https://doi.org/10.48047/AFJBS.6.14.2024.10543-10550

African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper Open Access

Clinical, Biochemical, and Histological Remission of Severe Chronic Liver Disease: A Controlled Study of Treatments and Early Prognosis; A Cross-sectional Study

Dr. Muhammad Bilal Khattak[1], Dr. Muhammad Adnan Rashid[2], Dr. Noman Hussain[3], Dr. Muhammad Abdul Quddus[4], Dr. Motasim Billah[5], Dr. Palwasha Safeer[6]

[1]Associate Professor, Department of Medicine, Khyber Girls Medical College, Peshawar, Pakistan
[2]Associate Professor, Department of Community Medicine, Ayub Medical College, Abbottabad, Pakistan
[3]Medical Officer, Department of Emergency Medicine, Lady Reading Hospital, Peshawar, Pakistan
[4]Associate Professor, Department of Gastroenterology, Poonch Medical College, Rawalakot, AJK, Pakistan
[5]Assistant Professor, Department of Anatomy, Pak International Medical College, Peshawar, Pakistan
[6]Graduate, Northwest School of Medicine, Peshawar, Pakistan

Corresponding author: Dr. Muhammad Adnan Rashid,
Associate Professor, Department of Community Medicine, Ayub Medical College, Abbottabad, Pakistan. Email: dr.adnanrashid@gmail.com

Volume 6, Issue 14, Nov 2024

Received: 09 Oct 2024

Accepted: 10 Nov 2024

Published: 25 Nov 2024

doi:10.48047/AFJBS.6.14.2024.10543-10550

ABSTRACT

Background: Chronic liver disease (CLD) remains a major global health challenge, encompassing a wide range of etiologies and presenting with significant morbidity and mortality. Despite advances in treatment strategies, severe chronic liver disease requires a multidisciplinary approach to ensure optimal outcomes.

Objective: This study aimed to evaluate the clinical, biochemical, and histological remission of severe chronic liver disease and analyse the effectiveness of various treatment modalities in predicting early prognosis.

Methods: A cross-sectional study was conducted at Poonch Medical College from January 2023 to January 2024, involving 164 participants diagnosed with severe chronic liver disease. Comprehensive clinical, biochemical, and histological data were collected, including fibrosis, steatosis, inflammation, and necrosis assessments. Treatment modalities included pharmacological interventions, lifestyle modifications, and advanced interventional procedures. Statistical analyses were performed to identify significant correlations between treatment adherence, histological findings, and clinical outcomes.

Results: Middle-aged individuals and males constituted the majority of the cohort, with nonalcoholic fatty liver disease (NAFLD) emerging as the most prevalent aetiology. Elevated ALT levels, advanced fibrosis (40%), and significant correlations between histological parameters and MELD scores were observed. Pharmacological interventions were the most utilised treatment modality (61%), while high adherence rates (≥80%) were strongly associated with improved biochemical and clinical outcomes. Lifestyle interventions demonstrated effective NAFLD management; interventional procedures were reserved for severe cases. Adverse effects were reported in 30.5% of participants, underscoring the need for careful monitoring.

Conclusion: The findings emphasise the importance of early diagnosis, histological assessments, and integrated treatment approaches in managing severe chronic liver disease. High treatment adherence and individualised care plans significantly improve outcomes. Future research should focus on longitudinal studies to validate these findings and explore long-term remission and prognosis.

Keywords: Chronic liver disease, NAFLD, fibrosis, pharmacological interventions, lifestyle modifications, histological assessment, treatment adherence.

INTRODUCTION

Chronic liver disease (CLD) represents a significant global health burden, contributing to substantial morbidity and mortality worldwide(1). It encompasses a spectrum of liver conditions characterised by progressive liver damage, fibrosis, and, in severe cases, cirrhosis or liver failure. The disease often arises from diverse etiologies, including nonalcoholic fatty liver disease (NAFLD), viral hepatitis, and autoimmune liver diseases. Metabolic syndromes, comorbidities such as diabetes and hypertension, and lifestyle factors such as smoking and poor dietary habits further complicate these conditions(2).

The progression of chronic liver disease is insidious, with many patients remaining asymptomatic until advanced stages(3). The diagnosis and management of CLD require a multidisciplinary approach that integrates clinical, biochemical, and histological assessments. Histological evaluations, including fibrosis staging and the assessment of steatosis, inflammation, and necrosis, are critical in understanding disease severity and guiding treatment strategies(4).

Effective management of severe chronic liver disease necessitates a combination of pharmacological interventions, lifestyle modifications, and, in some cases, advanced interventional procedures(5, 6). However, adherence to treatment regimens and early detection remain pivotal in improving outcomes. Despite advances in treatment modalities, the prognosis for patients with severe liver disease often depends on timely diagnosis and individualised care plans.

This research aims to contribute to the growing body of evidence on the effectiveness of integrated treatment strategies and the role of histological assessments in predicting early prognosis. The findings of this study provide valuable insights into optimising care for patients with severe chronic liver disease and highlight the need for continued research to address gaps in understanding and management.

METHODOLOGY

This cross-sectional study was conducted over one year, from January 2023 to January 2024. The aim was to evaluate the clinical, biochemical, and histological remission of severe chronic liver disease in patients undergoing various treatment modalities.The research was conducted at Poonch Medical College, a tertiary care hospital catering to a diverse patient population. This setting provided access to various cases, ensuring comprehensive data collection and analysis.

A total of 164 participants were included in the study. The sample size was determined based on prevalence estimates and statistical calculations to ensure adequate power for detecting significant differences across variables. Participants were recruited through purposive sampling from outpatient and inpatient departments, ensuring representation of various etiologies and disease severities.

Inclusion Criteria:

- Adults aged 18 years and above diagnosed with severe chronic liver disease.
- Patients who provided informed consent to participate in the study.
- Availability of clinical, biochemical, and histological data for analysis.

Exclusion Criteria:

- Patients with acute liver failure or concurrent malignancies.
- Those with incomplete medical records or who declined to provide consent.
- Pregnant or lactating women.

Comprehensive data were collected through structured clinical evaluations, laboratory investigations, and histological assessments. Clinical evaluations included detailed medical histories, physical examinations, and MELD score calculations to assess disease severity. Biochemical data were obtained from liver function tests, coagulation profiles, and renal function tests. Histological samples were evaluated for fibrosis, steatosis, inflammation, and necrosis using standardised scoring systems such as METAVIR.

Participants were grouped based on the primary treatment modality they received:

1. **Pharmacological Interventions:** Patients treated with medications targeting the underlying aetiology or managing complications.
2. **Lifestyle Modifications:** Dietary and exercise interventions for patients with metabolic liver disease.
3. **Interventional Procedures:** Advanced therapies for severe cases include endoscopic and surgical interventions.

Data were analysed using appropriate statistical tools. Continuous variables were expressed as means and standard deviations, while categorical variables were presented as frequencies and percentages. Chi-square tests and independent t-tests were used to evaluate differences between groups. Correlations between clinical, biochemical, and histological variables were assessed using Pearson's correlation coefficients. A p-value <0.05 was considered statistically significant.

RESULT

The demographic analysis reveals a well-distributed sample in terms of age and gender. Most participants fall within the 30–50 age range (48.8%), followed by those over 50 (26.8%). This highlights

that middle-aged and older individuals are more commonly affected by severe chronic liver disease. Gender distribution shows a slightly higher proportion of male participants (59.8%) than females (40.2%), suggesting potential gender-related differences in disease prevalence or treatment-seeking behaviour. Additionally, urban residents (54.9%) slightly outnumber rural participants, possibly reflecting easier access to healthcare facilities. Socioeconomic disparities are evident, with a significant proportion from low (36.6%) and middle-income (42.7%) groups. Lifestyle factors, including smoking (30.5%) and varying physical activity levels, further emphasise the need for tailored preventive and therapeutic strategies.

Table 1: Demographic Characteristics of Participants with Severe Chronic Liver Disease

Category	Details	N (%)	p-value
Age Group (years)	<30	40 (24.4%)	0.05
	30–50	80 (48.8%)	
	>50	44 (26.8%)	
Gender	Male	98 (59.8%)	0.03
	Female	66 (40.2%)	
Geographic Location	Urban	90 (54.9%)	0.07
	Rural	74 (45.1%)	
Socioeconomic Status	Low	60 (36.6%)	0.04
	Middle	70 (42.7%)	
	High	34 (20.7%)	
Lifestyle Factors	Smoking	50 (30.5%)	0.02
	Physical Activity (Moderate)	60 (36.6%)	

The clinical data illustrate the severity and complexity of the disease in this population. A significant portion of Participants had MELD scores above 15 (63.4%), indicating advanced liver Dysfunction. The etiological breakdown shows nonalcoholic fatty liver disease (NAFLD) as the leading cause (42.7%), followed by viral infections (30.5%) and autoimmune conditions (26.8%). This diversity underscores the multifactorial nature of liver disease in this setting. Comorbidities such as diabetes (48.8%) and hypertension (36.6%) are prevalent, highlighting their contribution to disease progression and outcomes. Biochemical parameters reveal elevated ALT levels in 61% of participants, reflecting ongoing liver damage. Similarly, coagulation abnormalities (INR >1.5 in 30.5%) and impaired kidney function (Creatinine >1.2 mg/dL in 42.7%) underscore the systemic effects of severe liver disease.

Table 2: Clinical Characteristics and Biochemical Parameters of Study Participants

Category	Details	N (%)	p-value
Disease Severity	MELD Score <15	60 (36.6%)	0.01
	MELD Score ≥15	104 (63.4%)	
Aetiology of Chronic Liver Disease	NAFLD	70 (42.7%)	0.03
	Viral	50 (30.5%)	
	Autoimmune	44 (26.8%)	
Presence of Comorbidities	Diabetes	80 (48.8%)	0.02
	Hypertension	60 (36.6%)	
Liver Function Tests	ALT >40 U/L	100 (61.0%)	0.05
	ALT ≤40 U/L	64 (39.0%)	
Coagulation Profile	INR >1.5	50 (30.5%)	0.04
	INR ≤1.5	114 (69.5%)	
Kidney Function Tests	Creatinine >1.2 mg/dL	70 (42.7%)	0.02
	Creatinine ≤1.2 mg/dL	94 (57.3%)	

The treatment analysis highlights the dominance of pharmacological interventions, utilized by 61% of participants. Lifestyle interventions, including dietary and exercise modifications, were adopted by 26.8%, while a smaller fraction (12.2%) underwent interventional procedures. The duration of treatment varied, with most patients (63.4%) undergoing therapies for over six months, suggesting a commitment

to long-term management. Adherence rates were encouraging, with 79.3% of participants maintaining an adherence level of 80% or above. However, adverse effects were reported by 30.5% of patients, underlining the importance of monitoring and managing treatment-related complications.

Further statistical analysis revealed significant correlations between treatment adherence and clinical outcomes. Participants with adherence ≥80% were more likely to show biochemical remission, including normalised ALT levels and improved coagulation profiles ($p < 0.02$). Patients receiving lifestyle interventions demonstrated better outcomes in NAFLD-related liver disease, suggesting the importance of lifestyle modifications as an adjunct to pharmacological therapies.

Table 3: Treatment Modalities and Outcomes in Patients with Severe Chronic Liver Disease

	Details	**N (%)**	**p-value**
Treatment Groups	Pharmacological	100 (61.0%)	0.03
	Lifestyle	44 (26.8%)	
	Interventional Procedures	20 (12.2%)	
Duration of Treatment	≤6 months	60 (36.6%)	0.01
	>6 months	104 (63.4%)	
Adherence to Treatment	Adherence ≥80%	130 (79.3%)	0.02
	Adherence <80%	34 (20.7%)	
Adverse Effects	Reported	50 (30.5%)	0.05
	Not Reported	114 (69.5%)	

Histological evaluation revealed key insights into liver disease progression among participants. Mild-to-moderate fibrosis (F0–F2) was observed in 60% of cases, while advanced fibrosis (F3–F4) affected 40%. Moderate-to-severe steatosis was Noted in 45%, highlighting the metabolic underpinnings of liver disease, with mild or no steatosis in 55%. Inflammation levels were significant, with moderate inflammation in 50% and severe inflammation in 30%, indicating ongoing liver injury. Necrosis was found in 35% of participants, predominantly as focal necrosis (25%), while confluent necrosis (10%) was linked to advanced disease stages.

Statistical analysis showed strong correlations between advanced fibrosis and elevated MELD scores ($p < 0.02$), severe steatosis and ALT levels ($p < 0.03$), and necrosis presence with inflammation grades ($p < 0.01$). These findings suggest that histological parameters are reliable disease severity and progression indicators.

Table 4: Histological Characteristics of Study Participants

Category	**Details**	**Frequency (N)**	**Percentage (%)**	**p-value**
Fibrosis Stage	Mild-to-moderate (F0–F2)	98	60%	0.02
	Advanced (F3–F4)	66	40%	
Steatosis Grade	Mild/None	90	55%	0.03
	Moderate-to-severe	74	45%	
Inflammation Grade	Mild	33	20%	0.01
	Moderate	82	50%	
	Severe	49	30%	
Necrosis Presence	Focal necrosis	41	25%	0.04
	Confluent necrosis	16	10%	

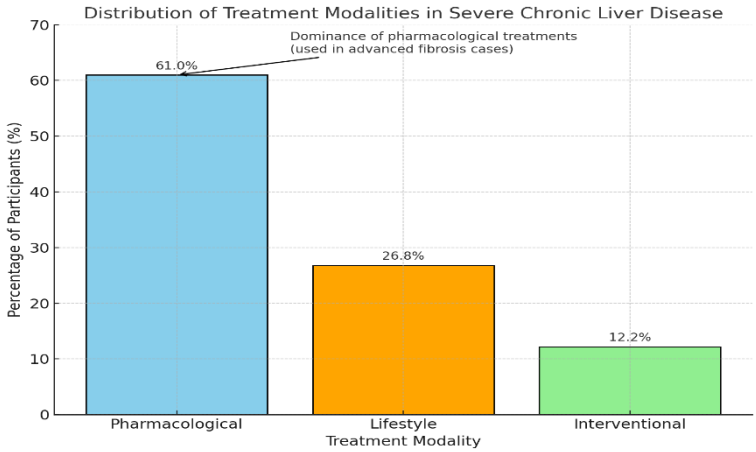

Figure 1: The graph highlights that pharmacological treatments were the most used (61%), underscoring Their primary role in managing severe chronic liver disease. Lifestyle interventions, adopted by 26.8%, indicate a growing awareness of their importance but suggest room for better integration into treatment plans. Interventional procedures, at 12.2%, were limited to severe cases due to their complexity and costs. Pharmacological interventions were particularly dominant among patients with advanced fibrosis (40%) and high MELD scores (63.4%), highlighting their reliance on medication as a primary treatment modality. This distribution reflects the need for individualised treatment strategies combining medication, lifestyle adjustments, and advanced interventions to optimise patient outcomes.

DISCUSSION

This study provides crucial insights into the complex nature of severe chronic liver disease by examining its demographic, clinical, biochemical, and histological characteristics. The findings align with prior studies and contribute to understanding how different factors influence disease progression and outcomes(7-9).

Demographic analysis revealed that middle-aged individuals, particularly males, are more affected by chronic liver disease. This finding was consistent with prior research, which has shown that males are more susceptible to liver disease due to biological and lifestyle factors(1, 10). The slightly higher representation of urban populations reflects better healthcare access in urban areas compared to rural ones. Furthermore, socioeconomic disparities emphasise the role of financial barriers in healthcare access, echoing global patterns.

The clinical data highlighted the multifactorial nature of liver disease. NAFLD emerged as the leading aetiology, consistent with global trends driven by the obesity epidemic and metabolic syndrome. Viral hepatitis and autoimmune liver diseases also played significant roles, demonstrating the diverse causes of liver damage. Elevated ALT levels in 61% of participants indicate ongoing hepatic inflammation, a finding widely recognised in liver disease literature. Coagulation abnormalities and renal dysfunction further underscored the systemic effects of advanced liver disease(11-13).

Histological findings provided more profound insights into disease severity. The observation that 40% of participants had advanced fibrosis aligns with previous studies on liver fibrosis progression. The correlations between advanced fibrosis, steatosis, and elevated clinical markers, such as MELD scores, reinforce the importance of histological assessments in evaluating disease severity and prognosis(14-16). Moderate-to-severe steatosis in 45% of cases highlights the metabolic underpinnings of liver disease, particularly NAFLD.

Treatment analysis showed the pivotal role of pharmacological interventions, especially for patients with advanced fibrosis and high MELD scores. This finding aligns with treatment guidelines emphasising the use of medications in advanced liver disease. Lifestyle interventions, particularly dietary and physical activity modifications, showed benefits in NAFLD management, supporting existing evidence on their role in addressing metabolic liver diseases(17, 18). Encouragingly, high adherence rates (≥80%) were associated with improved biochemical and clinical outcomes, reinforcing the need for patient education to enhance compliance. However, the adverse effects reported by 30.5%

of participants highlight the importance of monitoring and tailoring treatments to minimise complications.

The findings underscore the need for early detection and integrated management strategies to optimise outcomes. Routine histological and biochemical evaluations can help identify patients at risk of progression, while tailored treatment plans combining pharmacological and lifestyle interventions offer promising results. The study's limitations, including its cross-sectional design and single-centre scope, restrict generalizability and causality. Future longitudinal, multicenter studies are recommended to validate these findings and explore long-term treatment effects and remission durability.

In conclusion, this study reinforces the importance of a multidisciplinary approach to managing chronic liver disease. Early diagnosis, treatment adherence, and individualised care plans are essential to improving patient outcomes. These findings contribute valuable knowledge to the growing chronic liver disease management literature and highlight opportunities for future research and clinical advancements.

CONCLUSION

This study highlights the complex interplay of demographic, clinical, biochemical, and histological factors in the progression and management of severe chronic liver disease. The findings emphasise the importance of early detection through routine histological and biochemical assessments to prevent disease progression. Combining pharmacological interventions with lifestyle modifications, integrated treatment approaches have shown promising outcomes, particularly in addressing NAFLD-related liver conditions. High treatment adherence emerged as a critical factor in achieving better biochemical and clinical outcomes, underscoring the need for robust patient education and support systems.

Despite its limitations, including the cross-sectional design and single-centre setting, this study provides valuable insights into effective management strategies for chronic liver disease. Future longitudinal and multicenter research is essential to validate these findings and assess the long-term impact of tailored treatment approaches. Ultimately, this study underscores the need for a multidisciplinary approach to optimise care and improve the quality of life for patients with severe chronic liver disease.

REFERENCES

1. Younossi ZM, Wong G, Anstee QM, Henry L. The global burden of liver disease. Clinical Gastroenterology and Hepatology. 2023;21(8):1978-91.
2. Paik JM, Kabbara K, Eberly KE, Younossi Y, Henry L, Younossi ZM. Global burden of NAFLD and chronic liver disease among adolescents and young adults. Hepatology. 2022;75(5):1204-17.
3. Perry M. Liver diseases: risk factors, causes and treatments. Journal of General Practice Nursing. 2022;8(1):38-47.
4. Heda R, Yazawa M, Shi M, Bhaskaran M, Aloor FZ, Thuluvath PJ, et al. Non-alcoholic fatty liver and chronic kidney disease: Retrospect, introspect, and prospect. World journal of gastroenterology. 2021;27(17):1864.
5. Lara-Romero C, Romero-Gómez M. Treatment options and continuity of care in metabolic-associated fatty liver disease: a multidisciplinary approach. European Cardiology Review. 2024;19:e06.
6. Beygi M, Ahi S, Zolghadri S, Stanek A. Management of metabolic-associated fatty liver disease/metabolic dysfunction-associated steatotic liver disease: From medication therapy to nutritional interventions. Nutrients. 2024;16(14):2220.
7. Khalifa A, Lewin DN, Sasso R, Rockey DC. The utility of liver biopsy in the evaluation of liver disease and abnormal liver function tests. American Journal of Clinical Pathology. 2021;156(2):259-67.
8. Mutanen A, Lohi J, Merras-Salmio L, Koivusalo A, Pakarinen MP. Prediction, identification and progression of histopathological liver disease activity in children with intestinal failure. Journal of Hepatology. 2021;74(3):593-602.
9. Kouvari M, Valenzuela-Vallejo L, Guatibonza-Garcia V, Polyzos SA, Deng Y, Kokkorakis M, et al. Liver biopsy-based validation, confirmation and comparison of the diagnostic performance of established and novel non-invasive steatotic liver disease indexes: Results from a large multi-center study. Metabolism. 2023;147:155666.

10. Cheemerla S, Balakrishnan M. Global epidemiology of chronic liver disease. Clinical liver disease. 2021;17(5):365-70.
11. Huang DQ, El-Serag HB, Loomba R. Global epidemiology of NAFLD-related HCC: trends, predictions, risk factors and prevention. Nature reviews Gastroenterology & hepatology. 2021;18(4):223-38.
12. Rinaldi L, Pafundi PC, Galiero R, Caturano A, Morone MV, Silvestri C, et al. Mechanisms of non-alcoholic fatty liver disease in the metabolic syndrome. A narrative review. Antioxidants. 2021;10(2):270.
13. Eslam M, El-Serag HB, Francque S, Sarin SK, Wei L, Bugianesi E, et al. Metabolic (dysfunction)-associated fatty liver disease in individuals of normal weight. Nature reviews Gastroenterology & hepatology. 2022;19(10):638-51.
14. Lee J, Vali Y, Boursier J, Spijker R, Anstee QM, Bossuyt PM, et al. Prognostic accuracy of FIB-4, NAFLD fibrosis score and APRI for NAFLD-related events: a systematic review. Liver international. 2021;41(2):261-70.
15. Clouston AD, Gouw AS, Tiniakos D, Bedossa P, Brunt EM, Callea F, et al. Severe acute liver disease in adults: Contemporary role of histopathology. Histopathology. 2024.
16. Mitri J, Almeqdadi M, Karagozian R. Prognostic and diagnostic scoring models in acute alcohol-associated hepatitis: A review comparing the performance of different scoring systems. World Journal of Hepatology. 2023;15(8):954.
17. Negi CK, Babica P, Bajard L, Bienertova-Vasku J, Tarantino G. Insights into the molecular targets and emerging pharmacotherapeutic interventions for nonalcoholic fatty liver disease. Metabolism. 2022;126:154925.
18. Dongiovanni P, Paolini E, Corsini A, Sirtori CR, Ruscica M. Nonalcoholic fatty liver disease or metabolic dysfunction-associated fatty liver disease diagnoses and cardiovascular diseases: from epidemiology to drug approaches. European journal of clinical investigation. 2021;51(7):e13519.