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ORIGINAL ARTICLE

Assessment of Major Risk Factors for Hepatitis B and C among Patients in Wasit Governorate, Iraq

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ABSTRACT

Hepatitis B virus and Hepatitis C virus remain significant public health issues worldwide, especially in developing countries like Iraq, where awareness and access to healthcare are limited. These infections often progress silently, increasing the risk of late diagnosis and further transmission. This study aimed to assess the prevalence and associated risk factors of HBV and HCV among patients in Wasit Governorate, Iraq. A cross-sectional analytical study was conducted between December 2024 and April 2025 across six major hospitals in Wasit. Patients with confirmed HBV or HCV infection were included. Data were collected using a structured questionnaire that covered demographic information, clinical features, and behavioral risk exposures. Statistical analysis was performed using SPSS v29. Hepatitis B, C virus was found to be more prevalent than HCV among the participants. Most cases were among young adults aged 20–29 years, with a higher proportion of males, married individuals, and those with low socioeconomic status. Common risk factors included sharing personal hygiene tools (e.g., nail clippers, towels), unprotected sexual activity, and traditional practices like cupping. Many participants reported mild or no symptoms at onset, which contributed to delayed diagnosis. No significant associations were found between most socio-demographic variables and the type of hepatitis, except for a few behavioral practices. The study highlights the silent nature of hepatitis B and C infections and the need for improved public health awareness. Targeted interventions focusing on hygiene education, safe sexual practices, and the regulation of traditional healing methods are essential to reduce the spread of HBV and HCV in Wasit Governorate.

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1- INTRODUCTION

Hepatitis B (HBV) and Hepatitis C (HCV) continue to pose a major threat to public health, especially in developing nations where healthcare services are often inadequate and public awareness is limited [1]. Worldwide, approximately 71 million individuals are chronically infected with HCV, while over 250 million are living with chronic HBV [2,3]. Despite global efforts by the World Health Organization to eliminate viral hepatitis by 2030, several obstacles remain—such as poor awareness, limited healthcare access, and the persistence of overlooked transmission routes [4]. In Iraq, hepatitis B remains a common infection, with prevalence rates varying between

regions ranging from 1% in the north to 3.5% in the southern parts [5]. The national response in Iraq has included efforts to improve public awareness, vaccination coverage, and diagnostic capacity [6,7]. However, the progress of these interventions is hindered by socioeconomic inequalities, cultural beliefs, and systemic healthcare limitations [8]. Identifying the most common risk factors linked with HBV and HCV is therefore vital to guide prevention strategies and strengthen public health efforts [9].

2- MATERIALS AND METHODS

2.1 Study Design and Setting

This research employed a cross-sectional analytical design and was conducted in Wasit Governorate, Iraq. Data collection occurred across six major hospitals representing all five districts in the governorate: Al-Zahraa Teaching Hospital, Al-Karama Teaching Hospital, Al-Aziziyah General Hospital, Al-Numaniyah General Hospital, Al-Suwaira General Hospital, and Martyr Fayrouz General Hospital. The study period extended from December 15, 2024, to April 15, 2025. The primary objective was to explore the key risk factors linked with HBV and HCV infections among patients in these locations.

2.2 Study Population

Participants included patients diagnosed with HBV or HCV based on serological testing and PCR confirmation (when available), as verified by the Central Health Laboratory in Wasit. Inclusion criteria required participants to be 15 years or older and have complete demographic and exposure information.

2.3 Sampling and Data Collection

A non-probability (convenience) sampling approach was used to recruit participants from available patient records. Data were collected through a structured questionnaire completed by the researcher in Arabic. The data were then translated and entered in English for analysis.
Collected information included:

- **Demographics:** age, sex, residence, education level, marital status, occupation, type of housing, number of residents, and number of rooms.
- Socioeconomic status (SES): calculated using a standardized scale developed by Tiwari et al. (10), modified by Al-Naqeeb (11), based on employment, education, and household crowding.
- **Clinical history:** type of hepatitis, diagnosis date, initial symptoms, lifestyle changes prior to symptoms, and symptom severity.
- **Risk exposures:** sharing personal items (e.g., towels, nail clippers), sexual behavior, tattoos, piercings, IV drug use, shaving practices, use of glucose monitors, traditional therapies (e.g., cupping), smoking behavior, alcohol use, and immunological status, as well as visits to public baths or massage centers.

2.4 Data Analysis

Statistical analysis was conducted using SPSS v29. Descriptive statistics summarized the participants' characteristics. Chi-square tests (or Fisher's exact test where appropriate) were used to assess associations between hepatitis type and identified variables. A significance level of $p < 0.05$ was considered statistically meaningful.

2.5 Ethical Considerations

The original study received ethical approval from the Middle Technical University's Medical Ethics Committee. The present analysis was performed using anonymized data from the initial study, without any new data collection or patient contact.

3- RESULTS AND DISCUSSION

In Table (1) the current results showed that the highest percentage 25.3% of the patients belonging to age group (20-29 years), followed by 17.9% (50-59 years), and the lowest percentage 3.1% of patient belonging to age group (<20 years). The mean age was 44.0 ± 16.7 years, with an age range of 16 to 79 years. Regarding sex, found 50.5% of the patients were male, and 49.5% were females. Regarding marital status, the majority of participants were married 68.9%, followed by single 18.9%, while the lowest percentage 1.7%, of them were widowed. As for the area of residence, 52.6% of participants lived in urban areas, while 47.4% resided in rural areas, thus while the

highest percentage of the patients live in urban regions. And highest percentage of education-level for patients were read and write 24.7% while the lowest percentage was college graduate 1.7%, illiterate 14.7%. A high percentage of 75.8% of the patients were unskilled workers.

Table (1): The Distribution of the participants according to Socio Demographic Characteristics

Socio-Demographic characteristics		NO.	%
Age (years)	<20years	6	3.1
	20---29	48	25.3
	30---39	25	13.2
	40---49	31	16.3
	50---59	34	17.9
	60---69	30	15.8
	=>70years	16	8.4
	Mean±SD (Range)	44.0±16.7	(16-79)
Sex	Male	96	50.5
	Female	94	49.5
Marital status	Single	36	18.9
	Married	131	68.9
	Divorced	20	10.5
	Widowed	3	1.7
Residence area	Urban	100	52.6
	Rural	90	47.4
Level education of the patient	Illiterate	28	14.7
	Read & Write	47	24.7
	Primary graduate	38	20.0
	Intermediate graduate	42	22.1
	Secondary graduate	32	16.8
	College graduate	3	1.7
Occupation status of the patient	High professional & Managerial	12	6.3
	Lower professional, skilled & semiskilled workers	34	17.9
	Unskilled worker	144	75.8

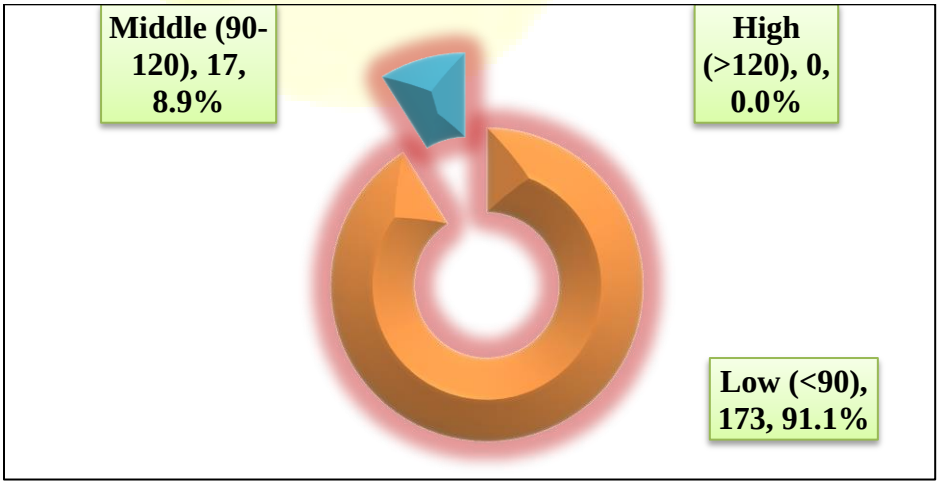

Figure (1): The Distribution of the Patients Occupation Reveal That Regarding to SES

In figure (1), regarding to SES, the results found that the highest percentage 91.1% of patients with low SES.

In table (2), participants were asked about the initial clinical symptoms they experienced, a total of 49.5% reported that they did not notice any symptoms at the beginning infection. While, 28.9% stated that feeling tired was the first sign they observed, 13.7% mentioned jaundice as the initial symptom, while 7.9% reported experiencing other unspecified symptoms. Regarding any significant events or life changes before the onset of symptoms, 70.53% indicated that there were no such changes, 29.47% acknowledged experiencing certain events or changes that may have coincided with the appearance of symptoms. When asked about the severity of their hepatitis B or C symptoms, 74% described them as mild, 19.8% considered their symptoms moderate, and 6.2% reported severe symptoms.

Table (2): The Distribution of the participants according to the clinical features

Clinical features		No.	Percentage (%)
What symptoms did you notice first?	Without symptoms	94	49.5
	Feel tired	55	28.9
	Jaundice	26	13.7
	Other symptoms	15	7.9
Were there any events or changes in your life before symptoms started?	Yes	56	29.5
	No	134	70.5
Did you have any symptoms of hepatitis B or C	Mild	71	74.0
	Moderate	19	19.8
	Sever	6	6.2

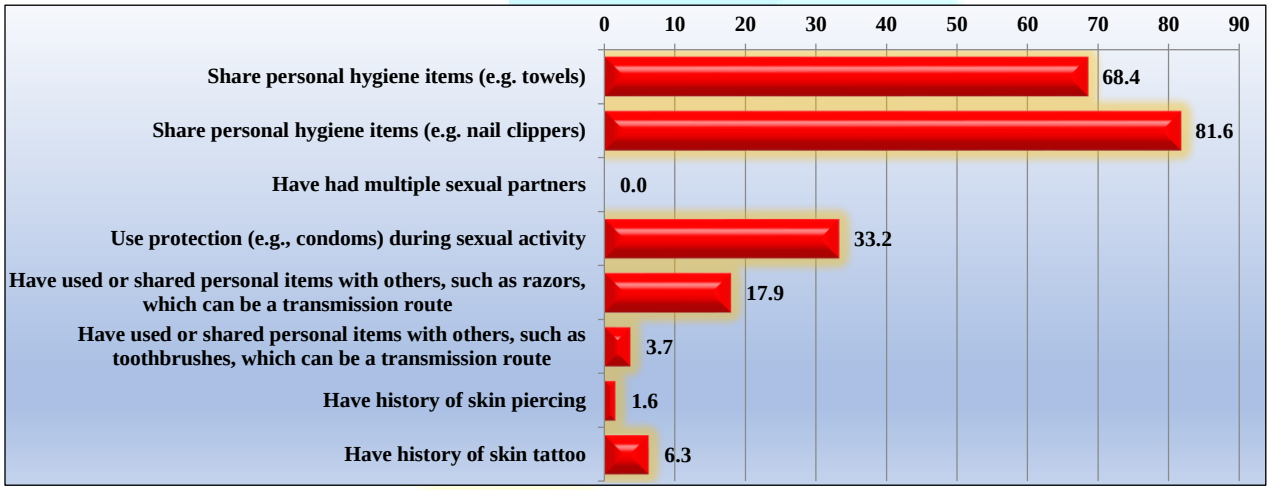

Figure (2): The distribution of the patients according to the Risk Factors Behaviors

Data reported.

In figure (2) regarding personal hygiene behaviours, 68.4% of participants reported sharing personal hygiene items such as towels, and 81.6% reported sharing items such as nail clippers. No data were reported on having multiple sexual partners, but 33.2% mentioned using protection (e.g., condoms) during sexual activity. When it comes to the use or sharing of personal items that may serve as routes of transmission, 17.9% had shared razors, and 3.7% had shared toothbrushes. In terms of skin piercing history, 1.6% of the participants had undergone ear piercing, with no other types reported. Regarding skin tattoos, 6.3% had a history of tattooing, while the majority, 93.7%, did not. Among those with tattoos 83.3% had skin tattoos, 16.7% had eyebrow tattoos. With range of 1-25 years, each of the individuals reported undergoing piercing once (33.3%), twice (33.3%), or three times (33.3%). Regarding intravenous drug use, 1.1% of the participants reported a history of intravenous drug abuse. Only 8.4% stated that they sterilize tools when shaving. When asked about the use of blood sugar monitoring devices, 32.6% had such a history. As for cupping or other traditional therapies, 25.3% reported previous experience, ranging from 1 to 10 years. In relation to sharing of sharp instruments, 3.7% admitted doing so, while 90.5% reported sharing eating utensils. Additional behavioural factors included the following: Alcohol consumption, No data reported, Smoking status, 4.7% were

smokers, Sharing of smoking devices: No data reported, Use of immunosuppressive medications: 2.6%, HIV-positive cases: No data reported, other immunological diseases: 1.1%, Visits to public baths or massage centres No.

In Table (3) showed none of the Socio-Demographic variables analyzed showed a statistically significant association with the type of viral hepatitis at the 0.05 significance level. This suggests that factors such as age, sex, marital status, residence, education, occupation, household crowding, and socioeconomic status may not be distinguishing factors between HBV and HCV infections in this study population.

Table (3): Characteristics and the type of viral hepatitis [HBV] vs [HCV]

Variable	Subcategory	HBV No.	HBV %	HCV No.	HCV %	Total No.	Total %	P-value
Age	<20 years	1	0.9	5	6.0	6	3.1	0.485
	20–29	29	27.1	19	22.9	48	25.3	
	30–39	14	13.1	11	13.3	25	13.2	
	40–49	18	16.8	13	15.7	31	16.3	
	50–59	18	16.8	16	19.3	34	17.9	
	60–69	16	15.0	14	16.9	30	15.8	
	≥70	11	10.3	5	6.0	16	8.4	
	Mean±SD	44.5		43.3		44.0		0.623
Gender	Male	54	50.5	42	50.6	96	50.5	0.985
	Female	53	49.5	41	49.4	94	49.5	
Marital status	Single	17	15.9	19	22.9	36	18.9	0.331
	Married	75	70.1	56	67.5	131	68.9	
	Divorced	14	13.1	6	7.2	20	10.5	
	Widowed	1	0.9	2	2.4	3	1.7	
Residence area	Urban	56	52.3	44	53.0	100	52.6	0.926
	Rural	51	47.7	39	47.0	90	47.4	
Education level	Illiterate	17	15.9	11	13.3	28	14.7	0.098
	Read & Write	19	17.8	28	33.7	47	24.7	
	Primary	27	25.2	11	13.3	38	20.0	
	Intermediate	22	20.6	20	24.1	42	22.1	
	Secondary	20	18.7	12	14.5	32	16.8	
	College graduate	2	1.8	1	1.1	3	1.7	
Occupation	High prof.	7	6.5	5	6.0	12	6.3	0.532
	Lower skilled	22	20.6	12	14.5	34	17.9	
	Unskilled workers	78	72.9	66	79.5	144	75.8	
Crowding Index	1	18	16.8	8	9.6	26	13.7	0.563
	2	50	46.7	42	50.6	92	48.4	
	3	33	30.8	28	33.7	61	32.1	
	≥4	6	5.7	5	6.1	11	5.8	
Socio-economic status	Low (<90)	97	90.7	76	91.6	173	91.1	0.827
	Middle (90-120)	10	9.3	7	8.4	17	8.9	
	High (>120)	–	–	–	–	–	–	

In table (4) showed that regarding the first symptom observed, the most commonly reported was No symptoms, followed by fatigue and jaundice. However, this variable did not show a statistically significant relationship with the type of hepatitis (p = 0.909). A statistically significant association was found between lifestyle changes before the onset of symptoms and the type of hepatitis (p < 0.001). Patients with HCV were more likely to report experiencing lifestyle changes before symptoms appeared compared to those with HBV. For symptom severity, no statistically 1significant association was found between symptom severity and hepatitis type (p= 0.647).

Table (4): The association Between Clinical Features and Types of Hepatitis B, C

Clinical Feature		**HBV**		**HCV**		**p-value**
		NO.	%	NO.	%	
Symptom Noticed first	**No Symptoms**	55	51.4%	39	47.0%	
	Fatigue	29	27.1%	26	31.3%	
	Jaundice	15	14.0%	11	13.3%	
	Other Symptoms	8	7.5%	7	8.4%	0.909
Lifestyle Change	**Yes**	13	12.1%	43	51.8%	< 0.001
	No	94	87.9%	40	48.2%	
Symptom Severity	**Mild**	52	48.6%	44	53.0%	
	Moderate	55	51.4%	39	47.0%	
	Severe	0	0.0%	2	2.4%	0.647

In table (5), the results showed no statistically significant differences between males and females regarding the assessed clinical features. Similarly, lifestyle changes before symptom onset with no significant association found (p = 0.1808). Regarding symptom severity, most participants of both sexes experienced mild symptoms—70.7% of males and 76.4% of females—with no significant difference (p = 0.8188).

Table (5): The associations Between Participants Regarding Sex (Male and Female) And clinical features

Clinical Feature		**Male**		**Female**		**p-value**
		NO.	%	NO.	%	
Symptom Noticed first	**No Symptoms**	55	57.3	39	41.5	0.1385
	Fatigue	22	22.9	33	35.0	
	Jaundice	13	13.5	13	13.8	
	Other Symptoms	6	6.2	9	9.6	
Lifestyle Change	**Yes**	33	34.4	23	24.5	0.1808
	No	63	65.6	71	75.5	
Symptom Severity	**Mild**	29	70.7	42	76.4	0.8188
	Moderate	9	22.0	10	18.2	
	Severe	3	7.3	3	5.5	

Table (6) revealed that most behavioral risk factors such as sharing personal hygiene items like towels and nail clippers, using shared sharp tools like razors and toothbrushes, having tattoos, or a history of intravenous drug use were not statistically associated with the type of hepatitis virus (HBV or HCV). However, two factors showed significant associations. The use of protection during sexual activity was more common among HBV patients compared to those with HCV, so that unprotected sexual behavior may play a greater role in the transmission of HCV in this population. And, cupping or traditional therapies more frequently among HBV patients, indicating a possible link between these practices and HBV transmission, potentially due to the use of contaminated or non-sterile tools.

Table (6): The Associations between Behavioral Risk Factors and Type of Viral Hepatitis (HBV vs. HCV)

		The type of viral hepatitis						**P value**
		HBV		HCV		Total		
		No.	%	No.	%	No.	%	
Share personal hygiene items (e.g. towels)	Yes	78	72.9	52	62.7	130	68.4	0.132
	No	29	27.1	31	37.3	60	31.6	
Share personal hygiene items (e.g. nail clippers)	Yes	91	85.0	64	77.1	155	81.6	0.162
	No	16	15.0	19	22.9	35	18.4	
Have had multiple sexual partners	Yes	-	-	-	-	-	-	-
	No	107	100	83	100	190	100	
Use protection (e.g., condoms) during sexual activity	Yes	42	39.3	21	25.3	63	33.2	0.043*
	No	65	60.7	62	74.7	127	66.8	
Have used or shared personal items with others (razors) as a transmission route	Yes	19	17.8	15	18.1	34	17.9	0.955
	No	88	82.2	68	81.9	156	82.1	
Have used or shared personal items with others (toothbrushes) as a transmission route	Yes	4	3.7	3	3.6	7	3.7	0.964
	No	103	96.3	80	96.4	183	96.3	
Have history of skin piercing	Yes	2	1.9	1	1.2	3	1.6	0.716
	No	105	98.1	82	98.8	187	98.4	
Have history of a skin tattoo	Yes	6	5.6	6	7.2	12	6.3	0.649
	No	101	94.4	77	92.8	178	93.7	
Have history of use intravenous drug abuse	Yes	2	1.9	-	-	2	1.1	0.211
	No	105	98.1	83	100	188	98.9	
Sterilize the tools when shaving	Yes	12	11.2	4	4.8	16	8.4	0.115
	No	95	88.8	79	95.2	174	91.6	
History of use blood sugar device	Yes	32	29.9	30	36.1	62	32.6	0.363
	No	75	70.1	53	63.9	128	67.4	
History of cupping (or any traditional therapy)	Yes	35	32.7	13	15.7	48	25.3	0.007*
	No	72	67.3	70	84.3	142	74.7	
Sharing of sharp instruments	Yes	5	4.7	2	2.4	7	3.7	0.411
	No	102	95.3	81	97.6	183	96.3	
Sharing of eating utensils	Yes	98	91.6	74	89.2	172	90.5	0.570
	No	9	8.4	9	10.8	18	9.5	

In Table (7), based on the statistical findings, there was no significant link between the behavioral or immunological factors and the type of hepatitis. All the P-values were above 0.05, indicating no meaningful difference between HBV and HCV groups regarding these factors, Alcohol consumption, smoking status, sharing the use of smoking tools, use of immunosuppressive medications, HIV-positive status, other immunological diseases, visiting men's or women's baths and massage centers.

Table (7): The Associations between Additional Behavioral/Immunological Factors and Type of Viral Hepatitis

		HBV		HCV		Total		P value
		No.	%	No.	%	No.	%	
Additional Behavioral Factors: A-Alcohol Consumption	**Yes**	-	-	-	-	-	-	-
	No	107	100	83	100	190	100	
B-Smoking status	**Yes**	6	5.6	3	3.6	9	4.7	0.521
	No	101	94.4	80	96.4	181	95.3	
Share the use this type of smoking	**Yes**	-	-	-	-	-	-	-
	No	6	100	3	100	9	100	
C-On medication that suppresses the immune system	**Yes**	2	1.9	3	3.6	5	2.6	0.456
	No	105	98.1	80	96.4	185	97.4	
D-HIV-positive	**Yes**	-	-	-	-	-	-	-
	No	107	100	83	100	190	100	
E- Others immunological disease	**Yes**	1	.9	1	1.2	2	1.1	0.856
	No	106	99.1	82	98.8	188	98.9	
Visited men's or women's baths and massage center	**Yes**	-	-	-	-	-	-	-
	No	107	100	83	100	190	100	

4- DISCUSSION

The study found that the largest proportion of patients (25.3%) were in the 20–29 age group. This is consistent with findings from other studies [11, 12]. However, it differs from studies that reported higher incidence in the 31–45 age group. Regarding gender, 50.5% of the infected individuals were male, which agrees with several studies [13, 14]. For marital status, 68.9% of cases were married, in agreement with other studies [15]. Urban residents made up 52.6% of the cases, which aligns with previous findings [16-18]. In terms of occupation, 75.8% were unskilled workers, similar to findings from other regions [19,20]. Concerning SES, 91.1% of patients came from low socioeconomic backgrounds [21, 22]. About 49.47% of participants reported no symptoms at onset, which aligns with previous studies [23]. Moreover, 74% reported only mild symptoms, consistent with findings from other research [24]. The most reported behaviors were sharing nail clippers (81.6%) and towels (68.4%). These findings support other studies [25, 26].

No significant associations were found between socio-demographic variables and hepatitis type, supporting existing literature [27]. There was a significant association between virus type and reported lifestyle changes before symptoms, confirming findings from other studies [28]. No statistically significant differences were found between males and females in symptoms or lifestyle changes, which agrees with other research [29]. Most risk behaviors were not significantly associated with virus type. However, two behaviors showed significance: unprotected sex ($p=0.043$) and cupping/traditional therapy ($p=0.007$) [30].

5- CONCLUSION

This cross-sectional study reveals the persistent public health burden of HBV and HCV in Wasit Governorate, Iraq. HBV was more prevalent, especially among young adults, males, and individuals from low SES backgrounds. The findings highlight the urgent need for targeted health education, improved hygiene, and broader screening programs.

REFERENCES

[1] Waheed, Y., Tahir, S., & Jamil, H. (2021). Hepatitis B and C: Global perspectives and local challenges. Journal of Infection and Public Health, 14(4), 451–456.

[2] Ijaz, M., Khan, M. S., & Ahmed, T. (2022). Global burden of hepatitis infections and the role of health systems. International Journal of Epidemiology and Public Health, 8(1), 20–28.

[3] World Health Organization. (2020). Global hepatitis report 2020. World Health Organization. https://www.who.int/publications/i/item/9789240027077

[4] Njuguna, H., Mureithi, C., & Otieno, J. (2023). Barriers to hepatitis elimination: A regional review. BMC Public Health, 23(1), 110.

[5] Khalid, A. A., Salman, H. T., & Al-Bayati, Z. A. (2022). Epidemiological distribution of hepatitis B virus in Iraq. Iraqi Journal of Medical Sciences, 20(2), 115–122.

[6] Ullah, S., Ahmed, R., & Al-Shammari, H. (2022). Hepatitis control strategies and challenges in the Middle East. Eastern Mediterranean Health Journal, 28(5), 432–438.

[7] Ananthakrishnan, A. N., Khalili, H., & Bernstein, C. N. (2015). Socioeconomic disparities and access to care in liver disease. Liver International, 35(3), 227–234.

[8] Rafal, A. H., Jabbar, M. K., & Hassan, S. A. (2024). Epidemiological features of HBV and HCV in Diyala Province, Iraq. Iraqi Journal of Community Medicine, 38(2), 133–140.

[9] Amir, M. A., Farhan, H. A., & Ali, S. H. (2018). Incidence of hepatitis B and C in relation to age group in Baghdad hospitals. Iraqi Medical Journal, 64(3), 101–106.

[10] Arooj, S., Khan, M. N., & Javed, F. (2025). Gender differences in hepatitis infection rates: A review of national data. Journal of Clinical Virology, 142, 105–112.

[11] Al-Rubaye, A. K., Al-Rubaye, R. J., & Al-Dabbagh, S. A. (2016). Seroprevalence of hepatitis B and C among blood donors in Basrah and Samarra. Eastern Mediterranean Health Journal, 22(4), 283–289.

[12] Adjei, A. A., Asamoah-Adu, A., & Owusu, M. (2021). Prevalence of hepatitis B among pregnant women in Ghana. African Health Sciences, 21(1), 77–84.

[13] Raziq, A., Shah, S. M., & Iqbal, N. (2025). Marital status and HBV/HCV prevalence in a Pakistani cohort. Global Journal of Medical Research, 25(1), 55–62.

[14] Hussein, A. K., Ismail, R. A., & Hamza, A. M. (2025). Hepatitis B and C epidemiology in Kurdistan region, Iraq. Kurdish Journal of Medicine, 19(2), 91–100.

[15] Umer, M., Khaliq, T., & Riaz, S. (2023). Impact of urbanization on hepatitis transmission in Pakistan. Journal of Public Health and Epidemiology, 15(3), 133–140.

[16] Naif, A. H., Jasim, S. M., & Kareem, N. A. (2023). Prevalence of viral hepatitis in Karbala city: A cross-sectional analysis. Iraqi Journal of Epidemiology, 18(1), 45–51.

[17] Wasihun, A. G., Mulugeta, A., & Tesfaye, B. (2024). Association between education level and HBV infection in Ethiopia. Pan African Medical Journal, 48, 113.

[18] Alnaffakh, S. H., Ahmed, A. A., & Naji, M. H. (2023). Relationship of education and hepatitis risk in Iraq: A retrospective study. Iraqi Biomedical Journal, 29(4), 210–218.

[19] Molla, L., Berhanu, M., & Temesgen, A. (2015). Educational status and hepatitis B prevalence in Ethiopian adults. Ethiopian Journal of Health Sciences, 25(1), 33–39.

[20] Mohammed, S. B., Tadesse, M., & Getahun, A. (2025). Occupational risk and hepatitis infection among unskilled workers in Northwest Ethiopia. Occupational Health Reports, 9(2), 59–66.

[21] Al-Jumaily, K. S., Ahmed, A. A., & Salman, H. T. (2013). Hepatitis among health workers in Ramadi: Risk and prevention. Iraqi Medical Journal, 59(2), 73–80.

[22] Omland, L. H., Jepsen, P., & Krarup, H. B. (2013). Low socioeconomic status and risk of hepatitis C in Denmark. Journal of Hepatology, 58(1), 102–109.

[23] Hama, H. A., Rashid, H. A., & Omar, S. B. (2025). Clinical spectrum of HBV and HCV in hemophilia patients in Kurdistan. Kurdish Medical Journal, 12(1), 32–40.

[24] Hassan, M. K., Saeed, R. A., & Abdulridha, H. T. (2021). Hygiene-related hepatitis transmission risks in Kirkuk. Iraqi Journal of Public Health, 19(3), 211–219.

[25] El-Sayed, H. A., Mahmoud, M. H., & El-Sharkawy, R. M. (2017). Clinical patterns of hepatitis among ESRD patients. Egyptian Journal of Internal Medicine, 29(2), 99–104.

[26] Hashemi, S. M., Naderi, H. R., & Ziaee, M. (2017). Risk factors for hepatitis in low awareness communities. Iranian Journal of Medical Sciences, 42(5), 421–428.

[27] Ali, F. M., Ismael, H. M., & Yassin, H. M. (2024). Hepatitis transmission among prisoners in Duhok, Iraq. Iraqi Journal of Health Sciences, 10(1), 55–63.

[28] Al-Dulaimi, B. J., Rahman, A. M., & Saleh, N. H. (2023). Traditional medical practices and hepatitis in central Iraq. Journal of Infection Control, 5(2), 90–97.

[29] Al-Khazraji, H. F., Mahmoud, L. A., & Al-Awadi, A. J. (2019). Lifestyle factors and hepatitis detection in Baghdad. Iraqi Journal of Epidemiology, 15(1), 25–32.

[30] Ahmed, H. A., Khaleel, Z. M., & Azzawi, A. M. (2020). Traditional therapy and HBV prevalence in Iraq. Journal of Alternative Medical Research, 11(2), 88–94.