Comparison in Some Biochemical and Hematological Tests Between Chronic Hepatitis B and C

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Abstract

Chronic viral hepatitis is an important health problem in the world, where hepatitis B virus (HBV) or hepatitis C virus (HCV) infections are the main causes of liver insufficiency. The study included 100 blood samples from patients with chronic viral hepatitis, fifty of them with HBV infection and 50 with HCV infection. Twenty apparently healthy age and gender matched subjects were included as a control group. Out of the 50 patients with HBV, 36(72%) were males and 14(28%) were females. Thirty two (64%) patients with HCV were males and 18(36%) were females. The mean age for HBV patients was 36.9 ± 15.8 year and for HCV patients it was 39.9 ±14.2 year. The results of the liver function tests showed no significant difference between HBV and HCV patients. Both of HBV and HCV patients showed a significant difference regarding liver function tests when compared with the control group. Total white blood cell count and hemoglobin concentration were lower (4296± 1050.9 cell/ mm3 and 10.9 ± 2.2g/dl respectively) in HCV patients than those in HBV patients (6224 ± 1749.1 cell /mm3 and 13.4 ±1.3 g/dl) with a significant difference. However there was no significant difference between HBV patients and control regarding total white blood cell count and hemoglobin concentration.

Aim of study: to compare between chronic hepatitis B, chronic hepatitis C and control regarding some hematological and biochemical parameters.

Key Words :Chronic Hepatitis B and C

Introduction

Viral hepatitis is a major global public health concern, it is a source of substantial morbidity and mortality around the world. Viral hepatitis is caused by at least five distinct viruses A, B, C, D, or E. Each belongs to an entirely different family of viruses, and they have very little in common except the target organ, they affect the liver and a certain degree of shared epidemiology. [1]

Chronic hepatitis B and chronic hepatitis C are progressive diseases linked to the development of cirrhosis and hepatocellular carcinoma. Chronic liver disease is accompanied by derangement of hepatocyte function including the synthesis of haemostastic factors. [2]

Four separate liver enzymes are included on most routine laboratory tests. They are- aspartate aminotransferase (AST or SGOT) and alanine aminotransferase (ALT or SGPT), which are known together as transaminases; and alkaline phosphatase (ALP) and gamma-glutamyl transferase (GGT), which are known together as cholestatic liver enzymes. Elevations of these enzymes can indicate the presence of liver disease. In cases of acute viral hepatitis, aminotransferase levels usually peak before jaundice appears and have a more gradual decrease thereafter, and there is a greater increase in serum bilirubin levels. The entire alphabet of viral hepatitis (A, B, C, D and E) may be responsible for a marked increase in aminotransferase levels, although the increase associated with hepatitis C infection tends to be

more modest than that associated with hepatitis A or B. Liver and bone diseases are the most common causes of pathological elevation of ALP levels, although ALP may originate from other tissue, such as the placenta, kidneys or intestines, or from leukocytes.[3]

The epidemiology of HBV and HCV infection varies according to geographical area. HBV infection is a serious global health problem, with two billion people infected worldwide, and 350 million suffering from chronic HBV infection. Chronic hepatitis B (CHB) affects more than 400 million people globally, of whom 75% are Asians [4]. In the Middle East, HBV prevalence has altered from high to intermediate or low prevalence, but HBV infection is a problem of public health, and a major cause of mortality and morbidity particularly in developing countries. [5] In the Middle East, Bahrain, Iran, and Kuwait are areas of low endemicity, Cyprus, Iraq and the United Arab Emirates have intermediate endemicity, and Egypt, Jordan, Oman, Palestine, Yemen and Saudi Arabia have high endemicity [6].

Studies in the Middle East show the prevalence of HBsAg to range from 3% to 11% in Egypt, 4% to 5% in Iraq, 2.6% to 10% in Jordan, 2% to 6% in the Libyan Arab Jamahiriya, 2.3% to 10% in Oman, 5% to 6% in Palestine, 7.4% to 17% in Saudi Arabia, 16% to 20% in Sudan, 6.5% in Tunisia, 2% to 5% in UAE and 12.7% to 18.5% in the Republic of Yemen. The studies conducted in the Middle East have collectively found that HBV infection is a serious public health problem in the region. [7]

Hepatitis C infection is now the most common cause of end-stage liver disease in many countries. It is a blood-borne infection that was a well-known cause of post-transfusion hepatitis after introduction of hepatitis B screening in blood banking and before implementation of hepatitis C-sensitive screening laboratory methods. World Health Organization (WHO) estimations suggest that up to 3% of the world's population (170 million) have been infected with HCV [8]. Regionally, the highest prevalence of HCV infection occurs in Egypt, where the prevalence of infection increases steadily with age, and high rates of infection are observed among persons in all age groups [9].

Materials and Methods

Patients population

We studied one hundred patients with chronic viral hepatitis, 50 of them (36 males and 14 females) with chronic HBV infection and 50 patients (32 males and 18 females) with chronic HCV infection , who were in regular follow-up at the gastroenterology and hepatology center / Baghdad. Twenty unrelated apparently healthy, age and gender matched subjects were included as a control group. Chronic HBV infection was defined by the presence of hepatitis B surface antigen (HbsAg) in serum for more than 6 months, while chronic HCV infection was defined by the presence of HCV RNA in serum for more than 6 months which was done by using commercially available enzyme linked immunosorbent assay (ELISA) and performed according to the manufactures instructions.

Methods

Venous blood samples were collected from all patients, hematological tests were done, including total white blood cell count and estimation of hemoglobulin concentration. Liver function tests were performed manually by using assays which were done according to the manufacturers instructions using standard routine spectrophotometric methodology [10] in all patients which included the following kits;

1-Total serum bilirubine (TSB)-randox company;
Spectrophotometric determination (Winstel and Cehelyk method)
2- Alanine aminotransferase (ALT)-randox company;
Sphectrophotometric determination (Reitman and Frankel method)
3- Aspartate aminotransferase (AST)-randox company;

Sphectrophotometric determination (Reitman and Frankel method)
4-Alkaline phosphatase (ALP)-biomerieux-company;
Spectrophotometric determination of alkaline phosphatase activity

Statistical analysis

The test results are expressed as the mean ± standard deviation (SD). Data collected were subjected to analysis of variance (ANOVA), while the means were separated with LSD test using statistical programme for windows, P value of ≤ 0.05 was considered significant [11].

Results

In our study the patients population consisted of 68 males (68 %) and 32 females (32 %). Mean age of our patients was 38.4±14.9 years. Mean ages for chronic hepatitis B and hepatitis C patients were 36.9 ± 15.8 years (11 – 65years) and 39.9 ±14.2 years (7-61 years) respectively, table (1).

Table (2) compares the levels of liver function tests between HBV and HCV patients, which shows that the mean of total serum bilirubine level was 4.1 ± 3.1 and 4.2 ± 3 mg/dl in HBV and HCV patients respectively. On the other hand, AST level in HBV and HCV patients were 37.8± 10.4 IU/L and 41.6± 14.2 IU/L respectively. The same table also demonstrates that the level of ALT was 55±40.8 and 60.4±29.3 IU/L in HBV and HCV cases respectively, meanwhile ALP level was 82.1±46.5 IU/L in HBV patients and 86.3± 44.7 IU/L in HCV patients. Statistical analysis showed that there was no significant difference between HBV and HCV patients concerning liver function tests. However both HBV and HCV showed a significant difference in liver function tests when compared with the control group.

The data demonstrated by table (3) and figure (1) show a significant difference between HBV and HCV patients concerning total WBC count which was 6224 ± 1749.1 and 4296± 1050.9 cell/ mm3 respectively. Hemoglobulin concentration was 13.4 ± 1.3 g/dl in HBV patients and 10.9 ± 2.2 g/dl in HCV patients which was significant as illustrated by table (3) and figure (2). However HBV patients showed no significant difference when compared with control group regarding total white blood cell count (7599±980 cell/ mm3) and hemoglobine concentration (13.8±1.9 g/dl).

Discussion

Viral hepatitis is an important cause of chronic hepatitis. Based on the data obtained in this study, chronic viral hepatitis was more prevalent among males than females. These findings were similar to those obtained in another study which reported that the male: female ratio was 2:1 in Iraq [12]. On the other hand the current findings disagree with the findings of another study conducted in Iraq, which reported that an equal ratio in both males and females [13]. Our results agreed with a study conducted in Turkey which also found that male: female ratio was 2:1. [14]

Although the results of liver function tests in the current study was higher in HCV patients than those in HBV patients, statistical analysis revealed that there was no significant difference between HBV and HCV patients concerning liver function test. These findings disagreed with those obtained in another study which reported that HCV-infected patients presented more liver inflammation (higher AST, ALT and ALP) than HBV-infected patients. This difference in liver inflammation can be attributed to the higher percentage of previous antiviral treatment and the higher response rate to therapy in the HBV group compared with the HCV group [15]. It is well known that chronic hepatitis C is associated with a wide variation in ALT, from normal ALT to persistent elevation of ALT, although studies have

shown that patients with persistently normal ALT usually have slower progression and lower prevalence of cirrhosis. [16]

In this study we noted that hemoglobin concentration and total WBC count were different in HBV and HCV patients. Hepatitis C patients included in this study had lower total hemoglobin concentration and total WBC count than those found in hepatitis B patients with a significant difference. These results were similar to those obtained in another study which reported that HCV positive patients have lower hemoglobin and white blood cell count. [17] Nevertheless the current results were consistent with the data reported by a study which concluded that regarding liver disease severity, chronic hepatitis B compared with chronic hepatitis C patients had significantly lower white blood cell and platelet counts, but similar biochemical (aminotransferases levels) and histological (grading and staging) findings as well as a similar prevalence of all other thrombophilic or coagulation factors [18]. This variation may be due to the following factors, first patients in our study were younger than those in the other study. Second geographic variation in HBV genotypes in study population would influence the prevalence of chronic hepatitis B. Another factor is that the cause may also be nutritional or infectious, finally difference in sample size. Further studies on a much larger scale are needed to evaluate other factors that might affect the relationship between HBV and HCV infection with respect to hemoglobin, hematocrit levels, differential leucocyte count , phylogenic analysis for viral genotypes, viral titers, serum ferritin level and the degree of hepatic injury.

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Table (1): Demographic characteristics of cases

		HBV	HCV	total
Number of patient (%)		50	50	100
Sex	Male (%)	36(72)	32(64)	68(68)
	Female (%)	14(28)	18(36)	32(32)
Age(mean±SD) Years		36.9 ± 15.8	39.9 ±14.2	38.4±14.9
(min - max)		11 - 65	7 - 61	7 - 65

Table (2): levels of liver function tests in chronic HBV , HCV patients and control.

TEST	HBV	HCV	control	P-value*
Total Bilirubine (mean , mg/dl)	4.1 ± 3.1	4.2 ± 3	0.5±0.3	HBV*control=S HCV*control=S HBV*HCV=NS
AST(IU/L) (mean ± SD)	37.8± 10.4	41.6± 14.2	16±10.7	HBV*control=S HCV*control=S HBV*HCV=NS
ALT (IU/L) (mean ± SD)	55±40.8	60.4±29.3	20±7.8	HBV*control=S HCV*control=S HBV*HCV=NS
ALP (IU/L) (mean ± SD)	82.1±46.5	86.3± 44.7	40.6±9	HBV*control=S HCV*control=S HBV*HCV=NS

NS= non significant , S=significant

Table (3): Total WBC count and hemoglobulin concentration in HBV , HCV patients and control.

	HBV	HCV	control	P-value
Total WBC count (cell//mm3) (mean±SD	6224 ± 1749.1	4296± 1050.9	7599±980	HBV*control=NS HCV*control=S HBV*HCV=S
Hemoglobin concentration (g/dl) (mean±SD	13.4 ± 1.3	10.9 ± 2.2	13.8±1.9	HBV*control=NS HCV*control=S HBV*HCV=S

NS= non significant , S=significant

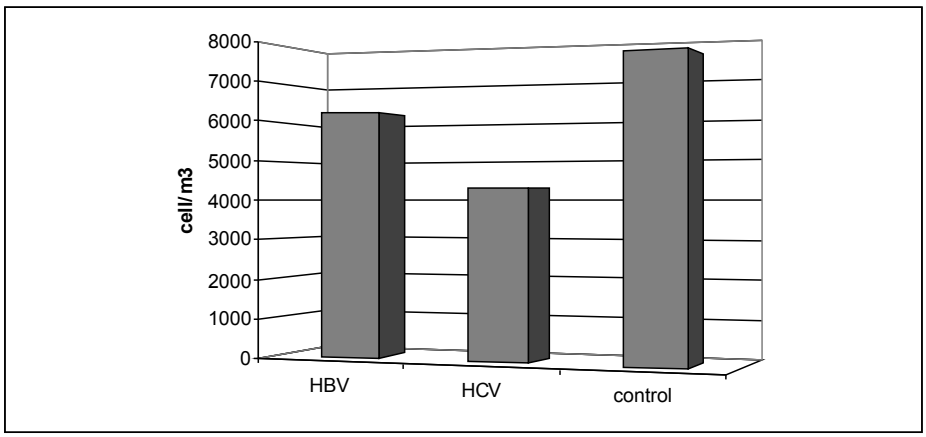

Fig. (1):Total WBC count in HBV , HCV patients and control.

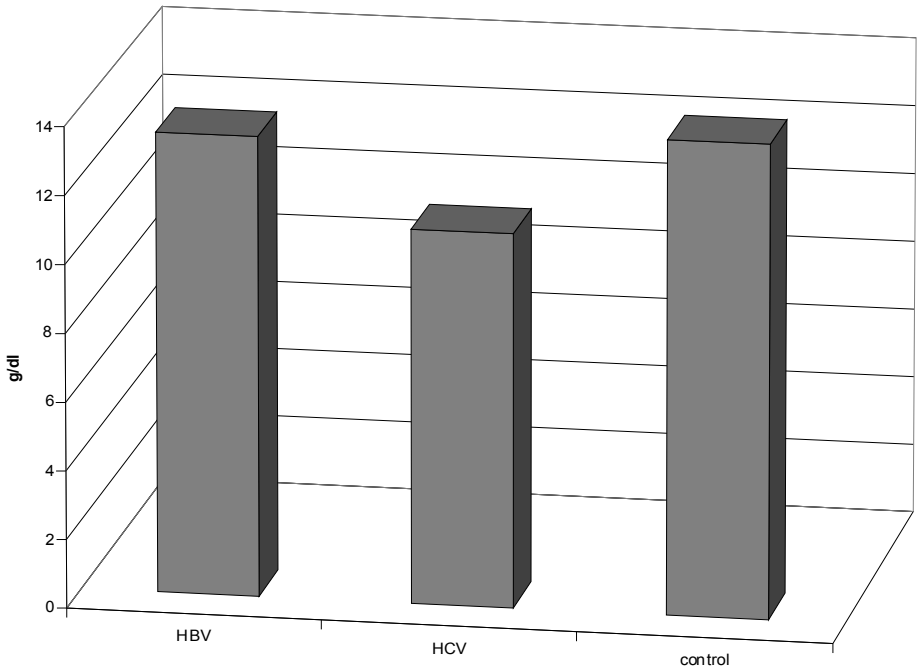

Fig. (2): Hemoglobulin concentration in HBV , HCV patients and control.

مقارنة في بعض الفحوصات البايوكيميائية وفحوصات الدم بين التهاب الكبد الفايروسي المزمن نوع B و C

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الخلاصة

التهاب الكبد الفايروسي المزمن هو مشكلة صحية مهمة في العالم. ،اذ إن التهاب الكبد الفايروسي نوع B أو التهاب الكبد الفايروسي نوع C هما من العوامل الرئيسة المسببة لعدم كفاية الكبد. تضمنت الدراسة 100 عينة دم لمرضى يعانون من التهاب الكبد الفايروسي، منهم 50 مريضا مصابون بالتهاب الكبد الفايروسي المزمن نوع B و50 مريضا مصابون بالتهاب الكبد الفايروسي المزمن نوع C. تضمن البحث عشرين من الاشخاص الأصحاءالمطابقين بالعمر والجنس مجموعة سيطرة. من ضمن الخمسين مريض المصابين بالتهاب الكبد الفايروسي نوع B كان هناك 36(72%) من الذكور و14(28%) من الإناث .اثنان وثلاثون (64%) من المرضى المصابون بالتهاب الكبد الفايروسي نوع C هم من الذكور و 18(63%) من الإناث. معدل العمر لمرضى التهاب الكبد الفيروسي نوع B كان 36,9 ± 15,8سنة و 39,9 ± 14,2سنة لمرضى التهاب الكبد الفيروسي نوع C. نتائج فحوصات وظائف الكبد أظهرت عدم وجود فرق معنوي بين مرضى التهاب الكبد نوع B والتهاب الكبد نوع C.أظهر كل من مرضى التهاب الكبد نوع B والتهاب الكبد نوع C وجود فرق معنوي بالنسبة الى فحوصات وظائف الكبد عند مقارنتهم بمجموعة السيطرة. في حين أظهرت النتائج أن مجموع كريات الدم البيضاء وتركيز الهيموغلوبين (4296±1050,9خلية/ ملم3 و 10,9±2,2 غم /100 مل) كان أقل في مرضى التهاب الكبد نوع C من مرضى التهاب الكبد نوع B (6224± 1749,1 9خلية/ ملم3 و 13,4± 1,4غم /100 مل) مع وجود فرق معنوي . في حين لم يكن هناك فرق معنوي بين مرضى التهاب الكبد نوع B ومجموعة السيطرة فيما يخص مجموع كريات الدم البيضاء وتركيز الهيموغلوبين.

يهدف البحث إلى المقارنة بين التهاب الكبد المزمن نوع B و التهاب الكبد المزمنC في بعض فحوصات الدم وبعض فحوصات الكيمياء الحياتية.

الكلمات المفتاحية : التهاب الكبد الفايروسي المزمن نوع B و C