

# Relationship between Renal Function Status with Infected of Chronic Hepatitis B in Fallujah Teaching Hospital

Mohamed Fouad Ali, Mohamed Madani Shaaban, Bilal Maher Atallah, Mustafa Ziad Neda, Omar Hamed Saleh

University of Fallujah College of Applied Sciences Department of Pathological Analysis

---

**Received:** 2024, 15, Jan  
**Accepted:** 2025, 21, Feb  
**Published:** 2025, 11, mar

Copyright © 2025 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).



Open Access

<http://creativecommons.org/licenses/by/4.0/>

**Annotation:** Hepatitis B virus (HBV) infection is a global health problem that affects many body systems, including the kidneys. This study aims to explore the relationship between renal function status and chronic HBV infection in patients at Fallujah Teaching Hospital, which contributes to improving the understanding of the impact of the disease on the renal system.

**Materials and methods:** The study was conducted from 20th July to 25th September 2023 at Fallujah Teaching Hospital in Fallujah city in Iraq on two groups: patients with chronic hepatitis B, and a control group of healthy individuals. Blood samples were collected from the participants and tested for HBV detection test using RDT and ELISA, in addition to measurement of biochemical parameters such as renal function tests (urea, creatinine), liver function tests (albumin, ALT, AST), and electrolyte levels such as sodium, potassium, and chloride.

**Results:** The study showed that patients with chronic HBV had significantly

---

higher levels of urea and creatinine compared to the control group, indicating that their renal function was affected. Low levels of albumin and increased liver enzymes were also observed, reflecting the presence of possible liver damage associated with hepatitis B.

**Conclusions:** This study confirms the existence of an association between chronic hepatitis B and deterioration in renal function. Therefore, it is recommended to conduct periodic follow-up of renal function in HBV patients to detect any potential complications early and take the necessary therapeutic measures.

**Keywords:** Hepatitis B, Kidney function, Electrolytes, Urea, Creatinine.

---

## 1.1 Introduction

Hepatitis B virus is a widespread infectious disease that causes chronic damage to the liver and kidneys. The World Health Organization (WHO, 2022) estimates that its incidence is high worldwide, as it is a major cause of liver cirrhosis and hepatocellular carcinoma. In Iraq, studies indicate a significant spread of the virus, making it a health challenge that requires continuous research (Al-Mayah et al., 2021). The virus is characterized by a long incubation period that may extend to several months before clinical symptoms appear, leading to gradual damage to the target organs (WHO, 2023). The virus directly affects the liver, causing inflammation and fibrosis that may develop into liver failure, and it also leads to disturbances in kidney function and the balance of vital electrolytes, which increases the risk of renal failure (Chen et al., 2020). This study aims to analyze the effect of chronic hepatitis B on kidney and liver function and electrolyte disturbances, which helps in understanding the physiological changes associated with this disease and taking appropriate preventive and therapeutic measures.

## MATERIALS AND METHODS

### Sample Collection

This study utilized a case-control design involving 28 patients infected with hepatitis B and 30 healthy individuals as a control group. Samples were collected from outpatients at Fallujah Teaching Hospital and the Health Center for Viral Hepatitis between July 20 and September 25, 2023.

Blood samples (6-8 mL) were drawn via venipuncture using **Easymed** syringes (Germany) and collected in **Biozek** plain tubes (Netherlands) or **Biozek** gel tubes (USA). The samples were allowed to clot before being centrifuged at 300g for 45 minutes using a **KUBOTA centrifuge** (Japan). The obtained serum was stored at -20°C in **Eppendorf tubes** (Scientific, USA) until further biochemical and serological testing.

## Hepatitis B Virus Detection

Hepatitis B virus (HBV) detection was initially performed using a **Rapid Diagnostic Test (RDT)** based on an immunochromatographic assay (ICA), specifically the **SD BioLine HBV kit**. Positive results were confirmed using the **CTK Biotech ELISA kit (USA)**. The ELISA method follows the antibody sandwich technique for detecting **HBsAg**.

## Biochemical Testing

Biochemical tests, including **ALT, AST, total serum bilirubin (T.S.B), albumin, urea, creatinine, and electrolytes (K<sup>+</sup>, Cl<sup>-</sup>, Na<sup>+</sup>, P)**, were conducted using an **automated chemistry analyzer (Selectra Pro S, ELITech Group, France)**.

## Electrolyte Measurement

Electrolyte levels were measured using the **GE-300 Electrolyte Analyzer (Genrui, China)**, which operates on the **Ion Selective Electrode (ISE) principle**. It provides automatic sampling, calibration, and maintenance-free electrodes with a lifespan of 12 months. **Electrolytes Tested:** K<sup>+</sup> (Potassium), Na<sup>+</sup> (Sodium) and Cl<sup>-</sup> (Chloride)

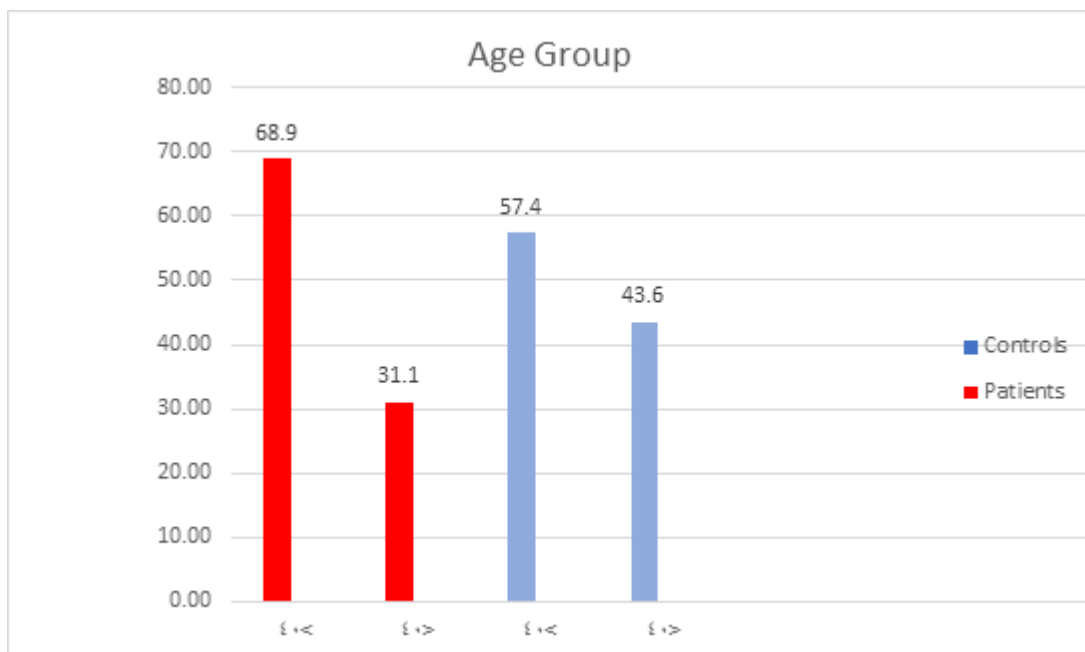
## Statistical Analysis

Data analysis was conducted using **SPSS version 26.0**. An **independent t-test** was used to compare the tested groups in addition to mean, frequency and Standard deviation, and statistical significance was considered at **p < 0.05**.

## 5. RESULTS AND DISCUSSION

### 1. Demographic Distribution of Hepatitis B Patients by age

Participants were classified into two age groups: below 40 years and above 40 years. Among hepatitis B patients, 31.1% were under 40 years old, while the majority (68.9%) were over 40 years old. In the control group, the percentages were 57.4% and 43.6%, respectively. These findings align with the study by Khan et al. (2011), which indicated that infection rates were higher among younger individuals.



**Figure (1): Distribution of Renal failure patients with HBV infection according to age groups**

### 2. Distribution of Patients by Gender

Results showed that males had a higher infection rate (57.4%) compared to females (43.6%). This

is consistent with the findings of Naz et al. (2002), who reported a higher prevalence of hepatitis B in males (57.4%) than females (43.6%). Similarly, Mansoor et al. (2007) found a higher infection rate in males (64%) compared to females (36%).

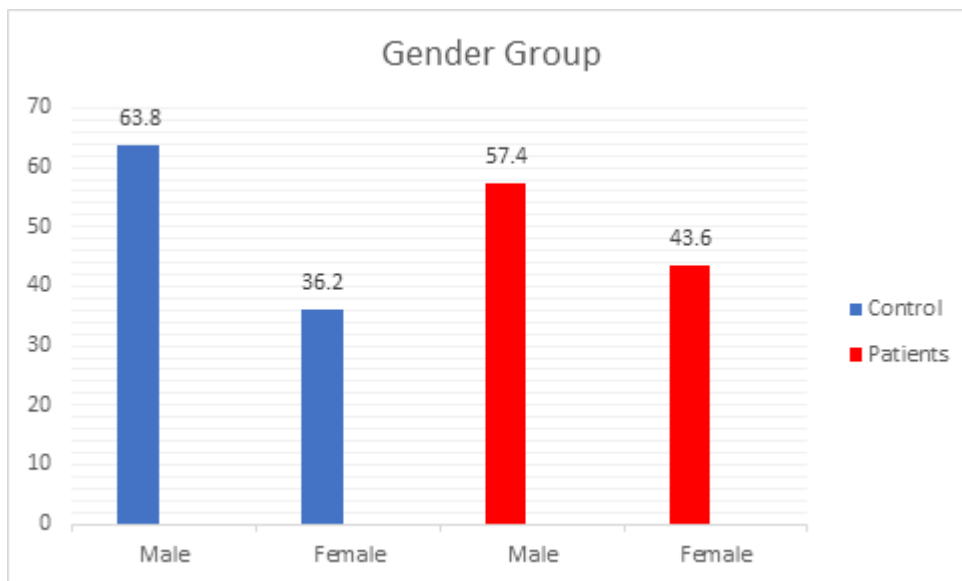


Figure (2): Distribution of Renal failure patients with HBV infection according to sex.

### 3. Biochemical Parameters

Table (1): Serum Levels of T.S.B, Albumin, ALT, and AST in Patients and Controls

Parameters	Controls (n=30)	Patients (n=28)	p-value
T.S.B (mg/100ml)	0.6995±0.063**	0.8663±0.21257**	0.000
ALT (IU/L)	24.662±5.3995**	38.3893±17.5*	0.000
AST (IU/L)	18.759±7.2*	53.46±18.4*	0.000
Albumin (gm/dl)	4.38±0.3357*	4.1719±0.43183*	0.025

\*Significant at (p<0.05), \*\* Highly significant at (p<0.01).

The data indicate a significant increase (P<0.01) in T.S.B and ALT levels in hepatitis B patients compared to the healthy control group, suggesting liver damage. This aligns with the findings of Panteghini et al. (1983), who confirmed that ALT and AST elevation is linked to hepatic cell injury. Additionally, a significant decrease (P<0.05) in albumin levels suggests impaired liver function, consistent with the findings of Ian et al. (1999).

Table (2): Levels of Urea, Creatinine, Sodium, and Potassium in Patients and Controls

Parameters	Controls (n=30)	Patients (n=28)	p-value
Urea (mg/dL)	33.5±4.76*	39.6±6.664 **	0.012
Creatinine (mg/dL)	0.7933±0.08**	0.9138±0.1398*	0.000
Na+ (mmol/L)	145±6.89**	143.1±6.76**	0.000
K+ (mmol/L)	4.6185 ±0.33948**	5.35389±0.78565**	0.000
Cl- (mmol/L)	101.4133±8.32457	105.2821±19.63813	0.8
P (mg/L)	33.7100±5	35±5.88	0.5

\*Significant at (p<0.05), \*\* Highly significant at (p<0.01).

The results showed a significant increase (P<0.01) in potassium and creatinine levels in hepatitis B patients compared to the control group. This is in agreement with Han et al. (2004), who found that hepatitis B virus infection affects kidney function, leading to potassium accumulation due to altered glomerular filtration. Moreover, a significant decrease (P<0.01) in sodium levels suggests impaired renal function, which supports the findings of Agrawal et al. (2008). And The study

results indicate that hepatitis B infection may affect kidney function, as a slight increase in creatinine levels was observed in patients compared to controls. This suggests a minor decline in glomerular filtration rate, aligning with Philipneri & Bastani (2001), who reported that viral hepatitis infections might cause chronic glomerular inflammation.

## 5. Conclusion

- HBV infection is associated with significant biochemical alterations, including increased ALT, AST, and T.S.B levels, along with decreased albumin levels, indicating hepatic dysfunction.
- Renal function parameters, particularly creatinine and potassium levels, were significantly altered in HBV patients, suggesting a potential link between HBV and kidney dysfunction.
- Male patients and individuals over 40 years old were more commonly affected, highlighting demographic risk factors.

## 7. References

1. **Agrawal, M., Shashank, R., & Joshi, A.K. (2008).** Hyponatremia and hypernatremia disorders of water balance. *Am. J. Physiol. Endo. Met.*, 286:136-143.
2. **Al-Mayah, A., Al-Saad, M., & Hassan, R. (2021).** \*Epidemiology of Hepatitis B Virus in Iraq: A Review of Recent Data\*. *Journal of Medical Virology*, 93(4), 1021-1030.
3. **Chen, Y., Tian, Z., & Zhang, J. (2020).** \*Hepatitis B Virus and Kidney Disease: Mechanisms and Clinical Implications\*. *World Journal of Hepatology*, 12(6), 433-446.
4. **Han, S.H. (2004).** Extrahepatic manifestation of chronic hepatitis B. *Clinical Liver Disease*, 8:403-418.
5. **Ian, D. D'Agata, & Balistreri, W. F. (1999).** Evaluation of liver disease in pediatric patients. *Pediatrics in Review*, 20(11), 151-157.
6. **Panteghini, M., Falsetti, F., & Chiari, E. (1983).** Determination of Aspartate aminotransferase isoenzymes in hepatic disease. *Lab J Res Lab Med*, 10:515-519.
7. **Philipneri, M., & Bastani, B. (2001).** Kidney disease in patients with chronic hepatitis C. *Current Gastroenterology Reports*, 3:78-83.
8. **World Health Organization. (2022).** \*Hepatitis B Fact Sheet\*. Retrieved from [www.who.int](https://www.who.int)
9. **World Health Organization. (2023).** \*Global Hepatitis Report\*. Geneva: WHO Publications.