



“EFFECT OF AGE ON LIPID PROFILE IN CHRONIC KIDNEY DISEASE”

Biochemistry

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ABSTRACT

Aim: The aim of this study was to establish a correlation & find effect of Age on Serum T.Cholesterol, HDL, LDL, VLDL, TG, T.Cholesterol/HDL ratio & LDL/HDL ratio of Chronic kidney disease patients.

Study Design: A hospital based Non-Experimental Observational Cross-sectional & Correlation Study was conducted on patients of both sex attending the Out Patient Department & In Patient Department of Nephrology & Medicine of SMI Hospital, P.Nagar Dehradun for a period of 4 months from January 2014 to April 2014. Study comprises 54 Chronic kidney disease patients which were divided into five age groups i-e Age group- 15-29yrs, Age group- 30-44yrs, Age group-45-59yrs, Age group- 60-74yrs, Age group- ≥75yrs. Inclusion criteria was patients with evidence of Chronic kidney disease selected randomly of both sex & age above 15 years. Exclusion criteria was age <15 years & those not willing to participate.

Methodology: Consecutive sampling technique & Bio-physiological method of collection of Data was used. .5ml blood was collected in sterile tubes from the fasting (8-12hrs) Chronic Kidney Disease patients & was analyzed for Serum T.Cholesterol, HDL, LDL, VLDL, TG, T.Cholesterol/HDL ratio & LDL/HDL ratio by enzymatic method using VITROS ECIQ, an auto analyser at SMI Hospital, P.Nagar, Dehradun. Correlation coefficient i-e r-value & p-value was analysed using Microsoft office Excel 2007. Positive r- value represented positive correlation between that age group & that parameter & vice versa. $P < 0.05$ was considered significant & $P < 0.01$ was considered highly significant

Results: Age group 15-29yrs was found to have negative Correlation coefficient with S. HDL, VLDL, TG, T.chol/HDL, LDL/HDL & positive Correlation coefficient with T.Chol, LDL values of Chronic kidney disease patients. Relationship of HDL, VLDL, TG, T.Chol/HDL was found to be Non significant ($P > 0.05$) & S. T.Chol, LDL, LDL/HDL was found to have significant ($P < 0.05$) relationship with this Age group.

Age group 30-44yrs was found to have negative Correlation coefficient with S. HDL, T.Chol, VLDL, TG, & positive Correlation coefficient with T.chol/HDL, LDL/HDL, LDL values of Chronic kidney disease patients. Relationship of HDL, VLDL was found to be Non significant ($P > 0.05$) & S. T.Chol, TG was found to have significant ($P < 0.05$) relationship, LDL, T.Chol/HDL, LDL/HDL ratio was found to have Highly significant ($P < 0.01$) relationship with this age group.

Age group 45-59yrs was found to have negative Correlation coefficient with S.T.Chol, LDL, T.Chol/HDL, LDL/HDL, & positive Correlation coefficient with HDL, TG, VLDL values of Chronic kidney disease patients. Relationship of S. T. Chol, LDL, VLDL, TG, T.Chol/HDL, LDL/HDL was found to be Non significant ($P > 0.05$) & HDL was found to have Highly significant ($P < 0.01$) relationship with this age group.

Age group 60-74yrs was found to have negative Correlation coefficient with HDL, & positive Correlation coefficient with S.T.Chol, LDL, VLDL, TG, T.Chol/HDL, LDL/HDL ratio values of Chronic kidney disease patients. Relationship of S. T.Chol, LDL, VLDL, T.Chol/HDL, LDL/HDL was found to be Non significant ($P > 0.05$) & HDL, TG was found to have Highly significant ($P < 0.01$) relationship with this age group.

Age group ≥75yrs was found to have negative Correlation coefficient with S.T.Chol, LDL, TG, T.Chol/HDL, LDL/HDL ratio & positive Correlation coefficient with HDL, VLDL values of Chronic kidney disease patients. Relationship of LDL, VLDL, T.Chol/HDL, LDL/HDL was found to be Non significant ($P > 0.05$) & S. T.Chol, HDL, TG was found to have Highly significant ($P < 0.01$) relationship with this age group.

KEYWORDS

Chronic Kidney Disease, Age Group, T.cholesterol.

INTRODUCTION:

Chronic Kidney Disease is characterized by a slow, insidious, and irreversible impairment of renal excretory and regulatory function.⁽¹⁾ Major causes of chronic renal failure are diabetes mellitus and hypertension, which account for approximately 60 percent of new cases.⁽²⁾ The prevalence of Chronic kidney disease in the United States increased by 10.4 percent during the last decade, the mortality rates for these patients are high despite modern intensive care medicine. The prevalence of Chronic Kidney Disease in India is 0.8%.⁽³⁾

Chronic kidney disease is an internationally recognized public health problem affects 5-10% of world population.⁽⁴⁾ Chronic kidney disease leads to disturbances in the function of virtually every organ system of body. However it is well documented that Cardiovascular diseases are major cause of morbidity & mortality in patients with Chronic kidney disease, so the American Heart Association has recommended Chronic kidney disease to be classified in highest risk factor for developing cardiovascular events. Cardiovascular disease mortality is 10-30 times higher in Chronic Kidney disease.⁽⁵⁾ Dyslipidemia has also been hypothesized to cause kidney damage & to play an important role in progression of renal failure as well.⁽⁶⁾

Dyslipidemia may damage glomerular capillary endothelial & mesangial cells as well as podocytes. Mesangial cells express receptors for LDL & oxidized LDL which upon activation induce mesangial cell proliferation, increase mesangial matrix deposition & enhance the production of chemokines such as macrophage Chemoattractant protein-1 & cytokines such as interleukin-6. Macrophages

infiltrate release cytokines causing damage to endothelial cells, mesangial cells & podocytes leading to progressive renal damage.⁽⁷⁾ Dyslipidemia seen in Chronic kidney disease is characterized by high TG & low HDL levels, accumulation of remnant particles, predominance of LDL particles & increased Lipoprotein a level.⁽⁸⁾ Progression of Chronic Kidney Disease is associated with increase in number of complications like anemia, peripheral neuritis, thyroid dysfunction, dyslipidemia & Cardiovascular disease.⁽⁹⁾ In Chronic renal disease, general measures include low sodium, potassium, and phosphate diet but high in calories and supplemented with essential amino acids are required. Other measures include balanced fluid intake, monitoring weight changes and vital signs, electrolyte balance, monitoring of cardiac and mental status.⁽¹⁰⁾ Thyroid Dysfunction added to dyslipidemia in Chronic kidney disease may further increase Cardiovascular disease risk hence early diagnosis of thyroid dysfunction & dyslipidemia by regular screening & treatment slows the progression of Chronic kidney disease in addition to reduction of Cardiovascular disease risk.⁽¹¹⁾

MATERIAL & METHODOLOGY:

A hospital based Non-Experimental Observational Cross-sectional & Correlation Study was conducted on patients of both sex attending the Out Patient Department & In Patient Department of Nephrology & Medicine of SMI Hospital, P.Nagar Dehradun for a period of 4 months from January 2014 to April 2014. Study comprises 54 patients with evidence of Chronic kidney disease selected randomly of both sex & age above 15 years which were divided into five age groups i-e Age group- 15-29yrs, Age group- 30-44yrs, Age group-45-59yrs, Age

group- 60-74yrs, Age group- ≥ 75 yrs.. Consecutive sampling technique & Bio-physiological method of collection of Data was used. 5ml blood was collected in sterile tubes from the fasting (8-12hrs) Chronic kidney disease patients & was analyzed for Serum T.Cholesterol, HDL,LDL, VLDL, TG, T. Cholesterol/ HDL ratio & LDL/HDL ratio by enzymatic method using VITROS ECIQ, an auto analyser at SMI Hospital, P.Nagar, Dehradun. Chronic kidney disease was diagnosed by clinical examination & biochemical analysis of the patient. Exclusion criteria for the study was age less than 15 years & those not willing to participate. Data was analysed using Microsoft office Excel 2007. Tests used were unpaired t- test with unequal variance & paired t- test, through that only p value was determined. Other tests applied were correlation analysis, standard deviation and mean values. Value of $p < 0.05$ was considered significant & $p < 0.01$ was considered highly significant.

RESULT:

Statistically, Age group 15-29yrs was found to have negative Correlation coefficient with S. HDL, VLDL, TG, T.chol/HDL, LDL/HDL & positive Correlation coefficient with T.Chol, LDL values of Chronic kidney disease patients. Relationship of HDL, VLDL, TG, T.Chol/HDL was found to be Non significant ($P > 0.05$) & S. T.Chol, LDL, LDL/HDL was found to have significant ($P < 0.05$) relationship with this age group as depicted by Figure 1 & Table 1.

Statistical analysis demonstrated that Age group 30-44yrs was found to have negative Correlation coefficient with S. HDL, T.Chol, VLDL, TG, & positive Correlation coefficient with T.chol/HDL, LDL/HDL, LDL values of Chronic kidney disease patients. Relationship of HDL, VLDL was found to be Non significant ($P > 0.05$) & S. T.Chol, TG was found to have significant ($P < 0.05$) relationship, LDL, T.Chol/HDL, LDL/HDL ratio was found to have Highly significant ($P < 0.01$) relationship with this age group as shown by Figure 1 & Table 1.

TABLE 1- Correlation Coefficient, p value & Level of Significance of Lipid profile according to Age Group distribution of Chronic Kidney Disease patients.

LIPID PROFIE		T. Chol	LDL	HDL	VLDL	TG	T.Chol/ HDL	LDL/ HDL
Age group 15-29yrs	r value	0.99	0.87	-0.489	-0.99	-0.86	-0.99	-0.63
	p value	0.024	0.01	0.39	0.73	0.35	0.05	0.03
	LOS	S	S	NS	NS	NS	NS	S
Age group 30-44yrs	r value	-0.21	0.028	-0.47	-0.04	-0.039	0.069	0.079
	p value	0.01	0.009	0.70	0.57	0.015	0.00021	0.0001
	LOS	S	HS	NS	NS	S	HS	HS
Age group 45-59yrs	r value	-0.09	-0.105	0.09	0.07	0.006	-0.018	-0.154
	p value	3.12	8.59	0.002	1.47	6.70	1.05	1.24
	LOS	NS	NS	HS	NS	NS	NS	NS
Age group 60-74yrs	r value	0.21	0.126	-0.38	0.476	0.34	0.52	0.66
	p value	8.82	0.70	0.0007	3.5	0.001	3.31	3.61
	LOS	NS	NS	HS	NS	HS	NS	NS
Age group ≥ 75 yrs	r value	-0.53	-0.400	0.57	0.017	-0.04	-0.05	-0.14
	p value	0.005	0.47	0.0015	6.87	0.009	2.76	2.65
	LOS	HS	NS	HS	NS	HS	NS	NS

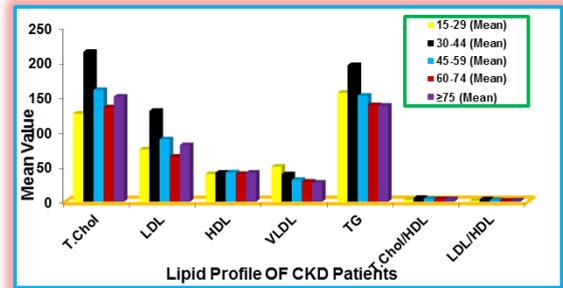
* LOS- Level of Significance, *S- Significant, *NS- Non Significant, *HS- Highly Significant.

Statistics states that Age group 45-59yrs was found to have negative Correlation coefficient with S.T.Chol, LDL, T.Chol/HDL, LDL/HDL, & positive Correlation coefficient with HDL, TG, VLDL values of Chronic kidney disease patients. Relationship of S. T.Chol, LDL, VLDL, TG, T.Chol/HDL, LDL/HDL was found to be Non significant ($P > 0.05$) & HDL was found to have Highly significant ($P < 0.01$) relationship with this age group as visible in Figure 1 & Table 1.

Statistically, Age group 60-74yrs was found to have negative Correlation coefficient with HDL, & positive Correlation coefficient with S.T.Chol, LDL, VLDL, TG, T.Chol/HDL, LDL/HDL ratio values of Chronic kidney disease patients. Relationship of S. T.Chol, LDL, VLDL, T.Chol/HDL, LDL/HDL was found to be Non significant ($P > 0.05$) & HDL, TG was found to have Highly significant ($P < 0.01$) relationship with this age group as demonstrated by Figure 1 & Table 1.

Statistical Analysis proved that, Age group ≥ 75 yrs was found to have negative Correlation coefficient with S.T.Chol, LDL, TG, T. Chol/ HDL, LDL/HDL ratio & positive Correlation coefficient with HDL, VLDL values of Chronic kidney disease patients. Relationship of LDL, VLDL, T.Chol/HDL, LDL/HDL was found to be Non significant ($P > 0.05$) & S. T.Chol, HDL, TG was found to have Highly significant ($P < 0.01$) relationship with this age group as depicted by Figure 1 & Table 1

FIGURE 1- Mean Values Of Lipid Profile According To Age Group Distribution Of Chronic Kidney Disease Patients.



DISCUSSION:

Chronic Kidney disease is biochemically typically detected by an elevated serum creatinine. In the science of physiology it is described as a decrease in glomerular filtration rate (GFR). When the kidneys malfunction, problems frequently encountered include abnormal fluid levels in the body, dearranged acid levels, abnormal levels of potassium, calcium, phosphate, and in longer term anemia⁽¹²⁾. Complications in renal failure include pulmonary edema, hypertensive crisis, acidosis, hyperkalemia, and infection. If renal failure remains untreated, the last stage of renal failure is almost invariably fatal⁽¹³⁾. The spectrum of dyslipidemia in patients with Chronic Kidney disease is distinct from that of the general population. The study involves all lipoprotein classes and shows considerable variations depending on the age of the Chronic kidney disease patient. There seems to be a gradual shift to the uremic lipid profile as kidney function deteriorates, which is further modified by concurrent illnesses such as diabetes and nephrotic syndrome⁽¹⁴⁾.

In this study T. Chol was found to be in significant relation with 15-29yrs & 30-44yrs age group, relationship was highly significant with ≥ 75 yrs & was non significant with 45-59yrs & 60-74yrs age group. LDL was seen to be in significant relation with 15-29yrs, relationship was highly significant with 30-44yrs & was non significant with 45-59yrs, 60-74yrs & ≥ 75 yrs age group. HDL was found to have non significant relation with 15-29yrs, 30-44yrs age group, relationship was highly significant with 45-59yrs, 60-74yrs & ≥ 75 yrs age group. VLDL was seen to have non significant relation with all age groups. TG was found to be in significant relation with 30-44yrs age group, relationship was highly significant with 60-74yrs & ≥ 75 yrs & was non significant with 15-29yrs & 45-59yrs age group. Age group 15-29yrs was having non significant & significant relation with T.Chol/HDL & LDL/HDL ratio respectively. Both the ratios were found to have highly significant relation with rest of the age group.

In 2011, Vasilis Tsimihodimos, Zoi Mitrogianni and Moses Elisaf did study on “Dyslipidemia Associated with Chronic Kidney Disease”.

In 2001, Nelva T. De Gomez Dumm, Ana M. Giammona, Luis A. Touceda, Clemente Raimondi did study on “Lipid abnormalities in Chronic Renal Failure patients undergoing Hemodialysis”.

In 2000, Tsumura et al. observed hypercholesterolemia in their study of patients with CKD.

CONCLUSION:

Management of Chronic kidney disease should be aimed at slowing the rate of decline of kidney function & minimizing the effects of other complications of chronic kidney disease.⁽¹⁵⁾ Many studies have already been done to see the dyslipidemia in chronic kidney disease. This study mainly focuses on the effect of age on dyslipidemia in chronic kidney disease patients so patients were divided into different age groups. In this study we determined the Level of significance of lipid profile to the different age groups and calculated the Correlation Coefficient. In this study T.Chol had positive Correlation Coefficient with 15-29yrs & 60-74yrs age group & Negative Correlation Coefficient with rest of the

age groups. LDL was found to have negative Correlation Coefficient with 45-59yrs & ≥ 75 yrs age group & Negative Correlation Coefficient with rest of the age groups. HDL had positive Correlation Coefficient with 45-59yrs & ≥ 75 yrs age group & Negative Correlation Coefficient with rest of the age groups. VLDL has negative Correlation Coefficient with 15-29yrs & 30-44yrs age group & positive Correlation Coefficient with rest of the age groups. TG was seen to have positive Correlation Coefficient with 45-59yrs & 60-74yrs age group & Negative Correlation Coefficient with rest of the age groups. T.Chol/HDL & HDL/LDL ratio had positive Correlation Coefficient with 30-44yrs & 60-74yrs age group & Negative Correlation Coefficient with rest of the age groups.

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