). In chronic renal failure there is a steady and continued decrease in renal clearance or GFR, which leads to the gathering of urea, creatinine and other chemicals in the blood.

The decline in Lipoprotein Lipase enzyme activity leads to increased triglyceride levels, it is the enzyme responsible for triglycerides in the blood and the demolition of this leads to a delay in the removal of triglyceride and thus high lipoprotein LDL-C and low HDL-C level (Trevisan *et al*., 2006; Padalkar *et al*., 2012). In the present study increase triglyceride levels may be due to an imbalance in the activity of lipoprotein lipase. Mannangi and Jayasree, (2014) and Balode and Khan (2013) found that significantly increase in levels of triglyceride and LDL-C due to abnormalities of lipoproteins. The results of present study accentual the presence of significant lipoprotein abnormalities in CRF as compared to control group.

In addition HDL-C levels were low in CRF as compared to control may be due to the declining activity of Lecithin Cholesterol Acyl Transferase; the enzyme responsible for the esterification of free cholesterol in HDL-C particles and increased activity of Cholesteryl Ester Transfer Protein (CETP) that facilitates the transfer of cholesterol esters from HDL to triglyceride-rich lipoproteins (Vaziri et al.,2001; Raju *et al*.,2013). HDL-C was similarly found to be low in CRF patients by Maheshwari *et al*. (2010) and Chijioke *et al*. (2012). Baria *et al*. (2013) also reported significantly low HDL-C level in their study.

Conclusions

We conclusion, our study in patients of CRF showed dyslipidemia, higher total cholesterol, Triglyceride, LDL-C, and lower HDL-C were independently associated with CRF. Consistent with the experimental model, dyslipidemia in humans might be associated with development and progression of renal dysfunction. Our results indicate that patients undergoing CRF show important abnormalities of lipid metabolism which could contribute to atherosclerosis and cardiovascular disease and may increase the morbidity and mortality in this patients.

References

1. Balode,A.A. and Khan,Z.H.(2013). Serum Lipid Profile in Chronic Kidney Disease Patients on Haemodialysis. Indian Journal of Applied Research,Volume 3,Issue 8:20-22.
2. Baria,D., Varsha, J., Tejas, S., Kapil, G., Nikunj, M.(2013). Impact of Hemodialysis on Lipid Profile among Chronic Renal Failure Patients - A Case Control Study. International Journal of Scientific and Research Publications, Volume 3, Issue 7:1-3.
3. Chen,Szu-Chia, Chi-Chih Hung, Mei-Chuan Kuo, Jia-Jung Lee, Yi-Wen Chiu, Jer-Ming Chang, Shang-Jyh Hwang and Hung-Chun Chen (2013). Association of Dyslipidemia with Renal Outcomes in Chronic Kidney Disease. PLoS ONE 8(2):e55643.
4. Chijioke, N.N.,Bartimaeus, E.A.S. and Okeke, C.U.(2012). Lipid Profile in Chronic Renal Failure Patients on Dialysis. European Journal of Cardiovascular Medicine, Vol. II ,Issue II:106-109.
5. Guyton A., Hall J.E. (2000). Textbook of medical physiology ,10th ed., Philadelphia W.B. Saunders, pp: 369–378.
6. Kumar,R.A., Baskaran, Appandraj and Ushaskehar(2014). Gender Variations among Lipids Levels in Chronic Renal Failure Patients who are on Renal Dialysis. Int. J. Pure App. Biosci. 2 (3): 327-330.
7. Lamb, E.J., Tomson, C.R., Roderick, P.J. (2005).Clinical Sciences Reviews Committee of the Association for Clinical Biochemistry. Estimating kidney function in adults using formulae. Ann Clin Biochem ,42: 321-45.

8. Lesley,A., Stevens, M.D., FRCPC, Andrew, S. Levey, M.D.(2005). Measurement of Kidney Function, Division of Nephrology, Tufts University School of Medicine, Med. Clin. N. Am.s 89:457–473.
9. Maheshwari,N., Muhammad R. A., Muhammad, S. L., Darshana, K. L., Kamran, A.(2010).Pattern of lipid profile in patients on maintenance hemodialysis. Saudi J Kidney Dis Transpl ,21(3):565-70.
10. Mannangi,N. and Jayasree,S.(2014). Lipoprotein(a) & Lipid profile in Chronic kidney disease. Case control study. Biochemistry,5(2):WMC004568.
11. Nagane,N.S. and Jayshree, V. G.(2011). Lipid Profile and Serum Paraoxonase1 Activity in CRF Patients Pre and Posthemodialysis. Al Ameen J. Med.Sci.,4(1):61-68.
12. Padalkar,R.K., Ashok V. Shinde, Sangita, M. Patil (2012). Lipid profile, serum malondialdehyde, superoxide dismutase in chronic kidney diseases and Type 2 diabetes mellitus. Biomedical Research , 23 (2): 207-210.
13. Raju,D.S. Lalitha,D.L. and Kiranmayi,P.(2013). A Study of Lipid Profile and Lipid Peroxidation in Chronic Kidney Disease with Special Reference to Hemodialysis. J Clinic Res Bioeth, 4(1): 1000143.
14. Rao, A.M., Bitla, A.R., Reddy, E.P., Sivakumar,V. and Srinivasa R.(2010).Lipid abnormalities lipoprotein (a) and apoprotein pattern in non-dialyzed patients with chronic kidney disease. Indian Journal of Clinical Biochemistry, 25 (1): 47-50.
15. Rudolf, P. O., Christian T .,Georg, G.,Maarten,k. Rainer,B. and Renate, Klauser-Braun(2008). Elevated Uric Acid Increases the Risk for Kidney Disease. J.A.S.N., 19: 2251-2253.
16. Sandesh,T. and Tilak,M.A.(2015). Lipid Profile in Chronic Renal Failure Patients - Pre and Post Hemodialysis. International Journal for Pharmaceutical Research Scholars, 4(1):236-241.
17. Sathiyanarayanan,S., Shankar, M. P. and Prabhakar, R. E. (2013). Serum lipid profile in Chronic Renal Failure and haemodialysis patients. Volume 1, Issue 3:36-41.
18. Trevisan,R., Alessandro R. Dodesini, and Giuseppe L.(2006). Lipids and Renal Disease.J Am Soc Nephrol 17:S145–S147.
19. Ul Amin,N., Raja, T. M. ,Javaid, A., Mudassar, Z. and Asad, M.R.(2014). A prospective study evaluating urea and creatinine levels in chronic renal failure pre and post dialysis: Journal of cardiovascular disease,Vol.2 No.2 : 2330-4596.
20. Vaziri ,N.D. and Norris,K.(2011). Lipid Disorders and Their Relevance to Outcomes in Chronic Kidney Disease. Blood Purif , 31:189–196.
21. Vaziri,N.D., Aziri,K.L. and John, S. P.(2001). Down-regulation of hepatic lecithin:cholesterol acyltransferase gene expression in chronic renal failure. Kidney International, Vol. 59, pp: 2192–2196.
22. Zhang,L., Zhiyong Y., Wu Chen, Shanying Chen, Xinyu Liu, Yan Liang, Xiaofei Shao and Hequn Zou(2014). Serum Lipid Profiles, Lipid Ratios and Chronic Kidney Disease in a Chinese Population. Int. J. Environ. Res. Public Health , 11: 7622-7635.