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DYSLIPIDEMIA AS A RISK FACTOR FOR RENAL CHRONIC FAILURE PATIENTS.

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ABSTRACT

Patients with chronic renal failure present disorder in the level of lipoproteins which leads to increase risk of atherosclerosis. The objective of this study is to assess the risk of cardiovascular diseases in patients with chronic renal failure treated with dialysis, by performing a lipid profile measurement as: level of total cholesterol TC, triglycerides TG, "good" cholesterol HDL-ch, "bad" cholesterol LDL-ch, very low density lipoproteins VLDL and determining the risk factor based on the ratio of TC/HDL-ch and LDL-ch/HDL-ch. The sample consists in 45 patients treated with hemodialyses and 45 healthy subjects used as control group. The examination was performed in the biochemical laboratory of Elbasan hospital center for a spontaneous routine control of lipid profile. Blood samples for laboratory analyses were drawn after 12 hours of overnight fasting, and before the dialysis session for HD patients. Hemodialyses patients presented sinjificative ($p< 0.05$) differences with the results of lipid profile compared with control group. The results showed differences in the TG, LDL-ch and HDL-ch levels. Results were compared and was seen that hemodialyses group was characterized from high levels of triglycerides and low levels of HDL–ch. We conclude that, dyslipidemia which increases the risk of CVD by increasing atherogenezis, progresses over time in dialysis patients. The presence of two or more risk factor as: diabetes, smoking, contributes to the worsening of lipid profile.

Keywords: Lipid Profile, Hemo-Dialyses, Hypertriglyceridemia, Chronic Renal Failure, Risk Factor Ratio.

INTRODUCTION

Dyslipidemia is a primary risk factor for cardiovascular disease (CVD) and a common complication of progressive kidney disease. The disorder in lipid metabolism in dialysis patients is more of a dyslipidemia rather than a hyperlipidemia (Coresh J. et al., 1998; Fried LF. et al., 2001). Triglycerides levels are increased whereas HDL cholesterol levels are decreased. Most patients with chronic kidney disease have an abnormal lipid panel that increases their risk for atherogenesis. Dyslipidemia (Crook ED. et al., 2003) contributes to cardiovascular mortality, which is 10 to 20 times higher in dialysis patients (HD) than in the normal population. Lipid profiles vary widely in these patients, reflecting the level of kidney function and the degree of proteinuria (Foley RN. et al., 1998; Prinsen et al., 2003). In general, the prevalence of hyperlipidemia increases as renal function declines, with the degree of hypertriglyceridemia and elevation of LDL cholesterol being proportional to the severity of renal impairment (Rahman M. et al., 2014). Several factors contribute to the development dyslipidemia associated with chronic renal impairment. Patients with chronic kidney disease (CKD) have a higher burden of dyslipidemia in comparison to the general population and are at increased risk for cardiovascular morbidity and mortality (Degoulet P. et al., 1982; Lowrie et al., 1990). Patients with chronic kidney disease also have an elevated ratio of low-density lipoprotein (LDL) cholesterol to high-density lipoprotein (HDL) cholesterol. LDL cholesterol, including lipoprotein (a) are pro-atherogenic, and levels are slightly elevated in patients with chronic kidney disease (Rahman M. et al., 2014). HDL cholesterol levels are decreased, indicating loss of anti-atherogenic effect.

High cholesterol levels have been linked to heart disease and stroke. For people without chronic kidney disease (Kilpatrick et al., 2007), risk factors for heart disease include: high total cholesterol, high LDL cholesterol, high triglycerides, low HDL cholesterol, high blood pressure, smoking, physical inactivity, obesity, diabetes, family history. Some of these risk factors, including smoking and blood pressure, can be controlled with lifestyle changes (quit smoking, monitor our blood pressure, eat right, exercise, etc.) or medicines, while the other factors, such as age or family history, are out of our control.

In fact many risk factors for CVD are more prevalent among individuals with chronic kidney diseases (CKD) than those with normal renal function. Numerous factors contribute to atherogenic diathesis and the high risk of cardiovascular disease in CKD (Go As. et al., 2004; Liu Y et al., 2004).

Some risk factors for people without chronic kidney disease do not always apply to people with chronic kidney disease. Different researches (Joles JA. et al., 2000; Kilpatrick et al., 2007) has shown that dialysis patients who have higher cholesterol actually have fewer hospitalizations and live longer than those with lower cholesterol. Severely malnourished people often have very low cholesterol levels, but are still at increased risk for illness and death (Iseki K., 2002). It is helpful to know the cholesterol level, especially when you have chronic kidney disease (K.Doqi., 2003; Kasike BL 1998; Schaffner ES. et al., 2003). Identification of these patients and intervention via lifestyle or pharmacologic therapy is an initial clinical approach.

Replacing saturated fats with monounsaturated fats and eating a healthy diet may go a long way to improving cardiovascular health (Stefanovic V. and Milojkovic M. 2004). Also, maintaining a healthy weight and getting regular aerobic

exercise as approved by our physician offers additional health benefits.

MATERIALS AND METHODS

For the estimation of lipid profile were taken in the examination 90 subjects where: 45 (thirty five males and ten females) patients with chronic renal failure treated in dialysis department of Elbasan hospital center and 45 (35 males and 10 females) healthy subjects that were used as control. The criteria of selection for control subjects was that no one should take any lipidlowering medicines. A standard questionnaire was used to take information about the age, smoking, alcohol, diabetes, family history for dyslipidemia, the use of lipid lowering medication. 6.7% had the smoking habit, 4% suffer of diabetes disease.We used the recently published recommendations of the Medical Experts Group concerning cardiovascular risk factors for the categorization of dyslipidemic factors. These were total cholesterol-overline >200 mg/dL, LDL cholesterol-overline >100 mg/dL, HDL cholesterol < 40 mg/dL, and triglycerides >180 mg/dL.

Collection of a blood sample and estimation of lipid profile:

Fasting blood samples were collected in the morning between 8 a.m. and 9 a.m (after 12 hours fast), for a period of a month by venipuncture of antecubital vein with all aseptic precautions, using a disposable syringe under sterile conditions. Serum was separated by centrifugation at 3000 rpm for 5minutes. Fresh serum was used for estimation of TC, TG and HDL-c by enzymatic endpoint method in a photometer, or automatized aparatus. The tests were carried out in a "SLIM" photometer. LDL-c was calculated by using Friedewald's formula. Lipid abnormality was based on the expert panel of the National Cholesterol Education Programme (NCEP). Further, atherogenic indices like, Castelli's Risk Index-I (CRI-I) =TC/HDL-c, Castelli's Risk Index-II (CRI-II) = LDL-c/HDL-c, are calculated.

RESULTS

Sample was divided in four groups: healthy males and females and HD males and females. In table 1 are presented the levels of lipid profile for males from both groups. The mean value and the standard deviation is calculated for every result, the SPSS 21 program was used to compare the groups and X^2 test was used to see the significance between variables.

Table 1: Table shows the means and dev.st for TC, TG, HDL, LDL,VLDL and risk ratios for male subjects.

Lipid profile mg/dl	Ch.renal failure males	Healthy males	P value
Total cholesterol*	184±26.3	175±21.2	P=0.062
Triglicerides	249±22.1	105±18.7	P< 0.05
HDL-ch	37±10.3	67±12.6	P< 0.05
LDL-ch	97±23.4	86±17.3	P< 0.05
VLDL	89±5.62	20±3.67	P< 0.05
TC/HDL-c	5.13	2.61	P< 0.05
LDL-c/HDL-c	3.53	1.28	P< 0.05

The values are mean ± S.D; * Total cholesterol is not significant p > 0.05

From our examination resulted that HD patients are characterized from high levels of Triglycerides (249 ± 22.1 mg/dl) and a low level of HDL cholesterol (37±10.3 mg/dl) as in the other studies (Hadjadj S, et al., 2004; Massy SA and Kassike BL 1998). The comparison for serum cholesterol showed non-significant variations. However all other components of lipid profile studied were found significantly increased for chronic renal failure compared to the healthy controls. We see the ratios of TC/HDL-ch and LDL-ch/HDL-ch which are lower in control group compared with hemodialysis group.

Based in the other studies (Bukachi F. et al., 2000; Iseki k. et al., 2002) patients with chronic kidney disease, especially in the later stages, experience frequent eating problems. Poor appetite results in low calorie and protein intake (Klahr S. et al., 1994) a condition known as protein energy malnutrition (PEM). In our hemodialyses sample malnutriation is an important problem.

We examined the relationship of four lipid parameters: total cholesterol , LDL-cholesterol, triglycerides, HDL-cholesterol and VLDL cholesterol for females subjects. The results we took from the examination showed to us that females suffering from renal diseases, are in high risk about cardiovascular diseases compared with females of control group (TG=228±24.2; LDL=191±7.82,p < 0.05). In this study was observed that all lipid parameters estimated except HDL-ch in chronic renal failure patients were significantly (p<0.05) higher than those of control sample irrespective of the sex.

Table 2: Table shows the means and dev.st for TC,TG,HDL, LDL, VLDL and risk ratios for female subjects.

Lipid profile mg/dl	Healthy females	Ch.renal failure females	P value
Total cholesterol	155±22.4	183±24.3	P>0.05
Triglicerides	98±20.3	228±24.2	P< 0.05
HDL-ch	70±2.6	44±3.74	P< 0.05
LDL-ch	135±18.7	191±7.82	P< 0.05
VLDL	19±0.67	26±6.71	P< 0.05
TC/HDL-ch	2.21	4.95	P< 0.05
LDLch/HDL-ch	1.92	4.34	P< 0.05

We compared and the ratio of TC/HDL-Ch and LDL-ch/HDL-ch to see the risk factor between two groups. Cardiovascular risk indices TC/HDL-ch and LDL-ch/HDL-ch indicated in both sexes that cardiovascular risk is higher in CRF patients.

From the results in our study 6.7% of sample had the smoking habit. We compared the results (figure 1) of lipid profile between smoking patients and non-smoking patients of the CRF group and resulted that smoking group had a significative elevated lipid profile (p<0.05) compared with other group.

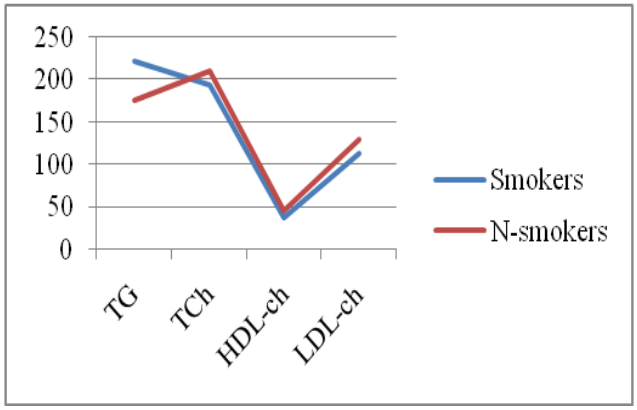

Figure 1. Lipid profile levels for smoker and N-smoker group.

To see the association between two variables smoking and triglycerides levels we found the value of chi square Hi^2 =6.624 with significance level p=0.05, which is higher than the critical value Hi^2=3.84 (for p=0.05 probability level) which shows the area of acceptance or rejection for H_0 hypothesis, (H_0 - means that between two variables has no correlation). In this case H_0 is not accepted. So between two variables has association. As we know from the other studies (McGill HCJ. et al., 1997) smoking tends to elevate the triglycerides levels. We examined the correlation between HDL-cholesterol and triglycerides and found the value of Hi^2 =4.942 with p=0.029 that is lower than p= 0.05, so high triglycerides levels are associated with low HDL-cholesterol levels. More risk factors to have, more rescued you are. When there are both smoking habit and diabetes, there is a double risk from CVD (Rahman M. et al 2014; Sarnak MJ. et al 2002). High levels of triglycerides ($p< 0.05$), LDL-ch and the low level ($p<0.05$) of HDL-ch show to us that people with chronic renal failure are in high risk about cardiovascular diseases. This thing is shown and from the risk ratios of the two groups. In our study in difference from other studies (Joles JA. Et al., 2000,Liu Y. et al., 2004) the level of cholesterol is not high and there is no association between TC and CRF. We think this is from malnutrition of our sample. Malnutrition is a problem that occurs in the patients of our country. It is helpful to know your lipid profile levels, especially when you have chronic kidney disease. Replacing saturated fats with monounsaturated fats and eating a healthy diet may go a long way to improving cardiovascular health. The results in our study shows that chronic renal failure is a risk factor to development of cardiovascular disease in patients in dialysis.

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REFERENCES

1. Bukachi F. et al., 2000. Lowering cholesterol in patients with coronary artery disease. African Health, 22 (2):16-18.

2. Coresh J, Longenecker JC et al., 1998. Epidemiology of cardiovascular risk factors in chronic renal disease. J Am Soc Nephrol 9: S24–S30.

3. Crook, E.D., Thallapureddy, A., Migdal, S. et al., 2003. Lipid abnormalities and renal disease: Is dyslipidemia a predictor of progression of renal disease?. Am J Med Sci. 325: 340–348.

4. Degoulet P, LeGrain M, et al., 1982. Mortality risk factors in patients treated by chronic hemodialysis. Report of the Diaphane collaborative study. Nephron 31: 103–110.

5. Durrington, 2003. "Dyslipidemia" Lancet 362(9385): 717-312 12957096.PMID

6. Executive Summary of The Third Report of The National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, And Treatment of High Blood Cholesterol In Adults (Adult Treatment Panel III) 2001. JAMA; 285:2486–97.

7. Fried L.F., Orchard T.J. and Kasiske B.L., 2001. Effect of lipid reduction on the progression of renal disease: a meta-analysis. Kidney Int, 260–2699.

8. Foley R.N, Parfrei P.S and Farnak M.J., 1998. Epidemiology of cardiovascular disease in chronic renal disease. J Am Soc Nephrol 9: S16–S23.

9. Go AS, Chertow G.M. et al., 2004. Chronic kidney disease and the risks of death, cardiovascular events, and hospitalization. N Engl J Med 351: 1296–1305.

10. Hadjadj S, Duly-Bouhanick B, Bekherraz A. et al., 2004. Serum triglycerides are a predictive factor for the development and the progression of renal and retinal complications in patients with type 1 diabetes. Diabetes Metab. 30: 43–51

11. Iseki K, Yamazato M, and Tozawa M.,2002. Hypocholesterolemia is a significant predictor of death in a cohort of chronic hemodialysis patients. Kidney Int. ;61:1887–93.

12. Joles, J.A., Kunter U., Janssen, U. et al., 2000. Early mechanisms of renal injury in hypercholesterolemic or hypertriglyceridemic rats. J Am Soc Nephrol. 11: 669–683.

13. Kasiske BL., 1998. Hyperlipidemia in patients with chronic renal disease. Am J Kidney Dis 32: S142–S156.

14. Kilpatrick RD, McAllister CJ, et al,. 2007. Association between serum lipids and survival in hemodialysis patients and impact of race. J Am Soc Nephrol. ;18:293–303.

15. Klahr S, Levey AS, Bech GJ, et al., 1994. The effects of dietary protein restriction and blood-pressure control on the progression of chronic renal disease. Modification of Diet in Renal Disease Study Group. N Engl J

Med.;330:877–84.

16. K. DOQI, 2003. Clinical practice guidelines for management of dyslipidemias in patients with kidney disease. Am J Kidney Dis. ;41:I–91.

17. Liu Y, Coresh J et al,. 2004. Association between cholesterol level and mortality in dialysis patients: role of inflammation and malnutrition. JAMA. ;291:451–9.

18. Lowrie EG and Lew NL,.1990. Death risk in hemodialysis patients: the predictive value of commonly measured variables and an evaluation of death rate differences between facilities.Am J Kidney Dis.;15:458–82.

19. Massy, Z.A., Khoa, T.N., Lacour, B. et al., 1994. Dyslipidemia and the progression of renal disease in chronic renal failure patients. Nephrol Dial Transplant.14: 2392–2397.

20. Massy, SA and Kasiske, BL. Hyperlipidaemia and management in renal disease. Nephrology, 1996; 16: 202-203.

21. McGill HCJ, McMahan CA., et al 1997. Effects of serum lipoproteins and smoking on atherosclerosis in young men and women: the PDAY Research Group: Pathobiological Determinants of Atherosclerosis in Youth. Arterioscler Thromb Vasc Biol.;17:95–106.

22. Prinsen BH, et al. Hypertriglyceridemia in patients with chronic renal failure: possible mechanisms. Kidney Int Suppl.;63:S121–4, 2003.

23. Rahman, M., W. Yang, S. Akkina, A., et al 2014. Relation of serum lipids and lipoproteins with progression of CKD: The CRIC study. Clin J Am Soc Nephrol 9: 1190-1198.

24. Samuelsson, O., Mulec, H., Knight-Gibson, C. et al.,1997. Lipoprotein abnormalities are associated with increased rate of progression of human chronic renal insufficiency. Nephrol Dial Transplant.12:1908–1915.

25. Sarnak MJ,Foley RN., et al 2002. Cardiovascular disease risk factors in chronic renal insufficiency. Clin Nephrol 57: 327–335.

26. Sarnak MJ, et al,. 2003. Kidney disease as a risk factor for development of cardiovascular disease: A statement from the American Heart Association Councils on Kidney in Cardiovascular Disease, High Blood Pressure Research, Clinical Cardiology, and Epidemiology and Prevention. Circulation 108: 2154–2169.

27. Schaeffner, E.S., Kurth, T., Curhan, G.C. et al., 2003. Cholesterol and the risk of renal dysfunction in apparently healthy men. J Am Soc Nephrol. 14: 2084–2091

28. Stefanovic, V. and Milojkovic, M., 2004. Treatment of dyslipidemia in chronic kidney disease. Int J Artif Organs. 27: 821–827.