Assessment levels of Hepcidin in patients with Hepatitis B and C: A comparative study

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Abstract
The study aimed to study the effect of Hepcidin levels by viral hepatitis B and C to indicate which is of them is more effect on liver functions. Researchers at Medical city in Baghdad, Iraq, will investigate the prevalence of parameter markers in patients with viral hepatitis B and hepatitis C. The study includes 47 patients with hepatitis (25 with hepatitis B and 22 with hepatitis C) and 19 healthy people as controls. Both patients and controls had blood drawn to estimate Hepcidin by ELISA and AST, ALT and alkaline phosphates by Fujifilm device according to manufactured company. The average hepcidin level in patients with hepatitis B was 1551.38 mg/dl and in hepatitis C patients was 1600.19 mg/dl compared with healthy as control 1547.86mg/dl indicating no significant difference between the two groups, Also for ALT in hepatitis B patients 31.71 mg/dl and in hepatitis C 28.29mg/dl compared to 36.07mg/dl in their healthy, indicate is no significant difference. Also, the level of AST (28.19mg/dl) in hepatitis B and 31.21mg/dl in hepatitis C compared with 31.38 in healthy persons indicate is no significant difference. For Alkaline phosphatase, the average level in hepatitis B was 191.83, in hepatitis C was 128.74 and in healthy was 136.82 there were significant differences at P value 0.01 between the pathological cases of viral hepatitis B, C. It was concluded For Alkaline phosphatase, there were significant differences at P value 0.01 between the pathological cases of viral hepatitis B, C. As for the links between the comparison, most of them were positive and non-significant except for the ALT with AST, it was a highly significant association. It was the opposite and non -significant connection between the alkaline phosphatase and the hepcidin.
Keywords: Hepatitis B, Hepatitis C, Hepcidin

1. Introduction

Viral hepatitis is a major global contributor to cirrhosis and hepatocellular carcinoma (HCC), as well as chronic liver disease and increasing liver fibrosis. Al-jebori and others (2008) Acute and chronic hepatitis are both brought on by the hepatitis B virus (HBV), a hepatotropic, non-cytopathic DNA virus. Increased cellular metabolism brought on by virus replication causes an increase in iron bioavailability and viral growth. (Drakesmith & Prentice, 2008). The liver serves as the body's main repository for iron. Patients with chronic liver illnesses frequently have iron buildup in their livers; this buildup activates hepatic stellate cells, causing them to produce collagen and other extracellular matrix proteins, which causes fibrosis (Guo et al., 2006). Changes in iron homeostasis may accompany viral infections that impair liver function, and iron overloading this organ might worsen chronic viral illness. According to recent research, the liver is critical in maintaining iron homeostasis because it secretes a peptide hormone called hepcidin (Guo et al., 2006). (Atanasiu et al., n.d.)

In order to maintain a continuous supply of iron for erythron and other tissues while avoiding greater amounts of iron that could be harmful to the organs, hepcidin, a 25 amino acid peptide produced by the hepatocytes, has emerged as the major regulator of iron uptake and release in the tissues. The availability of iron, the requirement for erythropoiesis, and the level of inflammation all affect how much hepcidin is produced.(X. H. Wang et al., 2013)

An rise in hepcidin lessens iron concentrations in the blood which might be useful in defense against iron-dependent microbes. Hepcidin's own mechanism of action, however, is what causes iron sequestration and anemia of inflammation. (P3-H15). Maintaining the body's iron homeostasis depends on hepcidin synthesis, which mostly takes place in the liver's hepatocytes. (Pigeon et al., 2001)(Atanasiu et al., n.d.). Hepcidin inhibits the efflux of iron from enterocytes and macrophages into plasma by binding to the cellular iron export channel ferroportin, causing ferroportin internalization and destruction (Nemeth et al., 2016). (Kemna et al., 2022). Hepcidin production is up-regulated by extra iron or inflammation, whereas it is down-regulated by enhanced erythropoiesis and low iron reserves. (Nemeth & Ganz, 2006). (X. H. Wang et al., 2013)

Hepcidin is gradually being accepted as an important systemic immune response mediator. The two main triggers for hepcidin release are inflammation and increased iron storage. As the liver is the main organ for the generation of hepcidin (Park et al., 2001), HBV-induced suppressive monocytes and macrophages are crucial in the development of the immunological pathogenesis of chronic persistent infection.(Gastroenterol, 2019).

Hepatitis, fibrosis, cirrhosis, and hepatocellular carcinoma (HCC) are among conditions that can

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develop as a result of persistent HBV infection, according to Seeger and Mason (2015). There is no evidence that HBV may infect other cells other than those found in the livers of humans and orangutans (Reed & Rice, 2000). HBV is a member of the non-cytopathic hepatic DNA virus family. HBV infection does not directly result in hepatocyte lesions; rather, it is cleared by the host's immune system or results in liver disease. Contrary to the fact that 95% of HBV infections in adults terminate with the virus being removed and the development of protective antibodies, the vast majority of neonatal vertical transmission of HBV from mother to child results in chronic infection. (Hospital et al., 2005)

Infection with the hepatitis B virus (HBV) can result in chronic hepatitis B. (CHB). In addition to directly harming host hepatocytes, HBV can also trigger autoimmune damage in living organisms and exacerbate liver inflammation. 1 Hepatocellular steatosis and inflammation typically first manifest in CHB patients. The formation of compensatory scar tissue will thereafter be caused by liver fibrosis. More severe cirrhosis or even liver cancer may develop if the reversible hepatic fibrosis is not successfully treated, which ultimately results in the patient with CHB dying.(Y. Wang et al., 2021). The current study is aimed to study the effect of Hepcidin levels by viral hepatitis B and C to indicate which is of them is more effect on liver functions.

2. Materials and Methods

Blood samples were collected from patients with Viral hepatitis of both types B and C (Hepatitis B 25 samples, 22 samples from Hepatitis C and 19 samples from healthy persons), where the blood sample was withdrawn from patients and healthy persons. Samples have been placed in a gel tubes and then centrifugation to obtained serum. The withdrawal of serum and its placement in the Pendroff tubes to be use in biochemical tests (ALT, AST, Alkaline phosphatase Hepcidin) according to procedure that provided with each kit. Chi-square tests were used in the analysis of data from SAS 2012. The results were compared using a less important difference (LSD) at a probability level of 0.05, 0.01. The Data was analyzed in a CRD (Complete Randomized Design) in a practical way 2x2x6. The averages were compared with L.S.D (less important difference) and Chi -square at a probability level of 0.05, 0.01 using SAS 2012. Institute Incorporated Cary. N.C. USA

3. Results and Discussion

The current study included 47 patients (25 hepatitis B patients and 22 hepatitis C patients) and these patients were attending the Medical city in the Baghdad, and 19 persons as control as shown in Table (1), which represents the demographic distribution, through our study, which focused on the Comparison of the four factors (Hepcidin, AST, ALT and Alkaline phosphatase) and knowing which of these studied factors is most affected by viral hepatitis disease. The results indicated to no significant differences between male and female in hepatitis B patients, in contrast to hepatitis that appear significant difference where in male more than female (73 %, 27% respectively) as illustrated in table (1).

Table (1): Demographic distribution of hepatitis patients according to gender

Groups	Male	Female	Total
Hepatitis B	14 (56%)	11(%44)	)100(% 25
Hepatitis C	) 73(% 16	) 27% (6	22 (100%)
Control	11 (58%)	8 (42%)	19(%28)

Table (2) For Hepcidin, shows that there is no significant difference between the types of viral hepatitis For AST, shows that there is no significant difference between the pathological condition of the viral hepatitis B and C, as well as healthy, and it was the highest reading between the viral hepatitis C and the least reading in the viral hepatitis B. For ALT. shows that there was no significant difference between the studied medical conditions.

For Alkaline phosphatase, there were significant differences at the level of 1% between the pathological cases of viral hepatitis B, C. and the healthy were the highest reading among healthy compared to the hepatitis B and C, followed by the state of the viral hepatitis B and the hepatitis C, respectively. As for there is a significant difference between the pathological condition and the highest reading in the hepatitis C and this result agreed with.(X. H. Wang et al., 2013)

Table (2): Show the mean value of Hepcidin, ALT, AST and Alkaline phosphatase. in studies groups

Groups	Hepcidin (mg/dl)	ALT (mg/dl)	AST (mg/dl)	ALK (mg/dl)
Hepatitis B	38.49±1551.58	4.01± 31.71	3.64±28.19	101.838.20±
Hepatitis C	48.58 ±1600.19	2.66 ±28.29	3.66 ±31.21	11.2 ±128.74
Control	35.72 ±1547.68	1.33 ±36.07	1.34 ±31.38	9.10 ±136.82

Table (3) was the highest connection between the ALT. with AST 0.823, followed by the Alkaline phosphatase with AST 0.631, as well as the corners of the Alkaline phosphatase with the ALT 0.511, and it was noted that there is a negative, but non -moral correlation between the alkaline phosphatase and the hepcidin and this result agreed with (Liu et al., 2020).

Table (3): Liver disease association with hepatitis B virus				
	Conc(pg/ml(	AST	ALT	ALK
Conc(pg/ml(	1.000	0.093 0.6	0.137 0.4	0.216 0.2
AST	0.093 0.6	1.00	0.823 0.01	0.631 0.01
ALT	0.137 0.4	0.823 0.01	1.00	0.511 0.01
ALK	0.216- 0.2	0.631 0.01	0.511 0.01	1.00

As for the hepatitis C in table (4) viral liver, there was a positive and significant correlation with the AST. As for the connection of the A LT and AST, it was a significant, but not moral association. There is also a weak connection between Alkaline phosphatase and Hepcidin. As for the rest of the links, they were inverse, but non -moral, compared to the previous table, the links were positive, but non -moral, except for the link between the two alkaline phosphates and the hepcidin in the hepatitis B was the opposite.(Pardee, 2019)

The highest number represents the value of the correlation, and the lower number represents the significance of the correlation.

Table (4): correlation between Hepcidin and AST, ALT and ALK. in hepatitis B & C				
	Hepcidin (pg/ml(	AST	ALT	ALK
Hepcidin (pg/ml(	1.000	0.184 -0.3	0.161 -0.4	0.053 0.7
AST	0.184 -0.3	1.00	0.311 0.1	0.443 0.01
ALT	0.161 -0.4	0.311 0.1	1.00	0.059 -0.7
ALK	0.053 0.7	0.443 0.01	0.059 -0.7	1.00

As for the links between the comparison in table (5), most of them were positive and non moral except for the ALT with AST, it was a highly moral association. It was the opposite and non -moral connection between the alkaline phosphatase and the hepcidin.(Shih & Liu, 2020)

Among the enzymes that give an indication of the functioning of the liver and its efficiency is the enzyme alkaline phosphatase, where it was found that this enzyme increases significantly in patients with viral hepatitis C and B compared to the control group and this study corresponds to many studies in this purpose.(Shih & Liu, 2020).

In terms of the correlation between these four factors (ALT,AST, Alkaline phosphatase, Hepcidin) it has been found that there is a correlation between AST and alkaline phosphatase significantly (p= 0.01) in patients with viral hepatitis B and C, as for the enzyme ALT, the association with alkaline is strong in patients with viral hepatitis B and not in patients with viral hepatitis C and this study corresponds to many studies in this purpose.

The upper number represents the value of the correlation, and the lower number represents the morality of the correlation.

Table (5): Comparative correlation between the four factors studied				
	Hepcidin (pg/ml(	AST	ALT	ALK
Hepcidin (pg/ml(	1.000	0.349 0.08	0.186 0.3	0.003 -0.9
AST	0.349 0.08	1.00	0.664 0.01	0.033 0.8
ALT	0.186 0.3	0.664 0.01	1.00	0.161 0.4
ALK	0.003 - 0.9	0.033 0.8	0.161 0.4	1.00

The highest number represents the value of the correlation, and the lower number represents the significance of the correlation.

4. Conclusion

For Hepcidin, AST and ALT shows that there is no significant difference between the types of viral hepatitis. For Alkaline phosphatase, there were significant differences at P value 0.01 between the pathological cases of viral hepatitis B, C. and the healthy were the highest reading among healthy compared to the hepatitis B and C. The relationship between the factors studied was the highest connection between the ALT. with AST, followed by the Alkaline phosphatase with AST, as well as the corners of the Alkaline phosphatase with the ALT, and it was noted that there is a negative, but non - significant correlation between the alkaline phosphatase and the hepcidin.As for the hepatitis C viral liver, there was a positive and significant correlation with the AST. As for the connection of the A LT and AST, it was a significant, but not significant association. There is also a weak connection between Alkaline phosphatase and Hepcidin. As for the rest of the links, they were inverse, but non - significant, compared to the previous table, the links were positive, but non -significant, except for the link between the two alkaline phosphates and the hepcidin in the hepatitis B was the opposite. As for the links between the comparison, most of them were positive and nonsignificant except for the ALT with AST, it was a highly significant association. It was the opposite and non -significant connection between the alkaline phosphatase and the hepcidin.

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