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The Impacts of Viral Hepatitis on Liver Enzymes and Bilrubin

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Abstract**—** *Viral hepatitis is an infection that causes liver inflammation and damage. Several different viruses cause hepatitis, including hepatitis A, B, C, D, and E. The hepatitis A and E viruses typically cause acute infections. The hepatitis B, C, and D viruses can cause acute and chronic infections. Hepatitis A causes only acute infection and typically gets better without treatment after a few weeks. The hepatitis A virus spreads through contact with an infected person's stool. Protection by getting the hepatitis A vaccine. Hepatitis E is typically an acute infection that gets better without treatment after several weeks. Some types of hepatitis E virus are spread by drinking water contaminated by an infected person's stool. Other types are spread by eating undercooked pork or wild game. Hepatitis B can cause acute or chronic infection. Recommendation for screening for hepatitis B in pregnant women or in those with a high chance of being infected. Protection from hepatitis B by getting the hepatitis B vaccine. Hepatitis C can cause acute or chronic infection. Doctors usually recommend one-time screening of all adults ages 18 to 79 for hepatitis C. Early diagnosis and treatment can prevent liver damage. The hepatitis D virus is unusual because it can only infect those who have a hepatitis B virus infection. A coinfection occurs when both hepatitis D and hepatitis B infections at the same time. A superinfection occurs already have chronic hepatitis B and then become infected with hepatitis D. The aim of this study is to find the effect of each type of viral hepatitis on the bilirubin (TB , DSB) , and liver enzymes; AST, ALT, ALP,GGT among viral hepatitis patients. 200 patients were selected from the viral hepatitis units in the central public health laboratory in Baghdad city, all the chosen cases were confirmed as a positive samples , they are classified into four equal group each with fifty individual and with a single serological viral hepatitis type either; anti-HAV(IgM) , HBs Ag , anti-HCV ,or anti-HEV(IgM). All patients were tested for; serum bilirubin (TB ,D.SB) , AST , ALT , ALP , GGT. Another fifty quite healthy and normal person was selected as a control group for comparison. . Liver enzymes and bilirubin changes are more pronounced in HAV, HEV than HCV and HBVAST and ALT lack some sensitivity in detecting HCV ,HBV and mild elevations of ALT or AST in asymptomatic patients can be evaluated efficiently by considering ,hepatitis B, hepatitis C. ALT is generally a more sensitive indicator of acute liver cell damage than AST, It is relatively specific for hepatocyte necrosis with a marked elevations in viral hepatitis.* Liver enzymes and bilirubin changes are more pronounced in HAV, HEV than HCV and HBV.AST and ALT lack some sensitivity in detecting HCV ,HBV and mild elevations of ALT or AST in asymptomatic patients can be evaluated efficiently by considering ,hepatitis B, hepatitis C. ALT is generally a more sensitive indicator of acute liver cell damage than AST, It is relatively specific for hepatocyte necrosis with a marked elevations in viral hepatitis.

Keywords**—** ***viral hepatitis, liver enzyme.***

I. INTRODUCTION

Hepatitis Inflammation of the liver that can be caused by viruses , chemicals , drugs , alcohol , inherited diseases ,or the patient's own immune system. Hepatitis may occur with limited or no symptoms , but often leads to jaundice, anorexia and malaise .Hepatitis is acute when it lasts less than six months and chronic when it persist longer.

Causes;

The most common cause of viral hepatitis are the five unrelated hepatotropic viruses , A , B, C ,D , E, and Other viruses which can also cause hepatitis includes ; Herpes simplex , Cytomegalo virus , Epstein Barr virus , Yellow fever.

	HAV	**HEV**	**HBV**	**HCV**	**HDV**
Transmission	Enteric	Enteric	Parent-eral	Parent-eral	Parent-eral
Classification	Picornavirus	Hepe virus	Hepadn-avirus	Hepacivirus	Delta virus
Genome	+ssRNA	+ssRNA	+dsDNA	+ssRNA	-ssRNA
Antigen			HBsAg,HBeAg	CoreAg	Delta Ag
Incubat-ion period	15-45 days	15-60 days	45-160 days	15-150 days	30-60 days
Chroni-city	NO	NO	YES (uncommon)	YES (com-mon)	YES with HBV

Liver function tests;

Groups of clinical biochemistry laboratory blood assays designed to give information about the state of a patient's liver.

They are indicative of:

1) liver inflammation: ALT and AST.

2) Cholestasis or biliary obstruction bilirubin (total, direct), ALP, GGT

3) synthetic function: albumin, PT.

Viral hepatitis with its different serotypes are known to have various extent of effects on the liver function tests.

Aim of the study

The aim of this study is to find the effect of each type of viral hepatitis whether A , B ,C , or E on the bilirubin (TB , DSB) , and liver enzymes; AST, ALT, ALP,GGT among viral hepatitis patients.

II. INDIVIDUALS AND METHODS

200 patients were selected from the viral hepatitis units all the chosen cases were surveyed for different types of viral hepatitis measured by ELISA and ELFA methods which was confirmed as a positive samples where they are classified into four equal group each with fifty individual and with a single serological viral hepatitis type either; anti-HAV(IgM) , HBs Ag , anti-HCV ,or anti-HEV(IgM). All patients were tested for; serum bilirubin (TB ,D.SB) , AST , ALT , ALP , GGT , which are measured indirectly by using a spectrophotometer method. Another fifty quite healthy and normal person was selected as a control group.

III. RESULTS

Table (1). General descriptive statistics for the liver enzymes and bilirubin, their number, mean± SD with the maximum and minimum values.

Parameters	**N**	**MINIMUM**	**MAXIMUM**	**MEAN**	**ST.DEV.**
TSB	250	O.12	9.80	2.2093	2.28672
D.SB	250	O.O1	5.10	.9220	1.05555
ALT	250	3.00	450.00	58.2234	67.38983
AST	250	4.00	291.00	59.2780	64.35098
ALP	250	20.00	841.00	166.7740	160.2512
GGT	250	8.00	980.00	82.3336	100.4452

Tab.(2).mean for comparison of TSB and D.SB with the control group in different types of hepatitis.

Parameters	**group**	**mean**	**Std.de.**	**Std.er.**
TSB	Contr.	.783	.349	.049
	HAV	4.066	2.013	.284
	HBV	.836	1.163	.164
	HCV	1.466	1.438	.203
	HEV	3.893	2.828	.399
D.SB	Contr.	.299	.208	.029
	HAV	2.253	1.209	.171
	HBV	.362	.260	.087
	HCV	.430	.413	.058
	HEV	1.248	.909	.128

Tab (3).mean for comparison of AST and ALT with the control group in different types of hepatitis.

parameter	**group**	**mean**	**Std.de.**	**Std.er.**
AST	Contro	23.314	9.569	1.353
	HAV	90.660	50.212	7.101
	HBV	33.740	34.360	4.859
	HCV	17.567	13.075	1.849
	HEV	131.10	83.966	11.874
AlT	Contro	17.996	11.105	1.570
	HAV	135.50	61.861	8.748
	HBV	32.860	46.744	6.610
	HCV	61.040	82.784	11.707
	HEV	43.640	38.081	5.385

Tab(4).mean for comparison of ALP and GGT with the control group in different types of hepatitis.

parameter	**group**	**mean**	**Std.dev.**	**Std.er.**
ALP	Control	64.078	19.178	2.172
	HAV	194.840	179.427	25.374
	HBV	71.800	49.520	7.003
	HCV	122.792	70.601	9.984
	HEV	180.300	123.731	17.498
GGT	Control	44.570	31.953	2.172
	HAV	140.343	84.550	25.374
	HBV	30.850	21.865	7.003
	HCV	98.472	145.843	9.984
	HEV	97.400	115.087	17.498

ANOVA test;

It shows significant difference between the groups with a P-value < 0.05 for all of the parameters.

Tab (5).Multiple Comparisons Dun net t-test with the Mean Difference and Significant P-values (< 0.05) between all groups.

Variable	Group	Mean Difference	Significant P- values
TSB	HAV	3.283*	.000
	HEV	3.110*	
D.SB	HAV	1.954*	.000
	HEV	.948*	
AST	HAV	67.346*	.000
	HEV	107.786*	
ALT	HAV	117.583*	.000
	HCV	43.043*	
ALP	HAV	330.762*	.000
	HCV	58.714*	
	HEV	116.222*	
GGT	HAV	95.922*	.000
	HCV	53.960*	
	HEV	52.888*	

Fig (A).mean for comparison of TSB,D.SB with control.

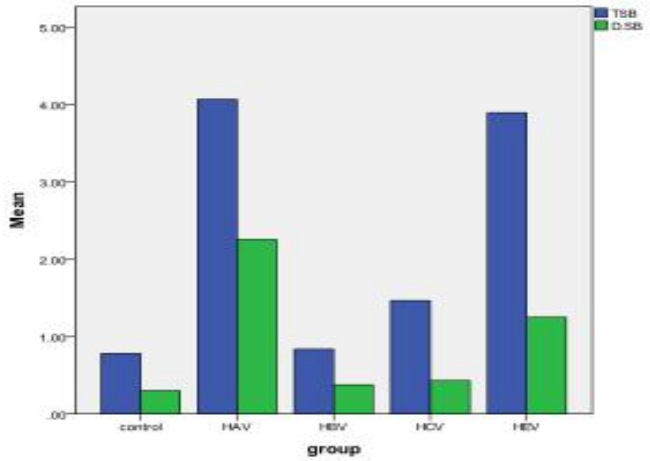


Fig. (B) mean for comparison of AST, ALT with control.

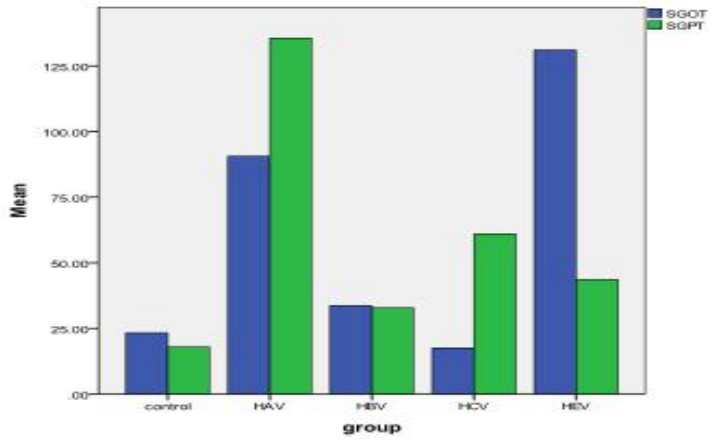
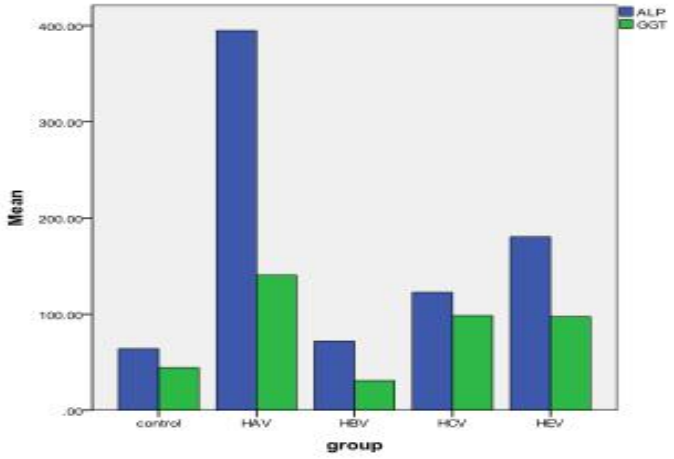


Fig. (C) mean for comparison of ALP, GGT with control.



IV. DISCUSSION

A number of pitfalls can be encountered in the interpretation of common blood liver function tests:

1. Normal LFTs do not always mean that the liver is normal.

2. They often, but not always, indicate that something is wrong with the liver.

3. They can provide clues to the nature of the problem.

4. Transaminases are the most sensitive indicators of hepatic cell injury.

Unfortunately (85%) HCV people are free of any symptoms , usually they are discovered because the liver enzymes in their blood are above normal limits , and their doctors do more blood tests to find the cause , or they are discovered during their donation for blood in blood bank and this is also true for HBV as (15%) of the patients can easily passed unnoticed as some of them have no outward signs or symptoms , and others do experience just "flu-like" symptoms.

The present study illustrate the significant changes in the values of the main hepatic markers in different types of viral hepatitis which was noticed mainly in HAV and HEV more than in the HCV and HBV (Table5) , a hallmark results that can easily be explained on the fact that the hepatocyte necrosis results in the leakage of enzymes into the circulation . While liver cell death with HBV and HCV occurs by

apoptosis (programmed cell death) as well as by necrosis which presumably synthesize less AST and ALT as they wither away. This probably explains why at least one third of patients infected with hepatitis C virus have persistently normal serum ALT, AST levels despite the presence of inflammation on liver biopsy. Thus, AST and ALT lack some sensitivity in detecting HCV, HBV and mild elevations of ALT or AST in asymptomatic patients can be evaluated efficiently by considering , hepatitis B, hepatitis C.ALT is relatively specific for hepatocyte necrosis with a marked elevations in viral hepatitis (Table 2, Fig. B).

AlP and GGT levels typically rise to several times the normal level after several days of bile duct obstruction or intrahepatic cholestasis , Both AlP and GGT levels are elevated in about 90% of patients with this study were we found mildly to Moderately elevated ALP and GGT due to hepatocyte necrosis in combination with some intrahepatic cholestasis specifically in HAV and HEV (Tab 4, Fig C).

Viral hepatitis is one of the main causes of hyperbilirubinemia whether it is direct or indirect fraction of bilirubin. Actually, both categories of bilirubin was elevated in all serotypes of viral hepatitis yet it was also more prominent in HAV and HEV (Table 2, Fig A).

V. CONCLUSION

1. Liver enzymes and bilirubin changes are more pronounced in HAV, HEV than HCV and HBV.
2. AST and ALT lack some sensitivity in detecting HCV ,HBV and mild elevations of ALT or AST in asymptomatic patients can be evaluated efficiently by considering ,hepatitis B, hepatitis C.

3. ALT is generally a more sensitive indicator of acute liver cell damage than AST, It is relatively specific for hepatocyte necrosis with a marked elevations in viral hepatitis.

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