

Comparison of Pre-Operative and Post-Operative Lipid Profile in Laparoscopic Cholecystectomy Patients: A Prospective Study

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Abstract:

Background: Cholelithiasis is a common surgical condition with an incidence of 1.4 per 100 persons per year worldwide. Based on evidence more than 50% of cholelithiasis have some sort of lipid disorder. Owing to one of the important causes of hospitalization surgical intervention is required for cholelithiasis for which Laparoscopic cholecystectomy has gained popularity. Removal of the Gall bladder is known to affect the production of bile acid and it causes re-distribution of bile in the enterohepatic circulation thus causing changes in the lipid profile.

Aim: This study aims to study levels of various constituents of the lipid profile of patients with cholelithiasis pre- & post-operatively on the 7th day and one month after surgery.

Materials and Methods: The prospective study was carried out on 33 patients of cholelithiasis admitted to the Surgery Department of Al-Falah School of Medical Sciences and Research Center, Faridabad, Haryana, India from July 2022 to June 2023 and who underwent Laparoscopic Cholecystectomy. Open Cholecystectomy and those in whom conversion from laparoscopic to open cholecystectomy were not included. The Lipid profile was evaluated pre-operatively and post-operatively on the 7th day and one month after the surgical procedure.

Results: 33 patients were included in this study of which 26 were female and 7 were male. The participants were in the age group of 19 – 60 years with a mean age of 37.3 years. The mean of Pre-operative serum cholesterol was 168.5 ± 0.33 mg/dl which increased to a mean value of 224 ± 0.67 after one week and the level decreased to 168.5 ± 0.6 after one month. The mean Pre-operative serum triglyceride was 148.8 ± 0.02 mg/dl though it rose to 166 ± 2.5 mg/dl on the 7th day but declined significantly to 137 ± 12 mg/dl. Total Serum LDL pre-operatively had a mean of 89.2 ± 0.6 mg/dl though increased slightly after 7 days but decreased to 84 ± 0.9 mg/dl, a significant decrease from pre-operative value. The serum HDL pre-operative mean was 52 ± 0.03 mg/dl though declined after 7 days but almost reached pre-operative values one month post-operatively.

Conclusions: Serum Triglycerides and Serum LDL cholesterol levels decreased postoperatively but serum cholesterol and serum HDL levels remained unchanged postoperatively.

Keywords: Cholelithiasis, Cholecystectomy, Cholesterol, Triglycerides and LDL.

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Introduction

Cholelithiasis is one of the frequent surgical diseases requiring a spectrum ranging from asymptomatic cases to acute inflammation of the bladder [1,2] About 10-15% of the adult population is known to present with stones in the Gall-bladder with obesity, advancing age, metabolic disorder and female sex as the common risk factor. Owing to one of the common causes of hospital admission is operative treatment for symptomatic gall bladder

stones, for which Laparoscopic Cholecystectomy has been the Gold standard treatment within the last few years [3, 4]. Cholelithiasis is known to be involved with lipid disorders [5, 6, and 7]. So removal of the Gall bladder is therefore known to affect the production of bile acids and lipid metabolism [11]. Dyslipidemia is reported to be a risk factor for Cholelithiasis [4, 8, and 9] and is present in more than 50% of patients [10, 11]. The

gallbladder supports the maintenance of lipid homeostasis in the human body. The gallbladder plays an essential role in the digestion and absorption of lipids by concentrating and storing hepatic bile. Peripheral uptake and cholesterol synthesis are mainly located in the hepatocyte, and excess cholesterol is converted into bile salts or directly secreted into bile [16]. Digestion and absorption of dietary fats and lipid-soluble vitamins are normal after cholecystectomy [17]. The bile acids pool has an unchanged size, but it has fast circulation, which exposes the enterohepatic organs to an increased flux of bile acids per day in cholecystectomized patients [18 – 21]. Due to the fast circulation of the bile after cholecystectomy, the higher flux of molecules of bile acids per unit time could affect blood lipid levels. This study aims to evaluate levels of different constituents of the lipid profile of Cholelithiasis patients before Cholecystectomy, after Cholecystectomy 7 days and one-month surgery. We hypothesize that Cholecystectomy is associated with changes in lipid metabolism in terms of lipid profile.

Method

This prospective study was carried out on 33 patients of Cholelithiasis admitted to the surgery Department of Al-Falah School of Medical Science

& Research Centre, Faridabad, and Haryana, India from July 2022 to June 2023 who underwent laparoscopic Cholecystectomy. Open Cholecystectomy and those who were converted from Laparoscopic to open Cholecystectomy were not included. Blood samples from these patients were sent for laboratory testing. Patients were evaluated and their complete profile was recorded after taking their history. The diagnosis was confirmed by ultrasound. Informed consent was taken before the study. The patients suffering from diseases that alter lipid profiles like renal failure, hypothyroidism, and diabetes were not taken in the study. Complete lipid profiles which included serum cholesterol, serum Triglycerides, serum HDL and serum LDL were evaluated pre-operatively and post-operatively 7 days and after one month of surgery. For lipid profile estimation 10 ml of blood sample was taken on these days.

Result

Thirty-three patients undergoing laparoscopic cholecystectomy participated in this study. The participants belonged to the age group of 19 to 60 years. The mean age was 37.3 years. Among them, male participants are 07 (21%) and the rest 26 (79%) female patients. All patients with comorbidity were excluded.

Table 1: Showing mean levels of total lipid profile (mg/dl) in patients with gall stones pre-operatively, 1 week post-operatively and 1 month post-operatively

Time of Sampling	Pre-operative Level (Mean in mg/dl)	One week Post-operative Level (Mean in mg/dl)	One month Post-operative Level (Mean in mg/dl)	P-Value
Total Serum Cholesterol	168.5 ± 0.33	224±0.67	168.5±0.6	0.036
Total Serum Triglyceride	148.8±0.02	166±2.5	137±12	0.004
Total Serum HDL Cholesterol	52.2±0.03	46±0.4	50±0.7	0.011
Total Serum LDL Cholesterol	89.2±0.6	93±0.37	84±0.9	0.004

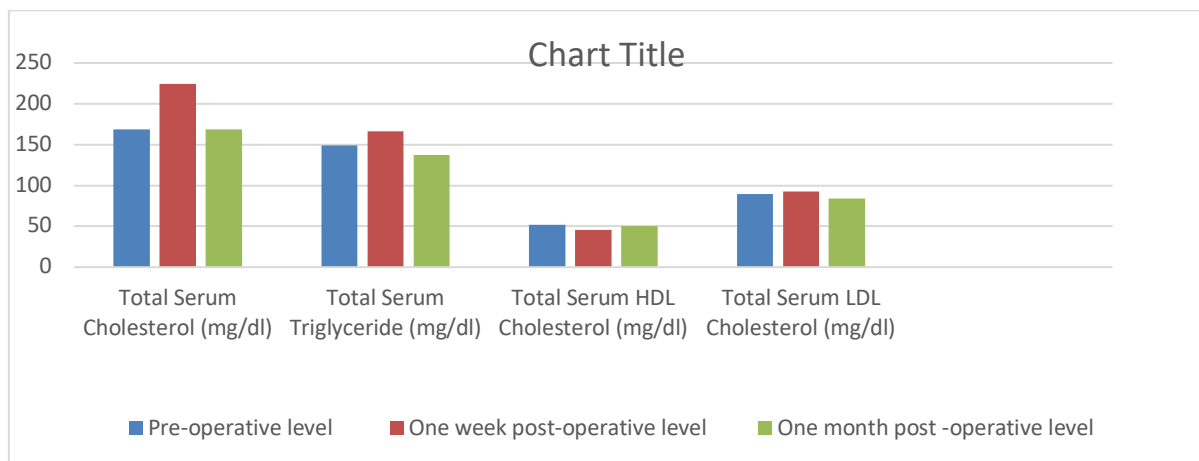


Figure 1: Bar Chart showing levels of Serum Total Cholesterol, Triglyceride, HDL, VLDL and LDL; Pre operatively, one week and one month Post-operatively

Total Serum cholesterol

Pre-Lap Cholecystectomy, the total serum cholesterol level ranges from 102-258 mg/dl with a mean value of 168.5 ± 0.33 mg/dl. This level increases to a mean value of 224 ± 0.67 (range of 121-260mg/dl) after one week post-operatively and the level goes on further declining up to a mean level of 168.5 ± 0.6 (ranging from 94- 280mg/dl) one month post-operatively. P-value: 0.036

Triglyceride level

Preoperatively the level of Serum Triglyceride ranges from 47-628 mg/dl with a mean value of 148.8 ± 0.02 mg/dl. After 7 days of surgery, this level significantly rises to a mean level of 166 ± 2.5 mg/dl (range 71-346mg/dl). But again one month post-operatively level declined somewhat upto 137 ± 12 mg/dl (range: 60-358mg/dl) but even slightly less than pre-operatively. P- value: 0.004 (<0.05)

High-Density Lipoprotein (HDL) Level

The mean HDL level pre-operatively was found to be 52 ± 0.03 mg/dl ranging from 31-118 mg/dl. This level significantly declines following one week of surgery up to 46 ± 0.4 mg/dl with a range of 30-86 mg/dl. Again this declined level rises to 50 ± 0.7 mg/dl (range 35-66 mg/dl) which is almost approaching pre-operative level. P-value: 0.011 (<0.05)

Low-Density Lipoprotein (LDL) Level

Pre-operative level of LDL ranges from 11-159 mg/dl with a mean value of 89.2 ± 0.6 mg/dl. This level rises very slightly to a range of 61-138 mg/dl with a mean value of 93 ± 0.37 mg/dl one week post-operatively and further declining significantly one month post-operatively ranging from 29-181 mg/dl with a mean value of 84 ± 0.9 mg/dl which is lesser than pre-operative value. P-value: 0.004 (<0.05) In this study, no significant change was found in the levels of serum total cholesterol. Although there is a significant decline for Triglyceride levels after one month post-operatively.

This is also statistically highly significant. P- value: 0.004 (<0.05). Conversely, Serum HDL level also declines post-operatively. P-value: 0.01 (<0.05). VLDL levels are raised significantly one month postoperatively. P-value: 0.005 (<0.05). LDL level also declines significantly one month post-operatively compared with pre-operatively with P-value: 0.004

Discussion

Our study shows that patients who went for Laparoscopic cholecystectomy were in the age group of 19 - 60 years with a mean age of 37.3 years. The percentage of females in this study is in alignment with the studies conducted by Pradhan

SB et al [10] Jindal N et al (11) and Gaharwar A et al [12]. The existence of relationships between Cholelithiasis and serum lipids is based on the fact that the majority of gallstones contain cholesterol as one of the constituents. In this study, the mean serum cholesterol pre-operatively was 168.5 ± 0.33 mg/dl which increased to 224 ± 0.67 mg/dl after one week and level decreased to 168 ± 0.6 mg/dl after one month. This increase in cholesterol after gall bladder surgery can be linked to an increase in cholesterol utilization or can be related to a known increase in the synthesis of other steroids during and following surgery and is seen as a healing process. This is by the study conducted by Ali Pooria et al in Annals of Medicine & Surgery 79/2022 [24].

In our study, Serum triglyceride pre-operatively was 148.8 ± 0.02 mg/dl and increased to 166 ± 2.5 mg/dl then decreased to 137 ± 12 mg/dl. In a study by Jindal N et al, there was a continuous decrease in the levels of serum triglyceride on the 7th Post-operative day and one month after surgery. A study conducted by Al Kataan MAG et al [13] showed that serum triglyceride increased on the 7th post-operative day and decreased after one month, in consonance with our study. Serum LDL levels in our study pre-operatively were 89.2 ± 0.6 mg/dl which decreased to 84 ± 0.9 mg/dl after one month.

This decrease has been documented by Jindal N et al [11], Pettiti DB et al [14], and Al Kataan MAG et al [13] who show similar study results. Serum HDL Pre-operatively was 52.2 ± 0.03 mg/dl though decreased after 7 days post-operatively but came to almost normal pre-operative levels within one month. Several studies have reported the impact of cholecystectomy on lipid levels. Malik et al [22] reported a significant reduction in the plasma concentration of triglycerides, total cholesterol, and LDL cholesterol in patients on the third day of surgery. Van der Linden et al [23]. Demonstrated that removing the gallbladder caused irregular but accelerated flow of activity to the duodenum using ^{99m}Tc-HIDA. Decreased serum LDL and serum cholesterol levels may be associated with this higher flux of bile per unit time. Accelerated enterohepatic bile flow causes more excretion of bile acids and cholesterol from the liver. It may result in lower blood cholesterol levels. Cholecystectomy does not negatively affect normal health status or total metabolic regulation. This study included a positive effect of cholecystectomy [17].

Conclusion

The study was conducted on 33 patients of cholelithiasis with were operated. We studied the lipid profile of this patient pre-operatively 7th day and one month after cholecystectomy. The mean age of gallstones in our study was 37. 3 years with

a female-male ratio of almost 3.7:1. The Serum cholesterol, Serum Triglycerides and Serum LDL levels increased on the 7th post-operative day but only serum triglycerides and serum LDL decreased one month after cholecystectomy.

Serum cholesterol and Serum HDL levels almost remained the same one month after cholecystectomy.

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