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# Estimation of liver function testes and IL 6 for pregnant women with hepatitis B and C within Baghdad teaching hospital

Marwa Ismail Abbas [1]

[1] College of Dentistry, Al-Iraqiya University, Baghdad , Iraq
Corresponding author: Marwa Ismail Abbas
Email: marwa.i.abbas@aliraqia.edu.iq
https://orcid.org/0009-0008-7876-1308

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* Corresponding Author: Marwa Ismail Abbas Email: marwa.i.abbas@aliraqia.edu.iq
https://orcid.org/0009-0008-7876-1308

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## Abstract

***Liver inflammation is called hepatitis, which can go away*** on its own or get worse and turn into cirrhosis, fibrosis, or liver cancer. Liver function tests explore serious liver diseases progression and their impact, like viral hepatitis. Aspartate and ALT, are frequently elevated and discharged into the bloodstream following a hepatitis infection. The study's objective was to determine the levels of liver enzymes and IL 6 in pregnant women with hepatitis C and B virus groups at various stages of the illness. Blood samples were collected from 40 pregnant women infected with hepatitis who visited Baghdad Medical Hospital in Baghdad Governorate / Iraq for use in determining HBsAg, HCV, ALT, AST, ALP, Direct Bilirubin, and IL-6. The study result shows there are significant differences (P≤0.05) between the pregnant women with hepatitis B and C in the study samples; the number of pregnant women suffering from HBV in the studied group was 39 (65%) in comparison with the number of pregnant women suffering from HCV 21 patient (35 %). In our research, Total blood bilirubin (TSB) levels and liver enzymes were found to be significantly different (P≤0.05) between pregnant women with hepatitis B and C in this study. There were also big changes in the levels of AST. The average AST for HBV was 19.90 ± 5.77, while 26.64 ± 5.11 for HCV. No big differences were found in the ALT or ALP levels, and IL-6 levels were not significantly different between the viral types, with a negative correlation. We conclude that there are significant differences in certain biochemical parameters between pregnant women infected with hepatitis B and C. Specifically, TSB and AST levels were notably higher in HCV patients.

**Keywords:** Liver function tests, hepatitis C, Hepatitis B, pregnant women, hepatic enzymes, IL-6

## Introduction

Inflammation of the hepatic cells is called hepatitis. It is manifested by the invasion of hepatic cells by inflammatory cells and damage to hepatic tissue. This condition may present with minimal or absent clinical symptoms (1). Hepatitis is classified as acute when it persists for less than six months and chronic when it lasts longer. While some



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patients may remain asymptomatic, others might exhibit symptoms such as jaundice, diarrhea, diminished appetite, abdominal discomfort, and vomiting (2). Hepatitis can go away on its own or get worse and turn into cirrhosis, fibrosis, or hepatocellular cancer. It is important to note that the hepatitis virus can be found in blood, saliva, seminal fluid, and even urine (3,4). Hepatitis B & C prevalence is impacted by various factors such as prior dental procedures, hospitalizations, genital mutilation, history of abortions, home births attended by traditional practitioners, blood transfusions, ear or nose piercings, body tattoos, and the transmission of sexually transmitted diseases (STDs) (5). Additional risk factors include shaving eyebrows, exposure to jaundiced individuals, receiving injections, snorting cocaine, and sharing razors, toothbrushes, or other personal items (6). A significant concern is the transmission of hepatitis B and C viruses from mother to child during labor and delivery (7). A lot of the time, this vertical transfer happens, and it can cause fetal and neonatal hepatitis, which can be very bad for the baby and could affect their mental and physical health later on (8). Various cell types can produce interleukin-6 (IL-6), like hepatocytes, macrophages, and T cells, in response to inflammatory stimuli. The production of IL-6 impacts the pathogenesis and progress of viral hepatitis, and their increasing levels lead to apoptosis and necrosis and escalate in the general hepatic inflammatory response (9). Additionally, IL-6 upgrades acute-phase protein production and triggers the hepatic innate immunity response, which is essential for combating viral infections (10). Furthermore, in chronic hepatitis infections, particularly hepatitis B and C, sustained elevated levels of IL-6 are related to the advancing of liver fibrosis and cirrhosis (11). Viral hepatitis in pregnant women and its relation with liver function tests is a neglected area of research in Iraq. Consequently, this study intends to investigate the levels of IL-16 and liver function tests of pregnant women diagnosed with liver hepatitis B & C infection.

## Materials and Methods

### Ethical approval

This study was conducted according to ethical standards and the Declaration of Helsinki. All participants signed an informed consent form. All the data used in this research collected with the permission of Baghdad teaching hospital .

## Subject and blood collection

Blood samples were collected from 60 pregnant subjects who attended the medical Baghdad Teaching Hospital in Baghdad province / Iraq, from January 2024 to April 2024. The women's ages ranged from 18 to ≥ 48. Venipuncture was performed to collect 5 ml of whole blood per participant. The samples were transferred to the laboratory in a cooled container. Each blood sample was centrifuged at 4500 rpm for 10 minutes and serum were collected and stored at -20 °C until various analyses were conducted.

## Laboratory tests

All serum samples were underwent for the following tests:

## Detection (HBs Ag) and (HCV Ab)



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The HBsAg surface antigen was detected in blood serum samples using the HBsAg ELISA Test Kit (Plasmatec/USA), specifically designed for identifying HBsAg antigens in blood serum and plasma. A volume of 50 microliters of each blood sample was utilized, following the manufacturer's operational guidelines. The ELISA diagnostic kit (Bio kit/Spain) was also employed to detect antibodies to the hepatitis C virus (HCV Ab). The manufacturer's instructions conducted for both tests.

## Liver function enzyme tests

The Aspartate Aminotransferase (ASR/ SGOT) and Alanine Aminotransferase (ALT/ SGPT) were measured by ready kit ( Human, Germany), but ALP was measured according to methods described by BioMerieux. Likewise, the total serum Bilirubin (TSB) was estimated by (BIOLABO SA, 02160, Maizy, France).

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## Interleukin 6 (IL6 ) test

The serum levels of the studied IL-6 were determined using human-premixed multi-analyte kits (catalog number LXSAHM).

## Statistical analysis

Analyzing quantitative data usually requires statistical analysis, which offers techniques for data description and basic inference for continuous and categorical data. The process included gathering information to test the link between two statistical data sets. All the statistics in this work are shown as frequency and percentage. For variables with normally distributed distribution, SPSS (2012) was applied for dependent t-test (two-tailed), and the independent t-test (two-tailed). Mann-Whitney U, the Wilcoxon test, and the Chi-square test were used for variables lacking a typically distributed distribution. at 0.05 is statistically significant (12).

## Results

## The Distribution of the study samples

Table 1 shows there are significant differences (P≤0.05) between the pregnant women with hepatitis B and C in the study samples. The number of pregnant women suffering from HBV in the studied group was 39 (65%) in comparison with the number of pregnant women suffering from HCV 21 patients (35 %).

**Table 1:** The Number and percentage of sample study according to viral type

| Viral type | Number of patients | Percentage (%) |
|---|---|---|
| HBV Ag | 39 | 65 |
| HCV Ab | 21 | 35 |
| Total | 60 | 100% |
| P-value | --- | 5.027 * |
| * (P≤0.05). | | |



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**The Relationship between Viral type and TSB level**

Table 2 shows there are significant differences (P≤0.05) between the pregnant women with hepatitis B and C in the TSB level. The Mean ± SD of TSB level for HBV patients was (0.663 ± 0.14 ) in comparison with the TSB level for HCV patients ( the Mean ± SD of TSB was (0.908 ± 0.84).

**Table. 2**: Relationship between Viral type and TSB

| Viral type | Mean ± SD of TSB | Minimum | Maximum |
|---|---|---|---|
| HBV | 0.663 ± 0.14 | 0.40 | 1.00 |
| HCV | 0.908 ± 0.84 | 0.40 | 4.10 |
| T-test | 0.242 * | --- | --- |
| * (P≤0.05). | | | |

**The Relationship between Viral type and AST level**

Table 3 shows there's a significant difference at (P≤0.05) between the Viral type and AST level; the Mean ± SD of AST for HBV patients was (19.90 ± 5.77) in comparison with HCV patients, the Mean ± SD of AST was (26.64 ± 5.11).

**Table. 3:** Relationship between Viral type and AST

| Viral type | Mean ± SD of AST | Minimum | Maximum |
|---|---|---|---|
| HBV | 19.90 ± 5.77 | 11.00 | 31.00 |
| HCV | 26.64 ± 5.11 | 10.00 | 104.00 |
| T-test | *6.505 | --- | --- |
| * (P≤0.05). | | | |

**The Relationship between Viral type and ALT level**

Table 4 shows there's no significant differences at (P≤0.05) between Viral type and ALT level, the Mean ± SD of ALT for HBV patients was (19.27 ± 5.12) in comparison with HCV patients, the Mean ± SD of ALT was (19.64 ± 9.73) .

**Table. 4:** Relationship between Viral type and ALT

| Viral type | Mean ± SD of ALT | Minimum | Maximum |
|---|---|---|---|
| HBV | 19.27 ± 5.12 | 12.00 | 30.00 |
| HCV | 19.64 ± 9.73 | 10.00 | 52.00 |
| T-test | 4.889 NS | --- | --- |
| NS: Non-Significant. | | | |



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**The Relationship between Viral type and ALP level**

There were no significant differences (P≤0.05) between the viral type and ALP level, as shown in Table 5. The mean ± SD of ALP for HBV patients was 45.22 ± 11.96, and the mean ± SD of ALP for HCV patients was 48.52 ± 21.48 ( Table 5).

**Table. 5:** Relationship between Viral type and ALP

| Viral type | Mean ± SD of ALP | Minimum | Maximum |
|---|---|---|---|
| HBV | 45.22 ± 11.96 | 22.00 | 62.00 |
| HCV | 48.52 ± 21.48 | 27.00 | 119.00 |
| T-test | 10.964 NS | --- | --- |
| NS: Non-Significant. | | | |

**The Relationship between the Age groups and enzymes level**

Table 6 shows there's a significant differences at (P≤0.05) between the Age groups the(18-30 and 31-48) at AST level with Mean ± SD (25.25 ± 16.54 and16.72 ± 5.27) respectively , while for other Tests (TSB , ALT , ALP ) the study shows no significant difference between the study groups as showed below .

**Table. 6:** Relationship between Age groups and enzyme level

| Age group (year) | Mean ± SD | | | |
|---|---|---|---|---|
| | TSB | AST | ALT | ALP |
| 18-30 | 0.807 ± 0.66 | 25.25 ± 16.54 | 20.53 ± 8.07 | 47.85 ± 17.95 |
| 31-48 | 0.676 ± 0.22 | 16.72 ± 5.27 | 16.63 ± 4.34 | 43.63 ± 12.83 |
| T-test | 0.418 NS | 8.382 * | 5.230 NS | 12.061 NS |
| * (P≤0.05), NS: Non-Significant. | | | | |

**Comparison between HBV, HCV and IL-6 level**

A look at Table 7 shows that there are no big differences (P≤0.05) between the viral type and the amount of IL-6. The mean ± SD of IL-6 for HBV patients was 0.184 ±0.06, and the mean ± SD of IL-6 for HCV patients was 0.159 ±0.03. the correlation between the viral type and IL-6 was negative (-0.29) .

**Table.7:** Comparison between HBV and HCV in IL-6 and correlation coefficient

| Type of virus | Means ±SE |
|---|---|
| HBV | 0.184 ±0.06 |
| HCV | 0.159 ±0.03 |
| T-test | 0.118 NS |
| P-value | 0.665 |
| The correlation: HBV and HCV in IL-6 | -0.29 * |
| * (P≤0.05), NS: Non-Significant. | |



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## Discussion

Hepatitis is an inflammation of the liver marked by cells that cause inflammation in the organ's tissue. When hepatitis lasts less than six months, it is called acute (13). When it lasts longer, it is called chronic (14). More problems are likely to happen to the mother if she has viral hepatitis while she is pregnant. Hepatitis can be quickly passed from mother to child if the mother has it. There are a lot of mental and physical health problems that can happen later on because of this (15,16). It is said to be the most common cause of jaundice in pregnancy and one of the main reasons mothers die. This sickness can be given from mother to child if the mother gets acute Hepatitis B in late pregnancy, in the week after giving birth, or if she has been carrying HBsAg for a long time. HCV is most often caught during pregnancy or giving birth. With this background knowledge, health planners and program managers need to know about the spread of viral hepatitis during pregnancy (17, 18). Hepatic failure in pregnancy is most often caused by viral hepatitis around the world. In our research, Total blood bilirubin (TSB) levels and liver enzymes were found to be significantly different ($P \leq 0.05$) between pregnant women with hepatitis B and C in this study. The average TSB level for people with HBV was (0.663 ± 0.14), and it was (0.908 ± 0.84) for people with HCV. There were also significant changes in the levels of AST. The average AST for HBV was 19.90 ± 5.77, while 26.64 ± 5.11 for HCV. However, no differences were found in the ALT or ALP levels (HBV: 19.27 ± 5.12; HCV: 19.64 ± 9.73) or (HCV: 48.52 ± 21.48). AST levels significantly differed between age groups (18–30) and 31–48 (25.25 ± 16.54 versus 16.72 ± 5.27). IL-6 levels were not significantly different between the viral types. The mean IL-6 level for HBV was 0.184 ± 0.06%, and the mean IL-6 level for HCV was 0.159 ± 0.03%. This shows a negative correlation (-0.29) between the viral type and IL-6.

According to this study, more people had HBV infections than in Port Harcourt (4.9%), Jos (10.3%), and other places. That was not the same as the 21.3% found in Ibadan, the 23.9% and 15.1% found in two studies in Jos, or the 17.1% found among sex workers in Nasarawa state. Also, 18.2% of pregnant women in Zaria, Nigeria, and 7.3% of pregnant women in Kano, Nigeria, were said to have the disease. This may be because some studies did not use people from the same risk group (19,20,21,22). A new study looked at 2439 pregnant women and tested them for Hepatitis B and C. 7.3% were positive for anti-HCV, 2.2% for HBsAg, and 0.08% for both. They are not as good as ours, but they show a high rate of HCV (23), which is the same as ours. Our study was different from others. This could be because HBV and HCV are spread differently and are shaped by social, cultural, and environmental factors. It could also be because they are studied in different ways. However, be careful when comparing our work to the others because they were done differently. ELISA was used to look for antibodies in our work and to find the DNA of viruses in other studies (24). The current study differs from others in that it did not find any of the usual risk factors for HBV and HCV seropositivity, such as age, parity, or other sociodemographic factors.

In the future, researchers must look into what might have caused these kinds of findings (25,26). As liver cells are damaged over and over again, they respond with inflammation, fibrosis, regrowth, and finally, cirrhosis. It was found that test subjects had more ALT, AST, ALP, and TSB than control subjects. Something like this was found in an earlier study. It was found that ALT and AST are strongly and statistically positively linked. This fits with what another study found in people who had Hepatitis B(8). More alkaline phosphatase (ALP) and total serum bilirubin (TSB) were found in the blood of patients with chronic hepatitis B than in healthy people.



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A bad AST, ALT, TSB, or ALP result was linked to HBV infection and could be used to help find and track the disease after the study. These enzymes, aspartate aminotransferase (AST), alanine aminotransferase (ALT), and direct bilirubin (DB), were much higher in the blood of people with chronic HBV than in healthy people who were not in the study. That proved the HBV infection had effects on the liver cells. The results of this study back up what Cheng said (27,28). Researchers have discovered that people who have chronic diseases have higher amounts of ALP, GPT, GOT, and TSB than people who are carriers. The rise in liver enzymes strongly points to damage to liver cells.

Another finding was that the amounts of ALP, GPT, GOT, and TSB in healthy people were average compared to the standard number for liver function tests (29).In this study, we looked at the serum levels of IL-6 in hepatitis B and C patients who were pregnant. Additionally, we compared the cytokine levels in patients with HB and HC viruses and looked for correlations between the serum levels of IL 6 and biochemical indicators of liver disease. Our data indicates a negative correlation -0.29 between viral type (HBV vs. HCV) and IL-6 levels. At the same time, a negative correlation means increasing or decreasing one variable. In this case, as the type of virus shifts from HBV to HCV, the IL-6 level tends to decrease slightly. The correlation of -0.29 suggests a weak inverse relationship, meaning that while the correlation exists, it is not strong, and other factors may be influencing the variability in IL-6 levels. Both HBV and HCV can cause chronic infections related to low-grade inflammation. A variation was seen in the degrees of hepatic cell inflammation depending on the patient's immune response and type of virus. The hormonal changes in pregnant women led to variations in the immune status, such as the suppression or activation and, consequently, the creation of severe inflammatory responses.

(30,31).

In conclusion, the significant differences between pregnant women infected with HBV and those with HCV regarding specific biochemical parameters were observed in this study. However, TSB and AST levels were notably higher in HCV patients, whereas no differences were seen in ALT and ALP levels. The results also displayed the influence of age on AST levels, with younger women showing higher values. Furthermore, no differences were seen between the viral types of infection. Additionally, a negative correlation was found between IL-6 and the type of viral hepatitis, displaying that HC revealed severe effects on liver function markers in comparison to HB in pregnant women, which needs more attention and healthcare.

## DECLARATIONS


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The author did not receive any source of fund.


### Competing interests statement

No conflict of interest related with publishing of this article.

### Ethics statement



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The author approved that this research follows the journal's ethical guidelines as appeared on the journal's author guidelines page.

**Author contributions**

The author did all the work Conception, design, acquisition of data, analysis, interpretation, drafting revision and proofreading.

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