RISK FACTORS ASSOCIATED WITH CHRONIC LIVER DISEASE AND THE IMPACT OF PATIENT AWARENESS: A CROSS-SECTIONAL STUDY AT A TERTIARY CARE TEACHING HOSPITAL

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Abstract

Chronic liver disease (CLD) is a major global health problem associated with substantial morbidity and mortality. This study aimed to identify the demographic, clinical, laboratory, and lifestyle-related risk factors associated with CLD and evaluate the importance of patient awareness in disease prevention. A prospective cross-sectional study was conducted over six months (October 2025–March 2026) among 181 patients diagnosed with chronic liver disease at a tertiary care teaching hospital in Tirupati. Data were collected using a validated questionnaire, patient interviews, and case record reviews. Demographic characteristics, clinical presentation, lifestyle habits, laboratory parameters, and medical history were assessed. Statistical analysis was performed using descriptive statistics and the Chi-square test, with $p < 0.05$ considered statistically significant. Most participants were males (81%) aged 31–45 years (47%). Alcohol consumption (70%), tobacco use (32%), low physical activity (48%), and mixed dietary habits (96%) were common lifestyle risk factors. Diabetes mellitus (27.6%) and hypertension (26.5%) were the predominant comorbidities. Abdominal pain (79%), abdominal swelling (64.6%), and fatigue (54.7%) were the most frequent clinical manifestations. Elevated bilirubin, SGOT, and alkaline phosphatase levels indicated significant hepatic dysfunction. Significant associations were observed between alcohol consumption and hepatitis status, SGPT, and SGOT levels, while age was significantly associated with comorbidities and smoking with symptom severity ($p < 0.05$). Patient education regarding lifestyle modification and disease prevention was provided following data collection. In conclusion, Early identification of high-risk individuals, routine screening, and targeted patient awareness programs are essential to reduce disease progression and improve clinical outcomes.

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Introduction:

Chronic liver disease (CLD) is associated significantly to morbidity, mortality, and healthcare costs globally, making it a significant public health concern. It includes a range of progressive liver diseases marked by cirrhosis, fibrosis, hepatic inflammation, and eventually liver failure[1,2]. Cirrhosis and hepatocellular carcinoma are the two main causes of liver-related mortality, according to recent estimates that liver illnesses cause around two million deaths worldwide each year. Due to shifting lifestyle habits, rising rates of metabolic diseases, and ongoing exposure to avoidable risk factors, the burden of CLD is rising quickly, especially in low- and middle-income nations like India[3,4,5].

Over the past 20 years, there has been a significant shift in the aetiology of chronic liver disease. Metabolic dysfunction-associated steatotic liver disease (MASLD), formerly known as non-alcoholic fatty liver disease (NAFLD), has become the most prevalent cause of chronic liver disease globally, although chronic hepatitis B and C infections and excessive alcohol consumption are still significant contributing factors[1,6,7]. The rising incidence of CLD has been significantly influenced by the rising prevalence of obesity, type 2 diabetes mellitus, dyslipidaemia, hypertension, sedentary lifestyle, unhealthy eating habits, tobacco use, and poor sleep quality. Hepatic steatosis, inflammation, fibrosis, and the development of cirrhosis are all accelerated by these changeable lifestyle factors[2,6,8,9].

Early-stage CLD patients sometimes show no symptoms, delaying diagnosis and causing severe consequences such portal hypertension, ascites, hepatic encephalopathy, variceal haemorrhage, and hepatocellular cancer to manifest[10,11,12]. Early detection of those at risk is crucial for stopping the progression of the disease and enhancing long-term clinical results since early liver damage may be reversed. To identify high-risk populations and direct preventative measures, a thorough evaluation

of demographic traits, lifestyle choices, comorbid diseases, family history, and biochemical anomalies is essential[13]. The current study was aimed to assess the clinical, laboratory, lifestyle, and demographic risk variables linked to chronic liver disease in patients receiving treatment at a tertiary care teaching hospital. It is anticipated that the results will assist programs to lessen the burden of chronic liver disease, encourage patient education, help identify high-risk individuals early, and offer evidence for specific preventive treatments[14,15,16].

Materials and Methodology

Over a duration of six months, from October 2025 to March 2026, a prospective cross-sectional study was carried out in the general medicine department of Sri Venkateswara Ramnarain Ruia Government General Hospital (SVRRGGH), Tirupati. Patients who were 18 years of age or older who had a diagnosis of chronic liver disease based on imaging results, laboratory tests, and clinical evaluation were eligible to be included. The study included patients who were willing to participate and gave written informed consent, whether or not they had related comorbidities. The study excluded patients who were critically ill, unable to communicate, unwilling to participate, recipients of liver transplants, and women who were pregnant or lactating.

Approximately 200 liver disease patients were contacted during the trial period; 181 of them gave their consent to participate and were included in the final analysis. Direct patient interviews and a review of patient case records were used to gather the data using a specially created and verified questionnaire. The questionnaire was divided into five sections: presenting clinical symptoms; medical history (comorbidities, long-term medication use, hepatitis status, blood transfusion history, and family history of liver disease); lifestyle and social habits (dietary pattern, alcohol consumption, smoking or tobacco use, physical activity, and sleep pattern); and laboratory investigations (liver function tests, lipid profile, and other pertinent biochemical parameters). All participants received an educational intervention to promote awareness of chronic liver disease after data collection. Counselling on good eating habits, abstaining from alcohol and tobacco, the value of consistent exercise, medication adherence, early detection of illness symptoms, and lifestyle changes required to stop the disease's progression were all part of the awareness program. Key health messages were reinforced using a patient information brochure and visual instructional materials, and participants were encouraged to ask questions throughout the counselling session.

Prior to the study's start, the Institutional Ethics Committee of Sri Padmavathi School of Pharmacy granted ethical permission (IEC No. SPSP/2025-2026/PHD07). Prior to enrolment, each participant gave written informed consent, and patient data confidentiality was upheld at all times. The collected data were entered into Microsoft Excel and analysed using IBM SPSS Statistics version 29. Descriptive statistics, including frequencies and percentages, were used to summarize demographic, clinical, lifestyle, and laboratory variables. Associations between categorical variables were evaluated using the Chi-square test, and a p-value of <0.05 was considered statistically significant. The results were presented in the form of tables and graphical illustrations. The data was entered into Microsoft Excel. Demographic, clinical, lifestyle, and laboratory characteristics were summarised using descriptive statistics, such as frequencies and percentages. The Chi-square test was used to assess associations between categorical variables, and a p-value of less than 0.05 was deemed statistically significant. Tables and graphical representations were used to display the results.

Results:

This prospective cross-sectional study included 181 patients with chronic liver disease who satisfied the inclusion criteria. The demographic traits, lifestyle factors, clinical profile, laboratory parameters, and related risk factors of chronic liver disease were assessed by analysing the gathered data. Demographic traits, lifestyle and social habits, medical history, clinical presentation, laboratory tests, and statistical analysis are the sections under which the results are displayed.

Of the 181 study participants, 84 (47%) were in the 31–45 age range. The age group of 46–60 years old, which included 62 (34%) participants, following, participants aged **above 60 years** constituted **25 (14%)** of the study population, while the **18–30 years** age group represented the smallest proportion, with **9 (5%)** participants.

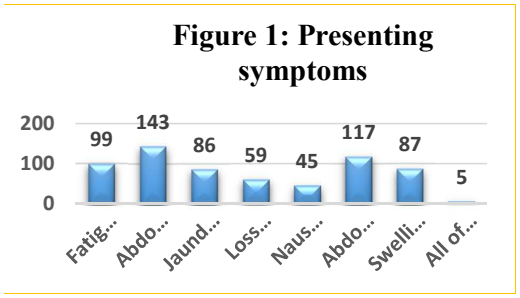
Table 1. Baseline demographic, lifestyle, clinical, and laboratory characteristics of the study participants (N = 181)

Variable	Category	n (%)
Age (years)	18–30	9 (5.0)
	31–45	84 (47.0)
	46–60	62 (34.0)
	>60	25 (14.0)
Gender	Male	146 (81.0)
	Female	35 (19.0)
Food habit	Vegetarian	8 (4.0)
	Mixed diet	173 (96.0)
Non-vegetarian/oily food consumption	Never	4 (2.0)

	1–2 times/week	114 (63.0)
	3–5 times/week	57 (32.0)
	Daily (7 times/week)	6 (3.0)
Alcohol consumption	None	55 (30.0)
	Low (1–7 units/week)	29 (16.0)
	Moderate (8–14 units/week)	54 (30.0)
	High (>14 units/week)	43 (24.0)
Smoking/Tobacco use	None	124 (68.0)
	Light (1–5/day)	23 (13.0)
	Moderate (6–10/day)	14 (8.0)
	Heavy (>10/day)	20 (11.0)
Physical activity	None (<30 min/week)	15 (8.0)
	Low	86 (48.0)
	Moderate	74 (41.0)
	High	6 (3.0)
Sleep pattern	Normal (6–8 h)	78 (43.0)
	Short (<5 h)	50 (28.0)
	Long (>9 h)	13 (7.0)
	Irregular/Disturbed	40 (22.0)
Comorbidities	None	82 (45.3)
	Diabetes mellitus	50 (27.6)
	Hypertension	48 (26.5)
	Obesity	6 (3.3)
	Portal hypertension	48 (26.5)
Family history of liver disease	None	146 (81.0)
	First-degree relative	24 (13.0)
	Second-degree relative	9 (5.0)
	Third-degree relative	2 (1.0)
Hepatitis (B/C)	Positive	31 (17.0)
	Negative	150 (83.0)

Most participants were male (81.0%), while females constituted 19.0% of the study population. Regarding dietary habits, 96.0% of the participants consumed a mixed diet, and 63.0% reported consuming non-vegetarian and oily foods 1–2 times per week, while 32.0% consumed them 3–5 times per week. Alcohol consumption was reported by 70.0% of participants, with 30.0% having moderate intake, 24.0% reporting high intake, and 16.0% reporting low intake. Tobacco use was observed in 32.0% of participants, including 13.0% light users, 8.0% moderate users, and 11.0% heavy users. Assessment of physical activity revealed that 48.0% of participants had low levels of physical activity, 41.0% had moderate activity, and only 3.0% reported high levels of physical activity. Regarding sleep patterns, 43.0% of participants had normal sleep duration (6–8 hours), whereas 28.0% had short sleep duration, 22.0% experienced irregular or disturbed sleep, and 7.0% reported prolonged sleep duration. Among the clinical characteristics, 45.3% of participants had no documented comorbidities. The most common comorbid conditions were diabetes mellitus (27.6%), hypertension (26.5%), and portal hypertension (26.5%), while obesity (3.3%) was less frequently observed. A family history of liver disease was absent in 81.0% of participants, whereas 13.0%, 5.0%, and 1.0% reported liver disease among first-, second-, and third-degree relatives, respectively. Furthermore, 17.0% of participants tested positive for hepatitis B or C infection, while 83.0% were hepatitis negative (Table 1).

Figure 1: Clinical Presentation of Patients with Chronic Liver Disease



The presenting symptoms of patients with chronic liver disease are shown in Figure 1. Abdominal pain or discomfort was the most frequently reported symptom, affecting 143 (79.0%) participants. This was followed by abdominal swelling, which was reported by 117 (64.6%) participants, and fatigue or weakness, observed in 99 (54.7%) participants. Swelling of the limbs and jaundice were reported by 87 (48.0%) and 86 (47.5%) participants, respectively. Loss of appetite was present in 59 (32.6%) participants, while nausea and vomiting were reported by 45 (24.9%) participants. Only 5

(2.8%) participants presented with all of the listed symptoms simultaneously. These findings indicate that abdominal pain/discomfort, abdominal swelling, and fatigue were the predominant clinical manifestations among patients with chronic liver disease in the present study (Figure 1).

The laboratory parameters of the study participants are, elevated direct bilirubin levels were observed in 133 participants, followed by elevated total bilirubin in 129 participants. Increased SGOT and ALP levels were reported in 116 and 114 participants, respectively, indicating hepatocellular injury and cholestatic changes. Elevated blood urea nitrogen (BUN) levels were found in 109 participants, whereas SGPT was elevated in 54 participants. Uric acid levels were elevated in 37 participants and total protein was elevated in only 8 participants. Most participants had normal SGPT (121), total protein (126), and uric acid (115) levels. Decreased total protein levels were observed in 47 participants, while decreased uric acid levels were noted in 29 participants. Reduced levels of ALP, SGPT, BUN, total bilirubin, direct bilirubin, and SGOT were observed in 7, 6, 5, 5, 3, and 4 participants, respectively.

Table 2: Association between demographic, lifestyle, and clinical variables using chi-square test analysis

S.No	Variables compared	X^2 Value	df	P Value
1	Gender vs alcohol consumption	62.06	1	<0.0001
2	Gender vs smoking	17.98	3	<0.001
3	Alcohol vs hepatitis status	10.87	1	0.003
4	Alcohol vs SGPT levels	12.63	2	0.007
5	Alcohol vs SGOT	11.32	2	0.006
6	Smoking vs symptoms	8.54	3	0.038
7	Age vs comorbidities	15.26	3	0.002
8	Physical activity vs Obesity	6.87	3	0.074
9	Hepatitis vs symptoms	11.54	1	0.023

(Bold, P value < 0.05, indicates significant)

To evaluate the relationship between clinical, behavioural, and demographic characteristics, a chi-square (χ^2) test was used. Gender and alcohol consumption were shown to be highly significantly correlated ($\chi^2 = 62.06$, df = 1, $p < 0.0001$), suggesting considerable disparities in alcohol intake between males and females. Additionally, there was a significant correlation between gender and smoking habits ($\chi^2 = 17.98$, df = 3, $p < 0.001$), indicating that different genders have different smoking habits. Hepatitis status ($\chi^2 = 10.87$, df = 1, $p = 0.003$) and liver enzyme levels, such as SGPT ($\chi^2 = 12.63$, df = 2, $p = 0.007$) and SGOT ($\chi^2 = 11.32$, df = 2, $p = 0.006$), were significantly correlated with alcohol use, indicating a potential impact of alcohol on liver function. While age demonstrated a significant link with comorbidities ($\chi^2 = 15.26$, df = 3, $p = 0.002$), indicating disparities across age groups, smoking was substantially associated with symptoms ($\chi^2 = 8.54$, df = 3, $p = 0.038$). Conversely, there was no significant correlation between physical activity and obesity ($\chi^2 = 6.87$, df = 3, $p = 0.074$). Furthermore, there was a significant correlation between hepatitis status and symptoms ($\chi^2 = 11.54$, df = 1, $p = 0.023$). With the exception of the correlation between physical activity and obesity, which was not statistically significant, these results generally show substantial relationships among important factors.

Discussion:

The main causes of morbidity and mortality worldwide, chronic liver disease (CLD) is a serious global health concern. Excessive alcohol use, obesity, metabolic problems, autoimmune hepatitis, and chronic viral hepatitis (HBV and HCV) are some of the etiological variables that cause it. In order to determine the demographic, lifestyle, clinical, and laboratory risk variables linked to chronic liver disease among patients visiting a tertiary care teaching hospital, the current prospective cross-sectional study was carried out. There were 181 participants in all, with 47% of them being between the ages of 31 and 45 and 34% being between the ages of 46 and 60. Just 5% of participants were between the ages of 18 and 30, and 14% were older than 60, as similar to Alemnew[2] et.al., study. These results imply that middle-aged persons are more likely to have chronic liver disease, potentially as a result of extended exposure to risk factors associated with their lifestyle and metabolic abnormalities.

With 81% of participants being men and 19% being women, the study also showed a clear male predominance, suggesting that men are more likely to suffer from chronic liver disease. Males are more likely than females to smoke, drink alcohol, and engage in other behavioural risk factors, which could account for this observation. In terms of eating patterns, just 4% of individuals were vegetarians, whereas 96% of participants ate a mixed diet. Additionally, 32% of individuals ate greasy and non-vegetarian foods three to five times a week, compared to 63% who ate them one to two times. These eating habits imply that regular consumption of high-fat meals may raise the risk of chronic liver disease by promoting the development of obesity, metabolic syndrome, and fatty liver disease. Similar findings have been reported by Majid[3] et al., study

who demonstrated that high-calorie diets, processed foods, and excessive fatty food consumption are strongly associated with the development of fatty liver disease and its progression to cirrhosis.

Only 30% of the study participants did not use alcohol, whereas 30% reported moderate usage, 24% heavy consumption, and 16% low consumption. With 96% of alcohol drinkers being men and only 4% being women, there was a clear gender gap, suggesting that male participants were more likely to engage in alcohol-related risky behaviours. These results are in line with the global epidemiological study conducted by Majid[3] et al., and Gage[4] et al., studies, which found that alcohol use is one of the main causes of chronic liver disease globally, especially in men. In a similar vein, 32% of the individuals reported using tobacco, comprising 13% light users, 8% moderate users, and 11% strong users. This result is consistent with the research conducted by Younossi[5] et al. (2024), which showed that smoking is a significant modifiable lifestyle factor linked to a higher risk of chronic liver disease. A sedentary lifestyle was indicated by the physical activity evaluation, which showed that 48% of participants had low physical activity, 41% had moderate activity, and only 3% had high levels of physical activity. Ashraf[6] et al., and Zeebaish[7] et al., studies reported similar results, showing a high correlation between sedentary behaviour and the onset of non-alcoholic fatty liver disease (NAFLD). Additionally, only 43% of subjects reported regular sleep duration, while 28% reported short sleep and 22% reported disrupted sleep, indicating that insufficient sleep may be a factor in metabolic dysfunction and raise the possibility of long-term liver damage.

The most common comorbidities in terms of clinical features were diabetes mellitus (50 cases) and hypertension (48 cases), underscoring the role of metabolic disorders in chronic liver disease. In contrast, 83% of subjects tested negative for hepatitis B or C, whereas only 17% tested positive. This result contradicts the findings of Majid[3] et al., and Zeebaish[7] et al., studies, who found that viral hepatitis contributed more to chronic liver disease in some populations, indicating potential regional and demographic differences in the aetiology of the disease. Additional statistical research revealed a number of noteworthy correlations between lifestyle choices, clinical outcomes, and demographic traits.

Alcohol use has a negative impact on liver health, as evidenced by a substantial correlation between hepatitis status and high liver enzyme levels (SGPT and SGOT). Alcohol is known to be a significant risk factor for chronic liver disease, and elevated liver enzyme levels in alcohol users indicate persistent hepatic damage and inflammation. The majority of participants (81%) had no family history of liver disease, indicating that in this study population, environmental and lifestyle variables have a larger role in the development of the disease than genetic factors. The most commonly reported clinical symptoms of chronic liver disease were fatigue (54.7%), abdominal pain (79%), and abdominal oedema (64.6%). Significant hepatic dysfunction was confirmed by laboratory assessment, which showed high SGOT, ALP, and bilirubin levels in several patients. There was a strong correlation between the patients' liver disease severity and these biochemical and clinical abnormalities. The results highlight the critical role that modifiable risk factors—such as alcohol use, poor eating habits, smoking, physical inactivity, and metabolic disorders like diabetes and hypertension—play in the development of chronic liver disease and underscore the necessity of focused public health interventions and lifestyle modification strategies.

Conclusion

In conclusion, the middle-aged men were the most afflicted group, with notable biochemical and clinical anomalies suggestive of liver failure. To stop disease progression and enhance clinical outcomes, early risk factor identification, routine screening, and patient education on healthy lifestyle habits are crucial. The burden of chronic liver disease may be significantly decreased by focused health education and preventive measures at the hospital and community levels.

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