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Association between lipid profile and gallbladder histopathology of post cholecystectomy patients

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Abstract

Introduction: *In cholelithiasis, lipid and histopathological alterations have been found and suggest the accumulation of lipids in the gallbladder tissue (cholesterolosis), due to the few existing reports a study was carried out to determine their association.* **Objectives:** *The aim of the study was to evaluate the association between the lipid profile and gallbladder histopathology in patients with cholelithiasis undergoing cholecystectomy.* **Methodology:** *An observational, cross-sectional, analytical, and prospective study was carried out in a group of patients from the Hospital General de México "Eduardo Liceaga" undergoing elective laparoscopic cholecystectomy from January 2015 to January 2020. With approval of the protocol by the ethics and research committee, the following variables were considered: age, sex, BMI, comorbidities (diabetes, dyslipidemia, hypertension, cirrhosis), LDL-C, HDL-C, total cholesterol, triglycerides, and histopathological findings (cholesterolosis, polyps, xanthogranulomatosis, acute cholecystitis, and cholecystitis chronicle). A descriptive and inferential analysis was performed with SPSS v.24. It was considered $p < 0.05$ as significant.* **Results:** *From a group of 302 patients, 133 cases (108 women and 25 men) were included in the study. They presented overweight (39%) and obesity (33%), the lipid profile with hypoalphalipoproteinemia (61%), hypertriglyceridemia (40%), hypercholesterolemia (17%), and elevated LDL-C (16%); and in histopathology chronic cholecystitis (70%), cholesterolosis (28%), and acute cholecystitis (7%).* **Discussion:** *Our sample is representative of the Mexican population (in physical characteristics and lipid profile). However, no significant association was found between dyslipidemia and histopathological findings.*

Keywords: *Lipid profile. Cholesterol, Cholesterolosis. Xanthogranulomatosis.*

Introduction

Cholelithiasis are hardened deposits (stones) of digestive fluid formed in the gallbladder, which are located within it or migrate to the main bile duct (MBD) and intrahepatic bile ducts. They are classified according to their composition and cholesterol stones are the most frequent with a prevalence of 10-15% in adults[1,2].

Its prevalence reaches its peak between 60-70 years (30% in women and 20% in men). However, studies indicate that its global prevalence is 64.1% in women and 29.5% in men[3]. It is a common problem in developed

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countries, representing a significant health burden, in the United States (EU) between 20 and 25 million adults have it[4], consuming up to $6.5 billion[5,6]. In Latin America, it occurs between 5 and 15%, and in Mexico 14.3% of adults present it (8.5% men and 20.5% women)[7].

More than 80% of cases are asymptomatic, only 10-20% will present symptoms within 5-20 years after diagnosis. Biliary colic occurs in 1-2% per year[8,9]. Its complications (cholecystitis, choledocholithiasis, pancreatitis due to gallstones, and cholangitis) occur with an annual rate of 0.1-0.3%[8]. Among its main risk factors are obesity, a diet rich in fat and a sedentary lifestyle[10,11].

Lipid profile abnormalities in patients with cholelithiasis

Altered serum lipids in cholelithiasis due to cholesterol stones suggest metabolic syndrome. More than half of patients with cholelithiasis could have a lipid disorder. It is accepted that the main event in the pathogenesis of cholesterol stones is altered lipid metabolism due to an increase in cholesterol levels compared to other lipids secreted by the liver into the bile[12].

Dyslipidemia is characterized by elevated levels of total cholesterol (TC), triglycerides (TG), low-density lipoproteins (LDL), and low levels of high-density lipoproteins (HDL). Studies have shown the association between dyslipidemia and stones, especially the increase in TG and LDL[13].

Channa et al. analyzed the serum lipid profile in patients with cholelithiasis and patients without cholelithiasis. They showed that elevated levels of TC, free cholesterol, LDL, TG, and reduced levels of HDL played an important role in the pathogenesis of gallstones in 45-year-old women with more than three children[14].

Acute/chronic cholecystitis is a chronic relapsing hepatobiliary disease, which can result from impaired metabolism of cholesterol, bilirubin, and bile acid. Many studies have shown an association between gallstones and abnormal lipids[15,16]. Due to cholelithiasis, various histopathological changes are produced in the mucosa of the gallbladder (acute, chronic and granulomatous inflammation, hyperplasia, cholesterolosis, dysplasia, and carcinoma). Being symptomatic, therapeutic intervention is necessary[17].

The objective of this study was to investigate the association between the histopathological finding of gallbladder lithiasis (secondary to an inflammatory process, hyperplasia, metaplasia, or carcinoma) and the lipid profile of patients undergoing laparoscopic cholecystectomy.

Material and methods

An observational, cross-sectional, analytical, and retrospective study was carried out. Records of patients over 18 years of age from the "Eduardo Liceaga" General Hospital of Mexico, who underwent laparoscopic cholecystectomy for cholelithiasis were analyzed in the period of January 2015 to January 2020. The pre-operative lipid profile was considered. Cases of patients older than 18 years of both sexes who underwent laparoscopic cholecystectomy for cholelithiasis were included in the study. Patients with incomplete clinical records were excluded from the study. The study was submitted for review by the Research Bioethics Committee of the General Hospital of Mexico "Eduardo Liceaga". Obtaining the following variables age, sex, BMI, comorbidities (diabetes, dyslipidemia, hypertension, cirrhosis, and other), LDL-c, HDL-c, TC, TG, cholesterolosis, polyps, xanthogranulomatosis, acute cholecystitis, chronic cholecystitis, and other finding histopathological. For the statistical analysis, the IBM SPSS version 24 software was used.

Results

Three hundred and two files were reviewed, of which 133 met the inclusion criteria. Twenty-five were men and 108 women, with an average age of 42.5 ± 13.86 years. The average weight in men was 77 ± 11.91 kg and 68.43 ± 12.03 kg for women. Height was 1.68 ± 0.08 m in men and 1.56 ± 0.06 m in women. The BMI in male patients was 27.86 ± 4.0 kg/m^2 and 27.92 ± 4.34 kg/m^2 in female patients.

Serum levels of LDL, HDL, cholesterol, and triglycerides of patients

TC levels were 172.5 ± 41.94 mg/dl, TG 165.1 ± 114.06 mg/dl, LDL-c 110 ± 42.67 mg/dl, and HDL-c 46.8 ± 12.82 mg/dl. In addition, the proportion of patients who presented abnormal values of these lipids was analyzed. It was found that 16.5% of the patients had hypercholesterolemia (values > 200 mg/dl), 39% hypertriglyceridemia (> 150 mg/dl), 16.5% high levels of c-LDL (> 130 mg/dl), and 57.8% low levels of c-HDL (< 50 mg/dl) (Fig. 1).

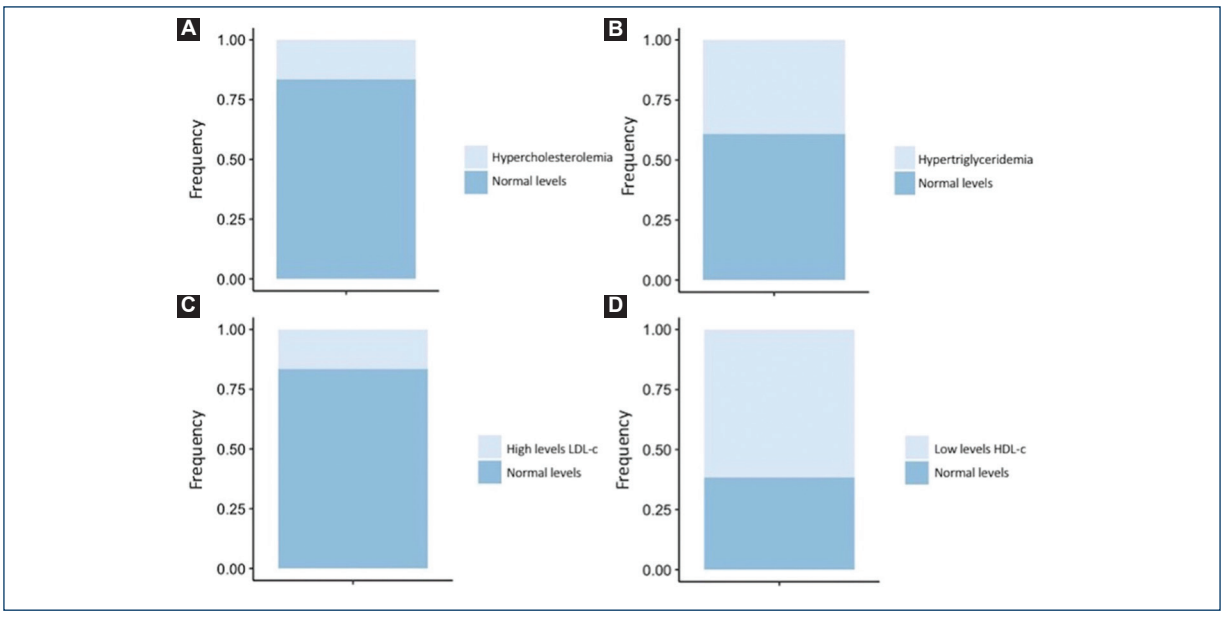

Figure 1. Proportion of patients with abnormal serum values. **A:** cholesterol. **B:** triglycerides. **C:** LDL-c. **D:** HDL-c.

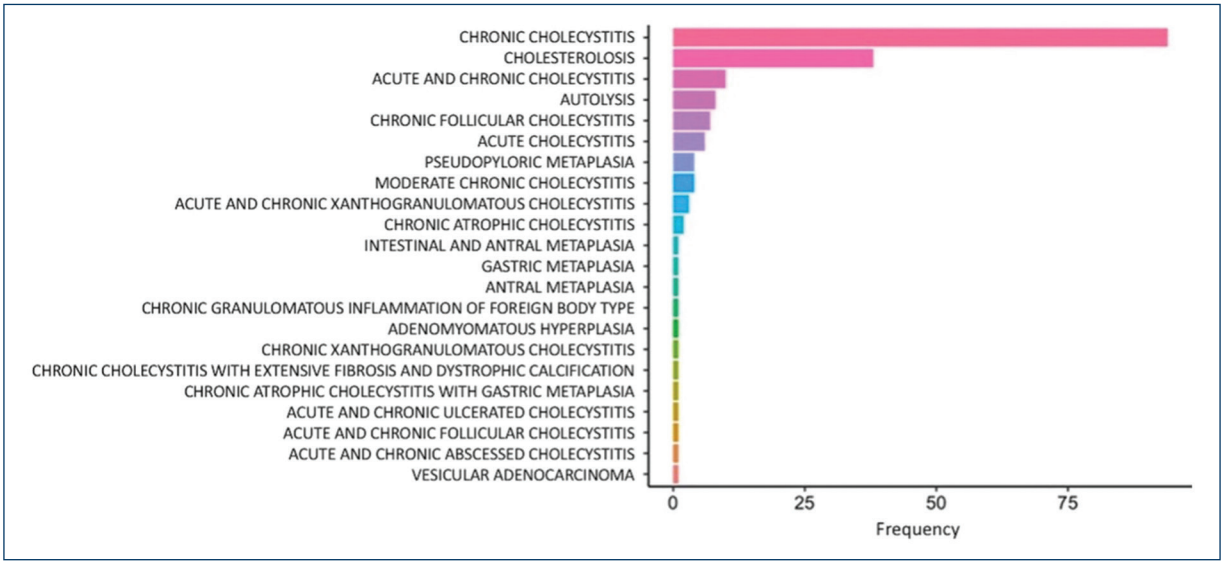

Figure 2. Frequency of pathologies in histopathological reports.

Frequency of cholesterolosis, polyps, xanthogranulomatosis, acute cholecystitis, chronic cholecystitis, and other histopathological findings

Chronic cholecystitis was found in 94 cases, cholesterolosis in 38, acute and chronic cholecystitis in 10, autolysis in 8, and adenocarcinoma in one case (Fig. 2).

Comparison between dyslipidemias and normal levels with reported pathologies

The Chi-square test was performed (CI 122-197) to evaluate the concordance between dyslipidemia with each reported pathology, without finding an association (Table 1). The four most common pathology reports were compared with dyslipidemia data, without finding an association (Table 2).

Table 1. Comparison of dyslipidemias with all pathology reports

Pathology	Total n (%)	p-value
Hypercholesterolemia	22 (16.54 %)	0.07
Hypertriglyceridemia	52 (39.09 %)	0.07
High levels of LDL	22 (16.54 %)	0.07
Low levels of HDL	77 (57.89 %)	0.08

Table 2. Comparison between main findings of pathology with dyslipidemia

Alterations in lipid profile	Total n (%)	p-value
Hypercholesterolemia	22 (21.35 %)	0.0614
Hypertriglyceridemia	52 (50.48 %)	0.18
High levels of LDL	22 (21.35 %)	0.17
Hypoalphalipoproteinemia	77 (74.75 %)	0.23

Discussion

In the sociodemographic characteristics of our patients, 33% presented obesity and 39% overweight, compared with the national characteristics where 39.1% presented obesity and 36.1% overweight. Regarding dyslipidemia, 17% had hypercholesterolemia, 40% hypertriglyceridemia, 16% high levels of LDL-c, and 61% low levels of HDL-c (hypoalphalipoproteinemia). In Mexico, 31% have hypercholesterolemia, 47% hypertriglyceridemia, and 55.2% hypoalphalipoproteinemia[18]. Histopathological reports coincide with the three phases of gallbladder inflammation from cystic duct obstruction (edema, hemorrhage, and gallbladder wall necrosis and leukocyte infiltration with subsequent wall necrosis and perforation)[5].

Among the international studies with the largest number of patients is the one of Yaylak et al., who reported 429 cases. The most common report was cholesterolosis (18%), followed by acute cholecystitis (10.7%). Battha and Singh reported 287 cases demonstrating chronic cholecystitis in 73.3% of cases. In our study, the most common finding was chronic cholecystitis (70%), cholesterolosis (28%), and acute cholecystitis (7%). No significant correlation between dyslipidemia and histopathological findings was found in comparison with the study by Battha and Singh[19,20]. However, we highlight the findings of gastric metaplasia and adenomyomatous hyperplasia in patients with altered lipid profile.

Conclusions

Alterations in the lipid profile were not associated with the following histopathological findings: Chronic cholecystitis, cholesterolosis, and xanthogranulomatosis in patients after elective laparoscopic cholecystectomy. However, the association of dyslipidemia with gastric metaplasia and adenomyomatous hyperplasia can be studied in a larger population. It should be noted that there are few reports that list all the histopathological findings of the gallbladder in the Mexican population, despite the fact that it is a very common pathology in our country, as we have already described. This, together with the characteristics of our population (overweight, obesity, and dyslipidemia) represents an area of opportunity in studies with a greater number of cases.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical disclosures

Protection of people and animals. The authors declare that no experiments have been performed on humans or animals for this research.

Data confidentiality. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors declare that no patient data appear in this article.

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