A SYSTEMATIC REVIEW AND META-ANALYSIS ARTICLE

Changes in the Lipid Profiles of Pre- and Post-Cholecystectomy Patients: A Systematic Review and Meta-Analysis

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ABSTRACT

Introduction: Patients with gallstones often exhibit irregular lipid profiles, such as hyperlipidemia, which may cause various morbidities. Gallstone treatment by cholecystectomy can alter bile acids, subsequently impacting the lipid profile. This study aimed to analyze the effects of cholecystectomy on lipid profiles.

Methods: This systematic review and meta-analysis adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. PubMed, Cochrane, ProQuest, and Google Scholar were utilized to discover prospective or retrospective cohort studies, cross-sectional studies, and non-randomized trials. The inclusion criteria were studies comparing lipid profiles pre- and post-cholecystectomy in the same patients, conducted on humans, and published in English with full text available. Abstracts from conferences, case studies/series, review articles, letters, editorials, and research published in languages other than English were excluded. A meta-analysis was conducted on patient outcomes using random- or fixed-effect models to generate pooled odds ratios (OR) with 95% confidence intervals (CI). A significant change in lipid profiles was indicated by $p<0.05$.

Results: There were 17 selected studies involving 1,691 participants. Within less than a week, cholecystectomy significantly decreased total cholesterol and low-density lipoprotein (LDL). During one-month follow-ups, cholecystectomy significantly increased high-density lipoprotein (HDL) while reducing other lipid profile markers, including total cholesterol, LDL, and triglycerides. During follow-ups beyond one month, there were no significant changes in lipid profiles.

Conclusion: Cholecystectomy decreases total cholesterol and LDL within days and improves all lipid profile markers a month post-surgery. Beyond one month, it does not exhibit significant changes in lipid profiles.

Keywords: Cholecystectomy; lipid profile; hyperlipidemia; gallstone; health risk

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Highlights:
1. This is the first systematic review and meta-analysis that provides valuable insights into the effects of cholecystectomy on lipid profile.
2. This study offers a foundation for more effective postoperative management strategies to mitigate cardiovascular disease risks.
3. This study may also be the foundation of theories regarding the advantage of cholecystectomy for improving lipid profile.

Article history: •Received 27 February 2024 •Revised 2 April 2024 •Accepted 15 April 2024 •Published 31 January 2025

INTRODUCTION

Many cardiovascular morbidities are known to be correlated with dyslipidemia (Shuwelif et al., 2022). Research has shown that a lipid issue affects more than 50% of people with gallstones (Ahi et al., 2017; Ikram et al., 2020). A high-calorie diet, obesity, diabetes, certain medications (including oral contraceptives), and hereditary factors are among the many potential causes of abnormal lipid metabolism. Metabolic factors play a role in the solubility of cholesterol in bile acids. Bile acids, which are produced from cholesterol in the liver, typically maintain a bile acid-to-cholesterol ratio of 25:1, with 13:1 being the critical threshold for precipitation. Conditions such as ileal disease, resection or gastric bypass surgery, or biliary fistulas can decrease the concentration of bile salts by disrupting their normal enterohepatic circulation. These disorders have led to an increase in the occurrence of gallstones (Ahi et al., 2017).

In individuals who have undergone cholecystectomy, the bile acid pool remains the same size. However, it circulates more rapidly, exposing the enterohepatic organs to an increased daily flow of bile acids. This accelerated circulation and higher bile acid flow per unit of time may affect blood lipid levels following the surgery (Aydin & Öztürk, 2022). Another hypothesis suggests that after cholecystectomy, a smaller bile acid pool and increased enterohepatic circulation frequency tend to lower lipid levels by reducing both total cholesterol and low-density

Available at https://e-journal.unair.ac.id/CIMRJ ; DOI: 10.20473/cimrj.v6i1.55507

lipoprotein (LDL) cholesterol levels (Ikram et al., 2020). The differing hypotheses prompted the objective of this systematic review and meta-analysis, which was to analyze blood lipid levels before and after cholecystectomy.

METHODS

Literature search and eligibility criteria for the analyzed studies

This systematic review has been registered in the International Prospective Register of Systematic Reviews (PROSPERO) under a registration number of CRD42023466148. The research followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines (Page et al., 2021). Extensive literature searches were conducted through electronic databases, including PubMed, Cochrane, ProQuest, and Google Scholar, from January 1, 2020, to September 30, 2023. The literature search used specific search terms, such as “cholecystectomy,” “cholecystectomies,” “gallbladder surgery,” “lipid profile,” “cholesterol,” and “cholesterol level.” Each reviewer meticulously examined the reference lists of the chosen manuscripts to ensure comprehensiveness by identifying prospective publications that fit the inclusion criteria. This systematic review and meta-analysis included research that employed different designs, including prospective or retrospective cohort studies, cross-sectional studies, and non-randomized trials. The inclusion criteria were as follows: studies focusing on the comparison of lipid profiles before and after cholecystectomy in the same patients, articles published in English, publications with accessible full text, and studies conducted on human subjects. Excluded from this systematic review were conference abstracts, case studies, case series, review articles, letters, editorials, and research published in languages other than English.

Extraction of data from the selected studies

Data extraction was systematically conducted by two independent reviewers. The extracted data included the following variables from each study: first author, year of publication, study design, follow-up duration, total population, mean age or age range, mean body weight, and mean body mass index (BMI). The outcomes of interest comprised four lipid profile parameters frequently used in recent studies: preoperative and postoperative total cholesterol (TC), high-density lipoprotein (HDL), low-density lipoprotein (LDL), and triglycerides (TG) (Karki & Timilsina, 2021; Aydin & Öztürk, 2022; Shuwelif et al., 2022).

Assessing the risk of bias in the selected studies

The Newcastle-Ottawa Scale (NOS) was used to assess the quality of cohort studies and cross-sectional studies. The maximum NOS scores were 9 for cohort studies and 10 for cross-sectional studies. The score was assigned according to the selection and comparability of study groups, as well as the ascertainment of the outcome of interest. Studies with a score of 7 or higher were considered to have a low risk of bias (Peters et al., 2023). The quality of non-randomized trials was assessed using the Risk of Bias in Non-Randomized Studies—of Interventions (ROBINS-I) tool. The assessment evaluated bias risk across seven categories: confounding, selection of participants, classification of interventions, deviation from intended interventions, missing data, measurement of outcomes, and selection of reported results. The bias risk for each assessment domain was classified into four levels: low, moderate, serious, and critical (Sterne et al., 2016).

Analysis of data acquired from the selected studies

A meta-analysis was carried out utilizing the Review Manager (RevMan) computer program, version 5.4 (The Cochrane Collaboration, 2020). The outcomes were analyzed using continuous data. The inverse variance (IV) method was employed to obtain the mean difference (MD) and its standard deviation (SD). A value of $p<0.05$ was considered statistically significant. Subgroup analysis was conducted according to the patients' follow-up durations. The heterogeneity of the data was assessed by I^2, where values of ≤25%, 26%–50%, and >50% indicated low, moderate, and high (statistically significant) degrees of heterogeneity, respectively (Hariyanto & Kurniawan, 2021). If the I^2 value was statistically significant, a random effects model was applied for the meta-analysis; otherwise, a fixed effects model was used. Funnel plots were used to assess publication bias when ten or more papers were included.

RESULTS

Results of the literature search

The literature search using a specified set of keywords yielded a total of 1,974 studies across four databases. After removing duplicates, irrelevant titles and abstracts, and unretrievable reports, 25 articles were assessed for eligibility. Following a thorough review of the full texts, eight articles were excluded due to incorrect outcomes and insufficient data resulting from the assessment of less than four parameters. This omission resulted in 17 studies that were eligible to be included in the systematic review and meta-analysis. The detailed literature search process using the PRISMA 2020 guidelines is presented in Figure 1.

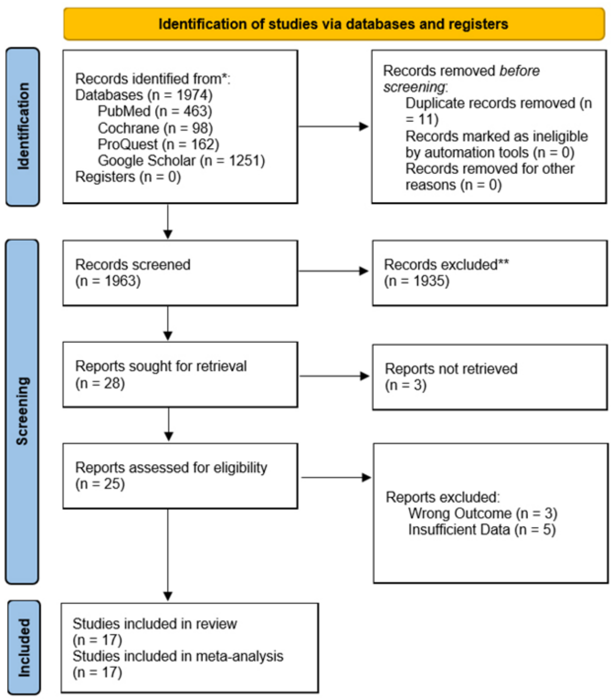

Figure 1. PRISMA 2020 flow diagram for the literature search

Table 1. Data extraction of the studies included in the meta-analysis

Author (year)	Country	Study design	Follow-up	Tot-pop	Age (years)	BW (kg)	BMI (kg/m²)	TC (mg/dL)		HDL (mg/dL)		LDL (mg/dL)		TG (mg/dL)	
								Pre	Post	Pre	Post	Pre	Post	Pre	Post
Shuwelif et al. (2022)	Iraq	Prospective	2 weeks	100	NA	NA	NA	201.18±42.62	190.01±34.62	98.95±23.84	110.21±25.22	80.62±49.88	74.55±47.08	112.95±36.55	105.54±36.07*
			1 month						158.3±30.28*		120.83±30.85*		43.27±35.22*		88.73±38.24*
Aydin & Öztürk (2022)	Turkey	Prospective	2 months	80	49±13	NA	NA	191.9±37.1	186.1±36.8*	39.8±9.2	38.7±8.3	142.6±41.7	133.9±35*	147.3±75.2	144.2±68.2
Karki & Timilsina (2021)	Nepal	Prospective	1 week	73	40.53±13.16	NA	NA	168.1±33.15	155.42±39.18*	44.47±9.04	46.62±10.98	99.04±27.35	100.03±22.90	138.22±56.60	134.66±73.14
			1 month						144.55±37.13*		49.97±9.00*		95.70±19.70		120.78±35.05*
Ikram et al. (2020)	Pakistan	Cross-sectional	1 month	170	21-70	NA	NA	196±29.79	144±22.47*	32±5.98	45±6.34*	172±27.77	111±17.32*	194±37.89	148±12.40*
Kumar et al. (2020)	India	Prospective	3 days	50	20–60	NA	NA	217.29±24.50	206.95±23.10*	44.09±8.88	51.99±8.97*	138.11±21.82	119.07±20.68*	175.45±24.19	179.44±24.00*
			1 week						199.89±22.63*		59.73±8.97*		103.56±19.56*		183.04±24.15*
			1 month						187.45±20.71*		68.65±7.99*		90.00±17.76*		144.00±18.92*
Osman et al. (2020)	Saudi Arabia	Retrospective	1 week	55	46.5±13.3	NA	NA	180±51.6	176.3±45.8	45.8 ±11.9	42.7±11.2	120±38.2	115.8±36.7	128.1±66.5	139.2±62.4*
			2 months						178.5±52.8		46.2±15.1		101.2±39.4*		123.6±41.7
			4 months						170.5±45.6*		50±14.4		108.4±40.8		93±24.2
			6 months						173.2±51.1*		46.2±13.6		108.5±41.3*		115.5±62.1
			8 months						173±41.8		50.4±10		104.6±32.9		116.7±51.2
			10 months						159.9±39.7		47.5±14.3		93.7±33.1		114.4±46.1
			1 year						176.6±45		46±11.5		114.4±36.9		116.1±46.2
Fathi et al. (2019)	Iran	Prospective	6 months	98	45.2±12.7	NA	31.24±8.3	168.95±47.92	181.40±46.58*	48.82±10.2	45.55±12.2*	107.68±39.4	111.29±41.1	136.42±66.8	138.25±81.7
Menezes & Katamreddy (2019)	India	Prospective	6 months	100	44.3±14.4	NA	NA	197.66±27.47	158.66±17.02*	35.28±6.18	42.06±4.12*	158.66±23.14	104.75±12.38*	183.62±38.04	159.99±8.40*
Al-Salih et al. (2018)	Iraq	Prospective	1 day	64	20–69	NA	32.05±8.08	215.41±28.16	201.89±28.46*	39.66±5.44	47.85±4.99*	140.11±21.85	120.76±20.76*	178.02±32.25	168.17±34.59*
Jain et al. (2018)	India	Prospective	1 year	50	45.5±12.2	NA	NA	140.35±33.8	188.24±40.1*	41.78±14.02	49.15±8.10*	77.20±30.86	56.12±29.97*	188.18±48.9	139.61±46.0*
Ahi et al. (2017)	India	Prospective	1 week	60	10–60	NA	NA	193.2±58.84	186.3±56.71*	41.35±5.4	43.27±6.3*	153.90±43.44	132.08±36.93*	143.63±69.05	159.47±43.32*
			1 month						167±48.08*		54.10±8.5*		117.52±29.00*		139.60±60*
Goodarzi et al. (2017)	Iran	Cross-sectional	1 month	70	51.4±14	68.6±9.7	26.2±2.38	182.7±41.8	181.5±36.6	43.2±11.7	41.7±10.8*	110.5±37.7	107.5±32.6	153.5±79.0	153.0±76.7
Gill & Gupta (2017)	India	Prospective	1 week	50	20–70	NA	27.45	162.98±32.89	150.98±28.32*	43.28±8.86	40.88±23.63	107.94±20.44	102.33±8.89	196.67±92.83	213.82±69.99*
			1 month						123.64±35.33*		48.25±44.94*		105.72±33.34*		179.73±52.28*
Haq & Giasuddin (2016)	Bangladesh	Prospective	2–3 months	44 (Pre op) 34 (Post op)	45.5±12.2	NA	NA	140.35±33.83	188.24±40.12	41.78±14.02	49.15±8.10	77.20±30.86	96.12±29.97	188.18±48.92	139.61±46.01
Moazeni-Bistgani et al. (2014)	Iran	Quasi-experimental	3 days	72	49.7±16.6	70.1±8.4	26.11±4.26	164.3 ± 52.3	156±47.5*	53.5±10.8	50.1±10.9*	87.8 ± 45.4	78.9±39.4*	109.6±51.4	140.8±64.9*
			1 month						164.9±46.3		51.9±10		85.1±38.9		128±61.7*
			1 year						168.1±48.1		52.4±10.9		91.6±60.1		179.2±102.8*
Jindal et al. (2013)	India	Prospective	1 week	71	5–90	NA	26.45	153.28±25.69	128.32±23.52*	49.53±8.75	51.56±7.68	105.94±20.44	94.7±18.55*	142.67±92.73	125.08±47.28*
			1 month						106.81±18.85*		58.57±7.61*		78.66±12.39*		85.16±25.53*
Al-Kataan et al. (2010)	Iraq	Prospective	1 week	60	NA	NA	NA	247.0±37.9	239.4±31.7*	35.2±5.8	35.6±5.8*	180.2±41.4	171.3±33.3*	171.83±51.37	174.48±46.06*
			1 month						237.4±21.7*		36.7±5.0*		168.6±24.4*		161.2±37.2*

Notes: An asterisk (*) denotes any statistical significance in comparison to the preoperative parameter. The participants' ages are represented as means or age ranges, while their weights and BMI are expressed as means. Tot-pop=total population; BW=body weight; BMI=body mass index; TC=total cholesterol; HDL=high-density lipoprotein; LDL=low-density lipoprotein; TG=triglycerides; NA=not available.

Characteristics of the studies included in this systematic review

This systematic review included multiple studies with a total of 1,267 participants. The majority of the studies were from Asian countries, including Iraq, Nepal, Pakistan, India, Saudi Arabia, Bangladesh, and Iran. Additionally, there was a study conducted in Turkey. The average age of the participants ranged from 40.53 to 51.4 years, with an overall age range of 5–90 years. The comprehensive baseline characteristics and outcomes of interest from the selected studies are shown in Table 1.

Assessment of the quality of the selected studies

Fifteen cohort studies and two cross-sectional studies were assessed using the Newcastle-Ottawa Scale (NOS). Among the cohort studies, 11 received a score of 8, whereas 2 had a score of 7. The remaining cohort studies earned a score of 6, indicating a higher risk of bias compared to the other cohort studies. The two cross-sectional studies were given scores of 7 and 8. The Risk of Bias in Non-Randomized Studies—of Interventions (ROBINS-I) was employed to assess the only quasi-experimental study in this systematic review. The assessment result indicated a moderate risk of bias, primarily due to confounding.

Lipid profiles assessed less than a week after cholecystectomy

We conducted six subgroup analyses according to the follow-up durations post-cholecystectomy: less than a week, one week, one month, two to three months, six months, and one year. The meta-analysis included three studies that analyzed lipid profiles less than a week after cholecystectomy. One study that was conducted by Al-Salih et al. (2018) assessed lipid profiles 24 hours after cholecystectomy. The other two studies, carried out by Moazeni-Bistgani et al. (2014) and Kumar et al. (2020), assessed lipid profiles three days post-cholecystectomy. The data revealed that cholecystectomy significantly decreased total cholesterol (MD=11.33; 95% CI=5.08–17.58; p=0.0004) and low-density lipoprotein (MD=17.80; 95% CI=12.67–22.94; p<0.00001) less than a week following the procedure. Figure 2 presents the detailed results of the meta-analysis of lipid profiles within less than a week post-cholecystectomy.

Lipid profiles a week post-cholecystectomy

The meta-analysis included seven studies examining lipid profiles one week after cholecystectomy. The results indicated that the procedure led to a significant decrease in total cholesterol (MD=15.80; 95% CI=11.45–20.15; p<0.00001) and low-density lipoprotein (MD=12.15; 95% CI=2.66–21.65; p=0.01) during one-week follow-ups. The comprehensive results of the meta-analysis of lipid profiles observed a week post-cholecystectomy are displayed in Figure 3.

Lipid profiles assessed a month after cholecystectomy

Ten studies focusing on lipid profiles during one-month follow-ups post-cholecystectomy were examined in the meta-analysis. This subgroup analysis showed that cholecystectomy significantly changed all lipid profile parameters. It elevated high-density lipoprotein (MD=-8.96; 95% CI=-13.84 to -4.08; p=0.0003), while simultaneously lowering total cholesterol (MD=27.68; 95% CI=16.01–39.35; p<0.00001), low-density lipoprotein (MD=23.52; 95% CI=8.14–38.90; p=0.003), and triglycerides (MD=20.07; 95% CI=7.18–32.95; p=0.002). Figure 4 exhibits the detailed results of the meta-analysis of lipid profiles a month after cholecystectomy.

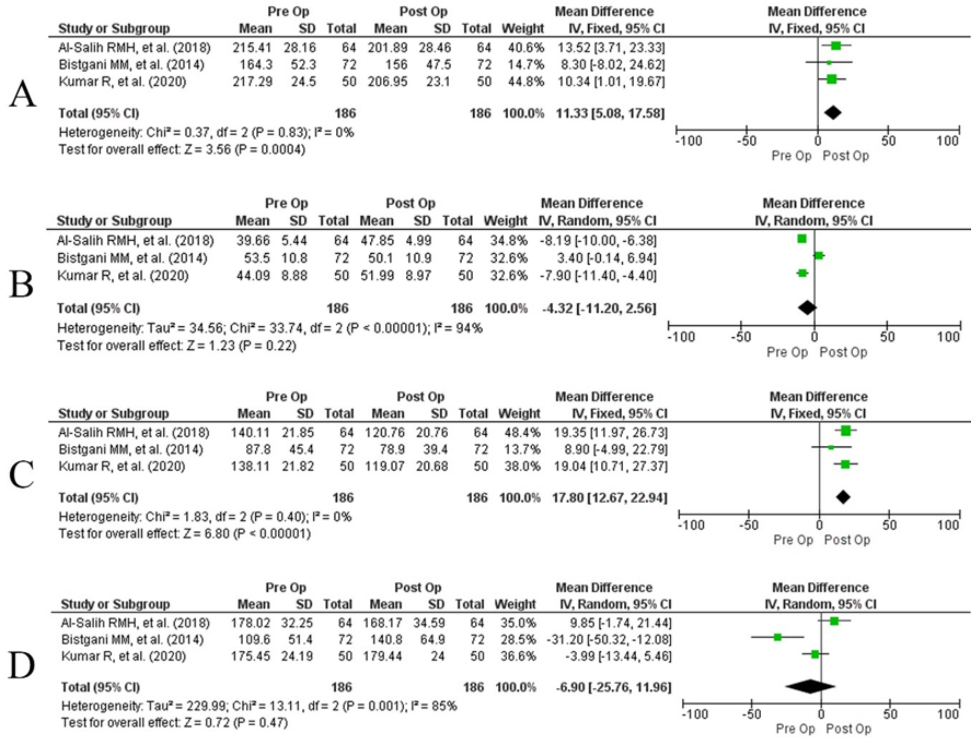

Figure 2. Forest plots for lipid profiles observed within less than a week after cholecystectomy.

Notes: (A) total cholesterol; (B) high-density lipoprotein; (C) low-density lipoprotein; (D) triglycerides.

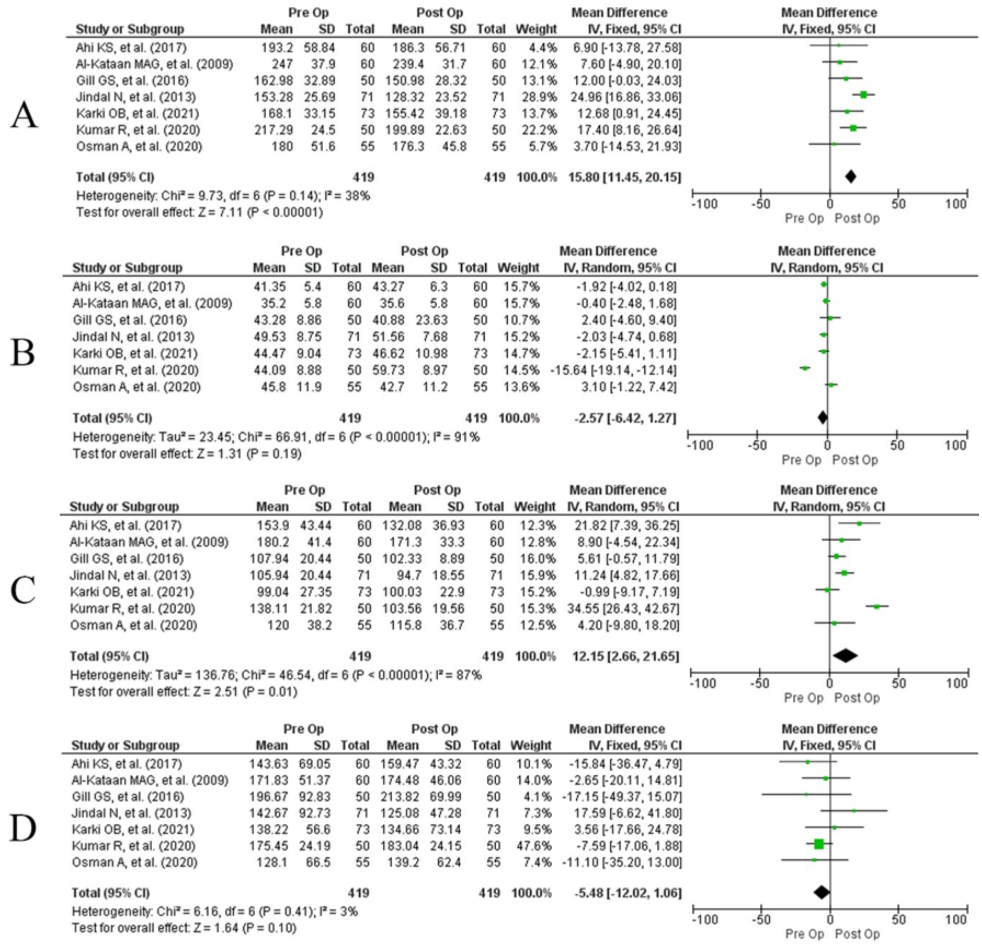

Figure 3. Forest plots for lipid profiles observed a week post-cholecystectomy.

Notes: (A) total cholesterol; (B) high-density lipoprotein; (C) low-density lipoprotein; (D) triglycerides.

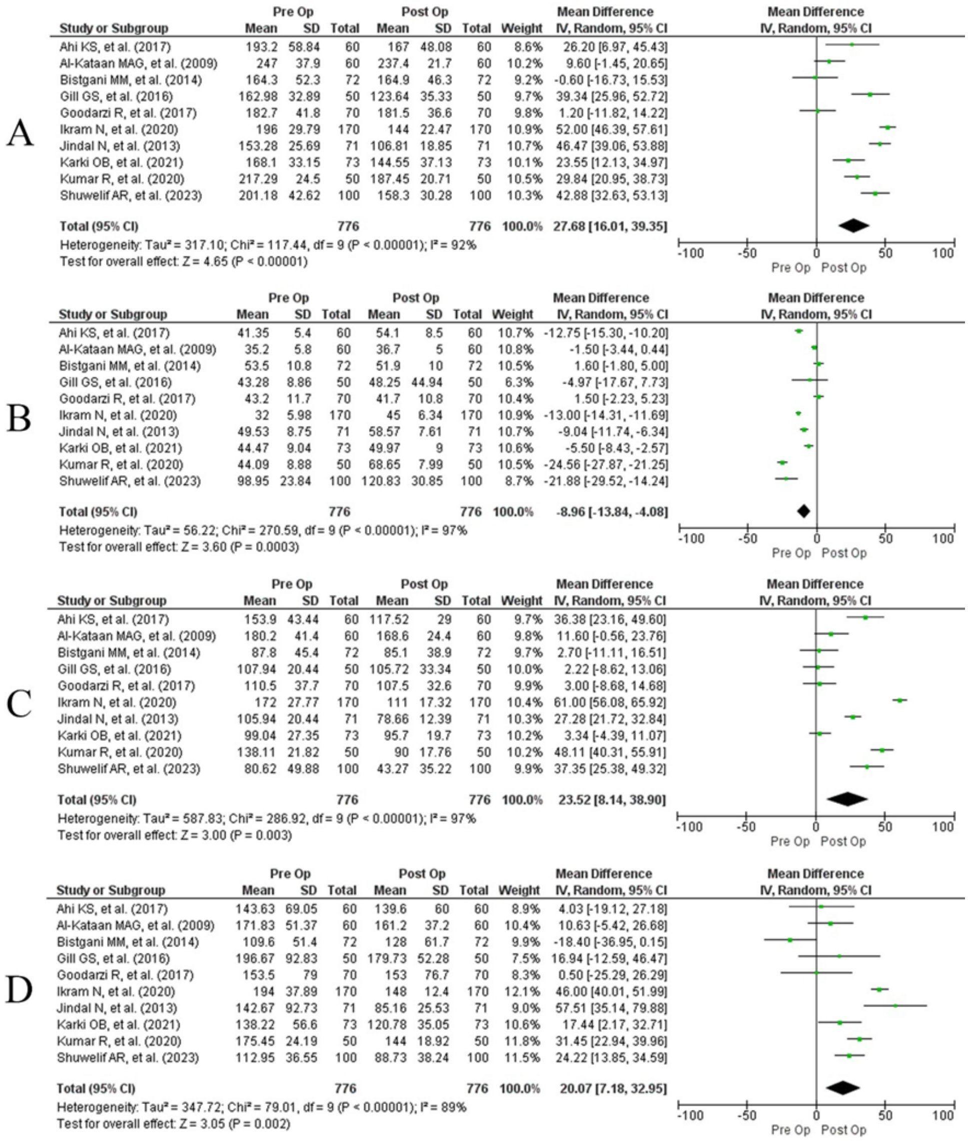

Figure 4. Forest plots for post-cholecystectomy lipid profiles during one-month follow-ups.

Notes: (A) total cholesterol; (B) high-density lipoprotein; (C) low-density lipoprotein; (D) triglycerides.

Lipid profiles assessed two to three months after cholecystectomy

In this meta-analysis, there were three studies that examined post-cholecystectomy lipid profiles with follow-up durations of two to three months. The analysis revealed no statistically significant changes in lipid profiles compared to the pre-cholecystectomy lipid profile parameters. The results of the meta-analysis of lipid profiles two to three months after cholecystectomy are detailed in Figure 5.

Lipid profiles six months after cholecystectomy

Three studies investigating lipid profiles six months following cholecystectomy were included in the meta-analysis. The analysis of the studies indicated no statistically significant changes in lipid profiles during six-month follow-ups in comparison to the pre-cholecystectomy lipid profile parameters. Figure 6 displays the detailed results of the analysis of post-cholecystectomy lipid profiles during six-month follow-ups.

Lipid profiles a year following cholecystectomy

Among the selected studies, there were three articles that provided data on post-cholecystectomy lipid profiles during one-year follow-ups. The meta-analysis of these studies revealed that no statistically significant changes in lipid profiles were observed during one-year follow-ups. Figure 7 presents the detailed results of the meta-analysis of lipid profiles a year after cholecystectomy.

DISCUSSION

In clinical practice, gallstone disease is among the most frequently occurring conditions. However, the majority of patients are asymptomatic, and their diagnosis is confirmed incidentally during abdominal scans for other conditions (Menezes & Katamreddy, 2019). Prior studies have found statistically significant changes in lipid profiles, including higher levels of triglycerides and HDL, among patients with cholelithiasis compared to the control groups (Batajoo & Hazra, 2013; Hayat et al., 2019; Preetha et al., 2020). However, to the best of our knowledge, there is no recommendation for using cholecystectomy as a therapeutic option for dyslipidemia.

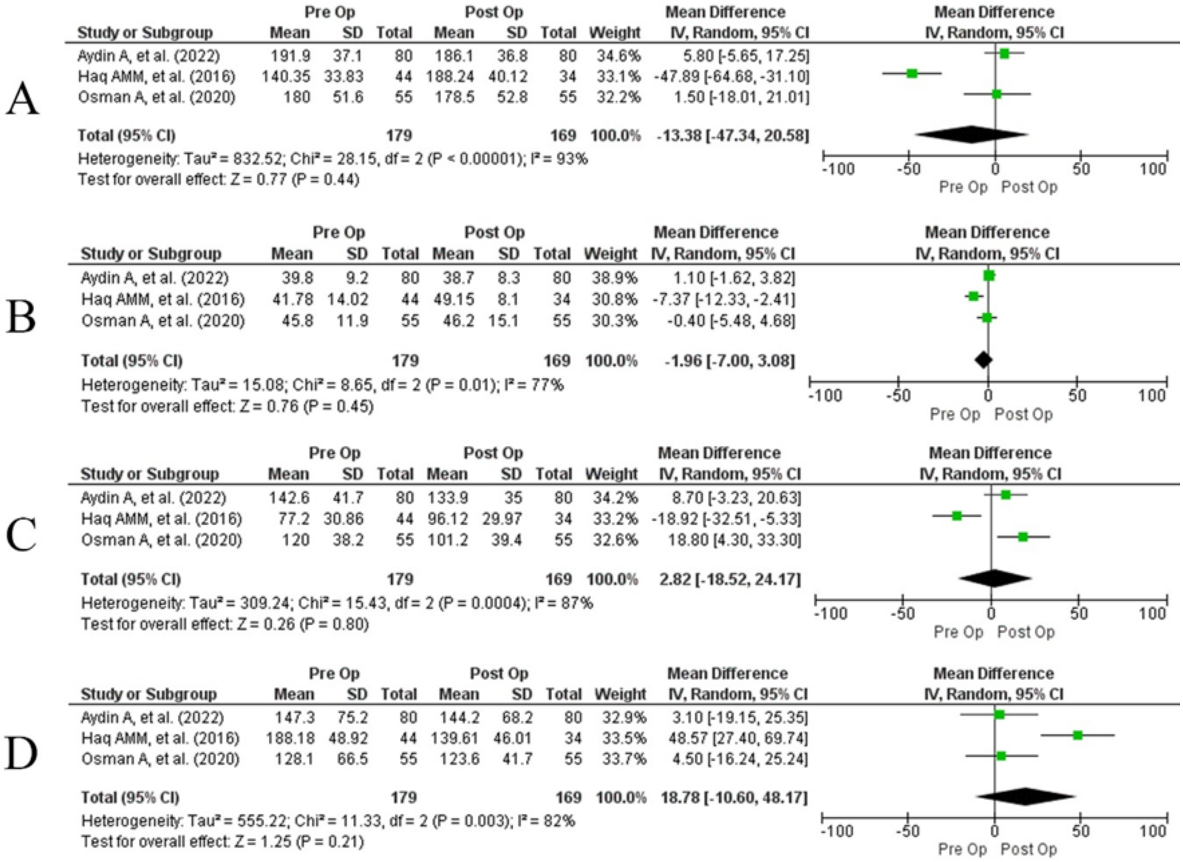

Figure 5. Forest plots for lipid profiles two to three months post-cholecystectomy.

Notes: (A) total cholesterol; (B) high-density lipoprotein; (C) low-density lipoprotein; (D) triglycerides.

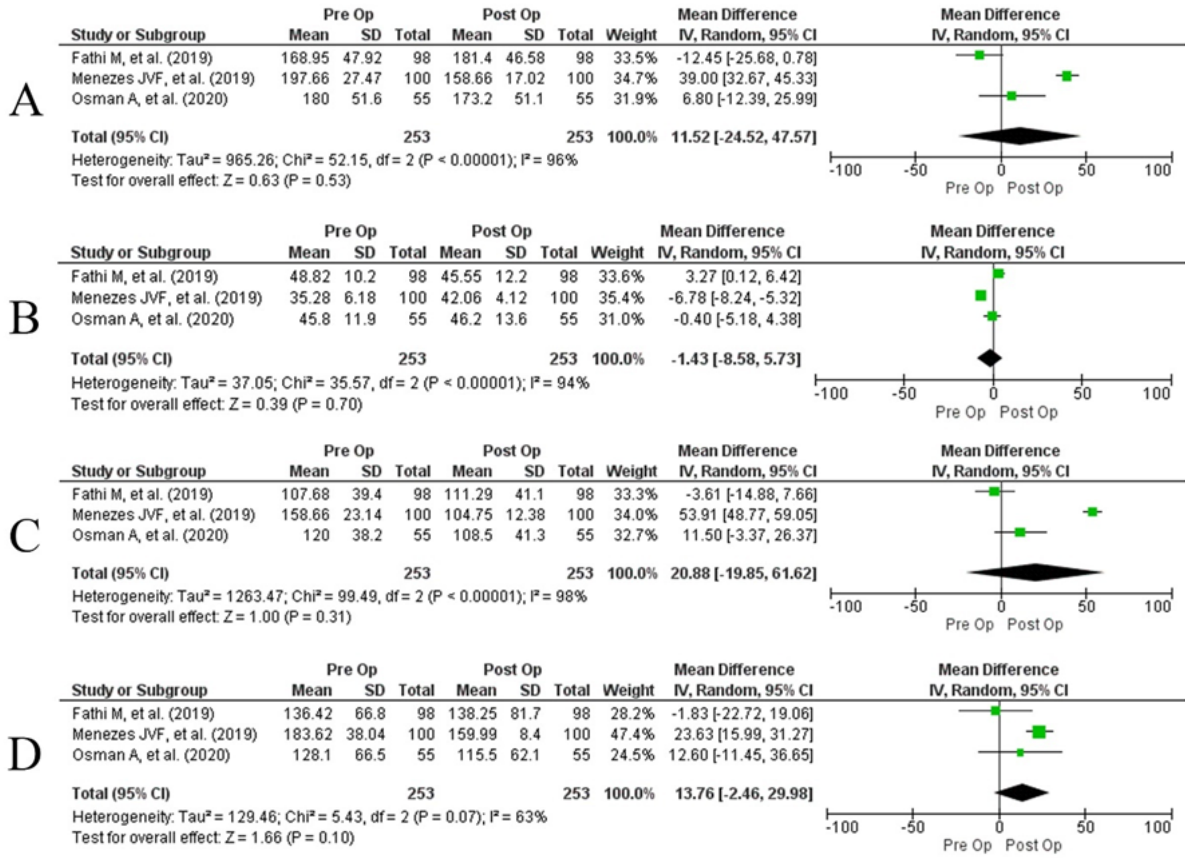

Figure 6. Forest plots for post-cholecystectomy lipid profiles during six-month follow-ups.

Notes: (A) total cholesterol; (B) high-density lipoprotein; (C) low-density lipoprotein; (D) triglycerides.

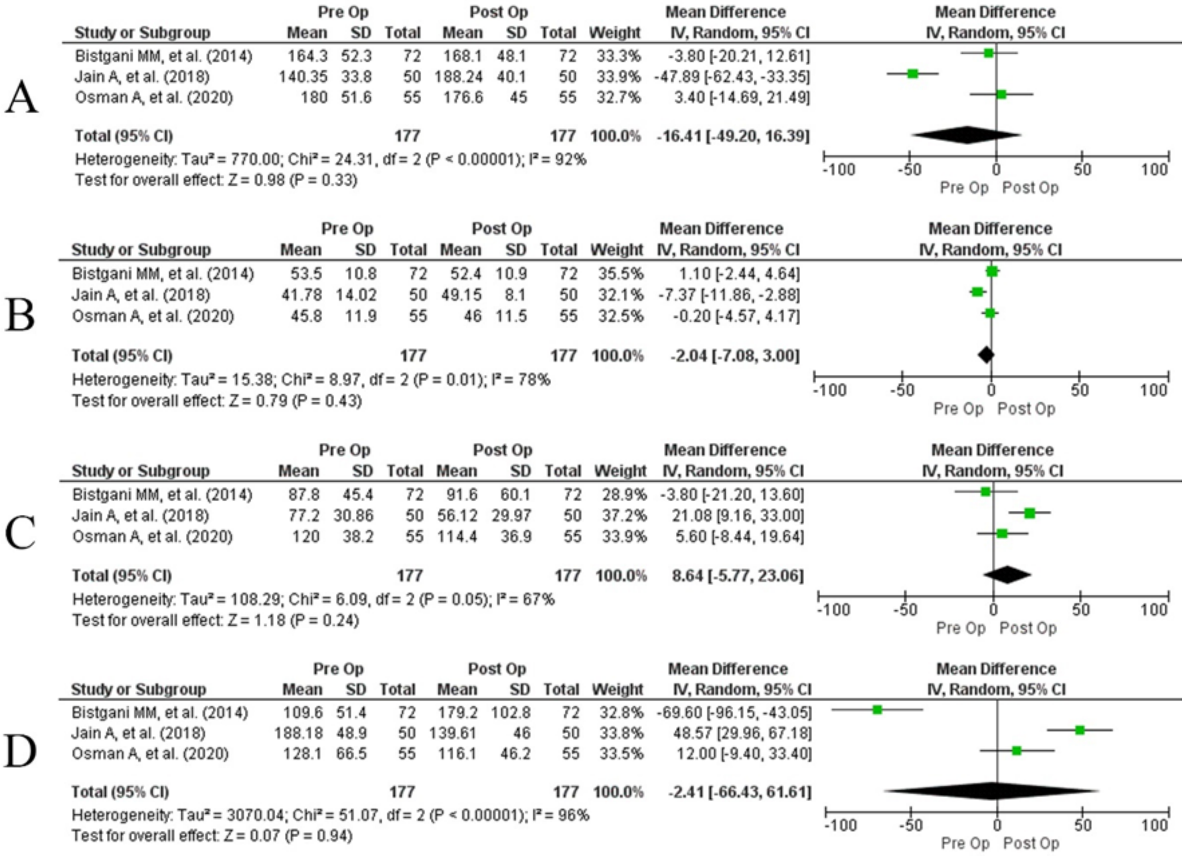

Figure 7. Forest plots for lipid profiles during one-year follow-ups post-cholecystectomy.

Notes: (A) total cholesterol; (B) high-density lipoprotein; (C) low-density lipoprotein; (D) triglycerides.

Bile has a role in facilitating the digestion of fat through emulsification. It is composed of several endogenous solid constituents, including bile salts, bilirubin, phospholipids, cholesterol, amino acids, steroids, enzymes, porphyrins, vitamins, heavy metals, as well as exogenous drugs, xenobiotics, and environmental toxins. Total cholesterol is one of the precursors for bile acids (Podgórski et al., 2023). Bile acids are stored in the gallbladder and secreted into the intestine when a meal is ingested. About 95% of the bile acids are reabsorbed and transported back to the liver via the portal vein, while the rest are converted to secondary bile acids by the intestinal microbiota and excreted in the feces. This system is known as enterohepatic circulation. The removal of the gallbladder leads to the continuous secretion of bile acids into the duodenum.

Theoretically, faster circulation of bile acids would inhibit cholesterol 7α-hydroxylase in the liver, the rate-limiting enzyme for bile formation (Yin et al., 2022). This leads to increased excretion of lipids, causing a reduction in the total pool of bile acids and a reduction in serum cholesterol (Ikram et al., 2020). Additionally, the upregulation of apoprotein (apo)-B/E receptors increases low-density lipoprotein (LDL) endocytosis from the blood into hepatocytes, leading to the formation of more bile acids (Karki & Timilsina, 2021).

The fastest statistically significant changes observed in this systematic review were the reductions in total cholesterol and LDL levels during the first week after cholecystectomy. This was likely caused by the change in bile acid flow (Aydin & Öztürk, 2022). All lipid profiles showed statistically significant changes a month after the procedure. On the other hand, no statistically significant changes in lipid profiles were noted two months or longer post-cholecystectomy. Goodarzi et al. (2017) researched dietary intake following cholecystectomy and found a significant reduction in HDL, although the patients' daily dietary intake did not significantly differ during the first month post-cholecystectomy. It has been found that patients exhibit higher BMI, calorie intakes, and fat and carbohydrate intakes, along with lower protein intakes during six-month follow-ups post-cholecystectomy compared to the pre-surgical assessments (Kenary et al., 2012). Additionally, post-cholecystectomy patients demonstrate significantly elevated levels of total cholesterol (Fathi et al., 2019). However, another study showed that patients who adhere to a low-fat diet and regular exercise still exhibit an increase in mean BMI (Osman et al., 2020). These findings suggest that immediate dietary and exercise consultation post-surgery may be beneficial. More studies are necessary to understand the effect of dietary intake on lipid profiles post-cholecystectomy.

According to a study conducted by (Di Ciaula et al., 2018), cholecystectomy is not a neutral procedure and may induce unnatural metabolic effects. The aberrant transintestinal flow of bile acids, which generate metabolic signals and operate without gallbladder rhythm in both the fed and fasted states, is most likely the mechanism mediating these processes. Another study reported by (Chen et al., 2018) suggests that undergoing a cholecystectomy increases the risk of long-term postoperative complications, including an increased chance of acquiring cancer. The data from this study indicate that cholecystectomy may disrupt the equilibrium of the body's metabolic processes. Some studies included in the analysis suggest the emergence of worse lipid profiles during follow-ups post-cholecystectomy. It is imperative that future prospective epidemiological and interventional research address the true cause-effect link, given the rising frequency of metabolic syndrome, especially among cholecystectomized patients.

In analyzing the effect of cholecystectomy on lipid profiles, it is crucial to take into consideration the age of the study populations. Several studies identified age-related lipid profiles, indicating that certain age groups may exhibit a higher lipid profile compared to others (Zhao et al., 2018; Feng et al., 2020). In this meta-analysis, some of the selected studies included a wide age range (>40 years). Simultaneously, several other studies investigated cholecystectomy and changes in lipid profiles by considering variables related to gallbladder stone types. These investigations documented postoperative lipid profile assessments with a six-month follow-up duration and compared the results to the initial preoperative lipid profiles. Fathi et al. (2019) revealed elevated mean levels of total cholesterol, LDL, and triglycerides, accompanied by lowered mean levels of HDL across all subtypes of gallstones. In contrast, Menezes et al. (2019) showed reduced mean levels of total cholesterol, LDL, and triglycerides, along with increased mean levels of HDL across all subtypes of gallstones (Menezes & Katamreddy, 2019).

Long-term usage of statin has been found to reduce the likelihood of developing gallstone disease and requiring cholecystectomy (Chang et al., 2023). According to prior research carried out by Wang et al. (2023), the use of statin can significantly minimize the risk of recurrent common bile duct (CBD) stones following cholecystectomy. The proposed mechanism of action is that the medication lowers biliary cholesterol levels.

This is the first systematic review that analyzed the effect of cholecystectomy on lipid profiles. This study provides new insights regarding four lipid profile parameters of the post-cholecystectomy hyperlipidemia patients. Despite multiple articles indicating that cholecystectomy may improve lipid profiles, no significant changes were observed across follow-up durations of two months to one year. This study faced several limitations. First, some of the subgroup analyses only included a small number of studies. Second, the selected studies did not report any long-term follow-up analysis, with the longest follow-up duration limited to only one year. Long-term lipid profile changes in post-cholecystectomy patients must be considered to determine the comparable risk of dyslipidemia in the same populations. Third, most of the studies were conducted in Asia, which might not represent the global population. Fourth, the reviewed studies exhibited varying follow-up durations, which prompted us to conduct subgroup analyses to reduce the potential risk of bias.

CONCLUSION

Cholecystectomy significantly decreases total cholesterol and low-density lipoprotein (LDL) levels within less than a week after the procedure and during one-week follow-ups. In addition, it significantly improves all lipid profile parameters a month following the procedure. However, post-cholecystectomy follow-ups beyond one month exhibit no significant changes in lipid profiles.

ACKNOWLEDGEMENT

The authors would like to thank the peer reviewers for providing constructive feedback that improved this systematic review and meta-analysis.

CONFLICT OF INTEREST

The authors declare no conflict of interest in this study.

FUNDING DISCLOSURE

None.

AUTHOR CONTRIBUTION

JR contributed to the conception and design, analyzed and interpreted the data, drafted the article, provided statistical expertise, and collected and assembled the data. VW and HT critically revised the article for important intellectual content, provided the study materials, offered administrative, technical, or logistic support, and collected and assembled the data. All authors gave final approval of the article for publication.

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