

# Effect of cholecystectomy on lipid profile and common bile duct

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## Abstract

**Background and Objective:** Gallstones represent a significant public health problem in modern societies, affecting 10% to 15% of the adult population. The types of gallstones include mixed, cholesterol and pigment stones. This study was aimed to evaluate the serum lipid profile and common bile duct diameter in patients with gallstones pre-operatively and post operatively and to establish the effect of cholecystectomy on lipid profile and common bile duct dimensions.

**Materials and Methods:** The study was conducted in Narayana Medical College and Hospital, Nellore, Andhra Pradesh, India. This was a prospective observational study carried out from August 2019 to March 2020.

**Results:** Out of total 50 cases, 29 cases (58%) were female and remaining 21 cases (42%) were male. Highest number of cases were in the age group 30-40 years (38%) followed by 30% between 40 to 50 years of age. In the present study, there was decrease in Total Cholesterol levels, Low density lipoprotein (LDL) and Very low density lipoprotein (VLDL) levels 1 week after surgery, 1 and 3 months after surgery. Triglycerides (TG) levels initially increased after 1 week and decreased significantly 1 and 3 months after surgery. Significant increase in HDL levels are seen after 1 week which continued till 3 months after surgery.

The current study showed a significant increase in CBD diameter of 0.53, 0.76 and 1.07 mm in 1 week, 1 month and 3 months respectively after surgery.

**Conclusion:** It can be concluded from this study that cholecystectomy results in normalization of lipid levels. And also increases the diameter of Common bile duct but within physiological limits of that age and sex group

**Keywords:** Gallstones, cholecystectomy, Cholesterol, Triglycerides, VLDL.

## Introduction

Gallstones represent a significant public health problem in modern societies, affecting 10% to 15% of the adult population <sup>[1]</sup>. The types of gallstones include mixed, cholesterol and pigment stones <sup>[2]</sup>. The major contents of gallstones are cholesterol, bilirubin (conjugated and unconjugated) and calcium. The constitutional risk factors for gallstones include female gender, elderly age group and interaction between genetic and environmental factors. Pure Cholesterol stones are associated with metabolic syndromes which is defined as a group of risk factors which include central obesity, increased levels of triglycerides and decrease in levels of HDL lipoprotein.

Gall bladder disease is more common in patients with hyperlipidemia Type IV <sup>[3]</sup>. Major factors that govern stone formation are: Super saturation of bile with cholesterol, enhanced nucleation of cholesterol crystals, impaired gallbladder emptying <sup>[4]</sup> with stasis along with decreased bile acid pool are the pathologic mechanisms responsible for cholesterol gallstones

formation. The normal range of Common bile duct diameter (CBD) size depends on age. Siegel stated that in infancy the normal CBD size should be <2 mm, in childhood <4 mm, and 7 mm after adolescence <sup>[5]</sup>.

Post cholecystectomy the common bile duct dilates in an effort to restore the storage function of gall bladder and helps in metabolism of lipids. A positive association of occurrence of gallstone diseases and lower levels of high-density lipoprotein cholesterol (HDL-c) and high triglycerides (TG) has also been demonstrated in the past literature.

## AIM

This study was aimed to evaluate the serum lipid profile and common bile duct diameter in patients with gallstones pre-operatively and post operatively and to establish the effect of cholecystectomy on lipid profile and common bile duct dimensions.

## Materials and Methods

This was a prospective observational study conducted in Narayana Medical College and Hospital, Nellore, Andhra Pradesh, India, from August 2019 to March 2020.

### Inclusion criteria

- Age between 25-60 years.
- Symptomatic gallstones patients.

### Exclusion criteria

- Patients less than 25 years of age
- Patients more than 60 years of age
- Patients on lipid lowering agents
- Patients with history of renal failure, cardiac failure, morbid obesity.
- Patients who are immune-compromised.

### Plan of study

All cases diagnosed and admitted in the hospital were considered for the study. All were screened for inclusion and exclusion criteria's and those who were eligible for the study were explained about the study and asked for the voluntary consent. Those who had given written consent were proceed further.

### Statistical Analysis

Data from each patient was collected and tabulated using Microsoft Excel. Each corresponding variable from both pre-operative and post-operative groups was be compared separately using the paired T-Test. Preoperative values were compared with different post-operative time interval i.e., 7th day, one month, 3rd month. Both Lipid profile and CBD diameter values were presented in mean and standard deviation. P value less than 0.05 was considered as statistically significant at 95% confidence interval.

### Demographics

Out of total 50 cases, 29 cases (58%) were female and remaining 21 cases (42%) were male. This study included cases between 20 to 60 years of age. Highest number of cases were in the age group 30-40 years (38%) followed by 30% between 40 to 50 years of age.

## Results

	Pre-op	Post-op		
		1 week	1month	3month
Mean TotalCholesterol	185.13±21.93	177.11± 22.5	172.27±20.73	166.30±19.87
Mean Triglycerides	155.44±18.54	162.98±18.54	153.72±17.12	144.22±17.14
Mean LDL	104.76±15.33	91.64±14.0	89.69±13.67	87.27±13.17
Mean Serum HDL	43.90±9.23	51.86±9.86	54.18±8.69	54.44±10.83
Mean Serum VLDL	36.50±3.56	33.94±4.01	28.40±3.87	24.59±3.65
CBD Diameter	4.39±0.78	4.91±0.87	5.15±0.96	5.45±0.91

	Difference between Pre-op and Post-op (P value)		
	1 week	1month	3month
Mean Total Cholesterol (mg/dl)	7.53 (<0.01)	12.73 (<0.01)	18.70 (<0.01)
Mean Triglycerides (mg/dl)	-7.54	1.72 (<0.13)	11.22 (<0.01)
Mean LDL (mg/dl)	13.12 (<0.01)	15.07(<0.01)	17.49 (<0.01)
Mean Serum HDL (mg/dl)	-7.96 (<0.01)	-10.28 (<0.01)	-10.54 (<0.01)
Mean Serum VLDL (mg/dl)	2.56 (<0.01)	8.10 (<0.01)	11.91 (<0.01)
CBD Diameter (mm)	-0.52 (<0.01)	-0.76 (<0.01)	-1.07 (<0.01)

## Discussion

The existence of a relationship between gallstones and serum lipids is an old belief based on the fact that most gallstones contain cholesterol as one of their constituents. In our study the mean cholesterol levels are 184.68mg/dl. Only 13 patients had cholesterol levels more than 200 mg/dl in our study. No individual has cholesterol levels more than 240mg/dl in our study. In this study, we found that all the values in lipid profile except the HDL cholesterol decreased significantly 1 and 3 months postoperatively. Similar results were found in the literature with decreased serum levels after cholecystectomy.

All the other studies like Al-Kataan MAG *et al.* [6], Jindal N *et al.* [7] and Pettiti BD *et al.* [8] showed similar findings. Lowering cholesterol levels in the post-cholecystectomy period has been assessed to improve bile cholesterol solubility due to faster circulation of bile acid pools in fasting cholecystectomy patients [9].

In the present study, there was decrease in Total Cholesterol levels, Low density lipoprotein (LDL) and Very low density lipoprotein (VLDL) levels 1 week after surgery, 1 and 3 months after surgery. Triglycerides (TG) levels initially increased after 1 week and decreased significantly 1 and 3 months after surgery. Other studies have shown similar results. In our study the HDL cholesterol levels increased significantly after the cholecystectomy. This effect is in contrast to a study by Malik *et al.* [10] who reported no change in HDL-C levels after 6 months of surgery.

The idea that the removal of the gallbladder causes bile duct dilatation as a physiological alteration was first put forth in the 1880s. The loss of the gallbladder's storage function following its excision was suggested to be the cause of CBD dilatation, which was supported by an animal experiment [11]. Then, in contrast to normal cases of human autopsy samples, dilatation of the bile duct was demonstrated in the case after gallbladder removal [12]. Although several cross-sectional studies showed that patients who had their gallbladders removed had larger CBD diameters than healthy individuals, the magnitudes and frequency of dilatation varied according to each investigation [13].

A prospective study conducted in Hong Kong examined the CBD diameter before and after cholecystectomy by ERCP, and found that 88.6% of 35 patients had a dilatation of approximately 2.0 mm, and the degree of dilatation varied over time. was found to increase in proportion to a period of 4 to 14 months [14]. However, in a Taiwanese study, 197 patients

showed mild CBD dilatation of 5.9 to 6.1 mm, and the degree of dilatation was not associated with time<sup>[15]</sup>.

The current study showed an increase in CBD diameter of 1.07 mm, 3 months after surgery. These results indicated CBD expansion which is less when compared to other studies. Patients presenting with biliary dilatation in this study were found to be asymptomatic with normal Liver Function Test. The study was performed on repeated measurements contrasting all his CBD areas and measuring the widest CBD diameter, so it can be determined to be meaningful and accurate. Although bile duct size is not significantly affected by patient sex, weight, or height, it has been reported to be highly correlated with age.

## Conclusion

It can be concluded from this study that cholecystectomy results in normalization of lipid levels and also increases the diameter of Common bile duct but within physiological limits of that age and sex group

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