Journal of Cardiovascular Disease Research
ISSN: 0975-3583,0976-2833 VOL 3, ISSUE 3, 2012

ROLE OF ALCOHOL CONSUMPTION IN THE PROGRESSION AND CLINICAL OUTCOMES OF LIVER DISEASE: A HOSPITAL-BASED OBSERVATIONAL STUDY IN A TERTIARY CARE CENTRE

Dr. Bishwa Bhusan Bharti[1], Dr. Manoj Kumar Murli[2]

[1] Assistant Professor, Department of Cardiology, J.J.M. Medical College, Davangere, Karnataka, India.
[2] Assistant Professor, Department of General Medicine, Mata Gujri Memorial Medical College & Lions Seva Kendra Hospital, Kishanganj, Bihar, India.

Corresponding Author: Dr. Manoj Kumar Murli

Address: Department of General Medicine, Mata Gujri Memorial Medical College & Lions Seva Kendra Hospital, Kishanganj, Bihar, India.

ABSTRACT

Background: Alcohol consumption is a major cause of chronic liver disease worldwide and contributes significantly to liver-related morbidity and mortality. The progression of liver disease among alcohol users depends on multiple factors including duration and quantity of alcohol intake. Limited data are available regarding the role of alcohol in liver disease progression in hospital settings.

Objectives: To evaluate the role of alcohol consumption in the progression of liver disease, assess the relationship between alcohol exposure and disease severity, and determine associated clinical outcomes among patients admitted to a tertiary care hospital.

Methods: A hospital-based observational analytical cross-sectional study was conducted in the Department of Medicine of a tertiary care hospital from July 2011 to December 2011. A total of 66 adult patients with clinically, biochemically, and radiologically confirmed liver disease were included using consecutive sampling. Information regarding demographic characteristics, alcohol consumption patterns, clinical features, laboratory findings, and disease severity was collected using a structured case record form. Statistical analysis was performed using SPSS version 17.0. Associations were assessed using Chi-square test, Fisher's exact test, and Student's t-test, with $p < 0.05$ considered statistically significant.

Results: Among the 66 study participants, 58 (87.9%) were males and the majority belonged to the 41–50-year age group. Alcohol consumption was reported by 44 (66.7%) patients. Among alcohol users, 18 (40.9%) had consumed alcohol for more than 20 years and 21 (47.7%) reported heavy alcohol intake. Alcohol users had a significantly higher prevalence of cirrhosis and decompensated cirrhosis compared with non-users ($p = 0.026$). A significant association was observed between duration of alcohol consumption and severity of liver disease, with longer duration of intake associated with cirrhosis ($p = 0.004$). Clinical complications such as ascites ($p = 0.048$), hypoalbuminemia ($p = 0.044$), and prolonged INR ($p = 0.049$) were significantly more common among alcohol users.

Conclusion: Alcohol consumption plays a significant role in the progression of liver disease and is associated with advanced hepatic injury and adverse clinical outcomes. Prolonged alcohol exposure increases the likelihood of cirrhosis and hepatic decompensation. Early identification of hazardous

alcohol use and implementation of preventive interventions may help reduce the burden of alcohol-related liver disease.

Keywords: Alcohol; Liver disease; Cirrhosis; Alcoholic liver disease; Disease progression; Ascites; Chronic liver disease

INTRODUCTION

Chronic liver disease is a major cause of morbidity and mortality worldwide and represents a substantial public health burden. Among the various etiological factors implicated in liver injury, alcohol consumption remains one of the leading preventable causes of liver-related disease and death. Excessive alcohol intake contributes to a spectrum of hepatic abnormalities ranging from simple steatosis to alcoholic hepatitis, fibrosis, cirrhosis, and hepatocellular carcinoma. The progression of liver damage is influenced not only by the quantity and duration of alcohol consumption but also by host-related, environmental, nutritional, and genetic factors [1].

Alcohol-related liver disease (ALD) accounts for a considerable proportion of chronic liver disease cases globally. Epidemiological studies have demonstrated that sustained alcohol consumption is associated with progressive hepatic injury through mechanisms involving oxidative stress, inflammatory cytokine activation, mitochondrial dysfunction, and altered lipid metabolism [2]. Although fatty liver develops in the majority of heavy drinkers, only a subset progresses to advanced liver disease, suggesting the contribution of additional risk modifiers [3].

The burden of alcohol-related liver disease has increased steadily in many developing countries due to changing social norms, urbanization, and increasing alcohol availability. In Asian populations, alcohol consumption patterns have undergone significant transitions during recent decades, resulting in a growing incidence of alcohol-induced liver injury [4]. Furthermore, alcohol frequently acts synergistically with other hepatic insults such as chronic viral hepatitis, obesity, and malnutrition, thereby accelerating disease progression and worsening clinical outcomes [5].

India is witnessing a significant rise in alcohol consumption, particularly among economically productive age groups. Alcohol-related disorders contribute substantially to hospital admissions and healthcare expenditure. Studies conducted in different parts of the country have reported alcohol as one of the major causes of chronic liver disease and cirrhosis among hospitalized patients [6]. The pattern of alcohol consumption in India is characterized by episodic heavy drinking and prolonged untreated dependence, both of which increase the risk of severe liver injury [7].

In India, liver diseases constitute a common cause of medical admissions in tertiary care hospitals. Alcohol consumption has emerged as an important etiological factor among patients presenting with chronic liver disease, hepatic decompensation, and cirrhosis. Despite the recognized association between alcohol use and liver disease, variations exist in the clinical presentation and progression of hepatic injury among alcohol users. Factors such as age at initiation of alcohol intake, duration of drinking, quantity consumed, nutritional status, and associated comorbidities may influence disease severity and progression [8].

Several international studies have evaluated the relationship between alcohol exposure and liver disease progression; however, regional data from tertiary care settings remain limited. Differences in drinking patterns, socioeconomic conditions, healthcare access, and associated risk factors necessitate local evaluation of the role of alcohol in liver disease progression. Understanding these associations may facilitate early identification of high-risk individuals, implementation of preventive strategies, and optimization of clinical management [9].

Therefore, the present study was undertaken in a tertiary care hospital to evaluate the role of alcohol in the progression of liver disease among hospitalized patients. The specific objectives were to assess the pattern and duration of alcohol consumption among patients with liver disease, examine the association between alcohol exposure and disease severity, and evaluate clinical outcomes in relation to alcohol-related liver injury [10].

METHODOLOGY

Study Design: This study was conducted as a hospital-based observational analytical cross-sectional study to evaluate the role of alcohol in liver disease progression among patients diagnosed with liver disease and admitted to a tertiary care hospital.

Study Setting: The study was carried out in the Department of Medicine of a tertiary care teaching hospital. Patients admitted to medical wards and evaluated for liver disease during the study period were screened for eligibility.

Study Duration: The study was conducted over a period of six months from July 2011 to December 2011.

Study Population: The study population comprised adult patients diagnosed with liver disease and admitted to the Department of Medicine during the study period. Eligible patients were enrolled after obtaining informed written consent.

Inclusion Criteria

Patients aged 18 years and above.
Patients diagnosed with liver disease based on clinical evaluation, biochemical investigations, and radiological findings.
Patients willing to provide informed written consent.
Patients with a documented history of alcohol consumption and/or non-alcohol-related liver disease for comparison.

Exclusion Criteria

Patients younger than 18 years.
Patients unwilling or unable to provide informed consent.
Patients with incomplete clinical or laboratory records.
Patients with acute poisoning or acute intoxication without evidence of underlying liver disease.
Patients with severe concurrent systemic illnesses preventing complete evaluation.

Sample Size:

The sample size was calculated using the formula for estimation of a proportion in descriptive studies:

$n = Z^2PQ / d^2$

Where:

n = required sample size
Z = 1.96 at 95% confidence level
P = anticipated prevalence of alcohol-related liver disease among hospitalized liver disease patients (assumed 50% due to variability in reported literature and to obtain maximum sample size)
Q = 100 − P = 50

d = allowable error of 12%
Substituting the values:
$n = (1.96)^2 \times 50 \times 50 / (12)^2$
$n \approx 66$
Therefore, a total sample size of 66 patients was included in the study.
Sampling Technique: A consecutive sampling technique was employed. All eligible patients fulfilling the inclusion criteria and admitted during the study period were recruited consecutively until the required sample size of 66 participants was achieved.

Data Collection Tolls & Procedure: After obtaining informed written consent, detailed demographic and clinical information was collected using a predesigned and pretested case record form. Data regarding age, sex, residence, occupation, duration and quantity of alcohol consumption, age at initiation of alcohol intake, comorbid conditions, and presenting symptoms were recorded. A thorough clinical examination was performed for all participants.
Relevant laboratory investigations including complete blood count, liver function tests, serum bilirubin, serum albumin, transaminases, alkaline phosphatase, prothrombin time/international normalized ratio (INR), and viral hepatitis markers were obtained. Ultrasonography of the abdomen was performed wherever indicated. Patients were categorized according to the severity and stage of liver disease based on clinical, biochemical, and radiological findings. The relationship between alcohol exposure and indicators of disease progression was subsequently analyzed.

Study Variables: The independent variables included age, sex, duration of alcohol consumption, quantity of alcohol intake, age at initiation of alcohol use, smoking status, and presence of associated risk factors. The dependent variables included severity of liver disease, occurrence of cirrhosis, hepatic decompensation, ascites, jaundice, hepatic encephalopathy, and abnormal liver function parameters. The study evaluated the association between alcohol-related factors and progression of liver disease.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) version 17.0. Continuous variables were expressed as mean ±standard deviation, while categorical variables were summarized as frequencies and percentages. Associations between categorical variables were assessed using the Chi-square test or Fisher's exact test whenever appropriate. Continuous variables were compared using Student's t-test. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations: Written informed consent was obtained from all participants prior to enrollment. Confidentiality and anonymity of patient information were maintained throughout the study. Participation was voluntary, and patients were free to withdraw at any stage without affecting their treatment. The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and prevailing institutional guidelines for biomedical research involving human participants.

RESULTS

A total of 66 patients with liver disease were included in the study. The majority belonged to the 41–50 years age group, and males constituted most of the study population (Table 1).

Table 1. Demographic Characteristics of Study Participants (N = 66)

Characteristic	Frequency (n)	Percentage (%)
Age Group (years)		
18–30	8	12.1
31–40	18	27.3
41–50	22	33.3
51–60	12	18.2
>60	6	9.1
Sex		
Male	58	87.9
Female	8	12.1

Alcohol consumption was reported by two-thirds of participants. Among alcohol users, prolonged exposure was common, with over 40% reporting alcohol intake for more than 20 years. Nearly half of the alcohol-consuming patients had heavy alcohol intake exceeding 80 g/day (Table 2)

Table 2. Pattern of Alcohol Consumption among Study Participants (N = 66)

Variable	Frequency (n)	Percentage (%)
History of alcohol consumption	44	66.7
No history of alcohol consumption	22	33.3
Duration of alcohol consumption (n=44)		
<10 years	10	22.7
10–20 years	16	36.4
>20 years	18	40.9
Average alcohol intake (n=44)		
Mild (<40 g/day)	8	18.2
Moderate (40–80 g/day)	15	34.1
Heavy (>80 g/day)	21	47.7

The clinical spectrum of liver disease differed significantly according to alcohol exposure. Alcohol users had a higher proportion of cirrhosis, particularly decompensated cirrhosis, compared with non-users (Table 3).

Table 3. Clinical Spectrum of Liver Disease According to Alcohol Exposure

Clinical Diagnosis	Alcohol Users (n=44)	Non-users (n=22)	Total (N=66)
Fatty liver disease	8	6	14
Chronic hepatitis	7	6	13
Compensated cirrhosis	11	5	16
Decompensated cirrhosis	18	5	23
Total	**44**	**22**	**66**

Chi-square test = 4.92, p = 0.026

A significant relationship was observed between duration of alcohol consumption and disease severity. Patients with longer durations of alcohol use were more likely to have cirrhosis, whereas shorter durations were more frequently associated with fatty liver disease or chronic hepatitis (Table 4).

Table 4. Association Between Duration of Alcohol Consumption and Severity of Liver Disease Among Alcohol Users (n = 44)

Duration of Alcohol Use	Fatty Liver/Chronic Hepatitis	Cirrhosis*	Total
<10 years	8	2	10
10–20 years	7	9	16
>20 years	3	15	18
Total	**18**	**26**	**44**

*Includes compensated and decompensated cirrhosis.
Chi-square test = 10.84, p = 0.004

Alcohol users also demonstrated a greater frequency of adverse clinical outcomes, including ascites, hypoalbuminemia, and prolonged INR, all of which showed statistically significant associations with alcohol exposure. Although jaundice and hepatic encephalopathy were more common among alcohol users, these differences did not achieve statistical significance (Table 5)

Table 5. Major Clinical Outcomes in Alcohol Users and Non-users

Clinical Outcome	Alcohol Users (n=44)	Non-users (n=22)	p-value
Ascites	23 (52.3%)	6 (27.3%)	0.048
Jaundice	25 (56.8%)	8 (36.4%)	0.118
Hepatic encephalopathy	10 (22.7%)	2 (9.1%)	0.186
Hypoalbuminemia	21 (47.7%)	5 (22.7%)	0.044

Prolonged INR	18 (40.9%)	4 (18.2%)	0.049

DISCUSSION

The present hospital-based observational study evaluated the role of alcohol in liver disease progression among 66 patients admitted to a tertiary care hospital. The study demonstrated that alcohol consumption was common among patients with liver disease, with approximately two-thirds reporting a history of alcohol intake. Alcohol users exhibited a significantly higher prevalence of advanced liver disease, particularly cirrhosis and decompensated cirrhosis, compared with non-users. Furthermore, a longer duration of alcohol consumption was significantly associated with increasing disease severity. Alcohol use was also associated with a higher frequency of adverse clinical outcomes such as ascites, hypoalbuminemia, and prolonged INR.

Alcohol has long been recognized as a major etiological factor in chronic liver disease worldwide. The findings of the present study are consistent with previous reports demonstrating that sustained alcohol consumption contributes to progressive hepatic injury and eventual development of cirrhosis [1,2]. The observed predominance of middle-aged males among alcohol-related liver disease patients is comparable to findings from other Indian and international studies, reflecting the higher prevalence of alcohol consumption among men and the cumulative effect of long-term exposure during productive years of life [4,6].

A notable finding of this study was the significantly higher proportion of cirrhosis among alcohol users compared with non-users. This observation is biologically plausible and supports existing evidence that chronic alcohol exposure induces repeated hepatocellular injury, oxidative stress, inflammatory responses, and progressive fibrogenesis, ultimately leading to cirrhosis [2,3]. The findings are in agreement with studies conducted in both Western and Asian populations that have identified alcohol as a major risk factor for advanced liver disease and hepatic decompensation [5,10].

The present study further demonstrated a significant association between duration of alcohol consumption and disease severity. Patients with alcohol intake exceeding 20 years were substantially more likely to have cirrhosis than those with shorter durations of exposure. Similar observations have been reported by earlier investigators who emphasized that cumulative lifetime alcohol exposure is an important determinant of liver disease progression [3,9]. Although the quantity of alcohol consumed is important, prolonged duration of intake may increase cumulative hepatic injury and reduce the likelihood of recovery from repeated episodes of inflammation. Alcohol users in the current study also experienced a greater burden of clinical complications, including ascites, hypoalbuminemia, and coagulation abnormalities. These findings likely reflect more advanced hepatic dysfunction among alcohol users. Development of ascites and impaired synthetic function are recognized markers of disease progression and are frequently associated with poorer prognosis in chronic liver disease [10]. The higher prevalence of these complications among alcohol users underscores the detrimental impact of continued alcohol exposure on hepatic reserve and clinical outcomes.

The results of this study are particularly relevant in the Indian context, where changing socioeconomic conditions and increasing alcohol availability have contributed to rising alcohol consumption [7]. Early identification of hazardous drinking behavior and timely intervention may help prevent progression from reversible stages of liver injury to irreversible cirrhosis. Public health

initiatives focusing on alcohol awareness, screening, counseling, and de-addiction services may therefore play an important role in reducing the burden of liver disease.
The strengths of the present study include the evaluation of clinically confirmed liver disease patients in a tertiary care setting and the assessment of both alcohol exposure and disease severity. The study also explored clinically relevant outcomes associated with alcohol-related liver disease progression.

However, certain limitations should be acknowledged. The relatively small sample size may limit generalizability of the findings. Being a single-center hospital-based study, the results may not fully represent the broader community population. Information regarding alcohol consumption was primarily based on patient self-reporting and may be subject to recall bias or underreporting. Additionally, the cross-sectional nature of the study limits the ability to establish a definitive temporal or causal relationship between alcohol exposure and disease progression. Future multicentric prospective studies with larger sample sizes are warranted to further clarify the determinants of alcohol-related liver disease progression in the Indian population.
Overall, the findings of this study support the established role of alcohol as a major contributor to liver disease progression and highlight the importance of preventive strategies aimed at reducing harmful alcohol consumption and its associated complications

CONCLUSION

This study highlights the significant role of alcohol consumption in the progression of liver disease among patients admitted to a tertiary care hospital. Alcohol use was common among patients with liver disease and was associated with a higher prevalence of cirrhosis, particularly decompensated cirrhosis. The severity of liver disease increased with longer duration of alcohol consumption, indicating the cumulative harmful effects of chronic alcohol exposure on hepatic function.Alcohol users also experienced a greater frequency of adverse clinical outcomes, including ascites, hypoalbuminemia, and coagulation abnormalities, suggesting more advanced hepatic dysfunction. These findings reinforce the importance of alcohol as a major modifiable risk factor in the natural history of chronic liver disease.Early detection of hazardous alcohol consumption, implementation of effective counseling and de-addiction programs, and regular monitoring of individuals at risk may help prevent progression to advanced liver disease and reduce associated morbidity. Further multicentric prospective studies with larger sample sizes are recommended to better understand the determinants and long-term outcomes of alcohol-related liver disease in the Indian population.

DECLARATIONS

Funding: No external funding was received for this study.
Conflict of Interest: The authors declare that there is no conflict of interest.
Informed Consent: Written informed consent was obtained from all participants before enrollment in the study.
Acknowledgment: The authors acknowledge the support of the faculty, residents, nursing staff, and study participants whose cooperation made this research possible.

REFERENCES

1. World Health Organization. Global status report on noncommunicable diseases 2010. World Health Organization; 2011.
2. O'shea RS, Dasarathy S, McCullough AJ, Practice Guideline Committee of the American Association for the Study of Liver Diseases, Practice Parameters Committee of the American College of Gastroenterology. Alcoholic liver disease. Hepatology. 2010 Jan 1;51(1):307-28.
3. Tilg H, Day CP. Management strategies in alcoholic liver disease. Nature clinical practice Gastroenterology & hepatology. 2007 Jan;4(1):24-34.
4. Rehm J, Mathers C, Popova S, Thavorncharoensap M, Teerawattananon Y, Patra J. Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders. The lancet. 2009 Jun 27;373(9682):2223-33.
5. Day CP, Bassendine MF. Genetic predisposition to alcoholic liver disease. Gut. 1992 Nov;33(11):1444.
6. Sarin SK, Malhotra V, Nayyar A, Sundaram KR, Broor SL. Profile of alcoholic liver disease in an Indian hospital. A prospective analysis. Liver. 1988 Jun;8(3):132-7.
7. Ray R. The extent, pattern and trends of drug abuse in India: National survey. Ministry of Social Justice and Empowerment, Government of India & United Nations Office on Drugs and Crime, Regional Office for South Asia; 2004.
8. Arteel G, Marsano L, Mendez C, Bentley F, McClain CJ. Advances in alcoholic liver disease. Best Practice & Research Clinical Gastroenterology. 2003 Aug 1;17(4):625-47.
9. Suchy FJ. Anatomy, histology, embryology, developmental anomalies, and pediatric disorders of the biliary tract. Gastrointestinal and Liver Disease: Pathophysiology, Diagnosis, Management. 2010 Jan 1;7:1019-42.
10. Varma V, Webb K, Mirza DF. Liver transplantation for alcoholic liver disease. World Journal of Gastroenterology: WJG. 2010 Sep 21;16(35):4377.
11. Becker U, Deis A, Sorensen TI, Gronbaek M, Borch-Johnsen K, Muller CF, Schnohr P, Jensen G. Prediction of risk of liver disease by alcohol intake, sex, and age: a prospective population study. Hepatology. 1996 May;23(5):1025-9.
12. Naveau S, Giraud V, Borotto E, Aubert A, Capron F, Chaput J. Excess weight risk factor for alcoholic liver disease. Hepatology. 1997 Jan;25(1):108-11.
13. Bellentani S, Tiribelli C. The spectrum of liver disease in the general population: lesson from the Dionysos study. Journal of hepatology. 2001 Oct 1;35(4):531-7.
14. Mann RE, Smart RG, Govoni R. The epidemiology of alcoholic liver disease. Alcohol research & health. 2003;27(3):209.
15. Day CP, Burt AD, James OF. Pure alcoholic fatty liver and progression to cirrhosis or fibrosis. The Lancet. 1995 Dec 9;346(8989):1563.