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**Gender Variations among Lipids Levels in Chronic Renal Failure Patients who are on Renal Dialysis**

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**ABSTRACT**

*The prevalence of end stage renal disease was found to be more common in the developing countries. The risk factors such as obesity, smoking, hypertension, uncontrolled diabetes mellitus favours the progress of renal failure among the old age population. Cardiovascular contribution to the renal failure increases as the lipid levels increases in the circulation. Many of the past studies have explained the factors which correlates the cardiovascular causes behind the progression of renal failure. Our study was taken up to evaluate the dyslipidemia in patients who are on end stage renal disease, undergoing regular dialysis.*

**Materials and Methods** – Totally 100 patients who are on regular dialysis were recruited for the study. Of 100 patients 50 were males Group M, 50 are females Group F. Blood samples were collected and analyzed for TG, TC, HDL, LDL, and VLDL. Results were analyzed to compare the lipid profile among males and females to rule out the high risk of cardiovascular related complication among the end stage renal failure population who are on regular dialysis.

**Results** – Our study showed a significant increase in TG, TC, LDL, and VLDL in females Group F when compared to males Group M. HDL was very low in females when compared to males which are statically significant.

**Conclusion** – From our study we summaries that the serum lipid profile level was found to be more in females Group F when compared to males Group M. It states that females in end stage renal disease are in high risk of occurrence of both vessel wall diseases, and cardiovascular diseases. Apart from renal marker, cardiovascular markers also play a role in worsening the progress of renal failure.

**Keywords:** Renal Failure, LDL, HDL, VLDL, TC, TG, cardiovascular disease.

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**INTRODUCTION**

The prevalence of CKD (chronic kidney disease) is increasing rapidly throughout the world and it has become major health issue in developing countries. Occurrence of CKD is found to be common in both the genders among adult to old age group. Abnormalities in the lipid metabolism are found to be most common among end stage renal failure patients<sup>1,2</sup>. Among the lipid profile, triglycerides and high cholesterol plays a major role in occurrence of cardiovascular disease. High level of above mentioned components affects the blood circulating pool by forming fat plaque deposition on major blood vessels. A part from lipid profile, insulin resistance and free radicals induced oxidative stress are the common cause of dyslipidemia in renal failure patients. Past studies have proven that insulin resistance has a high beneficial effect on stress, which in turn increases the cholesterol level<sup>3,4,5</sup>.

Dyslipidemia and hyperhomocysteinemia are important factors associated with the early onset of atherosclerosis. Dyslipidemia in combination with elevated blood pressure can cause impairment renal function. Abnormalities in lipid metabolism and dyslipidemia are known to contribute to glomerulosclerosis and are common in renal disease which has a higher mortality among obese renal failure patients<sup>6,7</sup>. In addition, post-transplant elevated lipid levels have been associated with an increased risk of heart disease and vessel wall disease. The common lipid profile analyzed are Serum triglycerides, Total cholesterol density lipoprotein (HDL) cholesterol, low-density lipoprotein (LDL), very low density lipoprotein (VLDL) cholesterol and marked oxidation of LDL cholesterol. All of which have been associated with increased atherosclerotic risk among both the genders of renal failure.

#### **Mechanism by which hyperlipidemia favours renal failure.**

**Step-1.** Re-absorption of fatty acids, phospholipids, and cholesterol in the glomerulus.

**Step-2.** Filtered contains proteins such as (albumin and lipoproteins)

**Step-3.** Albumin and lipoproteins tubule-interstitial inflammation.

**Step-4.** Favours the foam cell formation, and tissue injury.

**Step-5.** Accumulations of lipoproteins in glomerular mesangium can promote matrix production and glomerulo-sclerosis.

**Step-6.** LDL stimulates production of matrix proteins by cultured mesangial cells.

**Step-7.** Increases the generation of pro-inflammatory cytokines.

**Step-8.** Lead to recruitment and activation of circulating macrophages.

**Step-9.** finally increases the deposition of fat in adipose tissue<sup>4,7</sup>.

### **MATERIALS AND METHODS**

The study was conducted in Sri Ramachandra University in the period of around 8 months in 2006 in renal dialysis ward of Nephrology department. Proper oral consent was obtained by explaining the purpose of the study. Totally 100 subjects were included in the study among them 50 subjects were males group M, Rest 50 subjects were females group F who are on the regular dialysis three times a week. **Patient Selection-** Totally 100 subjects were selected by analyzing the stages of renal failure. Grade 4 renal failures, categories subjects and who are on regular hemodialysis were included for the study. **Collection of samples-** 7ml of overnight 12 hrs of fasting blood is collected from the venous line of dialyzer machine, by using the sterile technique methods. Blood samples were analyzed for TG, TC, HDL, LDL and VLDL. The standard enzymatic methods were used to analyze TG, HDL, LDL, and VLDL. TC was analyzed using oxides method.

**Statistical Analysis-** After analyzing the values of biochemical test. By using student paired t test, the mean, standard deviation/ standard error of mean were obtained. P value <0.005 was considered as statically significant. Data analysis was done using statistical soft ware SPSS version 16

### **RESULTS**

Our results were analyzed accordingly stating that the serum lipid profile was found to be more in females when compared to males. Total serum cholesterol was high in females  $184 \pm 1.70$ mg/dl, when compared to males  $179 \pm 1.20$ mg/dl. which is statically significant of P value <0.001\*\*. Total triglycerides were increased in females because of high body mass index when compared to males was around  $116 \pm 3.72$ ,  $109 \pm 2.71$ mg/dl. This is statically significant, of P value <0.001\*\*. HDL-cholesterol level were very low in females when compared to males. This is statically more significant. The values were around  $31.82 \pm 6.22$ ,  $38 \pm 6.77$ mg/dl. This is statically more significant, of P value <0.001\*\*. LDL cholesterol, level was found to be more in females when compared to males. The values are  $120.01 \pm 0.23$ ,  $118.4 \pm 20$ mg/dl. This is statically significant, of P value <0.005\*. VLDL-cholesterol was high in females when compared to a male which is statically significant the values are  $42.01 \pm 0.71$ ,  $36.22 \pm 3.20$ mg/dl. This is statically significant, of P value <0.001\*\*. TC/TG ratio was found to be more in females when compared to males. Total cholesterol and triglyceride level are the primary markers of risk factor for cardiovascular disease. There is a high risk of circulatory failure among the chronic renal failure patients. This is statically significant, of P value <0.001\*\*

**Table -1 Show the comparison of serum lipid profile between male and female end stage renal failure patients who are on regular hemodialysis**

| Parameters  | Males (M)  | Females (F) | P value  |
|-------------|------------|-------------|----------|
| TC mg/dl    | 179±1.20   | 184±1.70    | <0.001** |
| TG mg/dl    | 109±2.71   | 116±3.72    | <0.001** |
| HDL mg/dl   | 38±6.77    | 31.82±6.22  | <0.001** |
| LDL mg/dl   | 118.4±20   | 120.01±0.23 | <0.005*  |
| VLDL mg/dl  | 36.22±3.20 | 42.01±0.71  | <0.001** |
| TC/TG mg/dl | 5.6±1.0    | 5.12±0.22   | <0.001** |

**Legend 1-** Serum lipid profile was found to be more in females group F when compared to males of same age group M who are on regular dialysis. The mean standard deviation obtained P <0.005\* was considered as statically significant.

### DISCUSSION

Hemo dialysis has a major role cleansing the metabolic toxin in chronic renal failure patients. The common toxins such as urea, creatinine, and uric acid as washed out of the body during the dialysis session. Apart from those toxins a potential toxin which decreases the quality of life in renal failure patients is plasma lipid level<sup>2,6</sup>. Elevated in plasma lipid level causes the atherogenic effects on vascular compartment. By keeping dialyzer membrane complications Gomez DI *et al.* proved that repeated exposure of certain toxic material to dialyzer favours the compliment activation which causes the over oxidation of polyunsaturated fatty acid .apart from the body metabolism the dialyzer membrane also has a positive correlation with the lipid profile among the dialysis patients. The most commonly recommended dialyzer is high flux polysulfide or cellulose triacetate<sup>8</sup>. Markel Ms *et al* conducted a study in 2004 the results of the study stated that usage of low flux membrane dialyzer has a less efficiency in clearing the lipid molecules. Normally HDL is produced by liver and intestine normally. By peripheral uptake of lipids from the intestinal cells the rate of HDL molecules develops .hepatic lipase removes the triglyceride, so HDL cholesterol favours the extract of cholesterol<sup>9</sup>. Kunle *et al* in 1977 from their study said that dyslipidemia develops early in renal failure and it becomes more pronounced as the renal disease progresses because of imbalance between lipoprotein synthesis and degradation. In this study it was observed that all the lipid parameters estimated except HDL-C in chronic renal failure patients were significantly (p<0.05) higher than those of normal subjects. Female's subject's values were more when compared to males<sup>10</sup>. Riepponen *et al* (1987) cardiovascular risk indices, TC/HDL-C and LDL-C/HDL-C indicated in both sexes that cardiovascular risk is higher in CRF patients<sup>11</sup>. Fuh *et al* (1990)<sup>20</sup> demonstrated that plasma TG, VLDL-C were significantly higher while HDL-C was significantly lower in CRF patients and this associated with decreased synthesis of Apo A1 /ADC<sup>12</sup>. Hillege hL *et al.*. In 2002 from his study hypothesize that high level of plasma lipid level alters the functional status of most of the systems in the body. According to their conclusion the dyslipidemia indeed, leads to loss of renal function the mechanisium underlying is by damaging the mesangial cells, and glomerular endothelial cells. These increases the release of cytokines, which causes inflammation of glomerulus, leads to glomerulosclerosis<sup>13</sup>. Jenkins AJ *et al.* Conducted a study on lipo protein level variations among diabetic patients stating that lipo protein undergoes oxidatiative modification which leads to release of monocyte by filtration. The brush border podocytes can be damaged by triglycerides and cholesterol<sup>14</sup>. Peck LW *et.al* conducted a study in 1996 stating that females have more levels of lipid profile when compared to males, the reason underlying falls on body mass index, and estrogen imbalance level which increases the stress response which in turn increases the deposition of lipid molecules in the adipose tissue. He stated that adequacy of dialysis among the population increases the plasma lipid level<sup>15</sup>.

### CONCLUSION

Most of the chronic renal failure patients are at high risk of prevalence of cardiovascular disease due to elevated serum lipid profile. Among the lipid profile parameters the decrease in HDL level and VLDL

level favours the potential risk among renal failure patients. The underlying factor behind this is prolonged usage of heparin, low flux dialyzer, and acetate usage in the dialyzer. Elevated lipid profile not only affects the cardiovascular system, it also decreases the quality of dialysis access. Regular screening of lipid profile may reduce the risk of several complications in the body not only in the renal failure patients, and also in the healthy people.

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