CHARACTERISTICS OF 2D ULTRASOUND IMAGING AND FIBROSCAN VALUES IN THE ASSESSMENT OF LIVER FIBROSIS IN PATIENTS WITH CHRONIC HEPATITIS B

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ABSTRACT

Objective: *To describe the 2D ultrasound features and the value of FibroScan in assessing the stage of liver fibrosis in patients with chronic hepatitis B.*

Subjects anh methods: *A cross-sectional descriptive study was conducted on 137 patients with chronic hepatitis B. Patients underwent 2D ultrasound to evaluate liver morphology and liver stiffness measurement using FibroScan. The stage of liver fibrosis was classified according to the Metavir scoring system.*

Results*: On 2D ultrasound, coarse liver texture was observed in 56.9% of cases, increased echogenicity in 46%, and irregular liver margins in 57.7%, with no significant difference between genders (p > 0.05). FibroScan results showed a mean liver stiffness value of 22.01 ± 19.63 kPa (range: 7.5–75 kPa) and a median of 12.1 kPa. According to the Metavir classification, F2 accounted for 22.6%, F3 for 37.2%, and F4 for 40.2%.*

Conclusion: *2D ultrasound and FibroScan are useful noninvasive tools for evaluating liver fibrosis. FibroScan provides quantitative assessment and detects a high proportion of advanced fibrosis (F3–F4).*

Keywords: *Chronic hepatitis B; 2D ultrasound; FibroScan; Liver fibrosis; Metavir.*

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1. INTRODUCTION

Chronic hepatitis B (CHB) is one of the leading causes of liver fibrosis, cirrhosis, and hepatocellular carcinoma worldwide. Accurate assessment of liver fibrosis is crucial for treatment decisions, prognosis and early detection of complications. Liver biopsy remains the gold standard but it is invasive, associated with potential complications and and difficult to apply repeatedly. Consequently, noninvasive methods have gained increasing attention. Two-dimensional (2D) ultrasound is widely available, cost-effective and useful for detecting morphological features of liver fibrosis such as irregular liver margins, increased parenchymal echogenicity and ascites [1]. However, its sensitivity and specificity are limited, particularly in early stages of fibrosis [2]. FibroScan, based on transient elastography, enables rapid and noninvasive quantitative measurement of liver stiffness; numerous studies have demonstrated its diagnostic value in assessing liver fibrosis, especially in patients with chronic hepatitis B [1],[3]. Moreover, studies on normal liver stiffness values in Asian populations indicate lower reference ranges compared with European populations, which should be considered when establishing diagnostic cutoffs [2]. Therefore, the combined use of 2D ultrasound and FibroScan may optimize screening and stratification of liver fibrosis, reduce the need for liver biopsy, and support clinical decision-making [4],[5].

2. SUBJECT AND METHODS

2.1. Study Population

This study included 137 patients who presented for examination and treatment at ASIA General Clinic between September 2023 and December 2024.

- Inclusion criteria:

+ Evidence of chronic hepatitis B infection (HBsAg positive for ≥ 6 months; or HBsAg positive and anti-HBc IgG positive); May present with intermittent or persistent elevation of AST and ALT for more than 6 months.

+ Evidence of progressive liver injury or cirrhosis (confirmed by liver biopsy, liver stiffness measurement, FibroTest or APRI index), not attributable to other causes.

- Exclusion criteria:

+ Acute illnesses (e.g., myocardial infarction, pneumonia, tuberculosis, malaria, dengue fever).

+ Pregnancy.

+ HIV or HCV coinfection.

+ Decompensated cirrhosis, hepatocellular carcinoma, presence of ascites.

+ Alcohol abuse.

2.2. Study Design and Procedures

- Study design: Prospective cross-sectional descriptive study.

- Sample size: Convenience sampling of CHB patients with an indication for FibroScan in clinical practice.

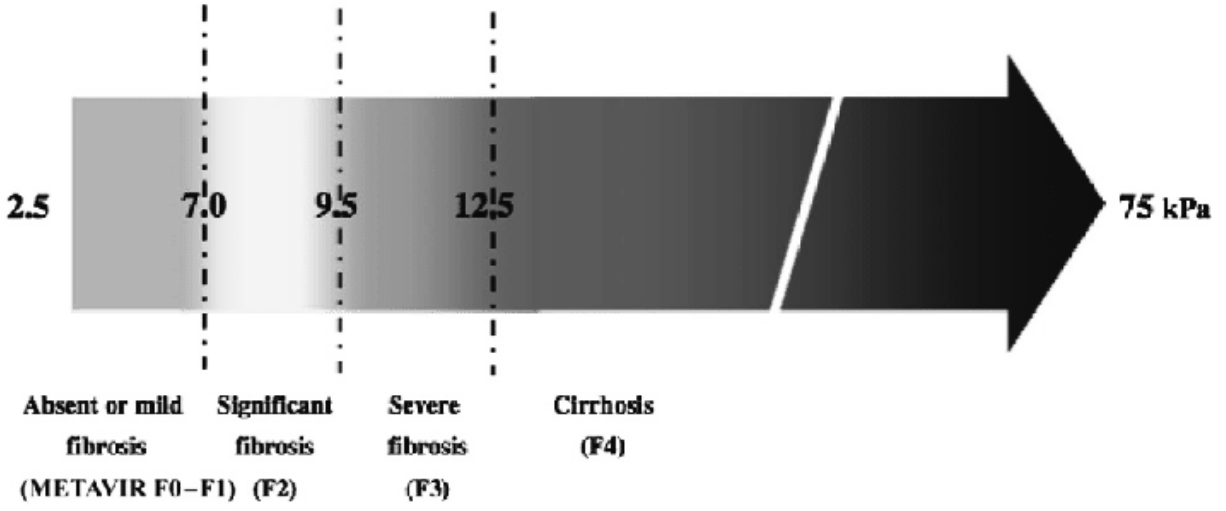
- Ultrasound examination: 2D (B-mode) ultrasound was performed using a Philips HD5 system with a 3.5–5 MHz convex transducer. Patients were examined primarily in the supine position, with left lateral decubitus positioning if necessary. Liver parenchyma, liver margins, echogenicity, and presence of ascites were assessed.

- FibroScan examination: FibroScan Expert 630 (Echosens) was used, equipped with S+, M+, and XL+ probes, selected according to patient body habitus. Ten valid measurements were obtained, and the mean value was recorded in kilopascals (kPa).

- Fibrosis staging: Liver fibrosis stage was determined based on FibroScan values and classified according to the METAVIR scoring system.

Table 1. Liver stiffness values corresponding to Metavir fibrosis stages

KPa	1 - 4,9	5 - 6,9	7 - 9,4	9,5 - 12,5	12,6 - 75
Metavir	F0	F1	F2	F3	F4



- Statistical analysis: Data were analyzed using SPSS version 28.0. Statistical significance was defined as $p < 0.05$.

- Ethical considerations: The study complied with regulations of the Ministry of Health. FibroScan was performed according to clinical indications and did not affect patient treatment or increase costs.

3. RESULTS

Among 137 patients, 75 were male (54.7%) and 62 were female (45.3%). The mean age was 44.4 ± 13.8 years. The mean duration since diagnosis was 4.1 ± 2.1 years, with 67.8% having disease duration ≥ 5 years.

Table 2. Distribution of 2D ultrasound findings (n = 137)

	Total (n=137)		Male (n=75)		Female (n=62)		p
	n	%	n	%	n	%	
Coarse liver echotexture	78	56,9	43	57,3	35	56,5	>0,05
Increased echogenicity	63	46,0	34	45,3	29	46,8	
Smooth liver margin	79	57,7	42	56,0	37	59,7	
Irregular liver margin	58	42,3	31	41,3	27	43,5	

Comment: No statistically significant difference was observed between genders ($p > 0.05$).

Table 3. Liver stiffness measurements (FibroScan)

Fibroscan (KPa)	Value
Mean	22.01±19.63
Minimum	7.5
Maximum	75
Median	12.1
Range	67.5

Comment: The mean FibroScan value among the study participants was 22.01 ± 19.63 kPa; the median was 12.1 kPa; and the range was 7.5–75 kPa.

Table 4. Distribution of fibrosis stages according to Metavir F

Metavir F	n	%
F0	0	0
F1	0	0
F2	31	22.6
F3	51	37.2
F4	55	40.2
Total	137	100

Comment: The Metavir F4 stage accounted for the highest proportion (40.2%), followed by F3 (37.2%) and F2 (22.6%). No cases of F0–F1 were observed.

4. DISCUSSION

2D ultrasound is a useful screening modality but has limited sensitivity in early stages of liver fibrosis [1]. Typical ultrasonographic features of cirrhosis include coarse and heterogeneous liver parenchyma, increased echogenicity, and nodular liver surface resulting from fibrous septa, fatty infiltration, and regenerative nodules. Many authors have evaluated liver fibrosis using ultrasound by assessing liver size, parenchymal heterogeneity, liver surface irregularity, perihepatic lymph nodes, portal vein and inferior vena cava changes, and splenic enlargement [1].

In our study, the prevalence of coarse liver echotexture, increased echogenicity, and irregular margins was comparable between male and female patients, with no statistically significant differences. These findings are consistent with previous studies [4],[6].

FibroScan has demonstrated a strong correlation with histological fibrosis stages. Yeh et al. reported normal liver stiffness values ranging from 2–8 kPa, consistent with other studies reporting values between 2.3–6.9 kPa [7].

In our study, the mean FibroScan value was relatively high, and most patients were classified as F3–F4. This likely reflects late presentation, long disease duration, and irregular treatment adherence. Similar findings have been reported in domestic studies [4],[5]. The absence of F0–F1 cases may be attributed to selection bias and limited sample size.

Overall, FibroScan outperforms serum markers in evaluating significant fibrosis and cirrhosis and is recommended as a first-line noninvasive modality [5].

5. CONCLUSION

Common 2D ultrasound findings in chronic hepatitis B include coarse liver parenchyma, increased echogenicity, and irregular liver margins.

FibroScan is a valuable noninvasive method for assessing liver fibrosis, particularly in patients with long-standing disease and irregular treatment, with a high proportion of F3–F4 stages.

The combination of 2D ultrasound and FibroScan improves screening efficiency and fibrosis assessment while reducing the need for liver biopsy.