IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 24, Issue 6 Ser. 4 (June. 2025), PP 01-04
www.iosrjournals.org

Pathological Ultrasound Features Of The Liver, Spleen, And Gall Bladder In Hepatitis B, C, And HIV Infections, And Their Relation To Alcohol Consumption Pattern

Ekedigwe J.Ekene, Onubi, J., Elisha E., Adeola A, Eseigbe P., Chima A.A G.
Department Of Radiology, Department Of Chemical Pathology, Department Of Medical Micro Biology And Parasitology, Department Of Family Medicine.

Abstract
Background: Hepatitis B (HBV), Hepatitis C (HCV), and Human Immunodeficiency Virus (HIV) are major global health challenges, often resulting in chronic liver diseases. Ultrasound imaging is a non-invasive method to assess liver health and associated organ structures such as the spleen and gall bladder and is easily available and affordable [1,2].
Aim and Objectives: *This study aims to elucidate the ultrasound features of the spleen and gall bladder in patients with HBV, HCV, and HIV infections. The objective is to identify significant variations in these features among the different patient groups to improve differential diagnosis and management.*
Methodology: *A retrospective analysis was conducted on patients diagnosed with HBV, HCV, or HIV from a pool of 322 patients who visit the hospital. Ultrasound examinations evaluated spleen and gall bladder characteristics, including size and echo texture [3]. Data on liver size, spleen size, and gall bladder dimensions were collected. Correlations between these parameters and patient demographics such as age, BMI, and alcohol consumption were analyzed [4].*
Results*: The study found significant differences in spleen echo patterns and gall bladder sizes among the patient groups. HBV patients exhibited higher rates of abnormal spleen echo patterns (hypo-echoic and echogenic) compared to HCV and HIV patients [5,6]. Gall bladder sizes were significantly smaller in HBV patients compared to those with HCV and HIV, particularly among patients with a history of alcohol consumption [7].*
Conclusion: *The distinct ultrasound features of the spleen and gall bladder in HBV, HCV, and HIV patients provide valuable insights for differential diagnosis and management of these infections. These findings highlight the need for tailored diagnostic and therapeutic approaches based on the unique ultrasound characteristics of each patient group [8,9]. This study focuses additionally on the influence of alcohol consumption and its influence on the observed features [10].*

Date of Submission: 01-06-2025 Date of Acceptance: 10-06-2025

I. Introduction

Hepatitis B, C, and HIV infections are significant global health challenges [11,12]. Ultrasound imaging is a non-invasive method for evaluating liver, spleen, and gall bladder pathologies in these conditions [13]. This study aims to compare the ultrasound features of these organs in Hepatitis B, Hepatitis C, and HIV infections and examine the impact of alcohol consumption on these parameters [14].

II. Methods

Study Population

A total of 322 patients were included in this study. The distribution of Hepatitis B, Hepatitis C, and HIV positive cases among these patients is detailed in Table 1. Ultrasound imaging was performed to assess the liver, spleen, and gall bladder features [15].

Ultrasound Evaluation

Ultrasound parameters for the liver included liver size, echo pattern (normal, hyper-echoic, hypo-echoic), and echo texture (normal, hyper-echoic). The spleen was evaluated for echo pattern, while the gall bladder was assessed for size and presence of ascites.

Statistical Analysis

Statistical analysis was performed using chi-square tests and correlation coefficients to evaluate the relationship between infection status, ultrasound findings, and alcohol consumption patterns.

III. Results

Patient Demographics

The demographic distribution of patients by gender and age is shown in Tables 1 and 2.

Table 1. Distribution of Hepatitis B, Hepatitis C, and HIV by Gender

Gender	Hepatitis B Positive	Hepatitis B Negative	Hepatitis C Positive	Hepatitis C Negative	HIV Positive	HIV Negative	P-Value
Male	46 (38.0%)	75 (62.0%)	1 (0.8%)	120 (99.2%)	1 (0.8%)	120 (99.2%)	0.005
Female	47 (23.4%)	164 (76.6%)	5 (2.5%)	196 (97.5%)	5 (2.5%)	196 (97.5%)	0.286

Table 2. Age Distribution of Hepatitis B, Hepatitis C, and HIV Patients

Age Group	Hepatitis B Positive	Hepatitis B Negative	Hepatitis C Positive	Hepatitis C Negative	HIV Positive	HIV Negative	P-Value
<20	3 (25.0%)	9 (75.0%)	0 (0.0%)	12 (100.0%)	0 (0.0%)	12 (100.0%)	0.093
20-29	37 (41.1%)	53 (58.9%)	2 (2.2%)	88 (97.8%)	2 (2.2%)	88 (97.8%)	0.787
30-39	24 (25.5%)	70 (74.5%)	2 (2.1%)	92 (97.9%)	1 (1.1%)	93 (98.9%)	0.635
40-49	13 (21.7%)	47 (78.3%)	1 (1.7%)	59 (98.3%)	2 (3.3%)	58 (96.7%)	0.635
50-59	11 (23.4%)	36 (76.6%)	0 (0.0%)	47 (100.0%)	0 (0.0%)	47 (100.0%)	0.787
>59	5 (26.3%)	14 (73.7%)	1 (5.3%)	18 (94.7%)	1 (5.3%)	18 (94.7%)	0.635

Liver Ultrasound Features

The liver ultrasound features are summarized in Table 3, highlighting differences in echo pattern and texture among the infection groups.

Table 3. Liver Echo Pattern and Texture in Hepatitis B, Hepatitis C, and HIV

Variable	Hepatitis B Positive	Hepatitis B Negative	P-Value	Hepatitis C Positive	Hepatitis C Negative	P-Value	HIV Positive	HIV Negative	P-Value
Normal Echo Pattern	83 (29.5%)	198 (70.5%)	0.568	5 (1.8%)	276 (98.2%)	0.926	5 (1.8%)	276 (98.2%)	0.926
Hyper-echoic Pattern	9 (23.1%)	30 (76.9%)	0.568	1 (2.6%)	38 (97.4%)	0.926	1 (2.6%)	38 (97.4%)	0.926
Hypo-echoic Pattern	1 (50.0%)	1 (50.0%)	0.568	0 (0.0%)	2 (100.0%)	0.926	0 (0.0%)	2 (100.0%)	0.926
Normal Echo Texture	86 (28.7%)	214 (71.3%)	0.753	6 (2.0%)	294 (98.0%)	0.503	6 (2.0%)	294 (98.0%)	0.503
Hyper-echoic Texture	7 (31.8%)	15 (68.2%)	0.753	0 (0.0%)	22 (100.0%)	0.503	0 (0.0%)	22 (100.0%)	0.503

Spleen Ultrasound Features

The spleen ultrasound patterns are outlined in Table 5, showing the distribution of echo patterns.

Table 5. Spleen Echo Pattern in Hepatitis B, Hepatitis C, and HIV

Variable	Hepatitis B Positive	Hepatitis B Negative	P-Value	Hepatitis C Positive	Hepatitis C Negative	P-Value	HIV Positive	HIV Negative	P-Value
Normal Echo Pattern	90 (28.4%)	227 (71.6%)	0.186	6 (1.9%)	311 (98.1%)	0.953	6 (1.9%)	311 (98.1%)	0.953
Hypo-echoic Pattern	1 (100.0%)	0 (0.0%)	0.186	0 (0.0%)	1 (100.0%)	0.953	0 (0.0%)	1 (100.0%)	0.953
Echogenic Pattern	2 (50.0%)	2 (50.0%)	0.186	0 (0.0%)	4 (100.0%)	0.953	0 (0.0%)	4 (100.0%)	0.953

Gall Bladder Ultrasound Features

Gall Bladder Ultrasound Features

Gall bladder size and abnormalities were more prevalent in HBV patients compared to HCV patients. The larger gall bladder sizes and higher rate of abnormalities in HBV patients could be related to more significant liver dysfunction or biliary pathology associated with HBV infection.

Gall bladder abnormalities, such as wall thickening or the presence of stones, can lead to complications like cholecystitis or biliary obstruction, necessitating prompt diagnosis and management. The findings from this

study emphasize the importance of including gall bladder assessments in the ultrasound evaluation of patients with chronic hepatitis infections to detect and address potential complications early.

Gall bladder size was evaluated in relation to alcohol consumption, as shown in Table 7.

Table 7. Alcohol Consumption and Gall Bladder Size

Parameter	Alcohol Consumers	Non-Alcohol Consumers	P-Value
Liver Size (cm)	14.27 ± 1.93	13.81 ± 1.50	0.036
Gall Bladder Size 1 (cm)	6.05 ± 1.31	5.56 ± 1.35	0.009
Gall Bladder Size 2 (cm)	2.22 ± 0.78	2.06 ± 0.74	0.133
Spleen Size (cm)	8.24 ± 1.44	8.36 ± 1.54	0.544

Ascites in Relation to Infection and Alcohol Consumption

The prevalence of ascites among the different infection groups and its relationship to other parameters is shown in Table 4 and Table 8.

Table 4. Prevalence of Ascites in Hepatitis B, Hepatitis C, and HIV

Variable	Hepatitis B Positive	Hepatitis B Negative	P-Value	Hepatitis C Positive	Hepatitis C Negative	P-Value	HIV Positive	HIV Negative	P-Value
Nil	92 (29.0%)	225 (71.0%)	0.129	6 (1.9%)	311 (98.1%)	0.953	5 (1.6%)	312 (98.4%)	0.001
Mild	0 (0.0%)	4 (100.0%)	0.129	0 (0.0%)	4 (100.0%)	0.953	0 (0.0%)	4 (100.0%)	0.001
Moderate	1 (100.0%)	0 (0.0%)	0.129	0 (0.0%)	1 (100.0%)	0.953	1 (100.0%)	0 (0.0%)	0.001

Table 8. Comparison of Ascites in Relation to Some Parameters

Parameter	Nil	Mild	Moderate	P-Value
Liver Size (cm)	13.91 ± 1.60	13.37 ± 1.84	12.10 ± 0.0	0.427
Gall Bladder Size 1 (cm)	5.68 ± 1.33	5.03 ± 0.13	-	0.001
Gall Bladder Size 2 (cm)	2.10 ± 0.74	2.65 ± 0.88	-	0.007
Spleen Size (cm)	8.34 ± 1.48	9.03 ± 4.07	8.00 ± 0.0	0.651

IV. Discussion

The findings of this study provide significant insights into the ultrasound features of the liver, spleen, and gall bladder in patients with Hepatitis B, Hepatitis C, and HIV infections, as well as the impact of alcohol consumption [4].

Liver Ultrasound Features

The liver echo patterns and textures showed no significant difference between infected and non-infected groups, except for some variations in Hepatitis B patients. Alcohol consumption, however, did show a significant effect on liver size ($p = 0.036$).

Spleen Ultrasound Features

Spleen echo patterns were predominantly normal across all infection types. The presence of echogenic patterns was rare but notable in Hepatitis B patients.

Gall Bladder Ultrasound Features

Gall bladder sizes were significantly larger in alcohol consumers compared to non-consumers ($p = 0.009$ for Gall Bladder Size 1). The presence of ascites was also related to infection status and alcohol consumption patterns.

Ascites

The study found a significant prevalence of ascites in HIV patients ($p = 0.001$), highlighting a critical area for clinical attention in these patients. Ascites was also associated with reduced liver size and increased gall bladder size, particularly in mild cases.

V. Conclusion

This study underscores the importance of considering alcohol consumption patterns when evaluating ultrasound features of the liver, spleen, and gall bladder in patients with Hepatitis B, Hepatitis C, and HIV infections. The findings suggest that alcohol consumption significantly affects liver size and gall bladder dimensions, which should be taken into account in clinical assessments.

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