AIM OF THE WORK

The aim of this work was to evaluate plasma D-Lactate, and fatty acid binding protein as non-invasive parameters of gut wall integrity in patients with HCV induced liver cirrhosis.

SUBJECTS

This study was carried out on:

Group I :

40 Patients with chronic HCV and liver cirrhosis who will be further subdivided according to Child Pugh classification.

Group II :

40 Patients with HCV liver cirrhosis and ascites with spontaneous bacterial peritonitis.

Group III :

Control group of 20 healthy volunteers of matched age and sex.

Written informed consent will be obtained from every patient and control in the study following the guidelines of Alexandria faculty of Medicine Ethics Committee.

Exclusion criiteria

- Malabsorption syndrome
- Acute appendicitis
- Septic shock
- Gut failure
- Necrotizing enterocolitis
- Triose phosphate isomerase deficiency.

METHODS

All patients and controls were subjected to the following:

- Complete history taking and thorough clinical examination.
- Routine laboratory investigations:
  - Complete blood count, ESR.
  - Liver function tests: Serum transaminases (ALT, AST), Prothrombin time, Serum albumin, Serum bilirubin) Alkaline phosphatase and gammaglutamyl transpeptidase.
  - C-reactive protein.
  - Renal function tests: blood urea and serum creatinine.
- Viral hepatitis markers by enzyme immunoassay kits:
  - HBsAg.
  - HCVAb.
- Qualitative PCR for HCV-RNA.
- Abdominal ultra sound.
- Estimation of plasma D-lactate;
  D-lactate was assessed by Colorimetic LOD-PAP-Test (Monoreagent) [Greiner Diagnostic GmbH-Unter Gereuth 10-D-79353 Bahlingen Germany]. Following the manufacturers instruction.[178,179]
- Quantitation of plasma Fatty acid binding protein;
  Plasma Fatty acid binding protein was assessed by Enzyme linked immunosorbant Assay(ELISA)(E90559 Hu, Uscn, Life science Inc..USA) following the manufacturer's instructions.[185]

Statistical analysis

After data were collected it was revised, coded and fed to statistical software IBM SPSS version 20. The given graphs were constructed using Microsoft excel software.

All statistical analysis was done using two tailed tests and alpha error of 0.05. P value less than or equal to 0.05 was considered to be statistically significant.

The following statistical tests were used:

A. Descriptive statistics: included the mean with range and standard deviation and percent to describe the scale and categorical data, respectively

B. Analysis of numeric data

1. One-Sample Kolmogorov-Smirnov Test: a procedure compares the observed cumulative distribution function for a variable with a specified theoretical distribution which was the normal distribution at the current data (testing for distributional assumption for numerical data) then the following statistical analysis was done:

    a. One Way ANOVA: it is a parametric statistical test that used to compared the mean for more than two independent groups for numeric data and following normal distribution. It equals multiple t test with adjustment for multiple comparisons.

C. Analysis of categorical data

    a. Pearson's chi square test: it is a non parametric statistic that is used to test for the association (or relationship) between the categories of two independent samples (row and column variables) to reflect a real association between these 2 variables in the population.

    b. Mont Carlo exact test and Fishers exact test: they are alternatives for the Pearson's chi square test if there were many small expected values.

D. Correlation analysis: correlation is used to test the nature and strength of relation between two quantitative / ordinal variables. The spearman correlation co efficient (rho) is expressed as the Pearson co efficient. The sign of the co efficient indicates the nature of relation (positive / negative) while the value indicates the strength of relation as follow: Weak correlation for rho less than 0.25, intermediate correlation for rho of value between 0.25-0.74 and strong correlation for values between 0.75-0.99.

E. Receiver operating characteristic (ROC curve): is a graphical plot that illustrates the performance of a binary classifier system (case / control) as its discrimination threshold is varied to identify the best discriminatory cutoff point with the highest sensitivity and specificity which are considered validation markers for the selected threshold level.

RESULTS

Age and Sex distribution

The present study was conducted on a hundred individuals classified into three groups:

Group I:

Included forty patients with chronic hepatitis C andliver cirrhosis. These weretwenty one males and ten females. Their ages ranged from 40 to 55 years with a mean of 46.2 ± 4.2 years, and their child score ranged from 5-9 with a mean of 6.7 ± 1.3.

Group II:

Consisted of forty patients withliver cirrhosis and ascites with spontaneousbacterialperitonitis. These were twentymales and twenty females. Their age ranged from 41to 55 years with a mean of49.0 ±4.3 years**,** and their child score ranged from7-13 with a mean of 9.5 ± 1.4.

Group III:

Compromised twenty healthy controls,ten males andtenfemales. Their ages ranged from 40 to 47 with a mean of 43.6 ± 1.8 years.

No significant difference was detected among the three groups regarding age (p0.078) and sex (p0.970).

Table (3): Age and sex distribution among the studied groups.

	Cirrhosis (n=40)		Cirrhosis & SBP (n=40)		Control (n=20)		p
	No.	%	No.	%	No.	%	
Sex							
Male	21	52.5	20	50.0	10	50.0	0.970
Female	19	47.5	20	50.0	10	50.0	
Age							
Min. – Max.	40-55		41-55		40-47		
Mean ± SD.	46.2 ± 4.2		49.0 ± 4.3		43.6 ± 1.8		0.078

MCP: P value based on Mont Carlo exact probability P value for One Way ANOVA

Clinical findings:

Group I:

The most frequent complaints were easy fatigability (82.5%), bleeding tendency (40%), abdominal distension in (25%), dyspepsia (50%), anorexia (40%), abdominal pain (32.5%). On clinical examination, ascites was found in (65%), splenomegaly in (100 %), flappy tremors in (50%), LL edema in (42.5%), and jaundice in (35%) of patients.

Group II:

The most common symptoms were easy fatigability (95%), dyspepsia and anorexia (70%), bleeding tendency (70%).While clinical examination revealed, splenomegaly in (100%), jaundice in (55%), itching (35%), ascites(100%), and flappy tremors in (80%) while LL edema in (75%).

Table (4): Clinical findings in the studied patients.

	Groups			
	I		II	
	No	%	No	%
Symptoms				
Easy fatigability	33	82.5	38	95
Bleeding tendency	16	40	28	70
Abdominal distension	10	25	40	100
Haematemesis and melena	16	40	20	50
Dyspepsia	20	50	28	70
Anorexia	16	40	28	70
abdominal pain	13	32.5	18	45
Yellowish discoloration of sclera	14	35	16	40
Dark urine	14	35	8	20
fever	9	22.5	6	15
Weight loss	8	20	30	75
Signs				
Ascites	26	65	40	100
Splenomegaly	40	100	40	100
Flappy Tremors	20	50	32	80
LL edema	17	42.5	30	75
Pallor	12	30	31	77.5
Jaundice	14	35	22	55
abdominal tenderness	10	25	35	87.5

Lab Investigations

1-Haematological Findings:

Haemoglobin concentration (Hb) (gm/dl)

In group I, Hb concentration ranged from7.1-10.3gm/dl with a mean of 9.0 ± 0.8gm/dl, while in group II, it varied from 7.3 – 10.0gm/dl with a mean of 8.5 ± 0.6gm/dl.

In the control group, the mean Hb concentration was 12.2 ± 0.6gm/dl with a range of 11.3 – 13.0 gm/dl.

Haemoglobin level was found to be significantly lower in groups I and II than in the control group($p<0.001$, F 15.7) ,while there was no significant difference between groups I and II (p 0.000).

Red blood cell count (RBC's) (millions cells/mm^3)

In group I, the RBC count ranged from 2.1 to 5.3 with a mean of 3.5 ± 0.9, in group II, it ranged from 1.0 to 3.7 with a mean of 2.4 ± 0.7, while in group III, it ranged from 4.5 to 5.5 with a mean of 5.0 ±0.3.

In groups I and II, RBC's count was significantly lower than in the control group.

Also there was a significant difference in the RBC count between the two groups (p 0.000, F 17.2) in whichRBCcount in groupI is higher than group II.

Platelet count (thousand cells/cmm)

In group I, platelets count ranged from 100.0to 115.0 **thousand** cells/mm^3 with a mean of 104.1 ± 4.6 thousand cells/mm^3, while in group II, it ranged from 80.0 to 99.0thousand cells/mm^3 with a mean of 92.0 ± 5.3 thousand cells/mm^3.

In the control group, the platelet count ranged from 200.0 to 355.0 thousand cells/ mm^3 with a mean of 279.1 ± 48.2 thousand cells/mm^3.

Platelet count in groups I and II was significantly lower than in group III ($p<0.001$), but there was a significant difference in platelet count between groups I and II (p0.000, F22.4). In which platelet count in group II is lower than groupI.

White blood cell count (thousand cells/mm^3)

In group I, WBCS count ranged from 10.0 to 15.0 thousand cells/mm^3 with a mean of 12.3 ± 1.4 thousand cells/mm^3, while in group II, it ranged from 13.2to 17.6 thousand cells/mm^3 with a mean of 15.7 ± 1.2 thousand cells/mm^3. In the control group, the WBCS count ranged from 3.5 to 7.8 thousand cells/mm^3 with a mean of 5.6 ±1.1 thousand cells/mm^3.

WBC count was higher in groups I and II than in group III, and was lower in group I than in group II, however there was a significant difference between the three groups (p 0.000,F 18.6).Were WBC count is highe rin group II than in groupI and also higher in group II andI than in the control group.

Erythrocyte sedimentation rate(ESR)

In group I, the **ESR** ranged from 20 to 30 with a mean of 25 ± 1.1, in group II, it ranged from35 to 45 with a mean of40 ± 1.3, while in group III, it ranged from 10 – 20with a mean of 15 ± 0.4.

In groups I and II, **ESR** was significantly higher than in the control group.

Also there was a significant difference in the **ESR** level between the two groups (p 0.000, F 17.5) in which **ESR** in group II is higher than group I.

C reactive protein (CRP)(mg/l)

In group I, **CRP** levels ranged from 0 to 8mg/l with a mean value of3.2 ± 2.1 mg/l while in group II, they ranged from1 to 41 mg/l with a mean value of 14.6 ± 6.1 mg/l.

In addition, **CRP** range in group III was from 0 to 3mg/l with a mean value of 1.4 ± 1.1 mg/l. Mean **CRP** level was significantly higher in groups I and II than in the control group ($p<0.001$, $p<0.011$ respectively), while there was a significant difference in **CRP** levels between groups I and II (p0.005). were **CRP** levels was higher in group II than in group I.

Table (5): The haematological findings in patients and controls.

	Cirrhosis (n=40)	**Cirrhosis & SBP (n=40)**	**Control (n=20)**	**Test of sig.**	**p**
Hb gm/dl					
Range	7.1– 10.3	7.3 – 10.0	11.3 – 13.0	F=15.7*	0.000*
Mean ± SD.	9.0 ± 0.8	8.5 ± 0.6	12.2 ± 0.6		
RBC's millions cells/mm3					
Range	2.1 – 5.3	1.0 – 3.7	4.5– 5.5	F=17.2*	0.000*
Mean ± SD.	3.5 ± 0.9	2.4 ± 0.7	5.0 ± 0.3		
WBC's thousand cells/cmm					
Range	10.0 – 15.0	13.2 – 17.6	3.5 – 7.8	F=18.6*	0.000*
Mean ± SD.	12.3 ± 1.4	15.7 ± 1.2	5.6± 1.1		
Platelets thousand cells/mm3					
Range	100.0 – 115.0	80.0 – 99.0	200.0 – 355.0	F=22.4*	0.000*
Mean ± SD.	104.1 ± 4.6	92.0 ± 5.3	279.1 ± 48.2		
ESR Range	20 – 30	35 – 45	10 – 20	F=17.5*	0.000*
Mean ± SD.	25 ± 1.1	40 ± 1.3	15 ± 0.4		
CRP mg/l Range	0 – 8	1 – 41	0 – 3	F=20.2*	0.000*
Mean ± SD.	3.2 ± 2.1	14.6 ± 6.1	1.4 ± 1.1		

2- Liver enzymes**:**

Serum Alanine Transferase (ALT) (u/l)

In group I, ALT levels ranged from 20-81.0 u/l with a mean value of42.97 ± 12.61 u/l while in group II, they ranged from15to 200 u/l with a mean value of 54.83 ± 22.26 u/l.

In addition, ALT range in group III was from 29 to 43 u/l with a mean value of 35.8 ± 5.65 u/l.

Mean ALT level was significantly higher in groups I and II than in the control group (p<0.001, p<0.011 respectively), while there was a significant difference in ALT levels between groups I and II (p0.005).wereALT levels was higher in group II than in groupI.

Serum Aspartate Transferase (AST) (u/l)

In group I, the AST values ranged from 21 to 152 u/l with a mean value of 54.69 ± 27.23 u/l. While in group II, it ranged from 20 to 190 u/l with a mean value of 79.06 ± 41.51 u/l. The AST ranged in group III from 26 to 39 u/l with a mean value of 32.0 ± 3.30 u/l.

Mean AST level was significantly higher in groups I and II than in the control group (p<0.001). Also, mean AST was found to be significantly lower in group I than in group II (p 0.000).

Serum Alkaline Phosphatase (ALP) (u/l)

The ALP values in group I ranged from 55 to 61 u/l with a mean value of 57.2 ± 1.5u/l and in group II, from 60 to 90 u/l with a mean value of 77.5 ± 8.1u/l). In group III, from 50 to 53 u/l (mean 50.9 ± 1.0 u/l).

Mean level of alkaline phosphatase were significantly higher in groups I and II than in the control group (<0.001), and there was a significant difference between its level in groups I and II **(**p 0.000, F 21.1**).**Were ALP levels was higher in group II than in group I.

Serum gamma glutamyl transferase (GGT) (u/l)

The GGT values in group I ranged from 32 to 57 u/l with a mean value of44.4 ± 10.2 u/l, in group II, from 33 to 65 u/l with a mean value of47.3 ± 11.4 u/l), in group III, from 24 to 48 u/l with a mean value of 36.2 ± 10.3u/l.

Mean level of GGT in group I,II was significantly higher in groups I and II than in group III (p<0.001, p<0.001), however there was a significant differences between levels of group I and group II (p 0.001). Were GGT levels was higher in group II than in group I.

Table (6): Summary of liver enzymes among the studied groups

	Cirrhosis (n=40)	Cirrhosis & SBP (n=40)	Control (n=20)	Test of sig.	p
ALT (U/L)					
Range	20.0 – 81.0	15.0 – 200.0	29.0 – 43.0	F=18.6	0.005*
Mean ± SD.	42.97 ± 12.61	54.83 ± 22.26	35.80 ± 5.65		
AST(U/L)					
Range	21.0 – 152.0	20.0 – 190.0	26.0 – 39.0	F=20.7	0.000*
Mean ± SD.	54.69 ± 27.23.56	79.06 ± 41.51	32.0 ± 3.30		
ALP(U/L)					
Range	55.0 – 61.0	60.0 – 90.0	50.0 – 53.0	F=21.1	0.000*
Mean ± SD.	57.2 ± 1.5	77.5 ± 8.1	50.9 ± 1.0		
Gamma GT(U/L)					
Range	32.0 – 57.0	33.0 – 65.0	24.0 – 48.0	F=8.6	0.001*
Mean ± SD.	44.4 ± 10.2	47.3 ± 11.4	36.2 ± 10.3		

3- Liver function tests:

Serum albumin (gm/dl)

The serum albumin concentrations in group I ranged from 2.0 to 3.8gm/dl with a mean value of 2.7 ± 0.4gm/dl. While in group II from 2.0 to 2.7gm/dl with a mean value of 2.3 ± 0.2gm/dl while in group III from 3.5 to 5.0gm/dl with a mean value of 4.1 ± 0.5gm/dl.

Mean albumin concentration was found to be significantly lower in groups I and II than in the control group (p0.000 in both groups), while there was a significant difference in albumin levels between groups I and II (p0.000).Were it was higher in groupI than in groupII.

Total Serum Bilirubin (mg/dl)

In group I, the serum bilirubin level ranged from 0.2 to 3.0 mg/dl with a mean of 2.6 ± 0.5 mg/dl. However, in group II, it ranged from 3.3 to 5.0 mg/dl with a mean of 4.0 ± 0.4 mg/dl.

On the other hand, serum bilirubin of group III varied from 0.2 to 0.6 mg/dl with a mean of 0.4 ± 0.1 mg/dl. Mean of total serum bilirubin was significantly higherin groups I and II than in group III (p<0.001 in both groups), while there was a significant difference between mean level of groups I and II (p 0.000).Were it was higher in groupII than ingroup I.

Prothrombin Time (PT) (sec)

The PT of group I ranged from 13.0 to 16.0 with a mean of 14.2 ± 0.9sec, while in group II, it ranged from 14.0 to 17.0sec with a mean value of 15.4 ± 0.8, while in group III, it ranged from 12.0 to 14.0 with a mean value of 13.1 ± 0.9sec (p<0.001).

Mean PT level of groups I and II was significantly higher than that of group III, while there was a significant difference between PT of groups I and II (p 0.000). Were PT was higher in group II than in group I.

Table (7): Summary of liver function tests among studied groups

	Cirrhosis (n=40)	Cirrhosis & SBP (n=40)	Control (n=20)	Test of sig	p
Total bilirubin (mg/dl)					
Range	0.2 – 3.0	3.3 – 5.0	0.20 – 0.60	F=21.4*	<0.001*
Mean ± SD.	2.6 ± 0.5	4.0 ± 0.40	0.40 ± 0.1		
PT(sec)					
Range	13.0 – 16.0	14.0 – 17.0	12.0 – 14.0	F=17.3*	0.000*
Mean ± SD.	14.2 ± 0.9	15.4 ± 0.8	13.1 ± 0.9		
Albumin(gm/dl)					
Range	2.0 – 3.8	2.0 – 2.70	3.50 – 5.0	F=16.8*	0.000*
Mean ± SD.	2.7 ± 0.4	2.3 ± 0.2	4.1 ± 0.5		

F: One Way ANOVA * P < 0.05 (significant)

4. Renal Function Tests:

Blood Urea:

Serum urea in group I ranged from 22to 39 with a mean value of 30.5±5.7, in group II, it ranged from 36 to 46 with a mean value of 41.8±2.9 while in group III, it ranged from 19 to 27with a mean value of 23.1±2.5.

Mean level of serum urea was found to be lower in groups I and III, than in groupII, however there was a significant difference between the three groups (p 0.000). were serum urea was higher in group II than in group I and it was higher in groupI and II than in groupIII.

Serum Creatinine:

Serum creatinine in group I ranged from 0.4 to 1.2 with a mean value of 1.06 ± 0.48, while in group II, it ranged from 0.47 to 1.6with a mean value of 0.98 ± 0.43 and in group III and it ranged from 0.20 to 0.1with a mean value of 0.61 ± 0.23.

Mean serum creatinine level was significantly higher in groups I and II than in group III (p 0.006, p 0.038 respectively) while there was no significant difference between mean levels of groups I and II (p 0.373).

Table (8): Comparison between the studied groups according to renal function

	Cirrhosis (n=40)	**Cirrhosis & SBP (n=40)**	**Control (n=20)**	**Test of sig.**	**P**
Urea(gm/dl)					
Min. – Max.	22.0-39.0	36.0 – 46.0	19.0 – 27.0	F=75.3	0.000*
Mean ± SD.	30.5±5.7	41.8±2.9	23.1±2.5		
Creatinine (gm/dl)					
Min. – Max.	0.40 – 1.2	0.47 – 1.6	0.20 – 1.0	F=5.7*	0.005*
Mean ± SD.	1.06 ± 0.48	0.98 ± 0.43	0.61 ± 0.23		

5. Ascitic fluid leucocytic count:(cells/cmm)

Ascitic fluid leucocytic count in groupII ranged from 280 to 405 cells/$mm^3$with a mean value of 366.6±57.5.

6. Child Pugh Classification:

Child score in group I consisted of 18 patients Child A,22patients Child B withChild score ranged from 5 – 9 with a mean value of 6.7 ± 1.3, while in group II, itconsisted of 21patients Child B and19patients Child C with score ranged from7 – 13with a mean value of 9.5 ± 1.4Mean Child score value was significantly higher in groupIII than in groupII(p 0.000) while there was a significant difference between mean levels of groups II and III regarding number of patients and Child scores of both groups (p0.000).

Table (9): Comparison between the studied groups according to ChildPugh

Clinical findings	Group				MCP
	Cirrhosis		Cirrhosis & SBP		
	No	%	No	%	
Child classification					
• Child A	18	45.0	0	0.0	0.000*
• Child B	22	55.0	21	52.5	
• Child C	0	0.0	19	47.5	
Child score					
• Range	5-9		7-13		0.000*$
• Mean ± SD	6.7 ± 1.3		9.5 ± 1.4		

7. Plasma intestinal Fatty acid binding protein (IFABP)(ng/ml):

Plasma intestinal Fatty acid binding protein level in group I ranged from 0.67 to 3.90ng/ml, with a mean value of 1.74 ± 1.03, while in group II, it ranged from 2.00 to 6.90 with a mean value of 3.43±1.98.

On the other hand, in group III, it ranged from 0.20 to 1.00 with mean value of 0.53 ± 0.26**.**

Mean Fatty acid binding protein was significantly higher in groups I and II than in group III). In addition, it was found to be significantly higher in group II than in group I (p 0.000).

Table (10): Comparison between studied groups according toPlasma Fatty acid bindingprotein.

	Cirrhosis (n=40)	**Cirrhosis & SBP (n=40)**	**Control (n=20)**	**Test of sig**	**P**
IFABP (ng/ml)					
Min. – Max.	0.67 – 3.90	2.00 – 6.90	0.20 – 1.00	F=60.9	0.000*
Mean ± SD.	1.74 ± 1.03	3.43 ± 1.98	0.53 ± 0.26		

F: One Way ANOVA
** P < 0.05 (significant)*
d: significantly different groups

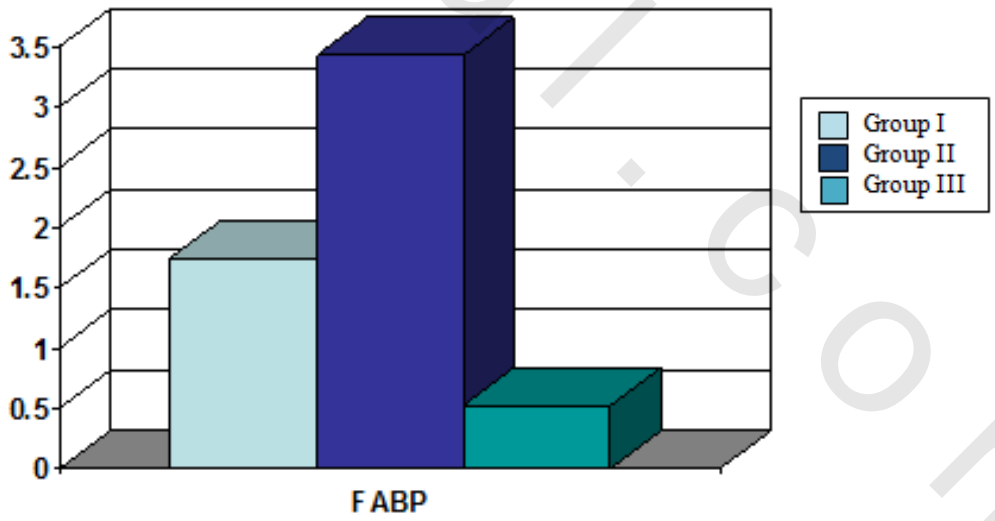

Figure (6): Descriptive of Plasma Fatty acid binding protein among the studied groups

8. Plasma D-lactate (mmol/l):

In group I, levels of Plasma D-lactate ranged from 0.49 to 0.99 with a mean value of 0.69±0.12, while in group II, it ranged from 0.70 to 2.40 with a mean value of 1.57 ± 0.48.

In group III, it ranged from 0.40 to 0.70 with a mean value of 0.50 ±0.09.

Mean Plasma D-lactate was found to be significantly higher in group II than in group I (p 0.000), and was found to be significantly higher in group I and II than in group III (p<0.001 in both groups).

Table (11): Comparison between studied groups according to Plasma D-lactate

	Cirrhosis (n=40)	Cirrhosis & SBP (n=40)	Control (n=20)	Test of sig	P
D-lactate (mmol/l)					
Min. – Max.	0.49 – 0.99	0.70 – 2.40	0.40 – 0.70	F=155.3	0.000*
Mean ± SD.	0.69 ± 0.12	1.57 ± 0.48	o.50 ± 0.09		

F: One Way ANOVA
** P < 0.05 (significant)*
d: significantly different groups

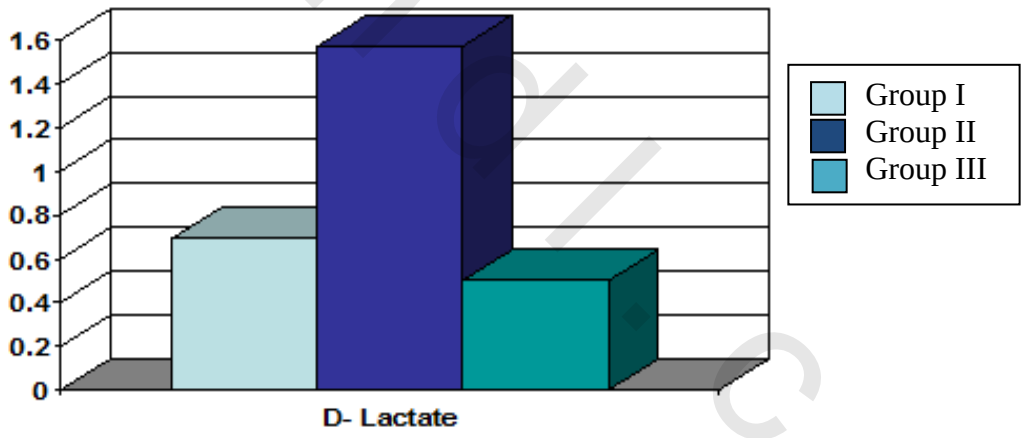

Figure (7): Descriptive of Plasma D- Lactate among the studied groups

Relation between Plasma Fatty acid binding protein and Child score:

Significant positive correlation was found between Plasma fatty acid binding protein and Child score in both groups (r= 0.78, P=0.00)

Relation between Plasma D-lactate and Child score:

Significant positive correlation was found between Plasma D-lactate levels and Child score in both groups(r=0.76, P=0.00)

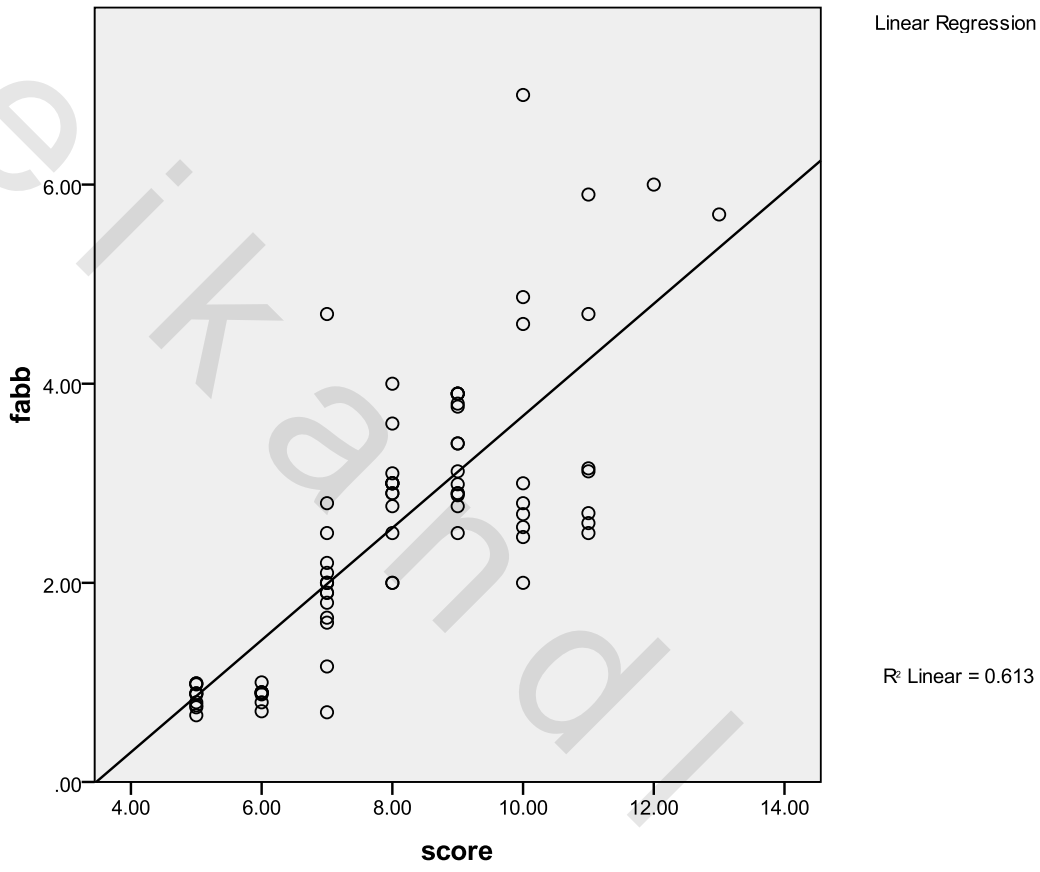

Figure (8): Scatter diagram for correlation between Plasma Fatty acid binding protein (FABP) and Child Pugh score in patients

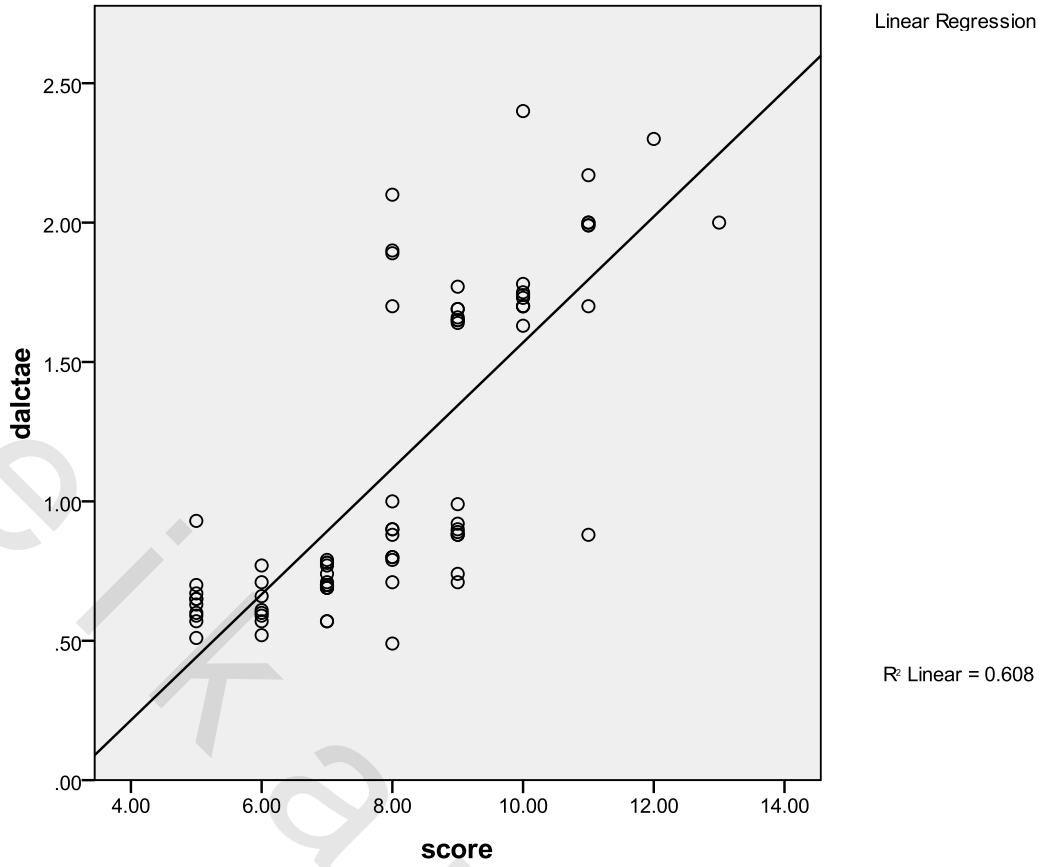

Figure (9): Scatter diagram for correlation between Plasma D-Lactate and Child Pugh score in patients

Relation between Plasma Fatty acid binding protein (FABP) and Plasma D-lactate:

In group I, there were a positive correlation between levels of Plasma D-lactate and Plasma Fatty acid binding protein, Also in group II, there were a positive correlation between levels of Plasma D-lactate and Plasma Fatty acid binding protein.

Table (12): Correlation between Plasma Fatty acid binding protein(FABP) and Plasma D-lactate among the studied groups:

Group	Item	Correlation coefficient	D-Lactate
Cirrhosis	FABP	r P	0.43 0.005*
Cirrhosis & SBP	FABP	r P	0.57 0.000*

r: Pearson correlation coefficient
** P , 0.05 (significant)*

Interpretation of r:

Weak (0.1-0.24) Intermediate (0.25-0.74) Strong (0.75-0.99)

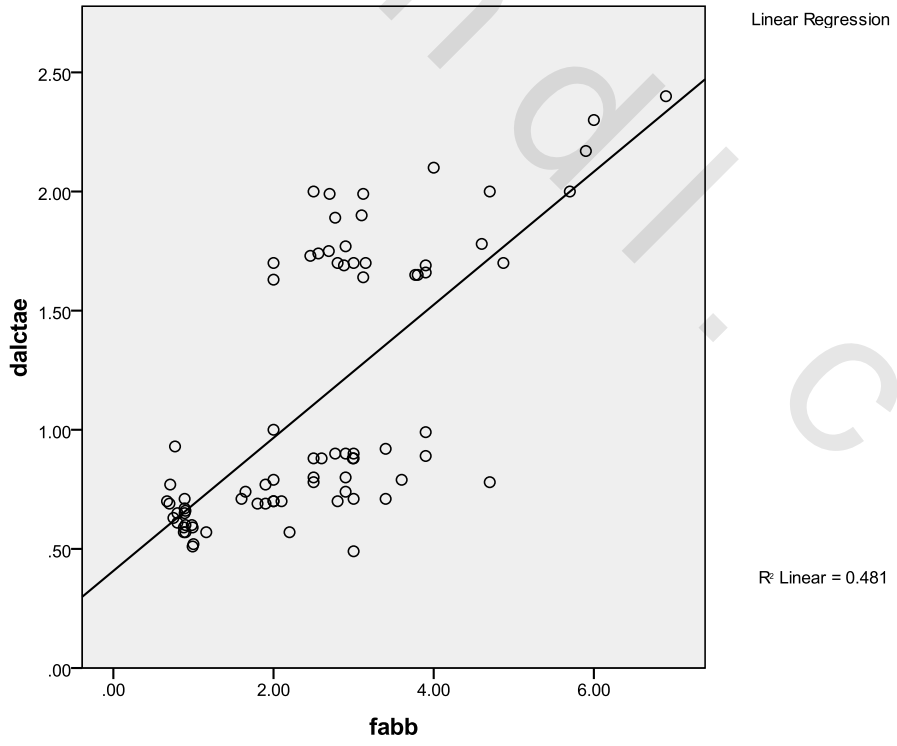

Figure (10): Correlation between Plasma D lactate and Fatty acid binding protein in patients

Senstivity and specificity of Plasma Fatty acid binding protein (FABP) and Plasma D-lactate:

Receiver operating characteristic curves (ROC curves) were done to estimate the cutoff points discrminating cirrhosis from controls of FABP as well as D-lactate**.**

1-Plasma Intestinal Fatty acid binding protein (IFABP)

The ROC curve for FABP was significant (p.001) and showed that the cutoff point discriminating control from cases was 2ng/ml, with sensitivity of 92%, specificity of 80%, positive predictive value of 99.1 % and negative predictive value of 0.9o% and diagnostic accuracy of 95%. Thus, at this cut off point, plasma FABP was found to have a better diagnostic sensitivity, accuracy and large AUC (0.85).

2-Plasma D-lactate:

The ROC curve for D-lactate was significant (p,0.001), showed that at a cut off value of ≥0.57, diagnostic sensitivity for discriminating control from cases was0.57 with sensitivity of 96%, specificity of 85%, positive predictive value of 91.8 % and negative predictive value 0f 8.2 and diagnostic accuracy of 95%. Thus, at this cut off point, plasma D-lactate was found to have a better diagnostic sensitivity, accuracy and large AUC (0.96).

Table (13): Agreement (sensitivity, specificity and accuracy) for FABP and D-lactate

	Cut off point	Sensitivity	Specificity	PPV	NPV	Accuracy
IFABP	≥2	92.0	80.0	99.1	0.9	95.0
D-lactate	≥0.57	96.0	85.0	91.8	8.2	95.0

Thus, at these cut off points, plasma FABP and plasma D-lactate was found to have better diagnostic sensitivity, accuracy and larger AUC (0.99) and (0.96) respectively as regards differentiating healthy controls from cirrhosis cases.

	AUC	p
Plasma FABP	0.89*	<0.001
Plasma D-lactate	0.96 *	<0.001

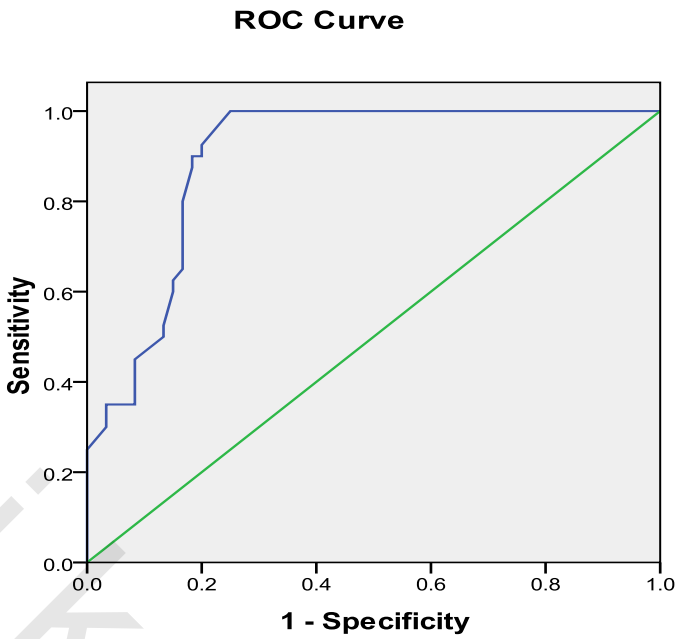

Figure 11: Roc curve for plasma FABP

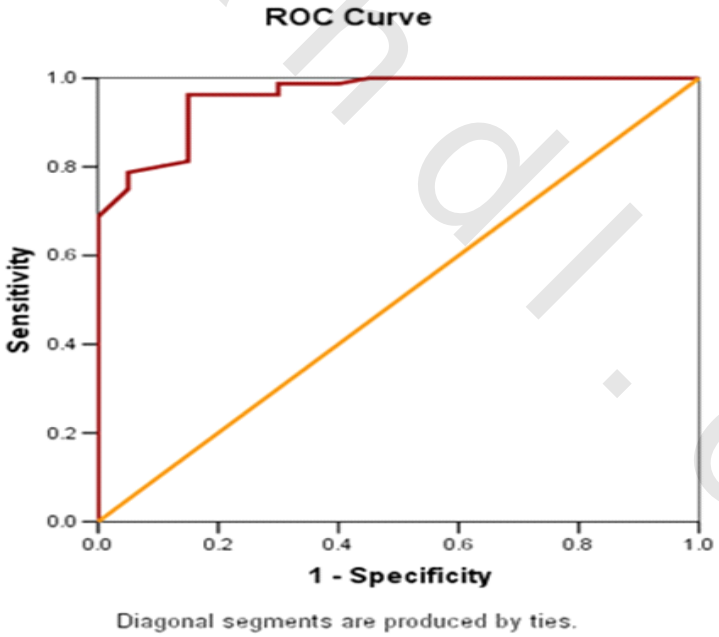

Figure 12 : ROC curve for PlasmaD-lactate