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Study of various physiological changes in the blood of hepatitis B and C in Iraqi patients

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Abstract
The main causes of viral hepatitis are the B and C viruses, which produce severe disease, mortality, and persistent carrier status. This causes global health and economic problems. The study included 110 participants: 60 patients (20-69), 38 males, 22 women, and 50 control group members (20-49). The study found a substantial (P <0.001) decrease in Haemoglobin and Plate lets values in hepatitis Band C patients compared to healthy controls. Plate lets decreases, but not Haemoglobin levels for both sexes and female patients' hepatitis C and B mean levels decrease. In biochemical testing, hepatitis B and C patients had significantly higher Alanine aminotransferase, Aspartate aminotransferase, Alkaline phosphatase, Total bilirubin, C reactive protein, and Alpha pheto protein than control groups (P<0.001). Comparing male and female patient mean values to healthy groups showed an increase. The study compares haematological and biochemical indicators in healthy hepatitis B and C patients.

Introduction:

Hepatitis viruses cause widespread sickness and death. The primary hepatotoxic viruses are HAV, HBV, HCV, HDV, and HEV. These viruses can cause several diseases in isolated outbreaks. The family Picornaviridae, genus Hepatovirus, includes HAV. The disease's global spread causes 1.4–1.5 million hepatitis cases annually [1,2]. Hepatitis is one of the most common viral diseases, but it may also be non-contagious. When they develop unexpectedly or repeatedly, only viruses B and C can cause chronic hepatitis [3]. The 2017 WHO Hepatitis Report found that chronic cirrhotic infection accounted for 720,000 hepatitis B and C viral infections, and due to the constant variability and vulnerability of host antiviral defences, hepatitis viruses affect liver homeostasis and the development of chronic disease [4]. Viral Hepatitis kills the second most people worldwide during cancer. HCC, cirrhosis, liver fibrosis, and other disorders are more likely. Five, the complex antigen HBs Ag on the HBV surface was used to diagnose. Serum or plasma HBs Ag indicates active hepatitis B. Blood or plasma tests

for HCV infection show the presence of HCV antibodies (HCVAb), but symptoms, including jaundice, may not develop for three to five weeks [5,6].

First, viral chromosomal rearrangements or deletions caused by DNA insertion into the hepatocyte genome may alter chromosome stability. HBV DNA may disrupt oncogene or tumour suppressor gene expression, determining cell survival. HBV is Orthohepadnavirus in Hepadnaviridae. Every year, 350 million people encounter this hepatotoxic virus. [7].

Current research shows that hepatitis C virus (HCV) is the leading cause of cirrhosis and liver cancer in wealthy countries. [8]. Chronic HBV hepatitis severity depends on HBV and reduced immunity. Acute HBV infection boosts CD4+ and CD8+ T cell responses and IFN-production. Another essential cytokine for HBV management and virus elimination is IFN [9]. The aim of the Study of the physiological effects of hepatitis B and C virus infection in patients and healthy subjects.

Material and Methods

Patients and Control Subjects

Hepatitis B and C patients were collected from Iraq's Public Health Laboratory, AL-Anbar Blood Bank, AL-Fallujah and AL-Ramadi Teaching Hospitals, and AL-Fallujah Blood Bank between September and December 2022. We divided the 60 patients into 50 control group members and 38 males and 22 women, ages 20–69. Patients' blood samples and parents' medical histories—name, age, gender, and hepatitis type—were collected. Patients in the current study without liver disease, diabetes, hypertension, lipid abnormalities, or chronic renal sickness were the control group.

Sample Blood

A disposable 5-milliliter syringe was used to obtain venous blood from hepatitis B and C patients and controls. Haematological assays using EDTA (Ethylene Diamine Tetra-Acetic Acid) and one millilitre of blood assessed haemoglobin (Hb) and platelet count. The remaining four millilitres of blood were placed in disposable plane tubes, centrifuged for 10 minutes at 3000 RPM, and left to rest at room temperature for 20 minutes to allow clots to form. The blood was kept at -20 C for examination. An Eppendorf tube held three portions of serum for assaying (ALT, AST, ALP, TSB, Total protein, Albumin, AFP, and CRP).

Blood and biochemical tests

The biochemical markers ALT, AST, ALP, total protein, albumin, AFP, and CRP were determined using a spectrophotometer and a reflection kit developed for each [10,11]. A Coulter blood test measures Hb and PLT levels.

Statistical analysis the current study collected data using ANOVA, which was performed using Genstat software. Comparing mean hepatitis B and C patients to controls. $P<0.05$ was the level of statistical significance.

Result and Discussion

Hematology parameters

Results from Table 1 Patients with hepatitis C and B have significantly lower mean Hb ($P <0.036$) and PLT ($P <0.001$) values than the control groups.

Table 1. Mean haematological parameters of hepatitis B and C patients compared to controls

Parameter	Healthy(control)				Patients				
	N	Mean	SD	SEM	N	Mean	SD	SEM	p-value
Hemoglobin	**50**	**16.45**	**16.148**	**2.284**	**60**	**11.50**	**1.524**	**0.197**	**< 0.036**
PLT	**50**	**293.0**	**100.57**	**14.088**	**60**	**135.3**	**16.18**	**2.088**	< 0.001

Table 2 indicates a substantial drop in mean PLT values (P <0.001) in male hepatitis B and C patients compared to male controls. No significant difference in HB (P < 0.208) was found between male hepatitis B and C patients and controls.

Table 2. The mean haematological parameters of male hepatitis B and C patients compared to male controls.

Parameter	Male **patients**				**Male control**				**p-value**
	N	Mean	SD	SEM	N	Mean	SD	SEM	
Hemoglobin	**38**	**11.90**	**1.614**	**0.261**	**30**	**10.57**	**6.687**	**1.008**	0.208
PLT	**38**	**138.0**	**17.09**	**2.77**	**30**	**297.1**	**109.79**	**20.04**	< 0.001

Furthermore, the results in Table (3) Results show that there is a significant decrease in the mean value of Hb (P <0.001) and PLT (P <0.001) for female hepatitis C and B patients compared with female control groups.

Table 3. The mean haematological parameters of hepatitis B and C patients compared to female controls.

Parameter	**Female patients**				**Female control**				**p-value**
	N	Mean	SD	SEM	N	Mean	SD	SEM	
Hemoglobin	22	10.80	1.068	0.226	20	12.70	0.441	0.098	< 0.001
PLT	22	130.6	13.59	2.90	20	286.8	87.29	19.52	< 0.001

Hepatitis B and C levels were much lower in our study's patients than in the healthy group, consistent with previous investigations. [12]. Multiple hematological abnormalities have been documented in liver disorders. Another study found that HCV patients have reduced haemoglobin and white blood cell levels [13]. In HCV-positive individuals, haemoglobin levels were lower compared to HCV-negative patients. In HCV-positive patients, haemoglobin levels are slightly lower [14].

In the first three weeks of Acute viral hepatitis, haematocrit, thrombocytopenia, leukopenia, aplastic anaemia, and anaemia reduced. [15, 16]. Another Taiwanese study connected anti-HCV antibodies to lower platelet counts. Another study used sensitive PCR amplification and a comprehensive survey to find a high connection between anti-HCV-positive persons' lower platelet counts and positive HCV RNA. Fibrosis affected platelet count, and HCV viremia persisted using non-invasive methods [17]. Another study found that chronic hepatitis B patients had similar aminotransferase levels, histological findings (grading

and staging), counts of white blood cells and platelets, and all other thrombophilia or coagulation factors, depending on liver disease severity. [17].

Tables 1 and 2 of the Hb parameter data show that male hepatitis B and C cases dropped but not female instances. PLT parameter values also decreased significantly between male and female patients and the healthy group. Males' mean values of hepatitis C, WBCs, PLT, PCV, and Hb decreased significantly compared to healthy controls, but not for hepatitis B. Compared to control groups, females with hepatitis C had decreased mean values of Hb, PCV, WBCs, and PLT [18,19]. Regional changes in HBV genotypes in the research sample may affect chronic hepatitis B prevalence, causing this gap. Finally, consider sample size disparities. Dietary or viral factors are possible.

Biochemical parameters

The statistical analysis for biochemical features is shown in Table 4, where it is evident that patients with hepatitis B and C had significantly higher mean values of GPT, GOT, ALP, total bilirubin, crp, and afp than the control groups ($P < 0.001$).

Table 4. Mean biochemical parameters of hepatitis B and C patients and controls.

Parameter	Healthy(control)				Patients				p-value
	N	Mean	SD	SEM	N	Mean	SD	SEM	
ALT	50	22.12	7.12	1.007	60	94.56	40.25	5.196	< 0.001
AST	50	16.32	5.26	0.744	60	57.82	18.82	2.429	< 0.001
ALP	50	35.3	15.20	2.149	60	192.1	54.65	7.05	< 0.001
T. bilirubine	50	0.770	1.314	0.185	60	2.063	1.123	0.1450	< 0.001
CRP	50	3.656	1.497	0.2118	50	13.858	13.092	1.69	< 0.001
AFP	50	13.15	3.44	0.487	60	90.81	67.90	9.927	< 0.001

The statistical analysis for biochemical characteristics is presented in Table 5, which indicates that in comparison to the control group, male hepatitis B and C patients had significantly higher mean values ($P<0.001$) for GPT, GOT, ALP, total bilirubin, crp, and AFP.

Table 5. The mean biochemical parameter of male hepatitis B and C patients and controls.

Parameter	Male patients				Male control				p-value
	N	Mean	SD	SEM	N	Mean	SD	SEM	
ALT	38	92.46	33.33	5.406	30	23.93	8.10	1.479	< 0.001
AST	38	59.75	19.53	3.168	30	17.63	5.50	1.004	< 0.001
ALP	38	185.4	56.56	9.175	30	38.2	15.19	2.774	< 0.001
T. bilirubine	38	2.128	1.312	0.212	30	0.857	1.687	0.308	< 0.001
CRP	38	12.408	11.362	1.843	30	2.834	1.753	0.264	< 0.001
AFP	38	93.20	81.66	13.247	30	9.81	6.75	1.018	< 0.001

Table 6 shows a substantial (P 0. 001) rise in the mean value of GPT, GOT, ALP, total bilirubin, crp, and AFP in female hepatitis B and hepatitis C patients compared to the control group.

Table 6. Mean biochemical parameters in female hepatitis B and C patients and controls.

Parameter	Female patients				Female control				p-value
	N	Mean	SD	SEM	N	Mean	SD	SEM	
ALT	20	98.20	50.72	10.813	22	19.39	4.21	0.941	< 0.001
AST	22	54.50	17.45	3.721	20	14.35	4.60	0.960	< 0.001
ALP	22	203.7	50.33	10.730	20	31.0	14.52	3.246	< 0.001
T. bilirubine	22	1.951	0.698	0.148	20	0.640	0.279	0.062	< 0.001
CRP	22	15.00	14.280	3.045	20	3.55	1.665	0.372	< 0.001
AFP	22	86.68	69.54	14.826	20	11.93	3.20	0.715	< 0.001

LFTs can assess HBV patients' hepatic function and disease severity. A study found that HBV infection can change blood levels of ALT, AST, ALP, and other liver enzymes [20,21]. This study found that HBV patients had increased ALT, AST, and ALP activity levels, suggesting damaged liver cells. All patients' samples were HBsAg positive. ALT, AST, and ALP were increased in the Anbar Governorate in earlier investigations [22,23].

It was significant in hepatitis C patients compared with controls. A study conducted in Fallujah found that chronic hepatitis C patients in all groups had significantly higher levels of T.S.B., S.ALT, and S.AST in their blood [24]. It was observed in Baghdad that patients suffering from chronic hepatitis C had higher levels of A.S.T. and A.L.P. compared to control groups; the results do not differ in Iraqi patients, as hepatitis C virus patients have higher levels of A.L.T. and A.S.T. compared to control groups [25, 26–27]. We observed that 56% of patients had elevated CRP levels, although Panichi and colleagues [28] found 47%, and another study found 36% [29].

Razeghi and colleagues' prior study, which indicated 41% of patients had CRP levels above 10 mg/L, is consistent with the current study's 46%. The literature on CRP levels is abundant. Adriana and colleagues37 found 25% of those had CRP levels over 16.7 mg/L [30,31] in 2008. The high-sensitivity CRP levels of 95 CHC patients and 95 healthy controls were also significantly higher. CRP dropped significantly after commencing ribavirin and pegylated IFN therapy. As in another study, HCV patients had greater CRP levels than non-HCV patients [32]. Serum AFP rises in hepatitis and cirrhosis. [33, 34]. Elevated blood AFP levels correlate with advanced liver fibrosis and cirrhosis [35, 36]. Hepatic progenitor cells in the liver's periportal area produce high amounts of AFP, which are linked to fibrosis and thought to regenerate the liver [37]. Some primary hepatic carcinoma patients have normal or slightly raised AFP values, which should not rule out HCC. Clinicians must know this. AFP positive and tumour size are examined. We found that 52% of people had AFP values of 400 ng/ml or above, 22.44% had levels below 20, and 25.5% had levels between 20 and 399 [38].

Others found that 32% of histopathologically confirmed HCC patients had normal serum AFP (300 ng/ml) [39].

Conclusions

Infection with hepatitis B virus and hepatitis C virus was more common among males than females. A decrease in haemoglobin and platelet levels appeared in hepatitis C virus patients compared to the control group. Haemoglobin showed a decline in its average value in females and did not show any significant difference in males, while platelets showed a substantial decrease in males and females. Biochemical measurements (AST, ALT, ALP, T.B., AFP, and CRP) showed an increase in the average value in patients compared to healthy groups and an increase in males and females. Liver function tests (ALT, AST, ALP, and T. bilirubin) can be used as clinical laboratory diagnostic parameters for the diagnosis of hepatitis B virus and hepatitis C virus infections as they are essential when compared with controls.

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دراسة التغيرات الفسيولوجية في دم مرضى التهاب الكبد الوبائي B و C لدى المرضى العراقيين

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الخلاصة:
الأسباب الرئيسية لالتهاب الكبد الفيروسي هي فيروسات B وC، والتي تسبب مرضًا شديدًا ووفيات ونواقل مستمرة. وهذا يسبب مشاكل صحية واقتصادية عالمية. شملت الدراسة 110 مشاركاً: 60 مريضاً (20-69)، 38 ذكراً، 22 امرأة، و50 عضواً في المجموعة الضابطة (20-49). وجدت الدراسة انخفاضًا كبيرًا (P <0.001) في قيم الهيموجلوبين والصفيحات الدموية لدى مرضى التهاب الكبد الوبائي C مقارنة بالأشخاص الأصحاء. تسمح اللوحة بالانخفاض، ولكن ليس مستويات الهيموجلوبين لكلا الجنسين، كما تنخفض مستويات متوسط مستويات التهاب الكبد الوبائي C وB لدى مرضى الإناث. في الاختبارات البيوكيميائية، كان لدى مرضى التهاب الكبد B وC مستويات أعلى بكثير من ناقلة أمين الألانين، ناقلة أمين الأسبارتات، الفوسفاتيز القلوي، البيليروبين الكلي، البروتين التفاعلي C، وبروتين ألفا فيتو مقارنة بمجموعات التحكم (P <0.001). وأظهرت مقارنة متوسط قيم المرضى من الذكور والإناث مع المجموعات الصحية زيادة. تقارن الدراسة مؤشرات الدم والكيمياء الحيوية لدى مرضى التهاب الكبد B وC الأصحاء.