

RESEARCH ARTICLE

BIO CHEMISTRY

CORRELATION OF SERUM LIPIDS AND GLUCOSE TOLERANCE TEST IN CHOLELITHIASIS



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ABSTRACT

The epidemiology of cholelithiasis has been debated for many years, the overall impression of an increasing and the common knowledge on risk factors are mainly based on hospital studies. Cholesterol gall stone in man is associated with abnormalities in the relative concentrations of the major biliary lipids like cholesterol and phospholipids. Hence, the present study is being undertaken to find out possible relationship between serum lipids, altered glucose tolerance in cholelithiasis which may be indicative of metabolic syndrome. A total 50 patients were taken for the study, among which 35 were female patients and 15 were males in the age group of 30-70 years. Plasma glucose, serum total cholesterol, HDL-cholesterol, triglycerides, and VLDL levels were estimated and LDL-cholesterol was calculated by Fried-walds formula. Oral glucose tolerance test was done according to the standard procedure. There was a significant increase in total cholesterol ($p < 0.01$), LDL cholesterol ($p < 0.01$) and an significant decrease in HDL cholesterol ($p < 0.01$) in cholelithiasis patients as compared to control subjects. The study shows a dearranged lipid metabolism in cholelithiasis patients and oral glucose tolerance was altered, only during post glucose load in female patients, so we conclude that altered glucose and lipid metabolism should be taken into consideration while treating these patients.

KEY WORDS

Cholelithiasis, oral glucose tolerance test, lipid profile, metabolic syndrome.

INTRODUCTION

The epidemiology of cholelithiasis has been debated for many years, the overall impression of an increasing and the common knowledge on risk factors are mainly based on hospital studies (1). Of varied pathologies affecting the biliary system, cholelithiasis happens to be the most prevalent. Gallbladder takes precedence over all other sites in the biliary system in formation of stone, owing to its physiological function of concentration of bile (2). Cholesterol gall stone in man is associated with abnormalities in the relative concentrations of the major biliary lipids like cholesterol and phospholipids. In general, the bile is saturated or supersaturated with cholesterol and a reduced size of the bile acid pool occurs in cholelithiasis. Though bile super saturation is necessary for gallstones to form, not all people with supersaturated bile form gallstones (3).

It is widely believed that diabetes mellitus and cholelithiasis are closely linked diseases, therefore an altered glucose metabolism may increase the risk of developing cholelithiasis in certain subjects (4). In recent years, a great deal of effort has been devoted to defining the pathophysiological basis of gallstone formation. The role of serum lipids in the etiology of cholelithiasis is very important and in cholesterol gall stones serum lipids are altered which is suggestive of metabolic syndrome. Metabolic syndrome is a cluster of conditions that includes obesity (especially belly fat), low HDL cholesterol, high triglycerides, high blood pressure and high blood sugar. Research suggests that metabolic syndrome is a risk factor for gallstones (5). The prevalence of the metabolic syndrome depends on age, ethnic

background, and gender. It rises linearly from 20 to 50 years and plateaus thereafter. Hence, the present study is being undertaken to find out possible relationship between serum lipids, altered glucose tolerance in cholelithiasis which may be indicative of metabolic syndrome.

MATERIALS AND METHODS

The study was carried out on patients with cholelithiasis admitted in inpatient department at J.S.S. Medical College Hospital, Mysore . A total 50 patients were taken for the study, among which 35 were female patients and 15 were males in the age group of 30-70 years. Patients with cholelithiasis had a history of pain in the right upper quadrant, and epigastric regions from the past 3 to 6 months, these patients were on treatment.

Exclusion criteria: Patients with renal failure, nephrotic syndrome, pancreatitis and cardiac failure were excluded from the study.

Sample collection and Biochemical estimations

Fasting venous blood samples were collected under strict aseptic precautions with informed consent of the patients and control subjects. Plasma glucose was estimated by GOD/POD method (6). Serum total cholesterol, HDL-cholesterol, triglycerides, and VLDL levels were estimated by enzymatic method (7). LDL-cholesterol was calculated by Fried walds

formula (8). Oral glucose tolerance test was done according to the standard procedure (9).

Statistical analysis

Analysis has been done on the basis of mean values, standard deviation, standard error and the t-test. The values are compared for the corresponding degree of freedom at 5% and 1% levels of significance. If the calculated value is greater than the table value, called the p-value the result is significant ($p < 0.05$).

RESULTS

The results of the study has shown in table 1, 2 and 3. There was a significant increase in total cholesterol ($p < 0.01$), LDL cholesterol ($p < 0.01$) and an significant decrease in HDL cholesterol ($p < 0.01$) in cholelithiasis patients as compared to control subjects. However, sex wise analysis of the HDL -cholesterol has revealed significant decrease ($P < 0.01$) in female patients, as compared to male patients. The triglyceride levels in both male and female patients are elevated compared to controls [$p < 0.01$] and oral glucose tolerance test showed no significance between the groups.

Table – 1
AGE, SEX AND PERSONAL HISTORY OF CONTROLS AND PATIENTS

	Controls (n = 50)	Patients (n = 50)
Age (Years) (Mean ± SD) Female	48.8 ± 12.7	48.6 ± 11.5
Age (Years) (Mean ± SD) Male	50.5 ± 10.3	51.1 ± 11.6
Vegetarian diet	72%	56%
Mixed diet	28%	44%
Alcohol use	20%	18%
History of diabetes mellitus	-	8%
Hypertension	-	2%

Table 2
SERUM CHOLESTEROL, LDL, HDL CHOLESTEROL AND SERUM TRIGLYCERIDE LEVELS

	Controls (n=50)	Patients (n=50)
Total cholesterol mg/dl (Mean ± SD)	196.9± 15.1	224.3 ± 42.4**
LDL cholesterol mg/dl (Mean ± SD)	114.2± 10.2	139.3 ± 23.8**
HDL cholesterol mg/dl (Mean ± SD) Female	52.49 ± 8.61	47.11 ± 5.11**
HDL cholesterol mg/dl (Mean ± SD) Male	53.00 ± 10.5	50.27 ± 7.64
Triglycerides mg/dl (Mean ± SD) Female	148.5 ± 21.7	185.1 ± 27.8**
Triglycerides mg/dl (Mean ± SD) Male	147.7 ± 17.9	185.9 ± 24.2**

* = Significant ($p < 0.05$)
 ** = Highly Significant ($p < 0.01$)
 *** = Very Highly Significant ($p < 0.001$)

Table – 3
ORAL GLUCOSE TOLERANCE TEST

	Controls n = 50	Patients n = 50
Fasting blood glucose mg/dl (Mean ± SD) Female	83.51 ± 8.2	88.3 ± 13.5
Fasting blood glucose mg/dl (Mean ± SD) Male	86.53 ± 9.14	90.5 ± 13.6
Sample – II mg/dl (Mean ± SD) Female	106.91 ± 7.79	111.34 ± 9.12*
Sample – II mg/dl (Mean ± SD) Male	110.4 ± 7.6	114.20 ± 9.22

* = Significant ($p < 0.05$)

** = Highly Significant ($p < 0.01$)

*** = Very Highly Significant ($p < 0.001$)

DISCUSSION

The present study was undertaken to know the levels of serum lipids namely, total cholesterol, LDL cholesterol, HDL Cholesterol, triglycerides and cholelithiasis and to find out the possible association of cholelithiasis with altered glucose tolerance by carrying out glucose tolerance test. The lipid profile and glucose tolerance test results were compared with control groups.

The age of the patients ranged from 35 to 70 years and incidence of cholelithiasis was observed more in female patients compared to male patients. In female patients the mean and standard deviation of the age was 48.6 ± 11.5 and that of male was 51.1 ± 11.6 .

In the present study, serum total cholesterol, LDL cholesterol, serum triglyceride levels were elevated significantly ($p < 0.01$) in both male and female patients compared to controls. Serum HDL cholesterol levels were decreased significantly ($p < 0.01$) in female patients of cholelithiasis, whereas the decreases was not significant in male patients. Pettiti D.B, et.al., Carl, Thijs and co-workers (10,11) observed that low serum HDL cholesterol levels and high serum triglyceride levels in patients with

cholelithiasis which is consistent with the present study.

In the present study, a positive correlation was observed between total cholesterol, LDL cholesterol, triglyceride levels in both female and male patients and negative correlation was observed with HDL cholesterol in female patients of cholelithiasis, which is comparable to the findings of other work done (12,13). Hyperlipidemia and obesity may affect cholesterol saturation in bile. Hence obesity hyperlipidemia and neuropathy are considered as important factors in cholelithiasis (14).

The glucose levels after an oral dose of 75 gms of glucose were found to be increased in female patients ($p < 0.05$) and such an increase was not found in male patients when compared with controls.

The occurrence of gallstone formation in diabetes mellitus is not clear. Adriano De Santis and co-workers (15) observed that an altered glucose tolerance in diabetics may increase the risk of developing cholelithiasis. The study shows a dearranged lipid metabolism in cholelithiasis patients and oral glucose tolerance was altered (only post glucose load) in female patients, so we conclude that altered glucose and lipid



metabolism should be taken into consideration

while treating these patients.

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