



## RESEARCH ARTICLE

## UNDISPUTABLE BEHAVIOUR OF LIPID PROFILE IN CHOLELITHIATIC GALL BLADDER

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**ABSTRACT**

In recent years, effort has been made to knowing the pathophysiological basis of gallstone formation. The role of serum lipids in the etiology of cholelithiasis is very important and in cholesterol gallstones serum lipids are altered, hence the aim of this study is to determine and analyze the changes in the lipid profile parameters and atherogenic index in gallstone patients. This was a cross sectional study conducted in a tertiary care hospital in South India from April 2012 to September 2012. A total of 80 subjects comprising of 40 healthy controls and 40 gallstone cases. In all the subjects, serum lipid profile and atherogenic index estimated. The gallstones received after colesystectomy examined grossly and categorized according to their morphology. Serum total cholesterol, LDL cholesterol and triglycerides levels increased in gall stone patients and HDL cholesterol level was decreased and patients with gallstones atherogenic index was high which is more likely to have additional risk factors for heart disease at young age, particularly in schools and colleges will help in reducing cardiovascular mortality.

**Key words:** Cholelithiasis, lipid profile, atherogenic index

**INTRODUCTION:**

Gall stones or cholelithiasis (chole=bile, lithier=stone & sis=process) are the most common digestive diseases worldwide. They can occur anywhere within the biliary tree, including the common bile duct [1]. Most of the gallstones patients present with severe abdominal pain requiring investigations and treatment. Many of them need surgical intervention by the time they are symptomatic [2].

The chemical composition of gallstones is essential to study the etiopathology of gallstone disease [3]. Hence, Gallstones are classified into: cholesterol stones, pigment stones and mixed stones. However, all stones even pure cholesterol gall stones also usually contain small amounts of bilirubin. The prevalence of gallstones continues to rise with age, and it is higher in women than in men. This may be due to the increase of cholesterol content in the bile by the effect of estrogen [4].

It is now widely accepted that the primary event in pathogenesis of cholesterol gallstones is an altered lipid metabolism because of which there is a relative increase in the cholesterol levels compared to other lipids secreted by the liver into the bile [5]. Cholesterol is water insoluble lipid, and is taken in mixed micelle and vesicles [6]. Cholesterol super saturation in bile secreted by the liver is the prerequisite of gallstone formation [7]. However now recent investigators mentioned that other

factors including nucleation of cholesterol crystals with mucin, and hypo motility of gallbladder also played an equally important role [5].

The relative concentrations of cholesterol, bile salts and phospholipids determine the cholesterol solubility in bile. Cholesterol precipitation results from an imbalance of these three components in bile; cholesterol, bile salts and phospholipids. These changes in bile composition are closely related to the disorders of lipid metabolism in liver. However, during the formation of cholesterol gallstones, different links in the disturbance of lipoprotein cholesterol metabolism and their effects in lithogenesis still have many controversies [6].

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 gallstones serum lipids are altered which is suggestive of metabolic syndrome [8]. Hence, the aim of this study is to determine and analyse the changes in the lipid profile parameters such as total cholesterol, triglycerides, HDL cholesterol, LDL cholesterol, VLDL cholesterol and atherogenic index in gallstone patients. The present study was done with the following objectives

1) To study the lipid profile in patients with gallstone patients and healthy controls.

2) To study atherogenic index in context with gallstone disease

#### MATERIAL AND METHODS:

This was a sectional study conducted at tertiary care hospital in South India from April 2012 to September 2012. The study was approved by Institutional ethics committee. Informed consent was taken from all the patients.

#### Inclusion Criteria:

- 1) Cases: 40 cases of clinically and radiologically diagnosed gallstone patients included in the study.
- 2) Controls: 40 normal healthy individuals were included in the study.

#### Exclusion Criteria:

- 1) Patients with Diabetes mellitus, Hypothyroidism, Familial hyperlipoproteinemia and Obstructive jaundice are excluded from the study.

#### Collection of blood sample:

About 5ml of fasting venous sample collected from large peripheral vein under aseptic precaution. The samples are centrifuged at 3500 rpm for 10 minutes and serum is collected from the centrifuge tube. The gallstones received after colesystectomy examined grossly and categorized according to their morphology. The gallstones are then analyzed biochemically to ascertain their composition using kit from Agappe diagnostics. The gallstones are then washed, dried and powdered. The powdered stones are divided into two parts. One part is used to test cholesterol and the other for bile pigments.

#### Estimation of serum cholesterol:

Serum cholesterol is estimated by Dynamic extended stability CHOD-PAP method using kit from Agappe diagnostics. Low density lipoproteins (LDL) and very low density lipoproteins (VLDL) and free cholesterol precipitated by addition of phosphotungstic acid in the presence of magnesium ion.

#### Serum HDL cholesterol:

After centrifugation, the HDL cholesterol fraction remained in the supernatant determined by immunoinhibition, end point method using kit from Agappe diagnostics.

#### Serum triglycerides:

The triglyceride concentration is estimated by method of GPO-PAP using kit from Agappe diagnostics

#### Serum VLDL cholesterol:

Very low density lipoprotein cholesterol calculated by dividing serum triglyceride concentration by five.

#### Serum LDL cholesterol:

LDL cholesterol is calculated as  
 $LDL\ cholesterol = Total\ cholesterol - (VLDL + HDL)$

#### Atherogenic index:

Atherogenic index is calculated as the ratio of Triglyceride conc. to HDL

$Atherogenic\ index = TG/HDL$

#### Statistical analysis:

The data that is collected has been analyzed on the basis of mean values, standard deviation, t-test and chi square test. The values are compared for the corresponding degree of freedom at 10% levels of significance.

$P < 0.05 =$  Significant

$P < 0.01 =$  highly significant

## RESULTS

Table 1: Comparison of lipid profile of gall stone patients with control

Parameter	Controls n=40	Patients n=40
Triglycerides (mg/dl)	98.35±34.87	144.19±12.70*
Total cholesterol (mg/dl)	150.79±29.31	175.83±12.68*
HDL cholesterol (mg/dl)	37.48±10.95	30.95±4.42**
LDL cholesterol (mg/dl)	93.74±25.08	115.76±12.01*
VLDL cholesterol (mg/dl)	20.4±8.19	29.14±2.64**
Atherogenic index	2.79 ±1.21	4.75±0.78**

\*significant

\*\*highly significant

Table 2: Comparison of lipid profile among cholesterol stone patients and mixed stone patients

Parameter	Cholesterol stones (n=14)	Mixed stones (n=24)	P value
Age in years	51.65± 5.9	52.75±8	NS
Triglycerides (mg/dl)	147.5± 11.01	144.9± 12.3	NS
Total cholesterol (mg/dl)	187.4± 11.2	170.2± 9.4	NS
HDL cholesterol (mg/dl)	29.64 ±3.7	30.8 ±4.4	NS
LDL cholesterol (mg/dl)	127.9 ±9	109.9± 8.1	NS
VLDL cholesterol (mg/dl)	29.57 ±2.2	29.45± 2.63	NS
Atherogenic index	5.02 ±0.55	4.79± 0.77	NS

NS = not significant

When comparison was made among the lipid levels of patients on the basis of morphology of gallstones, the changes were not significant (pigment gallstones were excluded in comparison due to very less samples). Although the triglyceride, total cholesterol, LDL cholesterol and atherogenic index in cholesterol patients are higher than that of mixed stone patients, but it is not statistically significant

#### DISCUSSION:

The present study was undertaken to know the levels of serum lipids namely, Total cholesterol, Triglycerides, HDL cholesterol, LDL cholesterol, VLDL cholesterol and atherogenic index in gallstones patients. The lipid profile results were compared with that of control group. In the present study, serum total cholesterol, triglycerides, and LDL cholesterol show significant increase where as serum HDL cholesterol shows significant decrease. This is in accordance with the study of Devaki R.N, et.al[8] and Tanden RK, et al [9] where high levels of TC, LDL cholesterol, TG and low HDL cholesterol observed in patients with gallstone which is consistent with the present study.

Many studies have shown that untreated gallstone patient present with hypercholesterolemia, the actual mechanism behind it is still unknown [10]. In this study high total cholesterol was observed, this may be due to two mechanisms, one Gallstone patients have abnormal secretary mechanism for bile acids and phospholipids and some of gallstone patients present with metabolic syndrome which is associated with altered lipid levels [4]. HDL cholesterol is significantly decreased in all the groups of gallstone patients as compared to controls. Previous investigators reported that the high cholesterol levels may be caused by presence of an abnormal LDL level in patients of intrahepatic or extrahepatic cholestasis and low HDL levels with an abnormal HDL component [6]. This suggests that the changes in serum lipid profile are a

possible consequence of the presence of gallstones, especially in the biliary tract.

In recent years, the etiology of cholelithiasis is thought to be closely related to metabolic syndrome, since the serum lipids are altered in gallstone patients [8]. Patients presenting with renal stones are fully assessed for an underlying metabolic disorder but this is not an established practice for patients with gallstones. In many of the studies related to gallstones, hypercholesterolemia was the most common abnormality in both the sexes, which is consistent with the present study. Hence the patients with gallstones are more likely to have additional risk factors for heart disease due to high atherogenic index [11].

#### Limitations of the study:

The sample size was small and was conducted at only one centre. Future studies should be multicentre with a large sample size.

#### CONCLUSION:

Present study demonstrates elevated serum total cholesterol, LDL cholesterol and triglycerides and decreased levels of HDL cholesterol in gallstone patients in Bijapur district population of Karnataka which may play a major role in the pathogenesis of gallstone and patients with gallstones are more likely to have additional risk factors for heart disease because of high atherogenic index. Hence the altered lipid metabolism should also be taken into account while treating these patients.

**Conflict of interest:** None

#### ACKNOWLEDGEMENT:

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