PRELIMINARY STUDY OF SERUM TRIACYLGLYCEROL AND LIPASE ACTIVITY IN NEPHROTIC SYNDROME

Biochemistry

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ABSTRACT

OBJECTIVE - To study serum triacylglycerol level and serum lipase activity by estimating these parameters in fasting and post prandial state that is 4 hours after meal in nephrotic syndrome patients and comparing these values with the control group.

Methods - Patients attending outpatient Department of LokmanyaTilak Municipal General Hospital clinically diagnosed as patients suffering from nephrotic syndrome were enrolled for the study. Duly signed consent forms were taken. Patients suffering from pancreatitis or any other acute diseases were excluded from our study.

Control group comprised of age matched subjects not suffering from nephrotic syndrome or any other acute diseases. The study protocol was approved by the Ethical Committee.

Results - The nephrotic syndrome group had significantly high mean serum triacylglycerol level and low lipase activity in fasting and post-prandial state that is 4 hours after meal as compared to healthy control group.

Conclusion - In Nephrotic syndrome patients, hyperlipidemia and low lipase activity may accelerate atherosclerosis and progression of renal disease.

KEYWORDS

Nephrotic syndrome(NS), Serum triacylglycerol (TG), Serum lipase, Lipoprotein lipase (LPL)

INTRODUCTION

In disease state homeostasis is disturbed and metabolic status is altered, response of human body differs according to type and duration of disease. Such response of human body can be assessed by estimating parameters such as triacylglycerol and enzyme lipase to indicate extent of derangement of lipid metabolism.

Nephrotic syndrome is characterized by massive proteinuria, hypoalbuminemia, generalized edema and hyperlipidemia. Triacylglycerol are the esters of glycerol with fatty acids and act as primary fuel reserves of the human body. Liver and the adipose tissue are the major sites of triacylglycerol synthesis. Triacylglycerol are the storage form of lipids in the adipose tissue. Triacylglycerol in the body are hydrolysed by enzyme lipases which are hydrolases. Lipase is a small molecule which can be filtered through the glomerulus.

Triacylglycerol is sequentially hydrolysed by hormone sensitive lipase to free fatty acids and glycerol. Some of the fatty acids released by lipolysis pass into the blood stream and the remainder are used for resynthesis of triacylglycerol. Thus there is a continuous cycle of lipolysis and reesterification.⁽¹⁾

Fatty liver is the excessive accumulation of fat primarily triacylglycerol in the liver parenchymal cells. Liver is not a storage organ for fat, it contains about 5% fat. In pathological conditions this may go up to 25-30% and the condition is known as fatty liver.

Increased serum triacylglycerol is associated with increased risk of atherosclerosis.

Postprandial levels of parameters like TG and enzyme lipase are indicative of body's ability to metabolize nutrients.⁽²⁾

MATERIALS AND METHODS:

Group A consisted of 61 clinically diagnosed nephrotic syndrome patients attending outpatient Department of Lokmanya Tilak Municipal General Hospital. These were selected for this study after duly signing consent form, taking care they were not suffering from pancreatitis or any other acute diseases. Group B consisted of 60 age matched controls not suffering from pancreatitis, diabetic mellitus, nephrosis and any other chronic infections.

Blood samples were collected after 12 hours fasting and post-prandial 4 hours after meal in plain vacutainers. Serum samples were obtained after centrifuging these blood samples. Triacylglycerol and lipase estimations were carried out in the fasting as well as in the post-prandial four hours after meal samples in both Group A and Group B subjects. Triacylglycerol was estimated by enzymatic method.⁽³⁾ Lipase was estimated by colorimetric method.⁽⁴⁾

Statistical significance was established using unpaired students't test.⁽⁵⁾

RESULTS:

In this study there was significant increase in the serum triacylglycerol level in fasting and post prandial 4 hours after meal in Group A patients as compared to that of Group B controls. Serum lipase activity was significantly decreased in fasting and post prandial 4 hours after meal in Group A patients as compared to that of Group B controls. **TG mg%** These results are highlighted in table 1 along with statistical significance.

Table 1. Comparison of serum triacylglycerol and lipase activity in the study groups

PARAMETERS	Group A n = 61 mean $\pm$ SD	Group B n = 60 mean $\pm$ SD	'P' value
TG fasting mg %	255 $\pm$ 89	87.4 $\pm$ 20.1	< 0.001
TG * mg %	297 $\pm$ 109	98.5 $\pm$ 21.8	< 0.001
Lipase fasting umol/ml/hr	3.61 $\pm$ 1.53	8.16 $\pm$ 1.85	< 0.001
Lipase* umol/ml/hr	2.77 $\pm$ 1.14	6.94 $\pm$ 1.63	< 0.001

*Sample Taken Post prandial 4 hours after meal

Histogram 1: Showing Comparison Of Mean Value Of Tg Fasting And 4 Hrs After Meal In Study Groups

Histogram 2: Showing Comparison Of Mean Value Of Lipase Fasting And 4 Hrs After Meal In Study Groups

TG – serum triacylglycerol

$P < 0.001$ indicates statistically significant

Normal range - serum triacylglycerol – 50 to 150 mg%

Normal range – serum lipase activity – 2.0 to 7.5 micro mol/ml/hr = unit of lipase activity

In Group A patients the mean value of fasting TG was 255 ± 89 mg% and the mean value of TG post prandial after 4 hours meal was 297 ± 109 mg%

In Group B controls the mean value of fasting TG was 87.4 ± 20.1 mg% and the mean value of TG post prandial after 4 hours meal was 98.5 ± 21.8 mg%

In Group A patients the mean value of fasting lipase activity was 3.61 ± 1.53 units and the mean value of lipase activity post prandial after 4 hours meal was 2.77 ± 1.14 units. In Group B controls the mean value of fasting lipase activity was 8.16 ± 1.85 units and the mean value of lipase activity post prandial after 4 hours meal was 6.94 ± 1.63 units.

DISCUSSION:

The severity of the proteinuria and the degree of residual renal function contribute to the hyperlipidemia⁽⁶⁾. The research findings of Shipra Agrawal et al reveal that the complications of nephrotic syndrome including the increased risk of atherosclerosis and thromboembolism to be linked to dysregulated lipid metabolism and dyslipidaemia. These abnormalities include elevated plasma levels of cholesterol, triglycerides, VLDL, IDL and decreased hepatic lipase activity to name a few⁽⁷⁾.

The research findings of Nasratola Vaziri highlight increased serum cholesterol, triglycerides, VLDL and LDL. Nephrotic syndrome results in deficiencies of lipoprotein lipase and hepatic lipase. Serum triglyceride content elevated in nephrotic syndrome suggested the presence of hepatic lipase deficiency or dysfunction⁽⁸⁾. Our research findings are in complete agreement with the research findings of Shipra Agrawal et al and Nasratola Vaziri.

In our study it was observed that there were significant changes in triglycerides as well as in lipase activity values in samples post prandial 4 hours after meal. Jeffrey Metal in their research estimated serum triglycerides in the fasting state and after 2, 4, 6 and 8 hours after a meal. These researchers studied postprandial lipemia to determine if an increasing degree of chronic kidney disease results in a proportional increase in triglyceride concentration.⁽⁹⁾ The results of our study were statistically significant ($p < 0.001$). Post prandial TG reflects lipid abnormalities and is a better reflector of cardiovascular status than the corresponding fasting value in diabetes and prediabeters.⁽¹⁰⁾

CONCLUSION:

In our study we observed that patients suffering from NS have high triacylglycerol values compared to healthy controls. This makes them more prone to the risk of developing cardiovascular diseases and fatty liver. However in these patients a lowered lipase activity was observed which is resulting in higher TG values. To conclude NS patients should be monitored for serum TG and lipase activity so that fatty liver and cardiovascular diseases can be prevented in them.

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