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GLOMERULOSCLEROSIS;
LIPIDS AND LIPOPROTEINS, A RISK FACTOR

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ABSTRACT: Objective: Objective is to determine the changes in lipids and lipoproteins in patients with glomerulosclerosis and healthy controls. **Place and Duration:** Department of Biochemistry, Frontier Medical College, Abbottabad with the collaboration of Nephrology Unit, Ayoub Medical Complex, Abbottabad. April, 2006 February 2007. **Material and Methods:** Study includes 50 subjects out of which 25 adult patients (18 males, 7 females; age range 20-50 years) with glomerulosclerosis were selected from Nephrology Unit of Ayoub Medical Complex, Abbottabad. Apparently, 25 clinically healthy volunteers of similar age, sex, body mass index (BMI), and socio-economic status as that of patients, were selected from various areas of Abbottabad, as controls. Serum triacylglycerols, serum total cholesterol, and HDL-cholesterol levels were measured by kit method. LDL-cholesterol was calculated according to the Friedewald formula[17]. Serum VLDL-cholesterol as calculated according to the formula proposed by Wilson cited by Delongi[18]. The results were expressed as mean ± standard error of mean. Statistical analysis was done using student's test. **Results:** Distribution of 25 patients and 25 controls, according to age is made. Male subjects with glomerulosclerosis were greater in number than female, with male to female ratio of 1.85:1. Comparison of serum TGs, TC, HDL-c, LDL-c, VLDL-c, and HDL-c, LDL-c ratio. The mean values of TAGs, TC, HDL-c, LDL-c, VLDL-c, and ratio of HDL-c, vs. LDL-c of patients were observed significantly high (P<0.001), when compared to controls. In addition significant low values (P<0.001) of HDL-c in patients were also observed when compared to healthy controls. **Conclusion:** It is concluded that the results of this study provide evidence for raised lipids and lipoproteins levels, which is invariable feature of nephritic syndrome with glomerulosclerosis. It is suggested that the patients with nephritic glomerulosclerosis should be assessed and managed to avoid potential of accelerating the development of coronary artery disease and increasing risk of renal failure. Hopefully earlier intervention might decrease higher morbidity and mortality.

Keywords: Lipids, Lipoproteins, Hyperlipidemia, Atherosclerosis, Glomerulosclerosis Nephrotic Syndrome, Renal Failure.

INTRODUCTION

Glomerulosclerosis is a glomerular disease with worldwide distribution, which can affect both children and adults and is generally associated with a nephritic proteinuria[1]. In addition to proteinuria, microscopic hematuria, hypertension and renal insufficiency are common features[2]. The patients with glomerulosclerosis have a high prevalence of lipids and lipoproteins abnormalities[3]. Increased total cholesterol (TC) concentration is the most common abnormality in renal diseases[4,5]. Plasma triacylglycerols (TAGs) levels may also be elevated particularly in patients with heavy proteinuria[6].

In general the magnitude of lipids and lipoproteins abnormality correlates with disease severity[7]. Factors contributing to lipid-induced renal injury are: glomerular lipoprotein deposition, tubulointerstitial lipoprotein

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deposition, LDL-oxidation and lipoprotein induced cytotoxicity[8, 9]. It was claimed that the elevated cholesterol level in patients with glomerulosclerosis may predispose to coronary artery atherosclerosis and increasing the risk of acute myocardial infarction mainly in patients with glomerulosclerosis[10]. Experimental and human studies, demonstrate that a reduction of plasma lipid levels, may decreases the risk for atherosclerosis and slows the progression of glomerulosclerosis[11]. Keeping these facts, object was to determine the changes in lipids and lipoproteins in patients with glomerulosclerosis and healthy controls.

MATERIAL AND METHODS

Study includes 50 subjects out of which 25 adult patients (18 males, 7 females; age range 20-50 years) with glomerulosclerosis were selected from Nephrology Unit of Ayoub Medical Complex, Abbottabad. All the patients had clinical evidence of nephritic syndrome, having subcutaneous edema, proteinuria more than 3 g/day and serum albumin and total protein concentration less than 3 g/day and 6g/dl, respectively, wirhout uremia serum creatinine, urea and creatinine clearance within normal range. Patients on dialysis, having jaundice or liver disease, hypothyroidism, alcohol abuse, obesity, hypertension, diabetes mellitus or any other systemic diseases affecting the kidney, were excluded from the study to avoid secondary causes. Apparently, 25 clinically healthy volunteers of similar age, sex, body mass index (BMI), and socio-economic status as that of patients, were selected from various areas of Abbottabad, as controls. Blood (10ml) was taken during morning hours (08:00- 10:00) after an over night fast of about 12-14 hours,. Serum was obtained and stored at -20° C, until assayed. Serum triacylgycerols, Serum total cholesterol and HDL-cholesterol levels were measured by kit method. LDL-cholesterol was calculated according to the Friedewald formula[12]. Serum VLDL-cholesterol as calculated according to the formula proposed by Wilson cited by Delongi[13]. The results were expressed as mean ± standard error of mean. Statistical analysis was done using student's t- test.

RESULTS

Distribution of 25 patients and 25 controls, according to age are shown in Table-1. Male subjects with glomerulosclerosis were greater in number than female, with male to female ratio of 1.85:1. Table-2 shows the comparison of serum TAGs, TC, HDL-c, LDL-c, VLDL-c, and HDL-c, LDL-c ratio. The mean values of TAGs, TC, HDL-c, LDL-c, VLDL-c, and ratio of HDL-c, vs. LDL-c of patients were observed significantly high ($P<0.001$), when compared to controls. In addition significant low values ($P<0.001$) of HDL-c in patients were also observed when compared to healthy controls.

Table-I. Age and sex distribution of the controls and the patients with glomerulosclerosis

Age Groups	Controls (n=25)			Patients (n=25)		
	Male	Female	Total	Male	Female	Total
11-20	0	01	01	0	01	01
21-30	06	02	08	06	02	08
31-40	07	03	10	07	02	09
41-50	05	01	06	05	02	07
Total Cases (%)	18(72)	07(28)	25(100)	18(72)	07(28)	25(100)
M:F	1.5:1			1.85:1		

Table-II. Mean values of serum triacylglycerols, total cholesterol, HDL-cholesterol, LDL-Cholesterol and VLDL-Cholesterol and the ratio of LDL-Cholesterol to HDL Cholesterol in the controls and the patients with glomerulosclerosis

Variables	Control (N=25) (Mean ± SD)	Patients (n=25) (Mean ± SD)
Trialcyglycerol	1.26 ± 0.023	2.52* ± 0.094*
Total Cholesterol	5.06 ± 0.065	8.94* ± 0.381
HDL-Cholesterol	1.48 ± 0.018	1.31* ± 0.035
LDL-Cholesterol	3.33 ± 0.067	7.13* ± 0.369
VLDL-Cholesterol	0.57 ± 0.010	1.13* ± 0.042
L:H	2.26 ± 0.059	5.57* ± 0.376

L:H= Ratio of the LDL-C to HDL-C
** P<0.001 values are statistically significant as compared to control subjects.*

DISCUSSION

Results indicate the changes in the serum lipids and lipoproteins in carefully selected patients with glomerulosclerosis, who had normal glomerular function and no complicating diseases such as diabetes and who were not receiving any therapy[14]. Glomerulosclerosis patients are accompanied almost invariably by the changes of the lipids and lipoproteins levels, which become an important risk factors of accelerated atherosclerosis in these patients and may account for up to 50% of all deaths in these patients[15]. It was reported that the hyperlipidemia is a significant adverse component of glomerulosclerosis, leading to nephritic syndrome and exhibit prominent lipids abnormality even in the absence of a marked reduction in glomerular filtration rate[16]. Increased serum cholesterol levels are one of the major determinants associated with glomerular susceptibility of glomerulosclerosis[17]. In nephritic glomerulosclerosis patients, serum cholesterol levels rise early in the course of glomerular diseases and continue to rise as the severity of the glomerulosclerosis increases[18]. Triacylglycerols synthesis found to be increased in patients with glomerulosclerosis, and being well documented by many researchers[19, 20]. In patients with glomerulosclerosis, the mean values for total cholesterol and triacylglycerols were similar to values obtained in other studies of similar subjects with this disease. It is observed a highly significant increase (P<0.001) in the levels of total cholesterol and triacylglycerols in patients with glomerulosclerosis when compared to control subjects. In addition to other vascular risk factors such as hypertension the disturbances in lipoproteins metabolism are the prominent risk factor[21, 22]. Although increased concentration of low density lipoprotein-cholesterol has been strongly correlated with coronary heart disease, other individual lipoprotein classes represent additional and independent risk factors[23]. Many studies have stated the increased levels of low density lipoprotein-cholesterol and very low density lipoprotein-cholesterol in majority of the patients with glomerulosclerosis, which as an atherogenic risk for coronary artery disease[24,25]. Findings on low density lipoprotein-cholesterol and Very low density lipoprotein-cholesterol were in harmony with the results of majority of the earlier workers[26, 27]. It was reported that patients with glomerulosclerosis have higher levels of high density lipoprotein-cholesterol than do other nephritic patients, whereas it was also concluded that high density lipoprotein-cholesterol levels in this study are significantly low (P<0.001)[28] and in accordance with the[29,30]. Primary glomerular diseases are accompanied almost invariably by the changes of the lipids and lipoproteins, which became and important risk factor for accelerated atherosclerosis[31]. It is observed that raised lipids and lipoproteins is an invariable feature in patients with glomerulosclerosis[32]. Although low high density lipoproteins-cholesterol is strong and independent risk factor for the development of atherosclerosis, there is no doubt that risk prediction can be improved by considering the low density lipoprotein-c: high density lipoprotein-c ratio[33, 34]. Framingham analysis has shown that low density lipoprotein-cholesterol: high density lipoprotein-cholesterol ratio of 5 is associated with the average risk. A ratio of 3.5 corresponds to half of the average risk, and ratios of 10 and 20 correspond approximately to 2-3 times the average risk respectively". The results of ratio of low density lipoprotein-c: high density lipoprotein-c in our study is 5.57 which is

significantly high (P<0.001) and an agreement with the results of earlier workers[15, 34, 35].

CONCLUSION

It is concluded that the results of this study provide evidence for raised lipids and lipoproteins levels, which is invariable feature of nephritic syndrome with glomerulosclerosis. It is suggested that the patients with nephritic glomerulosclerosis should be assessed and managed to avoid potential of accelerating the development of coronary artery disease and increasing risk of renal failure. Hopefully earlier intervention might decrease higher morbidity and mortality.

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