

Determination of Some Biochemical Parameters of Patients with Hepatitis B in Kirkuk City

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Abstract

Hepatitis B infection is a worldwide healthcare problem, especially in developing areas. The current study was to evaluate the alterations in different biochemical parameters including paraoxonase (PON), 5'-Nucleotidase (5NT), total bilirubin, direct bilirubin, indirect bilirubin, Prothrombin time (PT), alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), Total serum protein (TSP), albumin (Alb), Superoxide dismutase (SOD) and γ -glutamyl transpeptidase (GGT) in the serum samples of the viral hepatitis patients (n=100) compared with healthy controls(n=100). This study shown that there were significant increase ($p<0.05$) in the TSB, D. Bilirubin, In. Bilirubin, AST, ALT, PT, GGT, 5-NT, and ALP in viral hepatitis patients compared to their respective normal controls and there were significant decrease ($p<0.05$) in the serum (PON, SOD) activities, TSP and albumin concentration. It can be concluded that PON, 5-NT, SOD, ALT, AST, ALP and GGT may be specific method for making a diagnosis of viral hepatitis and also in distinguishing it with other kinds of hepatitis.

Keywords: Paraoxonase , 5'-Nucleotidase , viral hepatitis B.

تقدير بعض المعايير البيوكيميائية للمرضى المصابين بالتهاب الكبد الفيروسي

ب - في مدينة كركوك

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الملخص

التهاب الكبد الفيروسي هو مشكلة صحية عالمية ، بالخاص في المناطق النامية . الدراسة الحالية كانت لتقييم التغيرات في مختلف المعايير البيوكيميائية بما فيها البارأوكسونيز (PON) ، 5- نيوكليوتايديز (5NT) ، البليروبين الكلي (TSB) ، البليروبين المباشر (Direct bilirubin) ، البليروبين الغير المباشر (Indirect bilirubin) ، زمن البروثرومبين (PT) ، ناقلة الألائين (ALT) ، ناقلة الأسبارتات (AST) ، انزيم الفوسفاتاز القلوي (ALP) ، البروتين الكلي للمصل (TSP) ، الالبومين (Alb) ، فوق اكسيد الدسموتاز (SOD) و ناقلة الببتيد غاما غلوتاميل (GGT) في مصل المرضى المصابين بالتهاب الكبد الفيروسي نمط ب- و كان عدد المرضى (100) مريض تم مقارنتهم مع (100) شخص من الأصحاء كمجموعة التحكم. أظهرت هذه الدراسة بانه هناك زيادة ملحوظة ($p < 0.05$) في البليروبين الكلي (TSB)، البليروبين المباشر (Direct bilirubin) ، البليروبين الغير المباشر (Indirect bilirubin) ، ناقلة الأسبارتات (AST)، ناقلة الألائين (ALT) ، انزيم الفوسفاتاز القلوي (ALP) ، زمن البروثرومبين (PT) ، 5- نيوكليوتايديز (5NT) و ناقلة الببتيد غاما غلوتاميل (GGT) و كما أظهرت نقصان ملحوظ ($p < 0.05$) في فعالية البارأوكسونيز (PON) و فوق اكسيد الدسموتاز (SOD) و في تركيز البروتين الكلي للمصل (TSP) ، الالبومين (Alb). نستنتج من هذه الدراسة بان ال (SOD), 5NT, PON , ALT, AST , ALP و GGT كانت طريقة محددة إلى حد ما لإجراء تشخيص التهاب الكبد الفيروسي و كذلك في تمييزه عن بقية انواع التهاب الكبد .

الكلمات الدالة : بارأوكسونيز، 5- نيوكليوتايديز ، التهاب الكبد الفيروسي - ب-.

1. Introduction

Hepatitis B is a potentially life - threatening infection that affects millions of individuals worldwide, it attacks the liver [1]. Both acute and chronic liver diseases can be caused by hepatitis B Virus (HBV)[2]. About 5–6% are persistent carriers of HBV and approximately 8% of the world's population has been infected with HBV [3]. Noncytotoxic, chronic infection to hepatocytes are caused by HBV and this is one of the reasons for chronic HBV infections [4]. The viruses are continuously shed by hepatocytes into the bloodstream. Furthermore hepatocytes possess long-life, having 6 to 12 months or more. Hence, in the absence of a robust immune response, the combination of long-lived non-dividing host cell and a stable virus-host relationship virtually ensures the persistence of an infection [5]. Liver is one of the largest organs in the body. It has many important metabolic functions. Liver tissue has a relatively large amount of enzymes activity and alteration of various enzymes in hepatitis. Oxidative stress is a common pathogenic mechanism that participates to the development of hepatic damage in cases of hepatic inflammatory disorders, including acute and chronic hepatitis [6, 7]. Paraoxonase (PON) is known to be tightly bound with HDL in blood which belongs to a family of calcium-dependent antioxidant enzyme (lactonases/hydrolases) [8]. The aim of this study was to assess levels of PON, ALT, AST, ALP, and GGT in the patients with viral hepatitis patients compared with healthy controls.

2. Patients and Methods

This study includes 100 patients with Hepatitis B (58 men, 42 women), with a mean age of 40.34 ± 9.88 years and 100 healthy controls (57 men, 43 women, 46.12 ± 10.48), matched for sex and age were analyzed, admitted to Kirkuk Teaching Hospital (Kirkuk province), in a period from 12 September 2015 to 16 February 2016. Patients with neoplasia, diabetes, cardiovascular disease, and renal disease were excluded. Venous blood sample was acquired between 8 and 8:30 AM., Aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were evaluated by Reitman and Frankel method [9]. The Estimation of GGT, and ALP were done by the methods as proposed by Szasz [10], and King [11], respectively. Measurement of PON, 5'-nucleotidase, and PT were performed by according to the method described by Mackness *et al*, Campbell, and Quick [12-13, 14] respectively. The data was analyzed using SPSS-16 software package. Mean, and Standard deviation were applied.

3. Results

The Demographic Characteristics of serum samples of viral hepatitis patients and controls is summarized in Table 1.

Table 1: Demographic characteristics of the study

	Chronic hepatitis patients	Controls
Age (years) (mean \pm SD)	40.34 \pm 9.88	46.12 \pm 10.48
Sex (males %)	58	57
(females %)	42	43
Total	100	100
BMI (Kg/m ²) (mean \pm SD)	23.9 \pm 1.63	25.66 \pm 1.77
Duration of HD (years) (mean \pm SD) = 2.6 \pm 0.77		

P < 0.05, Not Significant

Table 2 revealed statistically significant increase in the concentration of TSB, D. Bilirubin , InD. Bilirubin , AST , ALT, ALP and PT in viral hepatitis patients (p < 0.05) (59.14 \pm 3.93 micromole/L), (8.52 \pm 1.7 micromole/L), (50.62 \pm 4.28 micromole/L), (46.36 \pm 2.67 IU/L), (88.78 \pm 2.88 IU/L), (95.64 \pm 3.04IU/L), (18.98 \pm 1.65 seconds) respectively, as compared to the control group (7.96 \pm 2.059 micromole/L), (2.86 \pm 1.16micromole/L), (5.96 \pm 2.03 micromole/L), (9.72 \pm 1.45 IU/L), (7.94 \pm 1.5 IU/L), (58.92 \pm 2.38 IU/L) and (13.54 \pm 1.81 seconds) respectively. While TSP, and albumin concentration were significantly decreased in serum samples of viral hepatitis patients (44.06 \pm 6.94) and (27.46 \pm 4.08) respectively as compared to control group (69.24 \pm 7.029) and (42.9 \pm 4.77) respectively.

Table 2: The diagnostic parameters of (total bilirubin, direct bilirubin, indirect bilirubin, AST, ALT, ALP, TSP, Alb and PT) levels in patients with viral hepatitis and the controls.

Parameters	Patients	Median (mini-max)	Controls	Median (mini-max)
TSB (micromole/L)	59.14 \pm 3.93	51-66	7.96 \pm 2.059	4-11
D. Bilirubin (micromole/L)	8.52 \pm 1.7	6-12	2.86 \pm 1.16	1-5
In. Bilirubin (micromole/L)	50.62 \pm 4.28	42-60	5.96 \pm 2.03	2-10
AST (IU/L)	46.36 \pm 2.67	41-51	9.72 \pm 1.45	7-12
ALT(IU/L)	88.78 \pm 2.88	79-95	7.94 \pm 1.5	5-11
ALP(IU/L)	95.64 \pm 3.04	99-101	58.92 \pm 2.38	55-66
Total serum protein (TSP)(g/L)	44.06 \pm 6.94	35-55	69.24 \pm 7.029	54-79
Albumin (Alb) (g/L)	27.46 \pm 4.08	20-33	42.9 \pm 4.77	37-51
Prothrombin time (PT)(seconds)	18.98 \pm 1.65	16-22	13.54 \pm 1.81	11-16

P < 0.05, Significant

Table 3 shows a significant decrease in PON1 and SOD concentrations in the serum of patients of viral hepatitis patients ($p < 0.05$) (56.54 ± 3.15 IU/L) and (1.64 ± 0.17 IU/L) respectively when compared with normal controls (205.62 ± 3.52 IU/L) and (2.09 ± 0.047 IU/L) respectively, while there is a significant increase in the 5-NT and GGT concentrations of the serum of patients of viral hepatitis patients ($p < 0.05$) (38.58 ± 2.69 IU/L) and (92.34 ± 3.88 IU/L) respectively when compared with normal controls (10.86 ± 1.73 IU/L) and (23.26 ± 1.98 IU/L) respectively

Table 3: The levels (PON1, 5-NT, SOD and GGT) in patients with levels in patients with viral hepatitis and the controls.

parameters	Patients	Median (mini-max)	Controls	Median(mini-max)
PON1(IU/L)	56.54 ± 3.15	49-61	205.62 ± 3.52	200-212
5-NT(IU/L)	38.58 ± 2.69	32-43	10.86 ± 1.73	8-14
SOD(IU/L)	1.64 ± 0.17	1.3-1.9	2.09 ± 0.047	2.01-2.2
GGT(IU/L)	92.34 ± 3.88	87-100	23.26 ± 1.98	19-28

$P < 0.05$, Significant

4. Discussion

Study finding demonstrated a significantly high serum ALT, AST, GGT, ALP concentration but significantly low TSP, and PON in patients with viral hepatitis versus healthy controls. γ -glutamyltranspeptidase, a membrane enzyme found in the hepatobiliary system, that is essential for synthesis of glutathione, which is the main antioxidant molecule in cells, is controlled by GGT. In the presence of cholestasis in viral hepatitis, GGT increases more than 10 folds, whereas in absence of cholestasis, it increases upto 5 times [15]. ALT is the most reliable biochemical value to show the of liver injury in patients with acute and chronic viral hepatitis, this is due to the distribution of cytoplasmic exclusively of ALT and longer half-life in the blood (about 50 hours) than for AST (about 16 hours) [16,17]. The possible mechanisms include Excretion of ALP is reduced in bile Will cause the in regurgitation of enzyme into circulation by the hepatic sinusoid [18, 19]. ALP increased in disease resembles the ALP which can be removed from liver. Production of ALP by the bile ductules cell is motivates via increased cholestatis that providing additional ALP which eventually enters the bloods, releasing of ALP from its membranes bound site and entry into

blood is facilitated due to amphillic nature of bile salts[20]. The Prothrombin time (PT) involves of the time required for the platelet-poor plasma to clot after the addition of thromboplastin and calcium chloride. In our study, PT values in patients hepatitis B was significantly different with to those in healthy participants , in accordance with the result of [21,22] Which has sustained that prolong the clotting time is connected with the degree of inhibition of the integrity of both the entrinsic pathway of coagulation, consequently the grade of liver damage. A reduction in PON1 activity in patients with chronic hepatitis could be interpreted via the following mechanisms. First, serum PON1 activity (with normal hepatic PON1 concentration) would be lowered as a result of changes in synthesis or secretion of the HDL secondary. [23, 24]. Impaired synthesis and Changes in the structure of HDL connected to reduced serum PON1 levels in mice with impaired lecithin: cholesterol acyl transferase (LCAT) activity Because of LCAT gene-targeted disturbances [25]. Second, although the PON1 gene expression confined only to liver, as there is liver damage, it is clear that there is a defective gene expression, thereby causative to lower PON1 in these patients. It has been reported that there was significant decrease in PON1 activity in in rats with chronically administered CCl₄ secondary to increased free radicles [26]. Superoxide dismutase plays a crucial role in the alleviation of H₂O₂ that was formed in RBC and because hemoglobin and SOD has been proven to be in closely linked in RBC. In the present results agree with other studies that have shown increased SOD level [27,28]. These findings indicate that the SOD may be cause free radical formation in hepatic diseases. 5'-Nucleotidase is a glycoprotein as an ectoenzyme in mammalian cells. confined in cytoplasmic membrane [29,30], Significant increase in 5'-Nucleotidase levels in chronic hepatitis B and suggest that the extent of damage to the liver. Subhani et al., [31] observed that higher level of 5'-NT in alcoholic consumers than in cirrhotic groups. Pratibha et al [32]., found that increases serum level of acute infective hepatitis patients. Subhani TF [33], stated that 5'-NT were higher among chronic hepatitis C than Alcoholic patients .

5. Conclusions

Our results indicate a link between the damage of cells caused by decreased PON-1, and hepatitis B indicating a possible contributive role of these markers in the development of hepatitis B and as an indicator in the discrimination of hepatitis B from healthy controls. These findings need to be confirmed by further prospective longitudinal studies with adequate sample size. is capable of hydrolyzing oxidized lipids and thus protects against atherosclerosis

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