RESEARCH ARTICLE

Comparative Study of Liver Function Test in Cholelithiasis Patient Pre and Post Cholecystectomy

Taban S. Hawar*, Diyari A. Lor

Department of Medical Laboratory Techniques, Al-Qalam University College, Kirkuk, Iraq.

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ABSTRACT

This study aimed to investigate the changes that occur in liver function tests in cholelithiasis and relate those changes to it. For this purpose, 38 blood specimens were collected from the patients with cholelithiasis undergoing/underwent Cholecystectomy at Azadi-teaching and Kirkuk hospital from January to June 2021, 19 pre-operative samples, and 19 four weeks post-operatively.

Our study showed that the gallstone disease was more common in females 17 (89.46%) than males 2 (10.54%). Age was a major risk factor as the patients' mean age was 39.26 years. Out of 19 patients undergoing cholecystectomy, pre-operative liver function tests (LFT) were normal in 11(61.11%) patients, and abnormal LFT was detected in 8 (44.44 %) patients. Eight (42.1%) patients had elevated alkaline phosphatase (ALK-P levels%), and also had an elevated of AST and ALT. In the serum, slight elevations in the level of total bilirubin 5 (26.3%), and direct bilirubin 3 (15.8) were also noticed in those patients.

Following Cholecystectomy (after 4 weeks), in some cases, changes occur in liver function tests where the finding of ALT, AST, and ALK-P closely shows restoration to normal. However, some cases show no significant variation. Statistically, big distinctions between levels of ALK-P, AST, and ALT have been found before and after Cholecystectomy ($p < 0.0050$, $p < 0.0124$, and $p < 0.0115$). The statistical result shows no significance in total bilirubin (TBIL) and direct bilirubin (DBIL) in postoperative cases.

At all, there were big distinctions between levels of ALK-P, AST, and ALT before and after Cholecystectomy ($p < 0.0050$, $p < 0.0124$, and $p < 0.0115$, respectively), but levels of total and direct bilirubin revealed no significant distinctions before and after Cholecystectomy.

Keywords: Cholecystectomy, Cholelithiasis, Gallstone, Liver enzymes, Tests of liver function.

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INTRODUCTION

Cholelithiasis is a common problem in the West and developing countries, and its incidence is increasing. Annually, in the United States, approximately 500,000 cholecystectomies are carried out, and nearly 10% of cholelithiasis cases affect adult individuals. Symptoms include pain and tenderness in the right upper quadrant, sometimes escorted by fever, vomiting, nausea, and chills.[1-3]

According to the presence of an obstruction in large bile ducts (extrahepatic) with the presence of cholangitis or not, the gallstones involve in the deterioration of the liver cells. To inspect the functional status of the liver, many routine analyses have been used LFT before the operation. In 1994, Geraghty and Goldin made up research where they noticed that an elevated percentage (66%) of the patients with cholecystitis and gallstones had histological abnormalities in the liver.[1,4,15]

It has become routine to request an LFT for each patient undergoing Cholecystectomy for symptomatic cholelithiasis. When the stone enters the cystic duct and then constantly blocks it, it can cause acute inflammation. Cholestasis induces the release of enzymes, such as serum levels of 5'NT, ALP, ALT, AST, and serum bilirubin. Gallstones prevent fluid from leaving the gallbladder. This can cause inflammation and swelling of the gallbladder. Infection or trauma can also cause cholecystitis. Arbitrary treatment can lead to malignant or cirrhotic changes. The related cirrhosis here is biliary cirrhosis, and the most common is the complication of gallstones.[1,5]

Studies on the impacts of the existence of gallstones in symptomatic cholelithiasis on liver function tests are being conducted worldwide and in different parts of Iraq.[6,7] However, such a study has not been conducted in Kirkuk city.

**Author for Correspondence: hawartaban123@gmail.com*

PATIENTS AND METHODS

This study was conducted on 19 patients admitted to Azadi and Kirkuk hospitals who underwent laparoscopic cholecystectomy from January to June 2021. All patients with asymptomatic gallstones have a pain history in the upper quadrant and epigastric regions. An abdominal sonogram was considered a normative examination to disclose the gallstones. Generally, their ages ranged from 20 to 55 years, the females and males were 17 and 2 respectively. Thirty-eight blood specimens were collected from the patients with cholelithiasis who were undergoing/underwent Cholecystectomy, 19 pre-operative and 19 four weeks post-operatively.

The following tests have been done on all the specimens before and four weeks after Cholecystectomy:

- Alanine aminotransferase (ALT).
- Aspartate aminotransferase (AST).
- Alkaline phosphatase (ALK-P).
- Total and direct bilirubin (TBIL & DBIL).

Statistical Tests

Graph pad prism was applied to analyze the entire data. Both unpaired t-test (p values > 0.05 deemed significant) and means and standard deviation were expressed.

RESULTS AND DISCUSSION

To assess the capability of liver function, LFT has been used before Cholecystectomy as a routine test. In the present project, the data has been divided into two groups normal and abnormal values (Table 1). Out of 19 cases of cholecystectomy, 11 LFT cases (61.11%) have been normal, and 8 LFT cases (44.44%) have been abnormal LFT.

Table 1: The ratio of normal and abnormal liver tests.

Pre-operative results			
No.	*Test*	*Normal*	*Abnormal*
1	ALK-P	11 (57.9%)	8 (42.1%)
2	AST	12 (63.1%)	7 (36.8%)
3	ALT	12 (63.1%)	7 (36.8%)
4	Total bilirubin	14 (73.7%)	5 (26.3%)
5	Direct Bilirubin	16 (84.2%)	3 (15.8%)
Postoperative results			
No.	*Test*	*Normal*	*Abnormal*
1	ALK-P	16 (84.2%)	3 (15.8%)
2	AST	16 (84.2%)	3 (15.8%)
3	ALT	16 (84.2%)	3 (15.8%)
4	Total bilirubin	15 (78.9%)	4 (21.05%)
5	Direct bilirubin	15 (78.9%)	4 (21.05%)

In eight (42.1%) cases an elevation of ALK-P levels was seen. The peak was 611 IU/dI. Likewise, an elevation of both AST and ALT has been noticed approximately in 7 (36.8%) cases, where the high point was 300 IU/dL for AST and 87 IU/dL for ALT. In addition, it was noted that the serum total bilirubin 5 (26.3%) and direct bilirubin 3 (15.8%) of these patients were slightly elevated (Table 1). This is comparable to a study conducted by Kassem and his colleges in 2011,[1] and a study conducted by ALZuwainy in Iraq in 2016.6 In a similar study conducted by Rangaswamy *et al*. in 2017,[8] he noted that among the 44 patients with cholelithiasis, 6 (13.6%) had an increase in ALK-P> 290 IU and 4 (9.1%) had an increase in total bilirubin level > 1 mg/dL.

The liver and bone consider the two main sources of ALK-P. Cholestasis's time is prolonged, indicating a steady elevation in alkaline phosphatase in serum.[9] Our study, serum ALK-P increased significantly by, up to 611 IU/dL. This correlated with a study conducted by Thapa *et al*. in 2010,[10] he announced that if the serum ALK-P level exceeds 2.5 times the normal value, bile duct stones can be predicted. AL-Ani in 2002,[11] confirmed the variations of LFT values in cholelithiasis patients depending on location and the types of stone, he observed a significant increase in values of ALK-P values in patients with pigment stones that presence in the common cystic duct.

All patients were seen and followed up for 4 weeks after Cholecystectomy. At this time, the elevated liver function values returned to normal. Substantially, the statistical results between pre-cholecystectomy and post-cholecystectomy cases cleared up the presence of significance in the levels of ALK_P ($p < 0.0050$), AST ($p < 0.0124$) and ALT ($p < 0.0115$). However, no significance was found in the values of total bilirubin and direct bilirubin before and after Cholecystectomy (Table 2). Many studies have shown that LFT returned to normal one month after Cholecystectomy.[1,8] Schirmer BD *et al.* observed similar findings in 2005,[12] in a study, they observed that compared with conservatively treated patients, liver function abnormalities in patients who underwent cholecystectomy were resolved within a few weeks.

Our study observed a case with normal bilirubin returned to abnormal after laparoscopic cholecystectomy. Maleknia and Ebrahimi in 2020,[13] demonstrated significant increases in the bilirubin values. They considered that if no side effects are seen after surgery, this increase appears to be due to the

Table 2: This table shows the values of Mean ±SD and p-value in patients before and after Cholecystectomy.

No.	*Test*	*Mean ± SD pre-cholecystectomy*	*Mean ± SD post-cholecystectomy*	*p-value*
1	ALK-P	280.4 ± 131.6	181.6 ± 58.74	0.0050
2	AST	34.12 ± 20.09	21.19 ± 7.398	0.0124
3	ALT	37.28 ± 24.58	21.18 ± 24.58	0.0115
4	Total bilirubin	0.8053 ± 0.4836	0.6263 ± 0.2400	0.1572
5	Direct bilirubin	0.4316 ± 0.3163	0.3737 ± 0.2469	0.5334

laparoscopic surgery itself and not a serious complication. Furthermore, they did not find significant correlations between gender, age, and BMI with postoperative enzyme changes.

Chen-Wang reported a case of hepatocellular injury where the case clinically was shown an elevation in aminotransferase and bilirubin levels. Regardlessly, whether bile duct stones were present or not, an elevation of aminotransferase was found with the presence of stones. However, he found hepatocellular injurys in a large number of patients with no presence of stones in their bile ducts. In addition, the levels of ALT, AST and bilirubin in most cases were returned to normal 14 days to 30 days subsequent to Cholecystectomy. Although there is an elevation in the levels of serum bilirubin and transaminase in this type of hepatocellular injury nevertheless, this should not be an obstacle for these patients to prepare for surgery. Moreover, the surgery will have interim and temperate pain and no further treatment will be needed, assuming that an infected gallbladder is eliminated.

CONCLUSIONS

In conclusion, the statistical results of our data assured the presence of a great improvement in the liver functions approximately in all patients who were taken cholecystectomy. Where significant differences have been noted between the levels of ALT, AST, and ALK-P before and after the operation, this indicated that an acute injury in the hepatocellular had resulted from symptomatic gallstones. In our study, we observed a case with a normal LFT returned to abnormal after laparoscopic cholecystectomy, this elevation seems to be due to the laparoscopic surgery itself and not a serious complication.

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