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The effect of cholecystectomy for symptomatic gall stone disease on hepatic steatosis using transabdominal ultrasonography: An observational prospective study

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ABSTRACT

Objective: Hepatic steatosis and gallstones are common in the general population, with risk factors being multifactorial. Experimental studies have shown that cholecystectomy increases hepatic steatosis and leads to non-alcoholic fatty liver disease (NAFLD). In order to evaluate this, the current study was carried out in the department of general surgery at a medical school, in the north of India.

Material and Methods: One hundred and three patients awaiting cholecystectomy were selected after written informed consent. Their baseline characteristics were captured preoperatively and thereafter followed at 3rd month with liver function test (LFT), lipid profile and ultrasound (USG) abdomen.

Results: Average age of the patients enrolled was 41.62 ± 13.62 years and mean body mass index (BMI) was 25.96 ± 1.73 kg/m^2. Total bilirubin (0.56 vs 0.76, $p< 0.0001$) and direct bilirubin (0.15 vs 0.27, $p< 0.0001$) decreased significantly post cholecystectomy as compared to preoperative values. Levels of serum glutamic-oxaloacetic transaminase (SGOT) (49.14 vs 34.98 IU/dL), serum glutamic-pyruvic transaminase (SGPT) (50.85 vs 35.46 IU/dL) and alkaline phosphatase (ALP) (101.16 vs 85.97 IU/dL) increased significantly post-surgery. Cholesterol values (146.28 vs 168.77 mg/dL), triglycerides (TGs) (119 vs 133.56 mg/dL), low density lipoprotein (LDL) (93.32 vs 113.05 mg/dL) and very low density lipoprotein (VLDL) (18.68 vs 27.45 mg/dL) decreased significantly while high density lipoprotein (HDL) (48.96 vs 42.42 mg/dL) increased significantly at three month follow-up. Prevalence of fatty liver increased post operatively with a rise in Grade 1 steatosis (75%). Severity of fatty liver increased with (8.73%) Grade 3 steatosis on USG post-surgery. Hence, new patients with formerly normal USG reports developed fatty liver and those with preexisting liver steatosis seemed to worsen.

Conclusion: The study concluded that the prevalence of fatty liver increased post-cholecystectomy. Lipid profile parameters improved favorably with a decline in total cholesterol, TG, LDL and VLDL versus increase in HDL. LFT parameters also changed significantly.

Keywords: Cholecystectomy, hepatic steatosis, liver function test, lipid profile, ultrasound abdomen

INTRODUCTION

Cholelithiasis is one of the most common diseases of the gastrointestinal tract, and patients often present with symptoms of biliary colic or sometimes with acute abdomen. Subsequently, cholecystectomy (laparoscopic) has become one of the most commonly performed surgical procedures worldwide (1). However, metabolic consequences following elective cholecystectomy have not been properly studied. Risk factors such as age, obesity and hyperlipidaemia are associated with cholelithiasis subsequently giving a solid argument for considering cholelithiasis as a part of metabolic syndrome. Metabolic syndrome is a multisystem disorder with diabetes, hypertension and central obesity as major components with insulin resistance suggested to be at the centre of it all (2). The gallbladder plays a major role in the regulation of bile storage and its enterohepatic circulation. With cholecystectomy, human body loses reservoir function of the gallbladder and hence, the bile gets continuously secreted into the gastrointestinal tract with subsequent shortening of enterohepatic circulation on bile acid pool ultimately exposing the liver to a higher flux of bile acids. Bile acids play a notable role in dietary lipid and cholesterol homeostasis. The gallbladder mucosa is metabolically active and is responsible for secreting and absorbing compounds to and from the bile, which are intricately associated with lipid metabolism (3). Following cholecystectomy, the body has to adapt to the altered milieu of lipid metabolism. Removal of the gallbladder eliminates the formation of cholesterol solid-plate crystals, which form in

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the gallbladder and are not able to be absorbed by the intestine. Therefore, cholecystectomy can increase the proportion of cholesterol that is reabsorbed and delivered to the liver, facilitating an increase in hepatic triglycerides concentration (4,5). Following the removal of the gallbladder, bile acid (BA)s are continuously secreted into the small intestine, and the BAs pool circulates faster, inducing increased cycling of the BA pool and thus expose the liver to a greater flux of BAs and the occurrence of metabolic derangements (6). Through this study, it was aimed to gain further insight into the metabolic changes in the body post cholecystectomy and to establish it as a risk factor for developing hepatic steatosis.

In order to find out the effect after cholecystectomy on hepatic steatosis, transabdominal ultrasound was done at three-month follow up along lipid profile and liver function test (LFT).

MATERIAL and METHODS

Study design and sample size: The present study was conducted as a prospective observational study among eligible patients undergoing cholecystectomy for chronic calculous cholecystitis from February 2023 to January 2024 in the department of general surgery at a medical school in the north of India. Written informed consent was obtained from all patients before inclusion into the study. The procedure was conducted in accordance with the Helsinki Declaration-2013. A total of 103 patients having symptomatic gallstone disease requiring cholecystectomy were enrolled in the study using convenience sampling method based on the patient load.

Inclusion and exclusion criteria: After getting approval from the Institutional Ethics Committee and written informed consent of the participants, a prospective observational study was conducted. Ultrasonography was the mainstay for preoperative diagnosis of gall stone disease and was performed by two experienced radiologists of the institute both in the preoperative period and postoperative follow-up. Patients aged 18-80 years having symptomatic gallbladder disease scheduled to undergo cholecystectomy were included in the study while patients who underwent cholecystectomy for cancer, with previous history of alcohol consumption, had pre-existing liver disease, had ischaemic cardiac or cerebrovascular disease, were on drugs causing steatosis (oestrogens, amiodarone, steroids, tamoxifen or lipid lowering agents), were affected by chronic viral hepatitis (HBsAg or HCV), were pregnant, had diabetes mellitus, and body mass index (BMI)> 30 kg/m^2 were excluded from the study.

Methods: The study involved screening of the patients presenting at the surgery outpatient department with symptoms of gallbladder stone disease. Initial assessment relied on detailed history-taking and physical examination to establish a provisional diagnosis. Confirmation of gall stone disease was subsequently achieved through transabdominal ultrasonography. Upon confirming cholelithiasis, patients willing to participate underwent a series of routine and specific investigations including preoperative lipid profile. Following completion of investigations and confirmation of diagnosis, patients underwent preanesthetic check-up to assess their fitness for surgery subsequent to which patients were scheduled for either laparoscopic or open cholecystectomy.

Preoperative preparation included nil per oral for six hours before surgery and administration of appropriate preanesthetic medications. During surgery, the extracted gallbladder was sent for histopathological examination. The patients were discharged in stable condition a day after surgery and were advised for routine follow-up in the outpatient department. At three months post-cholecystectomy, a visit was scheduled to evaluate hepatic steatosis using transabdominal ultrasound of the whole abdomen. Additionally, liver function tests and lipid profile were repeated at this visit. Findings from biochemical investigations and ultrasound scans were systematically recorded, analysed, and documented as per protocol.

RESULTS

Statistical Analysis

The data was compiled and analyzed using MS excel (R) office 365, GraphPad prism 8.4.2 and SPSS version 25. descriptive statistics were presented in the form of proportions/percentages for categorical variables, mean and standard deviation for continuous data variables. Fisher exact test/Chi-square test was used for the comparison of proportions (categorical variables). Continuous variables were analyzed using the Mann-Whitney U test/student's t test (independent group/unpaired data) and Wilcoxon sign rank test/paired t test (for paired data) based on the normality of the data. P value of <0.05 was considered significant.

A total of 103 patients with symptomatic gallstone disease were selected for the study after due screening and written informed consent. Demographic attributes and laboratory parameters of these participants along with abdominal ultrasound were captured in the preoperative period. All patients were followed up at three-month post-surgery with LFT, lipid profile and abdominal ultrasound. Demographic profile in terms of age and sex distribution, BMI and comorbidity is compiled in Table 1. Mean age of the patients undergoing cholecystectomy in our study was 41.62 ± 13.62 years, ranging from 18 to 80 years, with a median age of 40 years (IQR= 31.50-50 years). Most patients were below the age of 40 years (46.60%), followed by those aged 40-60 years (41.75%). Only 11% of the patients were aged 60 years and above. There was a significant female preponderance observed, comprising 88.35% of the study population. Mean BMI was 25.96 ± 1.73 kg/m^2,

Table 1. Demographic profile in terms of age, sex, BMI, comorbidity distribution

Age category		Number	Percentage/Value
	Below 40 years	48	46.60%
	40-60 years	43	41.75%
	More than 60 years	12	11.65%
Sex	Female	91	88.35%
	Male	12	11.65%
Body mass index (BMI)	Mean ± SD Range (Min-Max) Median (IQR)	-	25.96 ± 1.73 kg/m^2 21.80-29.60 kg/m^2 26.10 (24.80-27.30) kg/m^2
	<25 kg/m^2	24	23.3%
	25-30 kg/m^2	79	76.69 %
Comorbidity	Hypertension	16	15.5%
	Hyperthyroidism	20	19.41%
	Diabetes and CAD	Excluded as per exclusion criteria	
Indication	Chronic calculus cholecystitis	103	100%

ranging from 21.80 to 29.60 kg/m^2, with a median BMI of 26.10 kg/m^2. Patients with diabetes mellitus and coronary artery disease were excluded from the study. All patients who underwent cholecystectomy had chronic calculus cholecystitis. These patients had a normal hematological profile in the preoperative period (Table 2).

A comparison of LFT parameters, lipid profile and ultrasound (USG) grading of hepatic steatosis at three-month follow-up and preoperative levels revealed several significant changes and are shown in Table 3.

Total bilirubin levels (0.56 vs 0.76, p< 0.0001) and direct bilirubin levels (0.15 vs 0.27, p< 0.0001) were seen to decrease significantly in post cholecystectomy patients. Levels of serum glutamic-oxaloacetic transaminase (SGOT) (49.14 vs 34.98 IU/dL), SGPT (50.85 vs 35.46 IU/dL) and alkaline phosphatase (ALP) (101.16 vs 85.97 IU/dL) increased significantly in cholecystectomy patients. Total protein (7.71 vs 7.44, p= 0.0022) and S albumin levels (4.17 vs 3.89 mg/dL, p< 0.0001) level increased to statistically significant values (Figure 1).

In lipid profile test, it was seen that the levels of cholesterol (146.28 vs 168.77 mg/dL), triglycerides (119 vs 133.56 mg/dL), low density lipoprotein (LDL) (93.32 vs 113.05 mg/dL) and very low density lipoprotein (VLDL) (18.68 vs 27.45 mg/dL) were seen to decrease significantly while the levels of high density lipoprotein (HDL) (48.96 vs 42.42 mg/dL) were seen to increase significantly at the three-month follow-up suggesting a favorable impact on lipid profile after cholecystectomy (Figure 2).

Table 2. Summary of hematological parameters

	Parameters	Values
Hemoglobin (g/dL)	Mean ± SD	11.24 ± 0.84
	Range (Min-Max)	9.80-13.50
	Median (IQR)	11 (10.70-11.70)
TLC (cells/microL)	Mean ± SD	6.96 ± 1.40
	Range (Min-Max)	4.20-10.11
	Median (IQR)	6.90 (5.95-8.15)
Platelet count (cells/microL)	Mean ± SD	2.32 ± 0.41
	Range (Min-Max)	1.55-3.21
	Median (IQR)	2.22 (1.97-2.64)
INR	Mean ± SD	1.12 ± 0.01
	Range (Min-Max)	1.12-1.14
	Median (IQR)	1.12 (1.12-1.12)

Table 3. Liver function test, lipid profile parameters and usg grading for steatosis-pre op and post-op trend at three month

LFT	Pre-Op	Post-Op	p
Total Bilirubin (mg/dL)			
Mean ± SD	0.76 ± 0.26	0.56 ± 0.18	<0.0001
Median (IQR)	0.80 (0.60-0.90)	0.50 (0.40-0.65)	
Direct Bilirubin (mg/dL)			
Mean ± SD	0.27 ± 0.15	0.15 ± 0.06	<0.0001
Median (IQR)	0.21 (0.20-0.40)	0.15 (0.10-0.22)	
SGOT (U/L)			
Mean ± SD	34.98 ± 11.27	49.14 ± 10.95	<0.0001
Median (IQR)	36 (36-41)	50 (31-66)	
SGPT (U/L)			
Mean ± SD	35.46 ± 13.69	50.85 ± 12.37	<0.0001
Median (IQR)	34 (24-44)	50 (31.50-59)	
ALP (U/L)			
Mean ± SD	85.97 ± 22.44	101.16 ± 28.99	<0.0001
Median (IQR)	82 (68-98)	100 (77-108)	
Total Protein (g/dL)			
Mean ± SD	7.44 ± 0.74	7.71 ± 0.48	0.0022
Median (IQR)	7.60 (7-8)	7.80 (7.45-8)	
Albumin (g/dL)			
Mean ± SD	3.89 ± 0.47	4.17 ± 0.35	<0.0001
Median (IQR)	4 (3.80-4.10)	4.30 (4.10-4.40)	
Lipid Profile	**Pre-Op**	**Post-Op**	**p**
Cholesterol (mg/dL)			
Mean ± SD	168.77 ± 37.29	146.28 ± 21.94	<0.0001
Median (IQR)	169 (149-188.50)	150 (138.50-186.50)	
Triglycerides (mg/dL)			
Mean ± SD	133.56 ± 55.11	119.21 ± 50.71	0.0532
Median (IQR)	132 (96-155)	120 (114.50-127)	
HDL (mg/dL)			
Mean ± SD	42.42 ± 9.62	48.96 ± 9.05	<0.0001
Median (IQR)	42 (37-48)	50 (35-56)	
LDL (mg/dL)			
Mean ± SD	113.05 ± 34.37	93.32 ± 34.92	0.0001
Median (IQR)	112 (92-136)	93 (81-113)	
VLDL (mg/dL)			
Mean ± SD	27.45 ± 11.05	18.68 ± 10.40	<0.0001
Median (IQR)	28 (20-30)	19 (9-30.50)	
USG Findings	**Pre-Op**	**Post-Op**	**p**
Grade 1	33 (32.03%)	50 (48.54%)	<0.0001
Grade 2	10 (9.70%)	18 (48.54%)	
Grade 3	0	9 (8.73%)	
Normal	60 (58.25%)	26 (25.24%)	

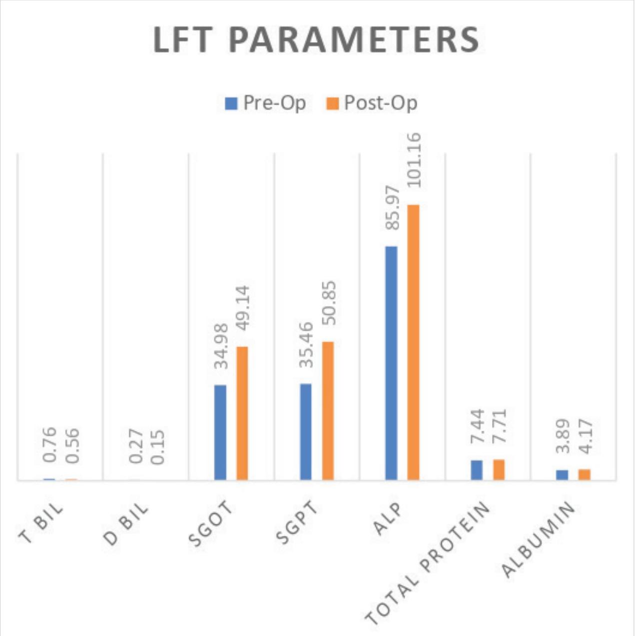

Figure 1. Liver function test parameteres. Pre op and post op trend.

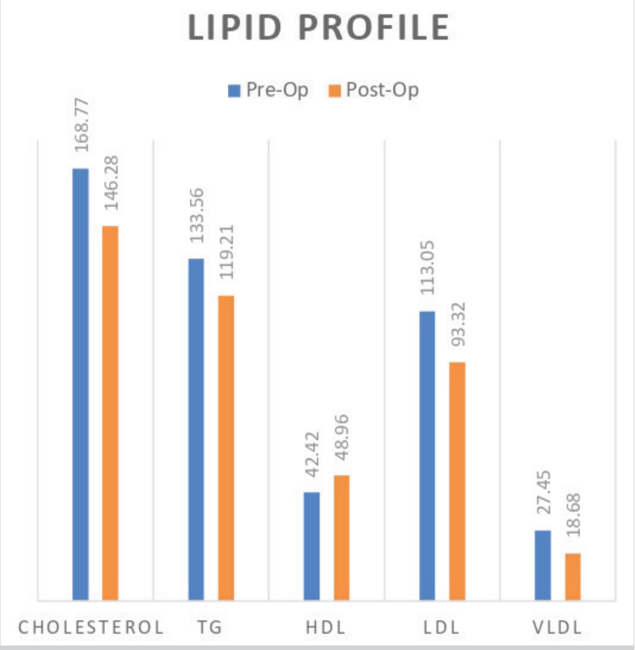

Figure 2. Lipid profile parameters.

The effect on liver steatosis post cholecystectomy was assessed using abdominal ultrasound, and it was found that the proportion of patients with Grade 1 fatty liver increased from 40% to 75%. Severity of fatty liver was also seen to increase, and about 8.73% patients developed grade three fatty liver at follow up, which suggests that patients with preoperative normal liver on abdominal ultrasound developed fatty liver and those with existing fatty liver seem to have worsening of liver steatosis.

DISCUSSION

Cholecystectomy has been shown in various studies to significantly decrease blood lipid levels in patients during subsequent follow-ups (4,5). Theoretically, this procedure leads to favourable impact on lipid profiles. These changes are attributed to enhancements in the secretion of phospholipids and bile acids into bile duct following cholecystectomy. Consequently, there is an increased frequency of bile acid circulation in the enterohepatic system, leading to greater excretion of lipids and thereby effectively reducing the total pool of bile acids. These physiological alterations contribute to the observed improvements in lipid metabolism and profiles post-cholecystectomy.

Multiple mechanisms have been postulated for the association between cholecystectomy and non-alcoholic fatty liver disease (NAFLD). It has been postulated that the basic underlying pathology is the increased responsibility of the liver to produce bile acids that help in digestion in the absence of the gallbladder storage. Wenzhu Yue et al. postulated that (6):

1. Removal of gallbladder eliminates formation of cholesterol solid-plate crystals which is not absorbed by intestine. Therefore, cholecystectomy can increase proportion of cholesterol reabsorbed and delivered to liver, facilitating an increase in hepatic triglycerides concentration.
2. Following cholecystectomy, bile acids are continuously secreted into duodenum, and BAs pool circulates faster, thus exposing liver to greater flux of BAs and occurrence of steatosis.
3. Cholecystectomy also removes the protective metabolic activity of gallbladder mucosa, which secrets fibroblast growth factor-19 that has a role in negative feedback regulation of BA synthesis and can inhibit hepatic fatty acid synthesis.

They showed that cholecystectomy was associated with a higher prevalence of NAFLD compared with gallstones among both centrally obese and non-centrally-obese subjects.

Profile of Patients Undergoing Laparoscopic Cholecystectomy

Aydın et al. reported a mean age of 49 ± 13 years in a similar study, with 75% of the patients being female, aligning closely with our observations. Nine patients (11%) in our study had diabetes and 14 (17%) were hypertensive, indicating comorbidities commonly associated with cholecystectomy candidates (7). Comparison with other studies reveals consistent findings.

Osman et al. noted a mean age of 46.5 ± 13.3 years among their cholecystectomy patients, slightly higher than our study. Their distribution showed 14.5% of patients being aged 30 years or younger, 43.6% being aged 31-50 years, and 41.8% being aged over 50 years, reflecting a broader age range compared to our findings (8).

Ahi et al. both found a female predominance in their study populations, similar to ours. Gill et al. (2017) reported a female to male ratio of 1.7:1, while Ahi et al. highlighted that 52 out of 60 patients were female. These ratios underscore the consistent observation of gallbladder diseases being more prevalent in females (9).

Menezes et al. and Naila Ikram et al. also documented female predominance in their respective studies, reinforcing the demographic pattern observed in our study. Menezes et al. reported a mean age of 44.3 ± 14.4 years, with a majority falling within the 21-30 years age group (10,11). Naila Ikram et al. noted that 60% of their patients were female, with the highest percentage (31%) aged 31-40 years (11).

Investigational Parameters Trend

A comparison of LFT parameters at three-month follow-up and preoperative levels revealed several significant changes. Total bilirubin levels decreased from 0.76 to 0.56 mg/dL ($p< 0.0001$), and direct bilirubin levels decreased from 0.27 to 0.15 mg/dL ($p< 0.0001$) postoperatively. Conversely, levels of SGOT increased from 34.98 to 49.14 IU/dL, SGPT from 35.46 to 50.85 IU/dL, and ALP from 85.97 to 101.16 IU/dL, all showing significant increases. Total protein levels increased from 7.44 to 7.71 g/dL ($p= 0.0022$), and serum albumin levels increased from 3.89 to 4.17 mg/dL ($p< 0.0001$), both statistically significant changes.

Assessment of lipid profile parameters demonstrated significant improvements at the three-month follow-up post-cholecystectomy. Cholesterol levels decreased from 168.77 to 146.28 mg/dL, triglycerides from 133.56 to 119 mg/dL, LDL from 113.05 to 93.32 mg/dL, and VLDL from 27.45 to 18.68 mg/dL, all showing statistically significant decreases. HDL levels, on the other hand, increased from 42.42 to 48.96 mg/dL ($p< 0.0001$), and comparison with other studies supports these findings.

Menezes et al. observed significant reductions in total cholesterol, LDL cholesterol, VLDL cholesterol, and triglycerides post-cholecystectomy, with a significant increase in HDL cholesterol levels (10). Similarly, Naila Ikram et al. reported statistically significant decreases in total cholesterol, LDL cholesterol, and triglycerides, along with a significant increase in HDL cholesterol post-surgery (11).

Contrary results were noted by Yue et al. who reported decreased bilirubin levels but elevated enzymes and Hajong et al. who found higher ALP levels but lower total cholesterol and LDL levels compared to our study (12,13). Osman et al. highlighted mixed changes in lipid profiles post-cholecystectomy, including varying trends in LDL and triglyceride levels over different postoperative periods (8).

Aydın et al. and Ahi et al. similarly documented significant reductions in total cholesterol and LDL cholesterol following cholecystectomy, with no significant changes in other liver enzymes or fasting glucose levels (7,9).

Radiological Parameters

Following cholecystectomy, there was a notable increase in the proportion of patients developing fatty liver disease during the postoperative period. The incidence of Grade 1 fatty liver increased from 40% to 75%, indicating both new occurrences and worsening severity among existing cases. Specifically, 8.73% of the patients were found to have Grade 3 fatty liver on ultrasound follow-up, highlighting a significant progression in hepatic steatosis.

Several studies corroborate these findings. De Luo et al. reported a 54% increased risk of nonalcoholic fatty liver disease (NAFLD), a 173% increased risk of cirrhosis, and a 46% increased risk of primary liver cancer associated with cholecystectomy (14). Jingting Lyu et al. similarly demonstrated a higher risk of postoperative NAFLD, particularly amplified in obese patients (15).

Yue et al. found significant correlations between hepatic steatosis index and fatty liver grade post-cholecystectomy, with notable proportions of patients experiencing worsening liver grades (6). Sanguankeo et al. observed a 1.56-fold increased risk of NAFLD following cholecystectomy, aligning with the increased incidence seen in our study (16).

Kwak MS et al. highlighted cholecystectomy as independently associated with NAFLD after adjusting for metabolic risk factors (17). Conversely, Wang et al. initially found a higher prevalence of fatty liver among those who underwent cholecystectomy, but this association became statistically insignificant after multivariate adjustment (1).

Hajong et al. noted higher metabolic risk factors in patients with non-alcoholic steatohepatosis among those undergoing cholecystectomy, suggesting routine liver biopsy may be warranted during surgery (13). Zin-Qin Xie et al. conducted a large-scale study linking cholecystectomy with substantially higher risks of liver fibrosis and cirrhosis, further underscoring the potential long- term consequences on liver health post-surgery (18).

In our study, the profile of patients undergoing laparoscopic cholecystectomy typically includes a relatively young age distribution with a significant female predominance, alongside comorbidities such as diabetes and hypertension. Postoperatively, there are notable improvements in lipid profiles but also an observed increase in fatty liver incidence and severity. These findings underscore the complex interplay between cholecystectomy, metabolic parameters, and liver health outcomes, necessitating ongoing monitoring and tailored management strategies for postoperative care.

Limitations

This study enrolled participants according to convenience sampling method, hence resulting in sampling bias where these participants cannot be considered representative of a larger group. Therefore, the key disadvantage can be lack of generalizability of the results on general population. Also, this study measures liver function test and lipid profiles along with the grading of fatty liver on ultrasound at the 3rd month of cholecystectomy. Therefore, it does not tell us about the trend over the time and cannot conclude causality. Hence, further studies involving random sampling technique, measuring lipid profile and LFT along with assessment on ultrasound with multiple scheduled intervals after surgery, and longer follow up are required to establish the effect of cholecystectomy over liver steatosis. Larger studies with multicentric study designs would be needed to further validate the findings.

CONCLUSION

The study was able to conclude that the prevalence of fatty liver disease (suggestive of NAFLD) and its severity were higher post cholecystectomy at 3rd month of follow up. It was observed that lipid profile parameters were favorable post cholecystectomy with a significant decrease in the total cholesterol, triglycerid (TG), LDL and VLDL and a significant increase in the HDL levels. In the liver function test, bilirubin levels decreased and hepatic enzymes levels were seen to increase significantly.

Ethics Committee Approval: This study was approved by Government Medical College and Hospital Institutional Ethics Committee (Decision no: GMCH/IEC/835/2022/197, Date: 29.11.2022).

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - UD; Design - RB; Supervision - RB; Materials - UD; Data Collection and/or Processing - UD; Analysis and/or Interpretation - RB; Literature Search - MS; Writing Manuscript - KA; Critical Reviews - RB, RS, NK, SG.

Conflict of Interest: The authors have no conflicts of interest to declare.

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Semptomatik safra taşı hastalığı için kolesistektominin transabdominal ultrasonografi kullanılarak hepatik steatoz üzerine etkisi: Gözlemsel prospektif bir çalışma

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ÖZET

Giriş ve Amaç: Hepatik steatoz ve safra taşı genel popülasyonda yaygındır ve risk faktörleri multifaktöriyeldir. Deneysel çalışmalar kolesistektominin hepatik steatozu arttırdığını ve alkol dışı yağlı karaciğer hastalığına (NAFLD) yol açtığını göstermiştir. Bunu değerlendirmek amacıyla, bu çalışma Hindistan'ın kuzeyindeki bir tıp fakültesinin genel cerrahi bölümünde gerçekleştirilmiştir.

Gereç ve Yöntemler: Kolesistektomi bekleyen yüz üç hasta yazılı bilgilendirilmiş onamları alındıktan sonra seçilmişti. Ameliyat öncesi temel özellikleri kaydedildi ve daha sonra üçüncü ayda karaciğer fonksiyon testi (KFT), lipid profili ve karın ultrasonografisi (USG) ile takip edildi.

Bulgular: Çalışmaya dahil edilen hastaların yaş ortalaması 41,62 ± 13,62 yıl ve ortalama VKİ 25,96 ± 1,73 kg/m^2 idi. Toplam bilirubin (0,56 vs 0,76, p< 0,0001) ve direkt bilirubin (0,15 vs 0,27, p< 0,0001) kolesistektomi sonrası preoperatif değerlere göre anlamlı olarak azaldı. Serum glutamik oksaloasetik transaminaz (SGOT) (49,14 vs 34,98 IU/dL), SGPT (50,85 vs 35,46 IU/dL) ve ALP (101,16 vs 85,97 IU/dL) düzeyleri ameliyat sonrasında anlamlı olarak yükselmiştir. Kolesterol değerleri (146,28 vs 168,77 mg/dL), trigliseritler (TGs) (119 vs 133,56 mg/dL), düşük yoğunluklu lipoprotein (LDL) (93,32 vs 113,05 mg/dL) ve çok düşük yoğunluklu lipoprotein (VLDL) (18,68 vs 27,45 mg/dL) üç aylık takipte anlamlı şekilde azalırken yüksek yoğunluklu lipoprotein (HDL) (48,96 vs 42,42 mg/dL) anlamlı şekilde artmıştır. Yağlı karaciğer prevalansı ameliyat sonrasında artmış ve Grade 1 steatoz oranı yükselmiştir (%75). Karaciğer yağlanmasının şiddeti ameliyat sonrası USG'de Grade 3 yağlanma ile (%8,73) artmıştır. Dolayısıyla, daha önce normal USG raporları olan yeni hastalarda yağlı karaciğer geliştiği ve önceden var olan karaciğer yağlanması daha da kötüleştiği görüldü.

Sonuç: Çalışma, yağlı karaciğer prevalansının kolesistektomi sonrası arttığı sonucuna varmıştır. Lipid profili parametreleri toplam kolesterol, TG, LDL ve VLDL'de düşüş ve HDL'de artışla olumlu yönde iyileşmiştir. KFT parametreleri de önemli ölçüde değişmiştir.

Anahtar Kelimeler: Kolesistektomi, hepatik steatoz, karaciğer fonksiyon testi, lipid profili, karın ultrasonografisi

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