International Journal of Multiphysics
Volume 18, No. 3, 2024
ISSN: 1750-9548

Feasibility and Difficulties of Laparoscopic Cholecystectomy in Cirrhotic and Non-Alcoholic Fatty Livers: A Comparative Prospective Cohort Study

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Abstract

Objective: To explore the effect of liver state on cholecystectomy which may help improving the pre-operative predisposing factors. This study is conducted to study the impact of fatty and cirrhotic livers on laparoscopic cholecystectomy and difficulties in the procedure, so we can modify correctable pre-operative factors.

Study design: a prospective cohort study.

Place and Duration of the Study: Department of General Surgery, Zagazig University, Egypt, between November 2024 to November 2025.

Methodology: This is a prospective cohort study included 72 patients who underwent laparoscopic cholecystectomy, divided into three groups: control (healthy or normal liver), fatty liver, and cirrhotic liver, each group contained 28 patients.

Results: The mean BMI was higher in the fatty liver group (31.7) with P< 0.001, pre- and post-operative liver enzymes and bilirubin were higher in cirrhotic and fatty liver groups. Group iii showed the highest values for operative time and bleeding with an inta operative time range of (79 – 200 minutes) and a mean bleeding amount of 172 ml. The cirrhotic group showed more post-operative drain discharge, longer hospital stay, and more pain score among the three groups.

Conclusion: Fatty and cirrhotic livers can affect the outcomes of laparoscopic cholecystectomy. Post-operative liver functions, operative time and bleeding, hospital stay, drain amount, and the pain score were statistically affected.

Keywords: Fatty liver, Cirrhotic liver, Cholecystectomy, Child Pugh

INTRODUCTION

Cholecystectomy, the surgical removal of the gallbladder, is one of the most common surgeries performed worldwide. It is primarily used to treat symptomatic gallstone disease, acute or chronic cholecystitis, and gallbladder polyps, which are frequently related with metabolic disorders like obesity and diabetes [1].

Hepatic steatosis and gallstone disease are common in the general population, with similar risk factors including age, ethnicity, obesity, insulin resistance, metabolic syndrome, atherosclerosis, cardiovascular disease risk, and mortality. Insulin resistance is the key factor in this association since it is a significant link between metabolic syndrome and non-alcoholic fatty liver disease, as well as a higher risk of gallstone development [2].

Liver cirrhosis was deemed a contraindication for laparoscopic cholecystectomy (LC) in a 1992 NIH consensus statement. Laparoscopy has changed since then, and several articles now support the safety of LC in some cirrhotic patients, primarily Child-Pugh class A or B. However, given the small population sizes, the therapeutic relevance of these findings is questionable [3].

Many studies showed that cholecystectomy can lead to fatty liver, but few studied how fatty liver can affect cholecystectomy. Similarly, literature studying the outcomes of LC in liver cirrhosis is still insufficient.

This study aims to improve the outcomes of laparoscopic cholecystectomy in patients with fatty and cirrhotic livers.

METHODOLOGY

This is a comparative prospective cohort study which was performed in GIT surgery unit from November 2024 to November 2025. It included 72 patients with gall stones who had a laparoscopic cholecystectomy divided in three groups, each group contained 24 patients: group i: control (normal) group, group ii (fatty liver) and group iii (cirrhotic liver).

This study followed the STROBE guidelines and adherent to the Helsinki Declaration of 1975, as revised in 2000 with IRB approval number 862/27-Nov-2024. A written consent was obtained from patients participating in the study to participate and publish data.

Patients above 18 years old, Child-Pugh class C, those with previous abdominal incisions or ERCP, malignancy, gall bladder polyps, pancreatitis, acute cholecystitis and cholangitis, cardio or pulmonary diseases were excluded.

Careful history taking from patients, pre-operative investigations were done with a special concern to liver functions, BMI, smoking, pelvi-abdominal ultrasound data, severity of fatty liver and Child-Pugh score of cirrhotic liver.

All patients were operated by the same surgical team to avoid technical bias by 4 port laparoscopic cholecystectomy. The critical view of safety was addressed in all cases using mono-polar diathermy. The cystic duct and artery were clipped by titanium clips (2 clips for the duct and one clip for the artery). A drain was inserted for all cases. Pre, intra and post-operative antibiotics were given (3rd generation cephalosporins). Operative bleeding, time, conversion to open, post-operative liver functions, pain score, drain discharge, and hospital stay were the outcomes. A physician blind to the study followed the patients and collect the data for two weeks post-operative.

ETHICAL APPROVAL

This study was conducted following the ethical principles of the Declaration of Helsinki (Edinburgh 2000) and the approval of the Institutional Review Board. An exemption for informed consent was given by the Institutional Review Board.

-This study was approved by institutional research board (IRB) in our University with ethics approval number #862\27-Nov-2024

PATIENT CONSENT

-Informed written consent was taken from all participants.

STATISTICS

Data was collected, revised, coded, and entered into the Statistical Package for Social Science (IBM SPSS Statistics for Windows, Version 23.0, IBM Corp., Armonk, NY, USA).

RESULTS

Table I demonstrates the demographic characteristics among the studied groups. There was no difference among the groups regarding the age, sex, smoking or chronic diseases e.g. Diabetes, hypertension and SLE. Liver span was shorter in group iii and BMI was higher in group ii.

Pre and post-operative investigations including total, direct and indirect bilirubin, ALT, AST, ALP and GGT were shown in **Table II, III.** Group iii showed statistical difference compared to other groups, but there was no difference between group ii, iii in post-operative total and indirect bilirubin.

The mean operative time was 59.3, 79.3, and 120.5 minutes in group i, ii, and iii respectively, while the mean bleeding amount was 52.8, 94.1, and 172 ml **(Table IV).**

Drain discharge in the first 3 days was significantly higher in group iii (P <0.001). Range of time for drain removal was2 – 3, 2-5, and 3-5 days, while the range of hospital stay was 2-3, 3-5, and 5-9 days in group i, ii, iii respectively. Pain score in the 1st three days after surgery was significantly higher in group iii with P value <0.001 **(Table V).**

DISCUSSION

Laparoscopic cholecystectomy (LC) includes a broad range of technical challenges. On the easy end of the spectrum, the process is quick and simple, usually completed in an hour; on the more challenging end, however, it might pose serious surgical difficulties [4].

Bile duct damage (BDI), which mostly happens when the operation is worsened by inflammation or scarring, is likewise primarily caused by LC.

Omental or bowel adhesions, distended, edematous, or thick-walled gallbladder, scarred or fibrotic gallbladder, the Pucker sign, cirrhotic liver with laterally displaced gallbladder, pericholecystic abscess, obliterated or scarred hepatocystic triangle due to biliary inflammatory fusion, intrahepatic gallbladder, obscured anatomical landmarks, dilated veins in the hepato-duodenal ligament, and other conditions are predictive of difficult LC [4].

Accordingly, cirrhotic and fatty livers may cause difficulties in LC. Bleeding, longer operative time, bile duct injury are expected.

Patients with portal hypertension and end-stage liver cirrhosis were not eligible for LC, according to the 1992 National Institutes of Health (NIH) consensus statement on LC [5].

This study showed no difference regarding age, sex, smoking and associated other comorbidities.

In this study, BMI was statistically lower in the cirrhotic group (mean 27.7) in comparison with the control group (mean 30) P<0.03 and was highly statistically lower than the fatty liver group (mean 31.7) P<0.001. Liver span was the longest in group ii and the shortest in group iii with a high significant difference P<0.001.

In Rodríguez-Antonio et al. study the mean BMI in healthy liver group was 26.5 and in fatty liver group was 29 [6].

Total and direct bilirubin were higher in cirrhotic and fatty liver groups in comparison with the control group. Indirect bilirubin was higher in group iii in comparison to group i and ii, while there was no difference between group i and ii. ALT, AST, ALP and GGT were the highest in group iii followed by group ii then group I with P<0.001. Post-operative total and indirect bilirubin were significantly higher in group ii and iii in comparison to group i, while there was no difference between group ii and iii. Post-operative ALT, AST, ALP and GGT were the highest in group iii followed by group ii then group i with P<0.001.

Hosseinzadeh et al. stated in their study that there was a transient minimal increase in ALT, AST, bilirubin, ALP and GGT after cholecystectomy [7]. This goes with our study as all these parameters slightly elevated in all groups after surgery.

In Goda et al. study, the mean operative time in cirrhotic liver was 75.2 minutes. They stated that the number of patients with Child Pugh score A was 12 and B was 8. Two cases converted to open and two patients needed blood transfusion [8]. The range of operative time in the study of Abo Steit et al. was (20-120 min), 40 patients were Child A and 10 were Child B. Twelve cases were converted to open, conversion was due to bleeding and they stated that one patient needed intra-operative blood transfusion [9].

Operation time was the longest in group iii with a range 79 – 200 minutes followed by group ii and group i respectively. There was no difference in bleeding between group i and ii, but bleeding was higher in

group iii in comparison with other groups. The highest amount of bleeding was in group iii (387ml). While operation time is longer than the previous literature, bleeding and conversion rate are lesser than them. Two cases in cirrhotic group due to bleeding and only one case of fatty liver group due to field obliteration were converted to open.

Regarding the drain discharge in the 1st three days after surgery, the cirrhotic group had the highest drain discharge. The higher discharge was in the 1st day (247 ml). Comparing the fatty liver group with the control group, there was difference in drain discharge in the 1st day, but discharge was more in fatty liver group in the 2nd and 3rd days after surgery. Drain was removed early in the healthy group (3rd day) and late in fatty and cirrhotic livers groups (5th day).

Post-operative pain evaluated by visual analogue score was the highest in cirrhotic group in the first 3 days after surgery. The score is reduced by time in the three groups. The highest score was 7 in cirrhotic group in the 1st day, while the lowest score was 0 in the 3rd day in the healthy group.

The mean hospital stay in group i was 2.71, in group ii was 3.96, and in group iii was 6.92 days. This is consistent with Abo Steit et al. [9] study on cirrhotic liver. They reported a mean hospital stay in Child A 3.4 days, and in Child B 6.8 days.

In our study there was only one patient developed biliary injury and leakage in cirrhotic group. No wound infection was reported.

CONCLUSION

In comparison to the control group, laparoscopic cholecystectomy with fatty liver has higher liver span, higher pre-and post-operative total and direct bilirubin, ALT, AST, ALP, GGT, higher post-operative indirect bilirubin, and longer operative time. It had more pain score in the 1st three days, more drain discharge in the 2nd and 3rd days with a longer hospital stay. While laparoscopic cholecystectomy with cirrhotic liver has lower BMI, shorter liver span, higher pre and post-operative total, direct and indirect bilirubin, ALT,AST, GGT, ALP, operative time, bleeding, drain discharge, hospital stay and pain score.

RECOMMENDATIONS

If it is possible, weight reduction and liver support should be done before cholecystectomy in fatty liver patients. Correction of child score for cirrhotic patients from B to A before surgery is better.

FUNDING: No funding was received for conducting this study.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

REFERENCES

1- Liu XY, Ma J, Jiao Y. Cholecystectomy and non-alcoholic fatty liver disease: Exploring the hidden connection and implications. World J Gastrointest Surg 2025; 17(10): 109359. DOI: 10.4240/wjgs.v17.i10.109359.
2- Rodríguez-Antonio I, López-Sánchez GN, Garrido-Camacho VY, Uribe M, Chávez-Tapia NC, Nuño-Lámbarri N. Cholecystectomy as a risk factor for non-alcoholic fatty liver disease development HPB 2020;22 (11) 1513-1520
3- Strömberg J, Hammarqvist F, Sadr-Azodi O, Sandblom G. Cholecystectomy in Patients with Liver Cirrhosis. Gastroenterol Res Pract 2015;783823. doi: 10.1155/2015/783823. Epub 2015 Dec 14. PMID: 26788053; PMCID: PMC4691627.
4- Abdallah, H.S., Sedky, M.H. & Sedky, Z.H. The difficult laparoscopic cholecystectomy: a narrative review. BMC Surg 25, 156 (2025). https://doi.org/10.1186/s12893-025-02847-3
5- Laurence JM, Tran PD, Richardson AJ, Pleass HC, Lam VW. Laparoscopic or open cholecystectomy in cirrhosis: a systematic review of outcomes and meta-analysis of randomized trials. HPB (Oxford) 2012;14(3):153-61. doi: 10.1111/j.1477-2574.

6- Rodríguez-Antonio I, Lopez-Sanchez GN, Reyes-Gomez VA, Contreras-Flores EH, Farías-García F, Espejel-Deloiza M et al. Laparoscopic cholecystectomy: Histopathological analysis of metabolic associated fatty liver disease and fibrosis. Annals of Hepatology 2022;27(2)100651.
7- Hosseinzadeh F, Nourazarian A. Transient liver enzyme elevations following laparoscopic cholecystectomy: a comprehensive review Updates Surg. 2025. doi: 10.1007/s13304-025-02458-w.
8- Goda A, Mohamed H, Ibrahim I. Laparoscopic cholecystectomy in cirrhotic patients with symptomatic cholelithiasis The Egyptian Journal of Surgery 2018; 237:533–536.
9- Abo Steit HH, Morad AS, Saad M. Evaluation of laparoscopic cholecystectomy in cirrhotic patients Ain-Shams J Surg 2010; 3(2):119-124.

Table I: Demographic characteristics among the studied groups

Variables		Normal (n=24)	Fatty (n=24)	Cirrhotic (n=24)	P value	Post hoc
Age *(years)*	*Mean ± SD*	38.8 ± 11.52	42.8 ± 8.88	43.6 ± 7.86	0.25[1]	-
	Range	(20 – 55)	(28 – 55)	(31 – 55)		
Sex *(n. %)*	Male	6 (25%)	8 (33.3%)	11 (45.8%)	0.31[2]	-
	Female	18 (75%)	16 (66.7%)	13 (54.2%)		
BMI *(Kg/m^2)*	*Mean ± SD*	30 ± 3.36	31.7 ± 2.78	27.7 ± 2.86	**<0.001[1]**	P1=0.16 P2=**0.03** P3<**0.001**
	Range	(25 – 35)	(27.6 – 38.6)	(21.7 – 31.5)		
Smoking *(n. %)*	No	18 (75%)	15 (62.5%)	16 (66.7%)	0.64[2]	-
	Yes	6 (25%)	9 (37.5%)	8 (33.3%)		
Liver span *(cm)*	*Mean ± SD*	14.6 ± 1.89	17 ± 2.03	10.6 ± 1.41	**<0.001[1]**	P1**<0.001** P2**<0.001** P3**<0.001**
	Range	(10.7 – 17.8)	(14 – 22.3)	(8.4 – 13.4)		
Associated comorbidities *(n. %)*	None	17 (70.8%)	21 (87.5%)	22 (91.7%)	0.57[3]	-
	DM	3 (12.5%)	2 (8.3%)	1 (4.2%)		
	HTN	3 (12.5%)	1 (4.2%)	1 (4.2%)		
	SLE	1 (4.2%)	0 (0%)	0 (0%)		

**[1]One way ANOVA test, [2]Chi-square test, [3]Fisher exact test, Non-significant: P >0.05, Significant: P ≤0.05*

**P value=Comparison between the three groups, P1=Comparison between Normal & Fatty groups, P2=Comparison between Normal & Cirrhotic groups, P3= Comparison between Fatty & Cirrhotic groups.*

**BMI=Body mass index*

Table II: Preoperative investigations among the studied groups

Variables	Normal (n=24)	Fatty (n=24)	Cirrhotic (n=24)	P value	Post hoc

Total bilirubin *(mg/dl)*	*Mean ± SD*	0.8 ± 0.2	1.34 ± 0.31	1.72 ± 0.53	**<0.001**	P1**<0.001** P2<**0.001** P3=**0.002**
	Range	(0.35 – 1.24)	(0.68 – 2.01)	(0.81 – 2.4)		
Direct bilirubin *(mg/dl)*	*Mean ± SD*	0.19 ± 0.04	0.44 ± 0.11	0.67 ± 0.22	**<0.001**	P1**<0.001** P2<**0.001** P3<**0.001**
	Range	(0.13 – 0.28)	(0.22 – 0.66)	(0.24 – 0.99)		
Indirect bilirubin *(mg/dl)*	*Mean ± SD*	0.63 ± 0.08	0.78 ± 0.25	1.06 ± 0.33	**<0.001**	P1=0.11 P2<**0.001** P3<**0.001**
	Range	(0.43 – 0.81)	(0.31 – 1.25)	(0.57 – 1.56)		
ALT *(U/L)*	*Mean ± SD*	29.3 ± 4.65	52.8 ± 13.38	65.7 ± 17.78	**<0.001**	P1**<0.001** P2<**0.001** P3=**0.003**
	Range	(18 – 35.7)	(26 – 77)	(30.2 – 104.6)		
AST *(U/L)*	*Mean ± SD*	26.1 ± 4.67	49.8 ± 9.09	81.5 ± 14.41	**<0.001**	P1**<0.001** P2<**0.001** P3<**0.001**
	Range	(17.6 – 36.5)	(32.1 – 66)	(53.1 – 104.3)		
ALP *(U/L)*	*Mean ± SD*	90.3 ± 9.69	110.8 ± 17.9	133.8 ± 27.62	**<0.001**	P1**=0.002** P2<**0.001** P3<**0.001**
	Range	(71.2 – 106)	(82.3 – 158)	(76 – 189)		
GGT *(U/L)*	*Mean ± SD*	32.7 ± 8.55	69.1 ± 17.49	100.2 ± 35.52	**<0.001**	P1**<0.001** P2<**0.001** P3<**0.001**
	Range	(14.7 – 46.2)	(39.6 – 99.2)	(43.8 – 188.8)		

**One way ANOVA test, Non-significant: P >0.05, Significant: P ≤0.05*

**P value=Comparison between the three groups, P1=Comparison between Normal & Fatty groups, P2=Comparison between Normal & Cirrhotic groups, P3= Comparison between Fatty & Cirrhotic groups.*

**ALT=Alanine transaminase, AST=Aspartate aminotransferase, ALP=Alkaline phosphatase, GGT=Gamma-glutamyl transferase*

Table III: Postoperative investigations among the studied groups

Variables		**Normal (n=24)**	**Fatty (n=24)**	**Cirrhotic (n=24)**	**P value**	**Post hoc**
Total bilirubin *(mg/dl)*	*Mean ± SD*	0.85 ± 0.22	1.51 ± 0.34	1.61 ± 0.61	**<0.001**	P1<**0.001** P2<**0.001** P3=0.66
	Range	(0.37 – 1.31)	(0.83 – 2.1)	(0.43 – 2.56)		
Direct bilirubin *(mg/dl)*	*Mean ± SD*	0.21 ± 0.04	0.57 ± 0.12	0.71 ± 0.29	**<0.001**	P1**<0.001** P2<**0.001**
	Range	(0.14 –	(0.4 –	(0.21 –		

		0.29)	0.83)	1.14)		P3=**0.03**
Indirect bilirubin *(mg/dl)*	*Mean ± SD*	0.63 ± 0.19	0.91 ± 0.35	0.94 ± 0.34	**<0.001**	P1=**0.006** P2=**0.002** P3=0.95
	Range	(0.21 – 1.05)	(0.3 – 1.57)	(0.22 – 1.46)		
ALT *(U/L)*	*Mean ± SD*	32.5 ± 5.74	63.9 ± 16.08	85.3 ± 27.1	**<0.001**	P1<**0.001** P2<**0.001** P3<**0.001**
	Range	(19.5 – 40.4)	(32.3 – 95.2)	(35.7 – 172.7)		
AST *(U/L)*	*Mean ± SD*	28.1 ± 5.55	59.3 ± 12.37	124.4 ± 25.38	**<0.001**	P1<**0.001** P2<**0.001** P3<**0.001**
	Range	(19.2 – 40)	(35.3 – 79.8)	(67.5 – 161.8)		
ALP *(U/L)*	*Mean ± SD*	94.6 ± 10.5	122.1 ± 22.7	172.2 ± 47.3	**<0.001**	P1=**0.008** P2<**0.001** P3<**0.001**
	Range	(72.7 – 113)	(82.4 – 182)	(98.1 – 279)		
GGT *(U/L)*	*Mean ± SD*	35.7 ± 9.27	84.7 ± 26.17	135.9 ± 49.79	**<0.001**	P1<**0.001** P2<**0.001** P3<**0.001**
	Range	(15 – 49.9)	(39.3 – 133)	(69.5 – 282.6)		

**One way ANOVA test, Non-significant: P >0.05, Significant: P ≤0.05*

**P value=Comparison between the three groups, P1=Comparison between Normal & Fatty groups, P2=Comparison between Normal & Cirrhotic groups, P3= Comparison between Fatty & Cirrhotic groups.*

**ALT=Alanine transaminase, AST=Aspartate aminotransferase, ALP=Alkaline phosphatase, GGT=Gamma-glutamyl transferase*

Table IV: Intraoperative data among the studied groups

Variables		**Normal (n=24)**	**Fatty (n=24)**	**Cirrhotic (n=24)**	**P value**	**Post hoc**
Operative time *(min)*	*Mean ± SD*	59.3 ± 10.2	79.3 ± 18.6	120.5 ± 31.9	**<0.001**	P1=**0.007** P2<**0.001** P3<**0.001**
	Range	(38.3 – 85)	(51.5 – 130)	(79 – 200)		
Intraoperative bleeding *(ml)*	*Mean ± SD*	52.8 ± 15.1	94.1 ± 43.8	172 ± 117.1	**<0.001**	P1=0.13 P2<**0.001** P3=**0.001**
	Range	(32.5 – 81.8)	(32.3 – 250)	(53 – 387)		

**One way ANOVA test, Non-significant: P >0.05, Significant: P ≤0.05*

**P value=Comparison between the three groups, P1=Comparison between Normal & Fatty groups, P2=Comparison between Normal & Cirrhotic groups, P3= Comparison between Fatty & Cirrhotic groups.*

Table V: Postoperative data among the studied groups

Variables		Normal (n=24)	Fatty (n=24)	Cirrhotic (n=24)	P value	Post hoc
Drainage 1st day *(ml)*	*Mean ± SD*	83.6 ± 22.6	97.5 ± 25.6	140.4 ± 50.4	**<0.001**[1]	P1=0.36 P2<**0.001** P3<**0.001**
	Range	(56.2 – 140)	(46 – 148)	(80 – 247)		
Drainage 2nd day *(ml)*	*Mean ± SD*	41.2 ± 9.45	64.1 ± 15.88	84.1 ± 26.94	**<0.001**[1]	P1<**0.001** P2<**0.001** P3=**0.001**
	Range	(22.9 – 61)	(38.5 – 96.3)	(44 – 132)		
Drainage 3rd day *(ml)*	*Mean ± SD*	19 ± 4.52	30.2 ± 9.56	49.9 ± 25.78	**<0.001**[1]	P1=**0.048** P2<**0.001** P3<**0.001**
	Range	(10.5 – 30)	(13.1 – 55.2)	(20 – 96)		
Time of drain removal *(days)*	*Mean ± SD*	2.58 ± 0.5	3.08 ± 0.78	3.5 ± 0.59	**<0.001**[1]	P1=**0.02** P2<**0.001** P3=0.07
	Range	(2 – 3)	(2 – 5)	(3 – 5)		
Hospital stay *(days)*	*Mean ± SD*	2.71 ± 0.46	3.96 ± 0.81	6.92 ± 1.32	**<0.001**[1]	P1<**0.001** P2<**0.001** P3<**0.001**
	Range	(2 – 3)	(3 – 5)	(5 – 9)		
Postoperative pain 1st day	*Mean ± SD*	3.13 ± 0.79	3.75 ± 0.74	6 ± 0.89	**<0.001**[1]	P1=**0.03** P2<**0.001** P3<**0.001**
	Range	(2 – 4)	(3 – 5)	(5 – 7)		
Postoperative pain 2nd day	*Mean ± SD*	1.5 ± 0.51	2.29 ± 0.46	4.25 ± 0.68	**<0.001**[1]	P1<**0.001** P2<**0.001** P3<**0.001**
	Range	(1 – 2)	(2 – 3)	(3 – 5)		
Postoperative pain 3rd day	*Mean ± SD*	0.54 ± 0.51	1.25 ± 0.44	2.67 ± 0.48	**<0.001**[1]	P1<**0.001** P2<**0.001** P3<**0.001**
	Range	(0 – 1)	(1 – 2)	(2 – 3)		
Conversion to open *(n. %)*	No	24 (100%)	23 (95.8%)	22 (91.7%)	0.77[2]	-
	Yes	0 (0%)	1 (4.2%)	2 (8.3%)		

**[1]One way ANOVA test, [2]Fisher exact test, Non-significant: P >0.05, Significant: P ≤0.05*

**P value=Comparison between the three groups, P1=Comparison between Normal & Fatty groups, P2=Comparison between Normal & Cirrhotic groups, P3= Comparison between Fatty & Cirrhotic groups.*