



Clinical Picture and Liver Fibrosis Based on Fib-4 in Chronic Hepatitis B Patients at Waled Hospital in 2022-2024

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KEYWORDS

Chronic Hepatitis B, Fib-4 Score, Clinical Picture

ABSTRACT

Chronic hepatitis B is a liver infection caused by the hepatitis B virus, characterized by the persistence of HBsAg for six months or more. This condition can lead to progressive liver damage, resulting in fibrosis and potentially cirrhosis if not detected early. Early identification of liver fibrosis is essential to prevent complications; therefore, non-invasive scoring systems such as the fibrosis index-4 (FIB-4) have been developed. The FIB-4 score incorporates age, platelet count, alanine aminotransferase (ALT), and aspartate aminotransferase (AST) levels to assess fibrosis risk. This study aims to describe the clinical characteristics and liver fibrosis status based on FIB-4 scores among chronic hepatitis B patients at Waled Hospital between 2022 and 2024. This observational descriptive study used a total sampling technique, including 42 patients diagnosed with chronic hepatitis B. The results showed that most patients were male (81%) and aged 45–59 years (42.9%). A high FIB-4 score (>2.67), indicating advanced fibrosis risk, was observed in 45.2% of patients. Elevated AST levels (>50 U/L) were found in 69% of cases, while ALT levels were mostly within normal to moderately elevated ranges. A small proportion of patients had decreased platelet counts and elevated total bilirubin levels. Clinically, 66.7% of patients were symptomatic, with splenomegaly being the most common finding. In conclusion, most patients were at risk of advanced fibrosis, highlighting the importance of early assessment.

INTRODUCTION

Hepatitis B is an infection of the liver caused by the hepatitis B virus. In 2022, the World Health Organization (WHO) estimated that there were 254,000,000 people living with chronic hepatitis B infection, with 1,200,000 new infections and around 1,100,000 deaths every year (World Health Organization [WHO], 2022). According to the Global Hepatitis Report 2024, 61,400,000 cases of hepatitis B infection were found in Southeast Asia in 2022, with a mortality rate of 218,000 deaths (WHO, 2024). The report also stated that the incidence of hepatitis B in Indonesia in 2022 was 17,500,000 people (WHO, 2024). The National Action Plan for Hepatitis Control for 2020-2024 highlights that Indonesia is one of the countries in Southeast Asia with the highest prevalence of hepatitis B infection compared to other countries in the region (Ministry of Health Republic of Indonesia, 2020). A contributing factor to this is the limited access to hepatitis B vaccination for the Indonesian population (Simanjuntak et al., 2021).

The hepatitis B virus is transmitted through blood or body fluids. Hepatitis B infection can result in liver tissue damage, leading to scarring, known as liver fibrosis (Dora et al., 2021).

Liver fibrosis can progress to cirrhosis of the liver, which is the final stage of the progressive process of liver fibrosis characterized by damage to the liver structure and the formation of regenerative nodules (Kalim et al., 2020). The Global Burden of Disease Study in 2019 reported around 2,050,000 cases of cirrhosis due to hepatitis, with a mortality rate of 1,470,000 and 46,190,000 people suffering from disabilities caused by cirrhosis of the liver (Global Burden of Disease Study, 2019). Early and accurate detection of liver cirrhosis is crucial so that patients can receive therapy to reduce the risk of liver cell carcinoma (Cai et al., 2021).

Currently, hepatitis B treatment is not provided in all cases of hepatitis B infection, both acute and chronic. Therapy selection for hepatitis B depends on several criteria, including HBeAg status, HBV-DNA levels, ALT levels, and the degree of liver fibrosis (Zhao et al., 2020). The gold standard for assessing liver fibrosis is biopsy, but due to its invasive nature, the current standard is transient elastography (Leung et al., 2019). Liver fibrosis is most commonly assessed using transient elastography, although not all health facilities have the necessary equipment, and due to its high cost, it is typically available only in hospitals in larger cities (Santo et al., 2021).

Other tests that can detect cirrhosis of the liver include MRI, CT scans, and ultrasound. Ultrasound can detect hepatic cirrhosis, but it is less sensitive, although quite specific (Parker et al., 2022). MRI and CT scans are also useful for detecting hepatic cirrhosis and determining its severity by assessing the size of the spleen and the presence of ascites (Choi et al., 2020). MRI has a sensitivity of 72.6% and specificity of 76.1% in assessing liver fibrosis, though it remains expensive (Yang et al., 2021).

The need for a simpler and more cost-effective method to detect liver fibrosis early has led to the development of a simple scoring system. One such system is the fibrosis index-4 (FIB-4), which uses age, platelet levels, ALT, and AST levels (Jiang et al., 2020). FIB-4 is a non-invasive test that predicts the risk of liver fibrosis. Research by Xiao-lan Xu et al. (2022) suggests that in medical facilities with limited resources, FIB-4 can serve as a screening tool for liver fibrosis, particularly in patients with chronic hepatitis B and chronic hepatitis C infections.

Research by Bandana et al. (2021) found that the sensitivity of FIB-4 for early detection of liver fibrosis was 46.81%, while the specificity was 80.36%, demonstrating that FIB-4 can be used as an effective early detection tool for liver fibrosis (Bandana et al., 2021). Another calculation method for detecting liver cirrhosis and liver fibrosis is the APRI (Aspartate Aminotransferase to Platelet Ratio Index). Research by Neehar et al. (2023) indicated that the sensitivity of APRI for detecting hepatic cirrhosis was 9.3%, with a specificity of 98.8% (Neehar et al., 2023).

Data on transient elastography examinations in Indonesia are limited, as the equipment is primarily available in hospitals in larger cities and is costly. Early detection of liver fibrosis risk using FIB-4 is expected to reduce costs, making it a more accessible option for detecting liver fibrosis, especially in chronic hepatitis B patients (Sari et al., 2022). Early detection allows for early intervention, preventing the progression of liver fibrosis to more severe stages, such as liver cirrhosis, hepatitis, and even liver cell carcinoma (Almahdali et al., 2021).

This study aims to investigate the clinical characteristics and liver fibrosis based on the FIB-4 index in patients with chronic hepatitis B at Waled Hospital from 2022 to 2024. The research question addressed in this study is: How do the clinical characteristics and liver

fibrosis profiles, based on the FIB-4 index, appear in chronic hepatitis B patients treated at Waled Hospital during the specified period? The general objective of this study is to determine the clinical characteristics and liver fibrosis status based on the FIB-4 index among chronic hepatitis B patients at Waled Hospital during 2022–2024. Specifically, this study aims to describe the characteristics of patients based on age and gender, identify the clinical characteristics of chronic hepatitis B patients, and analyze liver fibrosis using the FIB-4 index. Additionally, the study will describe laboratory characteristics related to liver function and fibrosis assessment, including alanine aminotransferase (ALT) levels, aspartate aminotransferase (AST) levels, platelet counts, and total bilirubin levels among chronic hepatitis B patients treated at Waled Hospital during 2022–2024.

RESEARCH METHODS

Scope of research

The scope of this research covers the fields of Internal Medicine and clinical Pathology.

Place and Time of Research

The place used in this study is Waled Hospital, the research was conducted in September 2024 – May 2025 using medical record data for the 2022-2024 period.

Types and Design of research

This study uses an observational descriptive method, with a sampling method in the form of total sampling.

Population and Sample

Target population

The target population in this study is hepatitis B patients in Cirebon Regency.

Affordable population

The affordable population in this study is chronic hepatitis B patients who are treated at Waled Hospital in the 2022-2024 period.

Research sample

Inclusion criteria

Patients diagnosed with chronic hepatitis B based on HbsAg who stayed > 6 months. Medical records of chronic hepatitis B patients with age, sex, clinical picture, and total bilirubin results. Medical records of chronic hepatitis B patients containing AST, ALT and platelet examination results, with an examination time interval of < 30 days.

How to sample

The sampling method in this study uses *a total sampling* technique for 2 years (2022-2024), all data that meet the inclusion and exclusion criteria will be analyzed in the study.

Sample size

The sample size in this study uses *total sampling*, where the number of samples is equal to the number of population.

Research variables

The variables in this study are the clinical picture and liver fibrosis based on FIB-4 in chronic hepatitis B patients.

Operational Definition

Table 1. Operational Definition

No	Variable	Definition Operational	Instruments	Measurement Results	Scale
1	Age	Information stated in the medical record that shows the age of the sample.	Medical records	Teenagers (< 18 years old n) Young adults (18-44 years old) Old Adult (45-59 years old) Senior(60-74 years) Elderly (> 75 years old). ⁽²⁹⁾	Categorical
2	Gender	Evidence in medical records that shows gender Sample	Medical records	1)Male 2)Female	Nominal
3	Clinical picture of chronic hepatitis B	The results of the physical examination stated on the sample's medical record	Medical records	1. Symptomatic a. Ikterik . Ascites . Hepatomegaly . Splenomegaly . Spidernervi f. Erythema palmaris 2. Asymptomatic	Nominal
4	FCS Score- 4	Calculation results using AST,ALT,Trombocytes and age to determine the risk of liver fibrosis in chronic hepatitis B patients with the formula . Formula : (age [years] × AST [U/L]/(thrombus it [109/L] ×√ALT [U/L])). ¹⁸ The Gospel of Jesus Christ	FIB-4 (<i>Fibrosis Index</i>)	1) < 1.30 : low risk of advanced fibrosis.) 1,30-2,67 : The risk of advanced fibrosis is uncertain 3)>2.67: The risk of advanced fibrosis is high. ¹⁸ The Gospel of Jesus Christ	Ordinal
5	ALT Rate	The results of laboratory tests listed in Medical Records	Medical records	< 0 U/L : low 0-50 U/l : normal >50 U/L : high	Ordinal

6	AST Rate	The results of laboratory tests listed in Medical Records	Medical records	<0 U/L: low 0- 50 U/L : Normal > 50 U/L: high	Ordinal
7	Platelet	Laboratory test results listed in medical records	Medical records	< 150,000 mcL: less 150.000- 400.000 mcL : normal > 400,000 mcL: Read More	Ordinal
8	Total Bilirubin	Laboratory test results listed in medical records	Medical records	<0.2mg/dL: low 0,2-1, 1mg/dL: normal >1.1 mg/dL: high	Ordinal

Source: Developed by the authors based on the study variables and medical record indicators of Waled Regional General Hospital

How data is collected

Materials and Tools

The instrument used in this study is based on secondary data in the form of medical records of chronic hepatitis B patients at Waled Hospital.

The research procedure was conducted in three main stages: preparation, implementation, and completion. In the preparation stage, the researcher determined the research objectives and title, consulted with the supervisor regarding variables and research methods, prepared research instruments, arranged permits and coordinated with relevant institutions, and established a research schedule. The implementation stage involved determining the sample based on inclusion criteria and conducting data collection by identifying chronic hepatitis B patients. In the completion stage, the researcher processed and analyzed the collected data, followed by compiling the research report systematically.

Research Flow

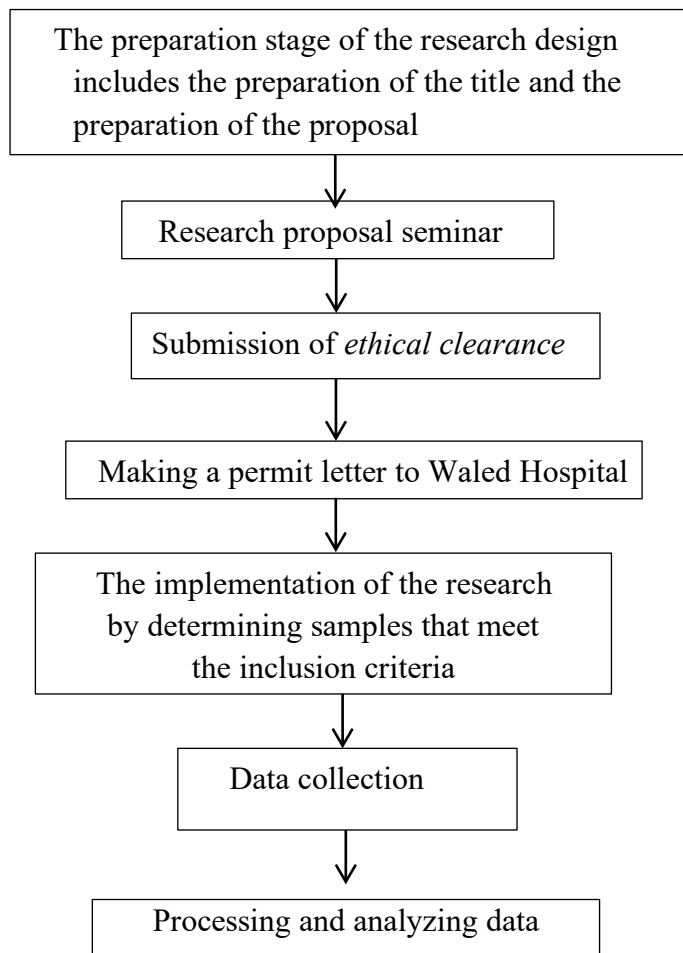


Figure 1. Research flow

Source: Developed by the authors

Data Analysis

Data processing

Editing

Editing is doing research or editing the data obtained so that if a mistake occurs, it can be immediately corrected and corrected, regarding the completeness of the data at Waled Hospital.

Coding (Data encoding)

Coding is coding every data obtained from the medical records of chronic hepatitis B patients so that it is easier to analyze the data.

Processing

Processing is processing data using a computer or manually so that it can be analyzed.

Entry (Data input)

Entry is the activity of entering the results of the data obtained in the data processing program.

Cleaning (Recheck)

Double-check or double-check for data errors so that the data is completely ready for analysis.

Data Analysis

Univariate analysis was carried out to see the frequency of distribution and percentage of clinical picture and liver fibrosis based on FIB-4 in chronic hepatitis B patients, then the data were presented in the form of narratives and tables.

Research ethics

This research has been approved by the Health Research Ethics Committee (KEPK) of Waled Hospital with Number: 000.9.2/131/KEPK/1/2025 and meets the administrative requirements of Waled Cirebon Hospital, namely the Research Permit of FK UGJ and the Research Certificate of the National and Political Unity Agency (KESBANGPOL) of Cirebon Regency.

RESULTS AND DISCUSSION

This research was conducted in the medical record room of the Waled Regional General Hospital, Cirebon Regency in April-May 2025 using secondary data with a total sampling technique. The population of chronic hepatitis B patients at Waled Hospital in 2022-2024 is 87 patients. However, there were 45 patients who did not meet the inclusion criteria. The following is a selection chart of research data:

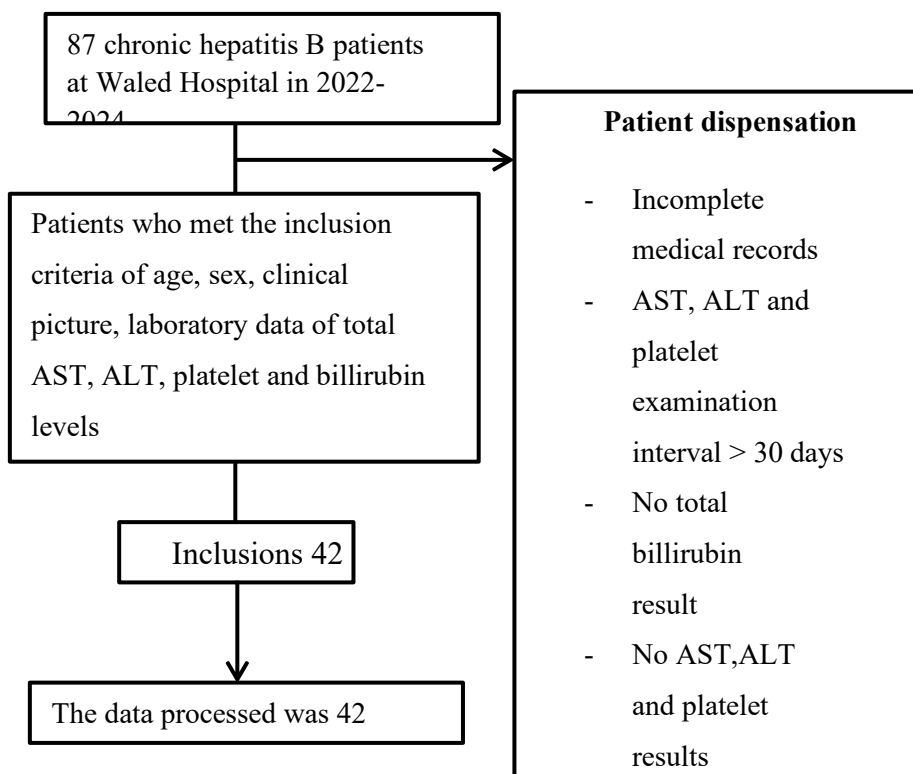


Figure 2. Research data selection chart

Source: Data processed by the authors from medical records of Waled Regional General Hospital, 2022–2024

Research results**Univariate Analysis****Distribution of research sample characteristics Clinical Overview and Liver Fibrosis****Table 2. Distribution of research sample characteristics**

Variable	Med	Min-Max
Age	50 years	19 years-71 years old
Variable	Frequency(s)	Present (%)
Age		
Young adults 18 – 44	17	40.5 %
Year		
Older adults 45 – 59 years old	18	42.9 %
Seniors 60 – 74 years old	7	16.7 %
Gender		
Male	34	81 %
Women	8	19 %
FCS Score - 4		
< 1.30 risk of advanced fibrosis	8	19.0%
Low		
1.30-2.67 risk of fibrosis	15	35.7 %
Continued indefinite		
>2.67 risk of advanced fibrosis	19	45.2 %
height		
ALT Rate		
<0 U/L: low	0	0%
0-50 UL: normal	24	57.1%
> 50 U/L : high	18	42.9%
AST Rate		
<0 U/L: low	0	0%
0-50 UL: normal	13	31.0%
> 50 U/L : high	29	69.0%
Platelet		
< 150,000 mcL : less	13	31.0%
150,000-400,000: Normal	27	64.3%
>400,000: more	2	4.8%
Total Bilirubin		
<0.2 mg/dL : low	0	0
0.2-1.1 mg/dL : normal	13	31.0%
>1.1mg/ dL : high	29	69.0 %

Source: Data processed by the authors from medical records of Waled Regional General Hospital, 2022–2024.

Based on table 2, this study obtained a sample of 42 patients who were in accordance with the inclusion criteria. Of the 42 patients, the majority were male as many as 34 patients (81%) and female as many as 8 people (19%).

The distribution of patients based on the age range of 18-44 years is 17 people (40%), the age range of 45-59 years is 18 people (43%), the age range 60-74 years old as many as 7 people (17%) with the youngest age being 19 years, the oldest age being 71 years old and the median age of patients is 50 years. The age group most affected by chronic hepatitis B in this study was the age range of 45-59 years as many as 18 people (43%).

Based on the assessment of liver fibrosis using FIB-4 scores, as many as 8 patients (19%) had a low risk of fibrosis (score <1.30), 15 patients (36%) had an uncertain risk of fibrosis (score 1.30-2.67) and 19 patients (45%) had a high risk of advanced fibrosis (> 2.67). In laboratory examinations, 29 patients (69%) had high AST levels > 50 U/L, while 13 patients (31%) had AST levels within the normal limit of 0-50 U/L.

In laboratory examination, there were 24 patients (57%) who had ALT levels at normal limits (0-50 U/L) and 18 patients (43%) had increased ALT levels. Platelet examination showed that 13 patients (31%) had low platelet levels (< 150,000 mcL), 27 (64%) patients had normal platelet levels (150,000-400,000 mcL) and 2 patients (5%) had elevated platelet levels (> 400,000 mcL). In total bilirubin, 29 patients (69%) had high total bilirubin levels (> 1.1 mg/dL) and 13 patients (31%) had normal total bilirubin levels.

Distribution of clinical images

A total of 42 patients had a clinical picture of chronic hepatitis B, while the distribution of the clinical picture is shown in table 3.

Table 3. Distribution of clinical images

Clinical picture	Frequency/ 42
Ikterik	8
Ascites	8
Hepatomegaly	8
Splenomegaly	11
Spidernervi	0
Erythema Palmaris	0
Asymptomatic	14

Source: Data processed by the authors from medical records of Waled Regional General Hospital, 2022–2024

Based on the table above, as many as 28 subjects (67%) showed clinical symptoms (symptomatic) and 14 subjects (33%) showed no clinical symptoms (asymptomatic). Of the 28 subjects (67%) had a distribution of clinical images such as icteric 8 patients (22.9%), ascites 8 patients (22.9%), hepatomegaly 8 patients (22.9%), splenomegaly 11 patients (31.4%).

Relationship of FIB-4 Score with Total Bilirubin Parameters

The FIB-4 score is an examination of the scoring system involving age, ast, alt and platelet components. In this study, we also evaluated the total bilirubin value and obtained the following scatter plot description:

Scatter plot FIB-4 score with Total Bilirubin

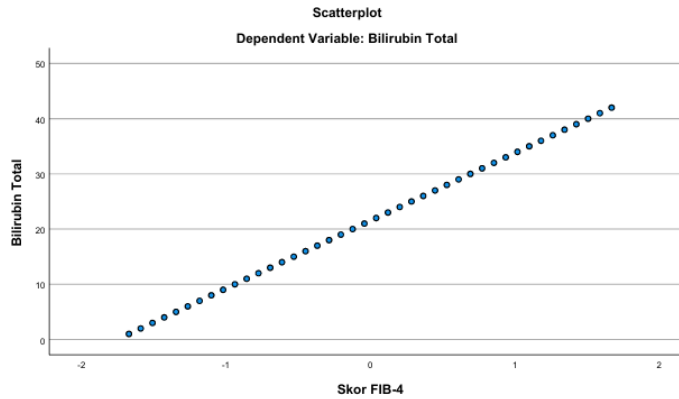


Figure 3. Scatter plot FIB-4 score with total Bilirubin

Source: Data processed by the authors from medical records of Waled Regional General Hospital, 2022–2024

The Relationship of FIB-4 Score with Age Parameters

The FIB-4 score is an examination of the scoring system involving the components of age, ast, alt and platelets. In this study, we also evaluated the age and obtained the following scatter plot description:

Scatter plot FIB-4 score by age

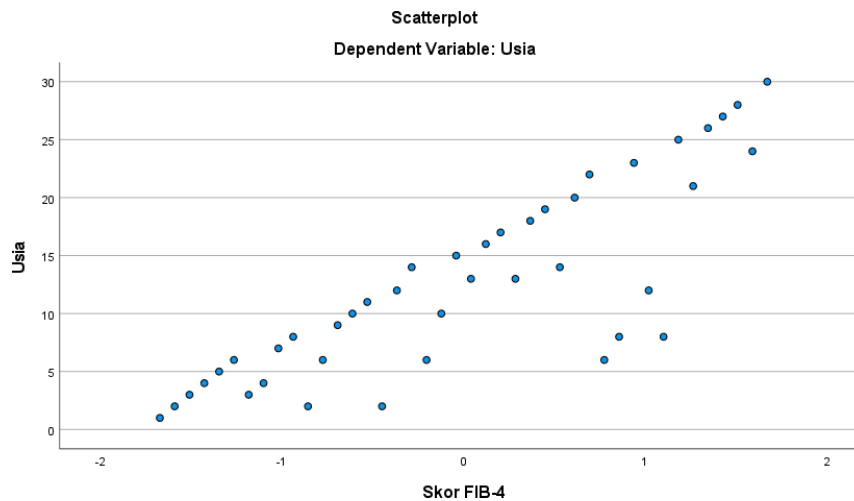


Figure 4. Scatter plot FIB-4 score by age

Source: Data processed by the authors from medical records of Waled Regional General Hospital, 2022–2024

In this study, the characteristics of chronic hepatitis B patients showed that the most common age range was 45–59 years, with 18 patients (42.9%). This result is in accordance with research conducted by Farahmadilah et al. (2022), which found that the maximum age

group was 46–55 years, with 15 patients (44.1%) (9). This can be associated with risk factors for the transmission of the hepatitis B virus through sexual intercourse, making adults more susceptible to hepatitis B virus infection (31).

The sex distribution in this study revealed that 34 patients (81%) were male. This result aligns with the research by Farahmadilah et al. (2022), which found that the gender distribution of hepatitis B infections in men was 64.7%, higher than in women (35.3%). A study conducted by Sulaiman et al. (2023) also found that the majority of chronic hepatitis B cases were in men (61.2%) (9,10). Epidemiological studies suggest that men are three times more susceptible to being infected with the hepatitis B virus. This could be due to the androgen hormone, which plays a role in controlling development and reproductive function in men. When a man is infected with the hepatitis B virus, the level of the androgen hormone decreases, affecting the replication of the HBV virus (32).

In this study, 19 people (45.2%) had a FIB-4 score above 2.65, indicating a high risk of fibrosis. This result is consistent with the research by Farahmadilah et al. (2022), where most participants experienced advanced fibrosis, with 18 patients (52.9%) showing similar results (9). The FIB-4 score is used to assess the risk of liver fibrosis and involves age, AST levels, ALT levels, and platelet count.

Regarding ALT levels, this study found that 24 people (57.1%) had normal ALT levels, while 18 people (42.9%) had high ALT levels. This aligns with the findings of Alwaali et al. (2021), who observed that 49 people (51.6%) had normal ALT levels, while 46 people (46%) had high ALT levels (33). Increased ALT levels in the body can be caused by hepatitis B virus infection, alcohol consumption, or excess iron in the body. In hepatitis B infection, liver inflammation occurs, causing ALT to leak from the liver cells into the bloodstream, thus increasing ALT levels (33).

This study also found that 29 people (69%) had elevated AST levels, while 13 people (31%) had normal levels. These findings are consistent with the research by Alwaali et al. (2021), who reported an increase in AST levels in 51 people (53.7%), with normal levels in 44 people (46.3%) (33). Elevated AST levels can also be attributed to hepatitis B virus infection, alcohol consumption, or excess iron. Liver inflammation caused by the infection leads to the release of AST from the liver cells into the bloodstream, thereby increasing AST levels (33).

Regarding platelet levels, 13 people (31%) in this study were found to have thrombocytopenia. This result is consistent with research by Brillian et al. (2022), which showed a decrease in platelet levels (34). Thrombocytopenia can occur due to several factors. In chronic hepatitis B infection, platelet levels may decrease due to liver damage, which results in a reduced synthesis of thrombopoietin, a hormone involved in platelet production (35).

This study found an increase in total bilirubin in 29 people (69%), with normal levels in 13 people (31%). These results are consistent with research by Deswinda et al. (2017), which found that 16 people (80%) had elevated total bilirubin, while 4 respondents (20%) had normal levels (38). Elevated bilirubin levels can occur for various reasons, one of which is hepatitis B virus infection, which can damage the liver structure, leading to lesions. These lesions affect the number of hepatocyte cells, interfering with the absorption of indirect bilirubin from plasma and reducing the transport of direct bilirubin (36).

The clinical picture observed in this study included icterus, hepatomegaly, ascites, and splenomegaly. This is in line with research by Nurul & Dian (2022), which found hepatomegaly

in their study (37). In chronic hepatitis B, the clinical picture can vary and may include icterus, hepatomegaly, splenomegaly, ascites, or no visible signs of chronic liver disease (7).

Additionally, this study used a scatter plot for evaluation and found a positive correlation between total bilirubin and the FIB-4 score, even though total bilirubin is not a component of the FIB-4 score assessment. There was also a positive correlation with age, as age is one of the components in calculating the FIB-4 score.

Research Limitations

This research has several limitations, including: 1) Small sample count. This happens because some medical records do not have complete data. 2) This study only focuses on a few variables. 3) This study is not accompanied by gold standard data, namely fibroscan, so it is recommended to conduct further research with fibroscan data and liver ultrasound.

CONCLUSION

In this study, it can be concluded that chronic hepatitis B patients at Waled Hospital during the period 2022–2024 were most commonly found in the age group of 45–59 years, accounting for 18 patients (42.9%), and were predominantly male, with 34 patients (81.0%). The most frequent clinical presentation was splenomegaly, found in 31.4% of cases. Based on the FIB-4 score, most patients had a high risk of advanced fibrosis, with 19 patients (45.2%) scoring >2.67. Laboratory findings showed that the majority of patients had normal ALT levels of 0–50 U/L, with 24 patients (57.1%) within this range, while high AST levels of >50 U/L were found in 29 patients (69%). Additionally, low platelet levels of <150,000 mcL were identified in 13 patients (31.3%), and elevated total bilirubin levels of >1.1 mg/dL were found in 29 patients (69%).

Based on these findings, it is recommended that early screening for liver fibrosis using the FIB-4 score be routinely performed in patients with chronic hepatitis B to facilitate early detection and management of fibrosis progression. Further studies with larger sample sizes and additional diagnostic tools, such as fibroscan, are suggested to obtain more comprehensive results.

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