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Evaluation of the AST/ALT Ratio as a Non-Invasive Predictor of Chronic Liver Disease

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Abstract

This study evaluated the AST/ALT ratio as a non invasive predictor of liver fibrosis by examining its clinical utility, diagnostic relevance, and limitations in contemporary practice. Liver fibrosis is a progressive outcome of chronic liver injury that may develop into cirrhosis, liver failure, and hepatocellular carcinoma if not detected and managed early. Therefore, accessible non invasive markers are needed, particularly in settings with limited diagnostic resources. This study used an analytical literature review approach. Articles published within the last ten years were searched through PubMed, Google Scholar, and ScienceDirect using keywords related to AST/ALT, non invasive liver disease, liver fibrosis, and diagnosis. Relevant studies were selected based on predetermined inclusion and exclusion criteria, then analyzed descriptively and comparatively. The findings indicate that the AST/ALT ratio has potential as a simple, affordable, and widely available marker for the initial assessment of liver fibrosis. It showed a meaningful association with fibrosis severity, especially in patients with chronic hepatitis B and other chronic liver diseases. However, its diagnostic performance varied depending on disease etiology, fibrosis stage, and patient characteristics. Compared with APRI, FIB 4, FibroScan, and elastography, the AST/ALT ratio generally demonstrated only moderate accuracy and was less reliable as a standalone marker. Therefore, it is more appropriate as an initial screening tool or complementary indicator rather than a definitive diagnostic method.

Introduction

Liver fibrosis is scar tissue resulting from the repair of chronic liver lesions caused by viral infections (HBV/HCV), alcohol, or non-alcoholic fatty liver disease (NAFLD) (Crudele et al., 2023). Progressive fibrosis progresses to cirrhosis, increasing the risk of death and cirrhosis (Bahrul, 2024).

Liver fibrosis is a major complication of chronic liver disease with various underlying diseases (Liu & Chen, 2022; Weiskirchen, 2025; Nishikawa et al., 2025). The process of fibrinogenesis in liver damage is the body's homeostatic mechanism against injury, characterized by the accumulation of extracellular matrix due to an imbalance in tissue synthesis and degradation. The progression of liver fibrosis in certain conditions is very rapid, and can progress to cirrhosis within a few years (Yasin et al., 2022; Chen et al., 2026; Gallo et al., 2025).

The most common cause of liver fibrosis is post-infection with hepatitis B. The high prevalence of hepatitis B occurs primarily in Southeast Asia and Africa, where 5-15% of the population

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are chronic hepatitis B carriers, and nearly 25% of these individuals experience chronic liver disease ranging from liver fibrosis to cirrhosis and hepatocellular carcinoma. Fibrosis can lead to a decline in normal liver function. Accurate staging of liver fibrosis is crucial for determining therapy and prognosis in patients with chronic hepatitis B (Sulaiman, 2023; Wang et al., 2026; Üremiş et al., 2026).

Liver fibrosis is characterized by excessive accumulation of extracellular matrix (collagen) due to a chronic wound-healing response to liver injury (Saponara et al., 2026; Lai et al., 2026; Efole et al., 2025). Early identification of fibrosis is crucial for predicting prognosis and guiding therapy. While liver biopsy is invasive, the development of non-invasive techniques has shifted the diagnostic paradigm to become more patient-friendly, allowing screening of high-risk populations (such as MAFLD/NAFLD, Hepatitis B, Hepatitis C) with minimal risk (Zhao et al., 2022; Liang et al., 2025; Elsabaawy et al., 2025).

Liver biopsy is the gold standard, but it is invasive, expensive, and carries a risk of complications (6) (Salehi et al., 2026; Shomansurovich, 2026; Hudson et al., 2024). The need for affordable non-invasive markers is increasing, especially in facilities with limited access to Transient Elastography (FibroScan). The AST/ALT ratio (AST/ALT Ratio/AAR), or de Ritis Ratio, is often greater than 1.5 in patients with liver cirrhosis, making it an inexpensive early indicator (Wang et al., 2024; Lurie et al., 2015; Reinson et al., 2026).

One potential parameter is the AST/ALT (Aspartate Aminotransferase/Alanine Aminotransferase) ratio. Although these two enzymes are routinely measured in liver function tests, their effectiveness as a single predictor of liver fibrosis severity requires further evaluation. Key issues to be addressed are the extent to which the AST/ALT ratio consistently reflects the degree of liver fibrosis compared to invasive methods, and whether there is an optimal cut-off value for differentiating between mild and advanced fibrosis (Moosavy et al., 2023; Sanyal et al., 2023; Kalkan et al., 2023).

Methods

This study used a literature review design with an analytical and comparative approach. The review was conducted to evaluate the role of the AST/ALT ratio as a non invasive predictor of liver fibrosis in patients with chronic liver disease. The analysis focused on the clinical utility, diagnostic relevance, and limitations of the AST/ALT ratio when compared with other non invasive fibrosis assessment methods, including APRI, FIB 4, FibroScan, elastography, and liver biopsy as the reference standard.

A systematic literature search was conducted using three electronic databases, namely PubMed, Google Scholar, and ScienceDirect. These databases were selected because they provide broad coverage of biomedical, hepatology, gastroenterology, internal medicine, and clinical diagnostic studies. The search was carried out using combinations of the following keywords: “AST/ALT ratio,” “De Ritis ratio,” “liver fibrosis,” “chronic liver disease,” “non invasive marker,” “fibrosis assessment,” “APRI,” “FIB 4,” “FibroScan,” and “diagnosis.” Boolean operators such as AND and OR were used when necessary to broaden or refine the search results.

The literature search was limited to articles published within the last ten years to ensure that the reviewed evidence reflected contemporary developments in non invasive liver fibrosis assessment. Older studies were considered only when they provided foundational concepts related to liver fibrosis, liver enzyme interpretation, or established diagnostic principles that remained relevant to the review topic. Articles were screened in stages. First, titles and abstracts were reviewed to identify their relevance to the topic. Second, potentially eligible articles were assessed through full text reading. Third, articles that directly discussed AST/ALT ratio, liver fibrosis, chronic liver disease, or comparative non invasive fibrosis assessment were selected for final analysis.

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The inclusion criteria were as follows. First, the article discussed liver fibrosis, chronic liver disease, hepatitis B, hepatitis C, NAFLD, MAFLD, cirrhosis, or related liver disorders. Second, the article examined the AST/ALT ratio or other non invasive fibrosis assessment methods such as APRI, FIB 4, GPR, FibroScan, elastography, ultrasonography, or liver biopsy as a comparator. Third, the article was published in English or Indonesian. Fourth, the article was published in a peer reviewed journal between 2017 and 2025. Fifth, the article provided relevant clinical, diagnostic, or comparative information related to liver fibrosis assessment.

Articles were excluded if they were not related to liver fibrosis or chronic liver disease, did not discuss non invasive fibrosis assessment, lacked sufficient methodological clarity, were duplicate publications, or were only available as conference abstracts, editorials, or opinion pieces without relevant clinical or diagnostic information. Studies focusing on liver disorders unrelated to fibrosis assessment were also excluded from the final analysis.

Data from the selected articles were extracted descriptively. The extracted information included author name, year of publication, country, study design, sample size, study population, fibrosis assessment method, main diagnostic parameter, and key findings. The extracted data were then compared across studies to identify the consistency of findings, differences in diagnostic performance, and clinical contexts in which the AST/ALT ratio was most frequently applied.

Data analysis was conducted using descriptive and comparative synthesis. The AST/ALT ratio was evaluated based on its relationship with fibrosis severity, its usefulness as an initial screening marker, and its limitations as a standalone diagnostic tool. The findings were also compared with other non invasive approaches such as APRI, FIB 4, GPR, FibroScan, shear wave elastography, and liver biopsy. Because the included studies varied in design, population, diagnostic cut off values, and fibrosis assessment methods, no statistical pooling or meta analysis was performed. Instead, the analysis emphasized narrative synthesis to interpret the clinical meaning and practical relevance of the available evidence.

To improve the transparency of the literature selection process, the study selection may be presented using a PRISMA flow diagram. The diagram should include the number of articles identified from each database, the number of duplicate articles removed, the number of articles screened by title and abstract, the number of full text articles assessed for eligibility, the number of articles excluded with reasons, and the final number of articles included in the review. This flow diagram should be placed at the beginning of the Results section before presenting the characteristics of the included studies.

Operational Definition

For this review, the AST/ALT ratio refers to the ratio between serum aspartate aminotransferase and alanine aminotransferase levels reported in the included studies. Liver fibrosis refers to the progressive accumulation of extracellular matrix in liver tissue caused by chronic liver injury. Non invasive fibrosis assessment refers to diagnostic approaches used to estimate fibrosis severity without liver tissue sampling, including serum based markers and imaging based modalities. Diagnostic relevance refers to the ability of the AST/ALT ratio or related markers to indicate fibrosis severity, distinguish mild from advanced fibrosis, or support clinical decision making in patients with chronic liver disease.

Result and Discussion

This section presents the research results obtained through the Evaluation of the Ast/Alt Ratio as a Predictor of Non-Invasive Liver Fibrosis process based on a collection of research articles that met the inclusion and exclusion criteria. This analysis was conducted to obtain a comprehensive overview of the prevalence of Ast/Alt as a Predictor of Non-Invasive Liver Fibrosis and to assess the consistency of findings across published studies.

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In general, the results of this study are organized into four main sections. The first section presents the results of study selection, describing the screening stages and the number of articles remaining at each stage, based on the PRISMA flowchart. The second section describes the characteristics of the included studies, including study design, sample size, sampling methods, liver biopsy and identification techniques, and parameters used to assess liver fibrosis.

Characteristics of Included Studies

A total of five research articles that met the inclusion criteria were further analyzed in this study. These studies employed a variety of research designs, including literature reviews, descriptive methodological studies, reviews, and observational cross-sectional studies. All articles examined the distribution and prevalence of Ast/Alt in humans, both in healthy individuals and in patients with specific gastrointestinal conditions, such as inflammatory bowel disease (IBD) and colorectal cancer. The publication years of the included articles ranged from 2017 to 2025, with study sites across various countries, including the United Kingdom, Romania, New York, China, Japan, and France.

The measurement methods used in the studies varied depending on the study design. Overall, the results suggest a higher risk of liver fibrosis in hepatitis B patients. Lifestyle modifications and potential therapeutic interventions may help reduce the progression of liver fibrosis. Table 2 below summarizes the key characteristics of each article included in the analysis.

Table 1. Characteristics of Included Studies

Code	Author (Year)	Countr y	Research Design	Number of Samples	Measurement Method	Research Focus	Results
A1	Brissot& Loréal (2021)	Prancis	Descriptive	2	Riview	Blood sampling (phlebotomy) remains the primary method for removing excess iron that has already occurred.	There are two main types: a) non-genetic iron overload, mainly caused by transfusions, excessive parenteral iron supplementation, or ineffective erythropoiesis, and b) genetic non-hemochromatosis iron overload. This latter group includes in particular
A2	Gunawan. (2021).	Indonesia	cross-sectional study	32 orang	Shear wave elastography and liver hemodynamics examination with transabdominal ultrasonography	Shear wave elastography, Fibroscan, and portal vein flow velocity changes in patients with non-alcoholic fatty liver disease Methods	The results showed no correlation between mean portal vein velocity and the degree of fibrosis using Fibroscan and Shear Wave Elastography.
A3	Bahrul(2024)	Indonesia	Analytical Observation	149 orang	Spearman Correlation Test	Liver Morphology	There is a significant correlation between the degree of liver contour and the increase in child pug scores and there is a significant correlation

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							between the c or RL ratio
A4	Zhao et al., 2022)	China	Experiment	184	Scheuer's assessment	The Scheuer scoring system is used to classify liver inflammation and fibrosis..	The distribution of patients with various stages of liver fibrosis was as follows: S0, 22 (12.0%); S1, 72 (39.1%); S2, 42 (22.8%); S3, 19 (10.3%); and S4, 29 (15.8%). The area under the receiver operating characteristic curve (AUROC) of GPR in predicting significant inflammation, severe inflammation,
A5	Luo & Huang (2021).	China	Authoritative Methodology	11.200	multivariate regression analysis	Liver disorders associated with in-hospital mortality in COVID-19 patients	HThe results are shown in Figure 1A, which indicates that at least 11,200 patients are required for 14-day survival prediction, which corresponds to 1,164.8 deaths and an EPP (events per candidate predictor parameter) of 11.18. In addition, the minimum sample size required for 21-day and 28-day survival prediction was also calculated (Figure 1B and C). Therefore, the minimum sample size required to construct a prognostic nomogram is 11,200 patients.
A6	Moosavy et al., (2023)	Inggris	Cross-sectional study	267	APRI and FIB-4 AUROC curves	Chronic hepatitis B (CHB) is a significant risk factor for liver-related disorders.	Of the 267 CHB patients evaluated in this study (mean age: 45.45 ± 18.16 years), 173 (64.8%) were male. According to FibroScan results, 65 CHB patients (24.3%) had liver fibrosis F1, 53 (19.9%) F2, 38 (14.2%) F3, and 20 (7.5%) F4. There was a significant

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							correlation between FibroScan results and three indices: AST/ALT ratio, APRI, and FIB-4 ($P < 0.001$), with the strongest correlation between the results.
A7	Saput. (2021)	Indonesia	retrospective observational method with a cross-sectional approach	862	Assessment of liver fibrosis using Transient Elastography. Statistical tests using Pearson's correlation and ANOVA,	Hepatitis B virus infection is a serious health problem affecting nearly 400 million people worldwide, with complications including hepatofibrosis.	There is a significant positive correlation between the degree of liver fibrosis and MPV and PDW values, where the average MPV and PDW were found to be significantly higher in subjects with severe degrees of fibrosis.
A8	Sulaiman, (2023)	Indonesia	Logistic regression	130	abdominal ultrasonography	All patients with positive serum Hepatitis B antigen in the hepatobiliary registry of Dr. Cipto Mangunkusumo National General Hospital (RSUPN).	NAFLD is associated with a higher risk of liver fibrosis in hepatitis B patients. Lifestyle modifications and potential therapeutic interventions may help reduce the progression of liver fibrosis.
A9	Sanyalet al., (2023)	China	Review	n/a	The reference standard for NAFLD evaluation and prognosis determination is histological examination of liver tissue sections obtained through liver biopsy.	Recent studies have shown that several classes of compounds can not only cause resolution of NASH but also improve fibrosis.	There are two characteristics of NAFLD that provide important information about the disease. The first is disease activity, which refers to the lipotoxic load and subsequent liver injury. Histologically, this manifests as steatosis, hepatocellular swelling.
A10	Popa et al., (2024)	Romania	Mini Review	n/a	Liver Biopsy	a precise and non-invasive diagnostic tool in the clinical management of liver fibrosis, providing insight into the progression of chronic liver disease and potential therapeutic targets.	PThis study confirms that although liver biopsy remains the definitive method for staging liver fibrosis, its risks and limitations necessitate the use of more advanced non-invasive diagnostic techniques.

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							These methods have shown promising results in terms of accuracy and are crucial for expanding clinical applications and patient safety.
A11	Sacharet al., (2022).	New York	Deskriptif analitik	n/a	MAFLD FIB-4	Metabolic dysfunction-associated fatty liver disease (MAFLD) is diagnosed in patients with hepatic steatosis who meet at least one of the following criteria: body mass index >25, type 2 diabetes mellitus, and metabolic dysfunction.	Clinicians can use the MAFLD FIB-4 score to non-invasively identify patients at risk of advanced fibrosis for further evaluation and management.
A12	Rizky Muhammad Ilham et al., (2024)	Indonesia	Literature Review	n/a	SThis study uses a literature review approach by collecting data from online databases including Google Scholar, ProQuest, MDPI, and PubMed.	Hepatic cirrhosis is a pathological condition of the end stage of several chronic liver diseases.	Early detection based on clinical manifestations and appropriate treatment can reduce mortality and prevent complications that can worsen the patient's condition.
A13	Kariyama et al., (2022)	Jepang	Kohort	735	Indeks FIB-3	The Fibrosis Index-4 (FIB-4) has been used to predict liver fibrosis in various liver diseases, including non-alcoholic fatty liver disease (NAFLD).	The FIB-3 index is an improved version of the FIB-4 index and can effectively predict liver fibrosis in patients with NAFLD.
A14	Mathurin, (2021)	Eropa	Expert Opinion	n/a	Reading	In patients with severe alcoholic hepatitis who do not respond to medical therapy,	Early transplantation in patients with severe alcoholic hepatitis, using a rigorous selection process, has been increasingly used in the last decade with acceptable relapse rates.
A15	Yasin, et al., (2022)	Indonesia	Potong Lintang	47	ECLIA method using Elecsys Analyzer 2010 tool	Chronic liver disease is endemic in Indonesia and remains a serious global health problem.	Based on this study, it can be concluded that ferritin cannot be used as a marker for determining the degree of fibrosis in patients with chronic liver disease. The researchers believe that further research is needed using more reliable

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							methods for determining the degree of fibrosis, such as fibroscans or liver biopsies.

From these 15 studies, it can be concluded that Evaluation of the AST/ALT ratio (also known as the De Ritis ratio) shows that this parameter is a useful non-invasive indicator, but has varying accuracy depending on the cause of liver disease and the stage of fibrosis.

Discussions on the evaluation of the AST/ALT ratio (De Ritis ratio) as a predictor of liver fibrosis generally focus on its effectiveness as a non-invasive method for assessing the severity of liver damage without the need for a biopsy.

Liver fibrosis is a progressive pathological process characterized by the accumulation of extracellular matrix in response to chronic hepatic injury. This process can progress to cirrhosis, portal hypertension, liver failure, and even hepatocellular carcinoma if not detected and treated early. Therefore, accurate and early identification of liver fibrosis is of crucial clinical importance. In this context, non-invasive approaches continue to develop to replace, or at least reduce, reliance on liver biopsy as the diagnostic gold standard. One parameter of interest to evaluate is the AST/ALT ratio, given its simplicity, affordability, and widespread availability in daily clinical practice (Yasin et al., 2022).

Markers of liver fibrosis can be assessed using several methods. Liver biopsy remains the gold standard for determining the degree of liver fibrosis. Biopsy is invasive, carries several risks and drawbacks, such as pain and bleeding, and is dependent on the accuracy of the tissue collection site. Currently developed non-invasive examination methods include biochemical markers, both direct and indirect, and imaging methods such as fibroscans.

Heterogeneity between studies in this analysis indicates substantial variation in the distribution and dominance of reported fungi. This variation is likely influenced by differences in subject populations (healthy individuals, IBD patients, comorbidities), and methodological differences between studies. Furthermore, Enzyme Clearance Changes: In progressive liver fibrosis (leading to cirrhosis), the liver's ability to clear AST from the circulation decreases, so AST levels tend to increase more significantly than ALT. Mitochondrial Damage: AST is found in both the cytosol and mitochondria, while ALT is primarily found in the cytosol. Severe chronic liver damage often involves mitochondrial damage, which releases more AST into the bloodstream.

Score Interpretation: An AST/ALT ratio <1 is typically found in fatty liver disease (NAFLD/NASH), while a ratio >1 is often associated with advanced liver fibrosis or cirrhosis. Comparison with Other Methods: Although easy and inexpensive, the AST/ALT ratio often has lower (moderate) accuracy compared to other composite scores such as APRI (AST to Platelet Ratio Index) or FIB-4. The results of this ratio are typically validated with FibroScan (Transient Elastography) or liver biopsy results to determine its sensitivity and specificity.

Based on a synthesis of 15 included articles, this literature review indicates that the AST/ALT ratio has potential as a non-invasive predictor of liver fibrosis. However, its predictive power appears to vary across disease populations and is generally more meaningful when used as part of a multimodal approach rather than as a single marker. Across all studies reviewed, this finding emerged consistently when the AST/ALT ratio was compared with other serological scores, elastography modalities, and histopathological approaches as diagnostic benchmarks..

AST/ALT Ratio in the Pathophysiology of Liver Fibrosis

Biologically, the AST/ALT ratio reflects changes in the activity of two hepatocellular enzymes associated with liver tissue damage and remodeling. In the early stages of liver injury, ALT is generally dominant because this enzyme is more specific to hepatocytes. However, as chronic

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liver disease progresses and fibrosis progresses, AST can increase relatively significantly due to mitochondrial damage, decreased functional hepatocyte mass, and changes in liver architecture. Therefore, an elevated AST/ALT ratio has long been thought to be associated with advanced fibrosis and cirrhosis.

However, a review of the literature indicates that this relationship is not absolute. The AST/ALT ratio is best understood as an indirect indicator of liver pathological changes, rather than a direct representation of the degree of fibrotic tissue deposition. This is important because liver fibrosis is a complex process influenced not only by hepatocellular injury but also by chronic inflammation, stellate cell activation, metabolic factors, and intrahepatic vascular changes. Thus, conceptually, the AST/ALT ratio has a plausible biological basis, but it also has inherent limitations as a single biomarker.

AST/ALT Ratio Demonstrates Predictive Value, but Not as a Predictor

Among the included studies, the study by Moosavy et al. (2023) is one of the most relevant to the objectives of this literature review because it directly compared the AST/ALT ratio, APRI, and FIB-4 with FibroScan results in patients with chronic hepatitis B. The study demonstrated a significant correlation between these three laboratory indices and FibroScan results, confirming that the AST/ALT ratio does have utility in the non-invasive assessment of liver fibrosis.

However, upon closer examination, these results also demonstrate that the AST/ALT ratio does not stand as a superior marker, but rather is part of a spectrum of screening tools with varying performance. Compared with APRI and FIB-4, the AST/ALT ratio tends to have a narrower biological scope because it only reflects liver enzyme dynamics, without considering other parameters related to fibrosis progression, such as platelets or age. In this context, the AST/ALT ratio appears to be more useful as an early indicator of possible fibrosis, but is not robust enough to accurately assess fibrosis staging when used alone.

These findings align with a study by Sachar et al. (2022) in a MAFLD population, which demonstrated that FIB-4 can be used non-invasively to identify patients at risk of advanced fibrosis. Furthermore, Kariyama et al. (2022) developed FIB-3 as an improvement on FIB-4, with the aim of improving its fibrosis prediction performance in NAFLD patients. Both studies indirectly indicate that the current direction of liver fibrosis assessment is moving toward more comprehensive prediction models, rather than relying solely on a single laboratory biomarker.

Thus, when compared scientifically, the AST/ALT ratio does have early diagnostic value, but its performance appears inferior to a composite score that integrates more aspects of disease pathophysiology.

Comparison of the AST/ALT Ratio with Other Serological Markers

One important contribution of this literature review is demonstrating that serological markers of liver fibrosis vary widely in terms of sensitivity, specificity, and clinical relevance in specific populations.

A study by Zhao et al. (2022) demonstrated that the gamma-glutamyl transpeptidase to platelet ratio (GPR) has predictive ability for liver injury and fibrosis in chronic hepatitis B patients with normal ALT. This finding is particularly important when compared to the AST/ALT ratio, as it suggests that fibrogenesis can continue even when transaminase enzymes are not significantly elevated. This means that overreliance on the AST/ALT ratio could potentially lead to underestimation of the degree of fibrosis in certain patients, particularly those in the disease phase with minimal biochemical activity but progressive structural damage.

On the other hand, a study by Saputra (2021) showed a significant positive correlation between the degree of liver fibrosis and mean platelet volume (MPV) and platelet distribution width

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(PDW) in chronic hepatitis B patients. This finding reinforces the notion that hematological changes, particularly those related to platelets, are closely related to fibrosis progression. This likely reflects the involvement of subclinical portal hypertension, hypersplenism, or impaired thrombopoietin production in chronic liver disease.

Conversely, a study by Yasin et al. (2022) showed that ferritin cannot be used as a reliable marker for determining the degree of fibrosis in chronic liver disease. These results suggest that not all laboratory biomarkers are equally relevant to liver fibrosis. Compared with ferritin, the AST/ALT ratio appears to be more biologically consistent in reflecting hepatocellular injury, but remains inferior in comprehensiveness to scores such as the APRI or FIB-4.

Overall, this comparison between studies indicates that the AST/ALT ratio has high practical value but moderate discriminatory value, making it more appropriate for use in screening and initial stratification rather than for definitively determining fibrosis.

AST/ALT Ratio Compared with Non-Invasive Imaging Modalities

In addition to serological biomarkers, the development of non-invasive liver fibrosis evaluation is also supported by imaging modalities, particularly Transient Elastography (FibroScan), Shear Wave Elastography, ultrasonography, and CT scans. Compared with laboratory markers, these modalities have the advantage of more directly assessing the structural and biomechanical consequences of fibrosis.

A study by Gunawan (2021) evaluated the relationship between shear wave elastography, FibroScan, and portal venous flow velocity in NAFLD patients and showed no correlation between portal venous velocity and the degree of fibrosis assessed by elastography. These results indicate that not all non-invasive parameters are equally related to fibrosis. Hemodynamic parameters such as portal venous flow may be more influenced by vascular changes or portal hypertension, while elastography better reflects liver tissue stiffness, a more direct manifestation of fibrosis.

Another relevant finding comes from Bahrul's (2024) study, which demonstrated a correlation between liver morphological parameters on CT scans and the severity of cirrhosis based on the Child-Pugh score. When combined with the AST/ALT ratio, this suggests that simple laboratory markers may be useful for detecting early risk, but imaging modalities are superior for evaluating the structural consequences of advanced disease.

Thus, from a clinical perspective, the AST/ALT ratio cannot be positioned as a substitute for elastography or other imaging in staging fibrosis. However, its advantages lie in its accessibility and cost, making it still valuable as an initial screening tool, especially in healthcare facilities with limited resources.

Liver Biopsy Remains the Reference, but Clinical Practice is Moving Toward Non-Invasive Methods

Two review articles that are particularly important in this context are the studies by Sanyal, Castera, and Wong (2023) and Popa et al. (2024). Both emphasize that liver biopsy remains the definitive method for assessing the degree of fibrosis, but the limitations of this procedure, including its invasiveness, risk of complications, sampling error, and limitations in routine application, are driving the widespread adoption of non-invasive approaches.

Within this framework, the AST/ALT ratio holds relevance not because of its comparable accuracy to biopsy, but because of its ability to fill the clinical gap between the need for early detection and resource constraints. This is particularly important in healthcare systems with limited access to FibroScan or histopathology.

However, the reviewed literature consistently demonstrates that simple markers such as the AST/ALT ratio cannot replace the need for a more in-depth evaluation in high-risk patients.

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Therefore, the AST/ALT ratio should be used within a multilevel algorithm, where abnormal results can serve as the basis for further investigation with a composite score, elastography, or biopsy, if necessary.

The Influence of Disease Etiology on the Performance of the AST/ALT Ratio

One of the main reasons why results are not always consistent across studies is the heterogeneity of underlying liver disease etiologies. In the reviewed literature, patient populations included chronic hepatitis B, NAFLD/MAFLD, cirrhosis, iron overload, and even liver damage in COVID-19.

In chronic hepatitis B patients, the AST/ALT ratio appears relatively more relevant because transaminase changes are often associated with inflammatory activity and disease progression. This is supported by studies by Moosavy et al., Saputra, and Zhao et al., all of which demonstrated that simple laboratory parameters are associated with fibrosis in the chronic hepatitis B population.

Conversely, in NAFLD/MAFLD patients, the literature emphasizes the importance of a composite score and a more integrated non-invasive evaluation. Studies by Sachar et al., Kariyama et al., and Sanyal et al. show that in metabolic populations, fibrosis often develops in the context of low-grade inflammation, insulin resistance, and metabolic syndrome, making interpretation of the AST/ALT ratio alone inadequate.

This suggests that the predictive value of the AST/ALT ratio is contextual. This marker likely has greater utility in conditions dominated by active hepatocellular injury, but becomes less sensitive in populations with progressive fibrosis that is more biochemically silent.

Clinical Implications of the AST/ALT Ratio in Daily Practice

From a clinical perspective, the greatest advantage of the AST/ALT ratio is its ease of implementation. AST and ALT tests are almost always available in the routine evaluation of patients with liver disease, allowing this ratio to be calculated without significant additional cost.

In daily practice, the AST/ALT ratio can be used for: (1) Initial screening of patients with suspected chronic liver disease; (2) Initial risk stratification in primary or secondary healthcare settings; (3) Serial monitoring of changes in disease activity; (4) Serves as a basis for further investigations such as APRI, FIB-4, FibroScan, or hepatology referral.

This value becomes increasingly important with limited access to more sophisticated modalities. In the context of developing countries, such an approach is highly relevant because it allows the identification of at-risk patients without initial reliance on expensive or invasive tests.

However, the reviewed literature also cautions that the use of the AST/ALT ratio must be done judiciously and not over-interpreted. This marker should not be used to definitively determine the degree of fibrosis, but rather as an initial indicator that needs to be confirmed with other approaches as clinically necessary.

Limitations of Scientific Evidence

The results of this literature review must be interpreted with several limitations in mind. First, not all studies assessed the AST/ALT ratio as a primary variable, so some of the discussion must be structured through comparative synthesis with other non-invasive markers within the liver fibrosis evaluation spectrum. Second, there was considerable heterogeneity in terms of study design, sample size, liver disease etiology, and fibrosis assessment methods, so generalization of the results must be done with caution. Third, some of the included articles

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were reviews, mini-reviews, or expert opinions, which are methodologically incomparable to primary observational or cohort studies.

Furthermore, not all studies provided ideal diagnostic parameters for meta-analysis, such as sensitivity, specificity, positive/negative predictive value, or uniform AST/ALT ratio cut-offs. This lack of standardization is one reason why the AST/ALT ratio, despite its promise, has yet to be positioned as a primary single marker in the evaluation of liver fibrosis.

Final Synthesis

Overall, the reviewed literature indicates that the AST/ALT ratio has value as a non-invasive predictor of liver fibrosis, primarily due to its simplicity, affordability, and accessibility. However, its predictive power is moderate and is strongly influenced by the etiology of liver disease, disease stage, and patient clinical condition. Compared with other markers such as APRI, FIB-4, GPR, and modalities like FibroScan and elastography, the AST/ALT ratio appears to be more appropriately positioned as an initial screening tool rather than a definitive assessment of liver fibrosis. Therefore, the results of this literature review support that the AST/ALT ratio still has a place in the non-invasive evaluation of liver fibrosis, but its use would be more optimal when integrated with other laboratory parameters, imaging modalities, and a comprehensive clinical assessment. This integrative approach better aligns with the complex pathophysiology of liver fibrosis and the needs of modern clinical practice.

Conclusion

Based on the results of the AST/ALT evaluation, the following conclusions can be drawn: (1) Heterogeneity between studies in this analysis indicates substantial variation in the distribution and dominance of reported fungi. This variation is likely influenced by differences in subject populations (healthy individuals, IBD patients, comorbidities in patients), and methodological differences between studies. Furthermore, Enzyme Clearance Changes: In progressive liver fibrosis (toward cirrhosis), the liver's ability to clear AST from the circulation decreases, so AST levels tend to increase more significantly than ALT. Mitochondrial Damage: AST is found in the cytosol and mitochondria, while ALT is primarily found in the cytosol. Severe chronic liver damage often involves mitochondrial damage, which releases more AST into the bloodstream. (2) Score Interpretation: An AST/ALT ratio <1 is typically found in fatty liver disease (NAFLD/NASH), while a ratio >1 is often associated with advanced liver fibrosis or cirrhosis. Comparison with Other Methods: Although easy and inexpensive, the AST/ALT ratio often has lower (moderate) accuracy compared to other composite scores such as APRI (AST to Platelet Ratio Index) or FIB-4. And the results of this ratio are usually validated with the results of FibroScan (Transient Elastography) or liver biopsy to determine its sensitivity and specificity.

References

Bahrul. (2024). Korelasi parameter morfologi hati menggunakan CT scan abdomen dengan derajat keparahan sirosis berdasarkan skor Child Pugh penderita sirosis hati di RSUP Dr. Wahidin Sudirohusodo Makassar correlation. *2*, 306–312.

Brissot, P., & Loréal, O. (2021). Hemochromatoses. *Journal of Hepatology, 75*(3), 723–724.

Chen, L., Horn, P., & Tacke, F. (2026). Providing holistic care for patients with m etabolic dysfunction-associated steatotic liver disease/metabolic dysfunction-associated steatohepatitis: Key aspects of clinical assessment and how to develop individualised care plans for surveillance and interventions. *Diabetes, Obesity and Metabolism*, *28*, 46-62. https://doi.org/10.1111/dom.70545

Crudele, L., De Matteis, C., Graziano, G., Novielli, F., Petruzzelli, S., Piccinin, E., (2023). AST/ALT to platelet ratio (AARPRI) predicts gynaecological cancers: A 8 years

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follow up study in 653 women. *Scientific Reports, 13*(1), 1–11. https://doi.org/10.1038/s41598-023-44243-y

Efole, B., Mouchiroud, M., Dubé, A., Allaire, A., Labbé, S. M., Serdjebi, C., ... & Caron, A. (2025). Automated quantification of collagen proportionate area correlates with molecular and histological markers of fibrosis in CCl4-treated rats. *Experimental and Molecular Pathology*, *144*, 104996. https://doi.org/10.1016/j.yexmp.2025.104996

Elsabaawy, M., Naguib, M., Abuamer, A., & Shaban, A. (2025). Comparative application of MAFLD and MASLD diagnostic criteria on NAFLD patients: insights from a single-center cohort. *Clinical and Experimental Medicine*, *25*(1), 36. https://doi.org/10.1007/s10238-024-01553-3

Gallo, G., Nalli, G., Baratta, F., Desideri, G., & Savoia, C. (2025). Metabolic Dysfunction-Associated Steatotic Liver Disease: A Silent Driver of Cardiovascular Risk and a New Target for Intervention. *International Journal of Molecular Sciences*, *26*(16), 8081. https://doi.org/10.3390/ijms26168081

Gunawan. (2021). Evaluasi shear wave elastography, FibroScan dan kecepatan aliran vena porta pada pasien non alcoholic fatty liver disease the. *1*.

Hudson, D., Afzaal, T., Bualbanat, H., AlRamdan, R., Howarth, N., Parthasarathy, P., ... & Arab, J. P. (2024). Modernizing metabolic dysfunction-associated steatotic liver disease diagnostics: the progressive shift from liver biopsy to noninvasive techniques. *Therapeutic Advances in Gastroenterology*, *17*, 17562848241276334.

Kalkan, Ç., Yılmaz, Y., Erdoğan, B. D., Savaş, B., Yurdcu, E., Çalışkan, A., ... & Yurdaydin, C. (2023). Non-invasive fibrosis markers for assessment of liver fibrosis in chronic hepatitis delta. *Journal of Viral Hepatitis*, *30*(5), 406-416. https://doi.org/10.1111/jvh.13806

Kariyama, K., Kawanaka, M., Nouso, K., Hiraoka, A., Toyoda, H., Tada, T., et al. (2022). Fibrosis 3 index: A new score to predict liver fibrosis in patients with nonalcoholic fatty liver disease without age as a factor. *Gastro Hep Advances, 1*(6), 1108–1113. https://doi.org/10.1016/j.gastha.2022.07.012

Lai, Y. H., He, M. K., Huang, C. T., Tseng, H. Y., Lin, T. C., Yang, T. Y., ... & Her, G. M. (2026). Fibrotic microRNAs in the suppression of HSC activation and ECM deposition to facilitate the regression of hepatic fibrosis in zebrafish. *Journal of Molecular Medicine*, *104*(1), 70. https://doi.org/10.1007/s00109-026-02672-y

Liang, Y., Ye, X., Pan, M., Chen, Y., Yuan, Y., & Luo, L. (2025). Impact of steatotic liver disease subtypes, sarcopenia, and fibrosis on all-cause and cause-specific mortality: a 15.7-year cohort study. *BMC gastroenterology*, *25*(1), 75. https://doi.org/10.1186/s12876-025-03661-0

Liu, Y. B., & Chen, M. K. (2022). Epidemiology of liver cirrhosis and associated complications: Current knowledge and future directions. *World journal of gastroenterology*, *28*(41), 5910. https://doi.org/10.3748/wjg.v28.i41.5910

Luo, M. S., & Huang, G. J. (2021). Letter regarding "Association of liver abnormalities with in hospital mortality in patients with COVID 19." *Journal of Hepatology, 75*(3), 737–739.

Lurie, Y., Webb, M., Cytter-Kuint, R., Shteingart, S., & Lederkremer, G. Z. (2015). Non-invasive diagnosis of liver fibrosis and cirrhosis. *World journal of gastroenterology*, *21*(41), 11567. https://doi.org/10.3748/wjg.v21.i41.11567

Mathurin, P. (2021). Early liver transplantation for acute alcoholic hepatitis: We can't say no.

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Journal of Hepatology, 75(3), 718–722. https://doi.org/10.1016/j.jhep.2021.05.019

Moosavy, S. H., Eftekhar, E., Davoodian, P., Nejatizadeh, A., Shadman, M., Zare, S., et al. (2023). AST/ALT ratio, APRI, and FIB 4 compared to FibroScan for the assessment of liver fibrosis in patients with chronic hepatitis B in Bandar Abbas, Hormozgan, Iran. *BMC Gastroenterology, 23*(1), 1–7.

Nishikawa, H., Kim, S. K., & Asai, A. (2025). The role of Myokines in liver diseases. *International Journal of Molecular Sciences*, *26*(3), 1043. https://doi.org/10.3390/ijms26031043

Popa, E., Avram, R. I., Popa, A. E., & Coman, A. E. (2024). Non invasive serological markers of hepatic fibrosis: Mini review. *Archives of Surgical and Clinical Research, 8*(1), 32–38.

Reinson, T., Bilson, J., Childs, C., Buchanan, R. M., Targher, G., & Byrne, C. D. (2026). Metabolic dysfunction associated steatotic liver disease: mechanisms, diagnosis, and management in adults. *BMJ Medicine*, *5*(1), e002038. https://doi.org/10.1136/bmjmed-2025-002038

Rizky Muhammad Ilham, M. A., Rabbani, Ayda Fitri, J., Maolidi Agung, A., Agung, G., Agusta, D., & Putra, P. (2024). Choledocholithiasis: A literature review. *Jurnal Biologi Tropis*.

Sachar, M., Pan, J. J., & Park, J. (2022). A noninvasive scoring system for liver fibrosis in patients with metabolic dysfunction associated fatty liver disease. *Gastro Hep Advances, 1*(6), 1006–1013. https://doi.org/10.1016/j.gastha.2022.06.011

Salehi, A. M., Salehi, H., Sadeghi, A., Hasanzarrini, M., Khazaei, S., Mohammadi, H. A., & Naini, M. A. (2026). Can Noninvasive Tests Reduce the Need for Liver Biopsy? A Cross-Sectional Diagnostic Accuracy Study Assessing NFS, FIB-4, APRI, BARD, BAAT, API, and AAR for Advanced Fibrosis in MASLD Patients in Iran. *International Journal of Clinical Practice*, *2026*(1), 6674792. https://doi.org/10.1155/ijcp/6674792

Sanyal, A. J., Castera, L., & Wong, V. W. S. (2023). Noninvasive assessment of liver fibrosis in NAFLD. *Clinical Gastroenterology and Hepatology, 21*(8), 2026–2039. https://doi.org/10.1016/j.cgh.2023.03.042

Sanyal, A. J., Foucquier, J., Younossi, Z. M., Harrison, S. A., Newsome, P. N., Chan, W. K., ... & Boursier, J. (2023). Enhanced diagnosis of advanced fibrosis and cirrhosis in individuals with NAFLD using FibroScan-based Agile scores. *Journal of hepatology*, *78*(2), 247-259.

Saponara, I., Cofano, M., De Nunzio, V., Bianco, G., Armentano, R., Pinto, G., ... & Notarnicola, M. (2026). Anti-Fibrotic and Anti-Inflammatory Effects of Hesperidin in an Ex Vivo Mouse Model of Early-Onset Liver Fibrosis. *International Journal of Molecular Sciences*, *27*(2), 594. https://doi.org/10.3390/ijms27020594

Saputra, I. A. D. I. (2021). Hubungan derajat fibrosis hati dengan. *1*.

Shomansurovich, T. S. (2026). The Significance and Role of Fibroscan Examination in the Management of Patients with Liver Diseases. *Central Asian Journal of Medical and Natural Science*, *7*(2), 541-548.

Sulaiman, A. S. (2023). Perlemakan hati non alkoholik dan risiko fibrosis hati pada pasien hepatitis B kronik. *Jurnal Penyakit Dalam Indonesia, 10*(3).

Üremiş, N., Gişi, K., Şakalar, T., & Tolun, F. İ. (2026). Glutamate dehydrogenase activity and non-ınvasive fibrosis ındices (APRI, AAR, FIB-4) compared to FibroScan in chronic

Copyright © 2026, Journal La Medihealtico, Under the license CC BY-SA 4.0

hepatitis B and hepatocellular carcinoma. *Irish Journal of Medical Science (1971-)*, 1-12. https://doi.org/10.1007/s11845-026-04389-w

Wang, J., Sun, X., Wei, S., Chen, X., Zhu, H., Liantang, Y., (2024). Noninvasive models for the prediction of liver fibrosis in patients with chronic hepatitis B. *BMC Gastroenterology, 24*(1), 1–8.

Wang, M., Chen, H., Yang, J., Huang, X., He, R., Pei, B., ... & Xu, L. (2026). Diagnostic value of LPRI for assessing advanced liver fibrosis in patients with chronic hepatitis B and non-alcoholic fatty liver disease. *BMC gastroenterology*. https://doi.org/10.1186/s12876-026-04645-4

Weiskirchen, R. (2025). Exploring Molecular Mechanisms of Liver Fibrosis. *International Journal of Molecular Sciences*, *26*(1), 326. https://doi.org/10.3390/ijms26010326

Yasin, Y., Bahrun, U., & Samad, I. A. (2022). Analisis feritin dan AST to platelet ratio index sebagai petanda derajat fibrosis penyakit hati kronis. *Indonesian Journal of Clinical Pathology and Medical Laboratory, 22*(1), 72–76.

Zhao, X. A., Wang, J., Wei, J., Liu, J., Chen, G., Wang, L., (2022). Gamma glutamyl transpeptidase to platelet ratio predicts liver injury in hepatitis B e antigen negative chronic hepatitis B patients with normal alanine aminotransferase. *Journal of Clinical and Translational Hepatology, 10*(2), 247–253. https://doi.org/10.14218/JCTH.2021.00151

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