RESEARCH PAPER

Analysis of Prescribing Patterns and Therapeutic Management, Including Drug Utilization and Rational Use of Medicines, in Patients with Alcoholic Liver Disease at a Tertiary Care Hospital.

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Abstract

Background: Alcoholic liver disease (ALD) is a major consequence of chronic alcohol consumption and a leading cause of liver-related morbidity and mortality worldwide. Management of ALD involves multiple pharmacological agents to address both the underlying disease and its complications, often resulting in complex prescribing patterns.

Objective: To analyze prescribing patterns, therapeutic management, drug utilization, and rational use of medicines in patients with ALD at a tertiary care hospital.

Methods: A prospective observational study was conducted among 110 patients diagnosed with ALD. Data on demographics, alcohol consumption history, clinical parameters, prescribed medications, and drug utilization were collected. Prescribing patterns were evaluated against standard guidelines, and World Health Organization (WHO) prescribing indicators were assessed. Descriptive statistics were used for analysis.

Results: Of the 110 patients, 77% were male and the majority were aged 31–50 years. Polypharmacy was common, with an average of 8 drugs per encounter. Propranolol (47%), antibiotics, and supportive therapies were the most frequently prescribed. Hepatic encephalopathy (50%) and ascites (36%) were the most commonly treated complications. WHO prescribing indicators revealed low generic prescribing (35%) and high injection use (76%), while 73% of drugs were from the essential drugs list. Overall, prescribing was largely guideline-based, with evidence of targeted therapy for specific ALD complications.

Conclusion: ALD primarily affects middle-aged men and requires multi-drug therapy to manage its complications. Prescribing patterns in this study were mostly rational and complication-specific, though there is scope to improve generic prescribing and reduce injectable drug use. Optimizing rational drug use may enhance treatment safety, cost-effectiveness, and patient outcomes in ALD management.

Keywords: Alcoholic liver disease, prescribing patterns, drug utilization, rational use of medicines, polypharmacy, hepatic encephalopathy

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Introduction:

Alcoholism, also referred to as alcohol use disorder, is defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM) as a maladaptive pattern of alcohol consumption that results in significant clinical impairment or psychological distress.[1] Alcohol consumption is a leading contributor to the attributable burden of disease, ranking as the primary risk factor among individuals aged 25–49 years, the second among those aged 10–24 years, and the ninth across all age groups. Globally, alcohol use is responsible for approximately 2.07 million male deaths and 374,000 female deaths annually.[2] Although alcoholism is associated with over 60 different diseases, the majority of alcohol-related deaths are attributable to alcoholic liver disease (ALD). ALD encompasses a spectrum of liver disorders, including alcoholic steatosis, alcoholic hepatitis, and alcoholic cirrhosis, progressing in severity along this continuum. Approximately 40% of all deaths due to cirrhosis are caused by ALD.[3]

The annual mortality rate for alcoholic liver disease (ALD) is approximately 4.4 per 100,000 individuals in the general population. The risk of developing ALD is closely related to the amount of alcohol consumed, with

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daily intake of 30 grams or more significantly increasing the likelihood of disease in both men and women.[4] Women are more prone to develop ALD than men, due to differences in ethanol metabolism.[5] A wide range of pharmacological agents are currently used in the management of alcoholic liver disease, including pentoxifylline, ursodeoxycholic acid, Metadoxine, and corticosteroids. In addition, certain adjunctive and alternative therapies such as Liv.52 and silymarin are also prescribed; however, these treatments have shown variable and inconsistent therapeutic efficacy.[6] Pharmacologic management of alcoholic liver disease complications includes antimicrobials for infections, lactulose, rifaximin, and L-ornithine-L-aspartate for hepatic encephalopathy, diuretics for ascites, vasoactive drugs (octreotide) and beta-blockers (propranolol) for variceal bleeding, and naltrexone or acamprosate for alcohol dependence. Benzodiazepines like chlordiazepoxide are used to treat withdrawal symptoms.[7] Chronic liver disease (CLD) is defined as a sustained impairment of liver function lasting for more than six months, characterized by progressive structural and functional deterioration.[8] Chronic liver disease has a broad spectrum of causes, including prolonged exposure to hepatotoxins, chronic alcohol consumption, viral infections, autoimmune disorders, as well as genetic and metabolic conditions.[9] Alcohol is a widely used psychoactive substance with addictive potential, and its consumption has been prevalent in many societies for centuries.[10]

Material and Methods:

Study Design:

This was a prospective observational study conducted in the of Department of Pharmacology in collaboration with department of General Medicine and during a period from January 2025- December 2025 at Rajkiya Mahamaya Allopathic Medical College, Ambedkar Nagar (U.P.), The study aimed to analyze the prescribing patterns, therapeutic management, drug utilization, and rational use of medicines in patients diagnosed with alcoholic liver disease (ALD).

Sample size: 110 patients with alcoholic liver disease.

Data Collection

Data were collected using a structured data collection form and included the following parameters:

- Demographic details: Age, sex, and relevant medical history.
- Alcohol consumption history: Duration, quantity, and pattern of alcohol use.
- Clinical and laboratory parameters: Liver function tests, imaging reports, and comorbidities.
- Prescribed medications: Name of drug, dose, route, frequency, duration, and indication.
- Drug utilization and rationality: Evaluation of adherence to standard guidelines (e.g., AASLD, EASL, and ACG) for ALD management.

Inclusion criteria:

1. Patients with Age ≥18 years
2. Confirmed diagnosis of ALD (clinical, lab, imaging)
3. History of chronic alcohol consumption
4. Both male and female patients
5. Provided written informed consent

Exclusion criteria:

1. Patients with non-alcoholic liver disease
2. Pregnant or lactating women
3. Patients with incomplete medical records
4. Patients refusing to give consent
5. Patients having malignancy

Data analysis: Data was entered and analyzed using Microsoft Excel. Results were expressed in terms of descriptive statistics. Different parameters were given as percentage.

Result:

Table 1: Gender distribution of the patients.

Gender	Number of Patients	Percentage (%)
Male	85	77
Female	25	23
Total	110	100

The study included 110 patients with alcoholic liver disease, of whom 85 (77%) were male and 25 (23%) were female, indicating a higher prevalence in men, likely due to greater alcohol consumption, while women, though fewer, are also affected.

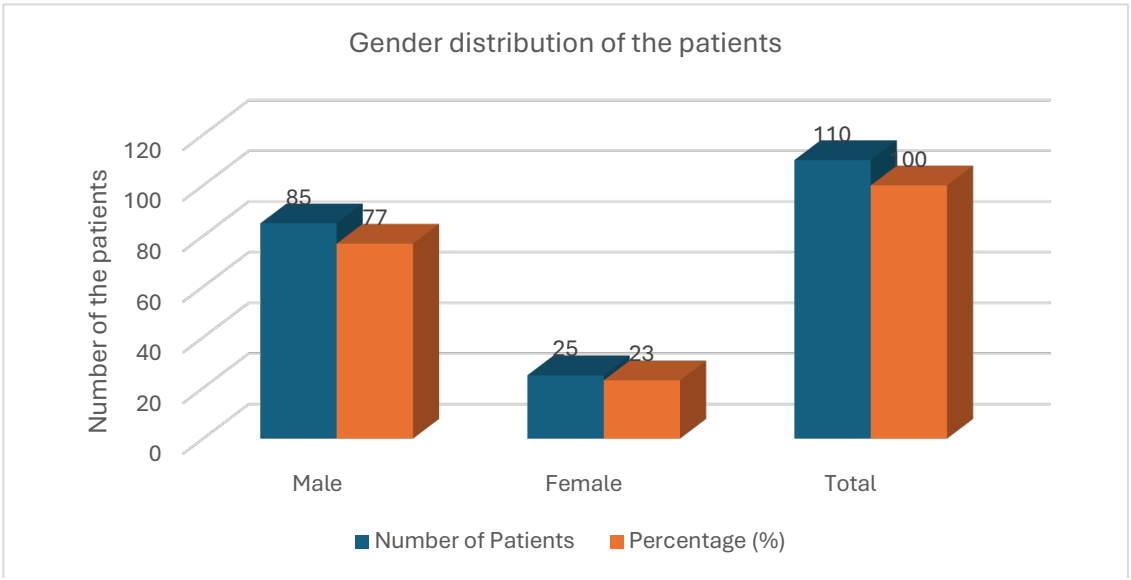

Figure: 1 Graphical represents gender distribution of the patients

Table 2: age wise distribution of the patients.

Age Group (years)	Male (n=85)	Female (n=25)	Total	p-value*
18–30	12	3	15	0.96
31–40	28	7	35	
41–50	23	7	30	
51–60	15	5	20	
>60	7	3	10	
Total	85	25	110	

The age distribution of patients shows that most patients were in the 31–40 years age group (35), followed by 41–50 years (30). Males were consistently higher in each age group compared to females. The p-value of 0.96 indicates no significant association between age and gender, meaning that the distribution of age is similar for both males and females in this study population.

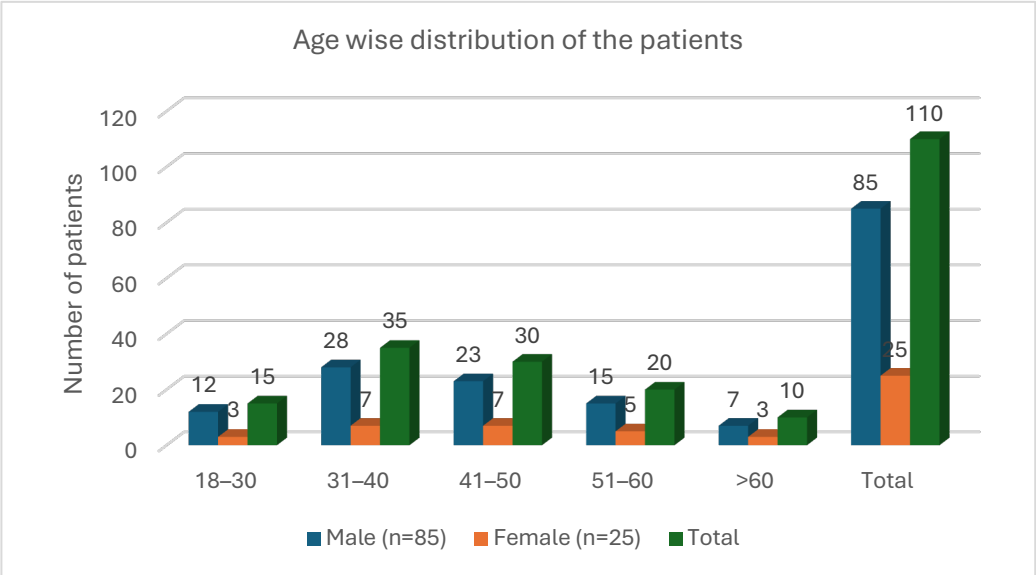

Figure 2: Graphical represents age wise distribution of the patients.

Table 3: Distribution of Number of Drugs per Encounter

Number of Drugs per Encounter	Number of Encounters	Percentage (%)
4	9	9
5	6	6
6	14	13
7	20	17
8	17	15
9	25	22
10	12	11
11	3	3
12	3	3
13	1	1
Total	110	100

Most encounters involved multiple drugs, with the highest proportion having 9 drugs (22%), followed by 7 drugs (17%) and 8 drugs (15%). Encounters with 7–9 drugs made up over half of the total, indicating common polypharmacy. Encounters with fewer drugs (4–5) and very high numbers (≥10) were less frequent.

Table 4: Pattern of Drug Utilization and Therapeutic Classes Among Patients.

Drug Name	Therapeutic Class	Number of Patients Prescribed	Number of Drug Encounters	Percentage of Patients (%)
Octreotide	Vasoactive agent	18	24	16
Octreotide	Vasoactive agent	18	24	16
Norfloxacin	Antibiotic (SBP prophylaxis)	16	22	15
Ciprofloxacin	Antibiotic	14	19	13
Cefotaxime	Antibiotic	12	17	11
Albumin (Human)	Plasma volume expander	15	21	13
Vitamin K	Hemostatic agent	13	18	12
Ondansetron	Antiemetic	21	29	19
Domperidone	Prokinetic agent	17	23	15
Paracetamol (low dose)	Analgesic/Antipyretic	19	26	17

Acamprosate	Anti-craving agent	11	15	10
Naltrexone	Opioid antagonist	9	12	8
Iron supplements	Hematinic	14	20	13
Folic acid	Vitamin supplement	20	28	18
Zinc supplements	Micronutrient	16	22	15
Calcium + Vitamin D	Supplement	18	25	16
Piperacillin + Tazobactam	Broad-spectrum antibiotic	20	28	18
Propranolol	Non-selective beta-blocker	52	61	47
Diazepam	Benzodiazepine	21	28	19
Haloperidol	Antipsychotic	11	15	10
Sodium bicarbonate	Alkalinizing agent	14	19	13
Sodium bicarbonate	Alkalinizing agent	14	19	13
PRBC (Packed Red Blood Cells)	Blood transfusion	12	16	11
Heparin	Anticoagulant	9	13	8

The table shows that Propranolol was the most commonly prescribed drug, used in 47% of patients, reflecting its key role in management. Supportive and symptomatic therapies such as Ondansetron (19%), Diazepam (19%), Folic acid (18%), Paracetamol (17%), and Calcium + Vitamin D (16%) were also frequently prescribed. Antibiotics and vasoactive agents, including Octreotide, Norfloxacin, Ciprofloxacin, and Piperacillin–Tazobactam, were commonly used, indicating management of complications and infections. Overall, the prescribing pattern reflects extensive use of multiple drug classes, highlighting prevalent polypharmacy.

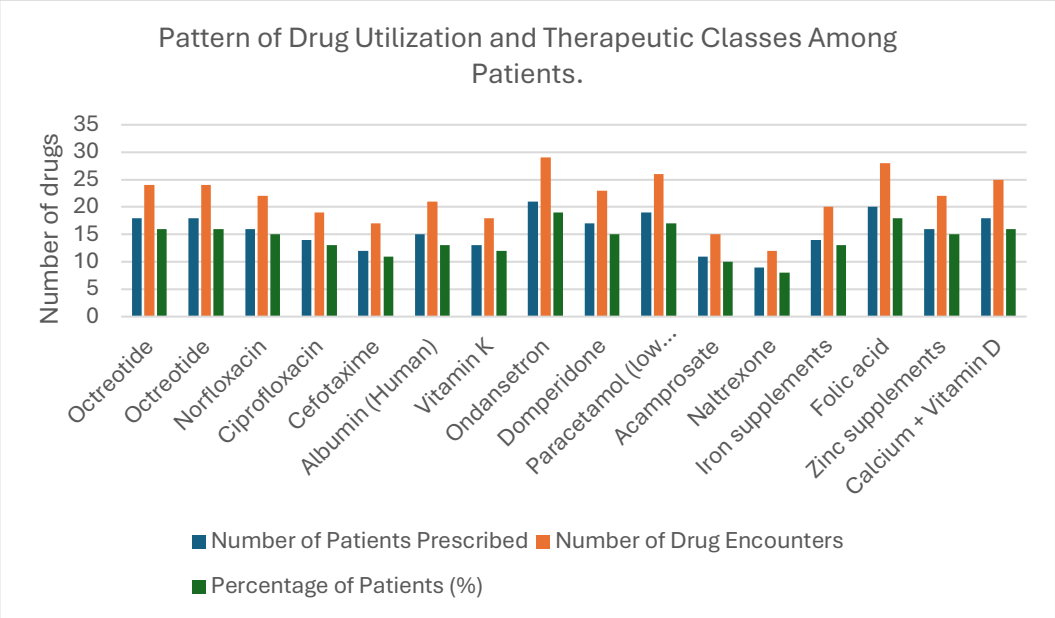

Figure 3: Graphical represents pattern of drug utilization and therapeutic classes among patients.

Table 5: Distribution of Number of Antibiotics per Encounter.

Number of Antibiotics per Encounter	Number of Encounters	Percentage (%)
0	18	16
1	42	38
2	31	28
3	14	13
≥4	5	5
Total	110	100

Most encounters involved the use of antibiotics, with 38% of encounters receiving one antibiotic and 28% receiving two antibiotics. A smaller proportion received three (13%) or four or more antibiotics (5%), indicating limited use of multiple

antibiotic combinations. Sixteen percent of encounters had no antibiotic prescribed. Overall, the pattern suggests rational antibiotic use in most encounters, with single or dual antibiotic therapy being the most common.

Table 6: WHO Prescribing Indicators and Prescribing Practices.

WHO Prescribing Indicator	Result
Average number of drugs per encounter	8
Percentage of drugs prescribed by generic name	35%
Percentage of encounters with an antibiotic prescribed	70%
Percentage of encounters with an injection prescribed	76%
Percentage of drugs prescribed from essential drugs list	73%

The average number of drugs per encounter was 8, indicating a high level of polypharmacy. Only 35% of drugs were prescribed by generic name, suggesting a preference for brand-name prescribing. Antibiotics were prescribed in 70% of encounters, reflecting frequent use, while 76% of encounters involved injectable medications, indicating substantial reliance on injections. Prescribing from the essential drugs list was relatively high at 73%, showing moderate adherence to WHO recommendations, though there remains scope for improvement in rational prescribing practices.

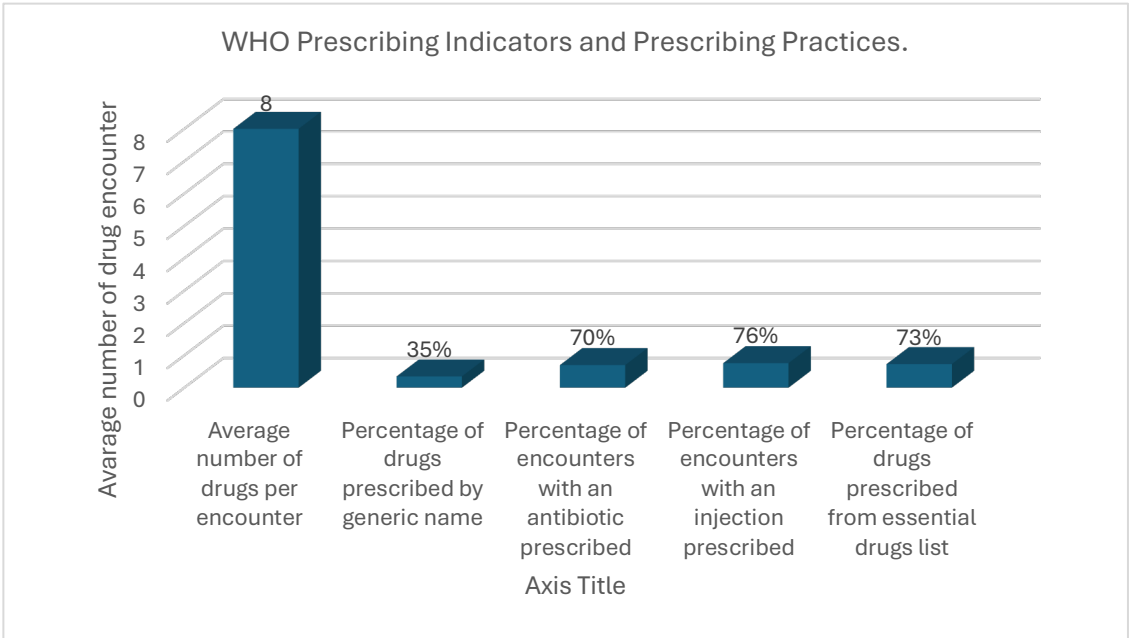

Figure 4: Graphical represents WHO Prescribing Indicators and Prescribing Practices.

Table 7: Drugs Prescribed for Complications of Alcoholic Liver Disease (ALD).

ALD Complication	Drug(s) Prescribed	Number of Encounters	Percentage (%)
Hepatic Encephalopathy	Lactulose, Rifaximin, L-Ornithine L-Aspartate	55	50
Ascites	Diuretics (Spironolactone, Furosemide)	40	36
Variceal Bleeding	Propranolol, Octreotide	15	14

Alcohol Dependence	Naltrexone, Acamprosate	12	11
Alcohol Withdrawal	Chlordiazepoxide, Diazepam	10	9
Infection/Sepsis	Piperacillin + Tazobactam, Cefotaxime, Levofloxacin	20	18
Nutritional Support	Silymarin + Antioxidants + Vitamins, Dextrose	25	23
Acid-related Symptoms	Pan MPS (Aluminium hydroxide + Magnesium hydroxide + Simethicone)	15	14

The table shows the pattern of drug use for various complications of Alcoholic Liver Disease (ALD). Hepatic encephalopathy was the most commonly managed complication, with 50% of encounters receiving Lactulose, Rifaximin, and L-Ornithine L-Aspartate. Ascites was treated in 36% of encounters, mainly with diuretics (Spironolactone, Furosemide). Variceal bleeding and acid-related symptoms were less common, each occurring in 14% of encounters, managed with Propranolol/Octreotide and antacids, respectively. Alcohol dependence and withdrawal were addressed in 11% and 9% of encounters using Naltrexone/Acamprosate and Chlordiazepoxide/Diazepam, while infections/sepsis and nutritional support were provided in 18% and 23% of cases. Overall, the prescribing pattern reflects targeted therapy for specific ALD complications, with emphasis on managing hepatic encephalopathy and ascites.

Discussion:

The study highlights that alcoholic liver disease predominantly affects middle-aged men, reflecting global patterns of alcohol consumption and susceptibility. The high average number of drugs per encounter (8) underscores the complexity of managing ALD and its multi-system complications. Propranolol, antibiotics, and supportive therapies were the most frequently prescribed, indicating a dual approach: addressing both complications (hepatic encephalopathy, ascites, variceal bleeding) and symptom management. While antibiotic use was mostly rational, WHO prescribing indicators revealed areas for improvement, particularly low generic prescribing (35%) and high injection use (76%), which may impact cost-effectiveness and patient safety. Overall, the prescribing patterns reflect evidence-based, guideline-aligned therapy, but optimizing rational drug use could further enhance clinical outcomes.

Conclusion:

Alcoholic liver disease primarily affects middle-aged men and often requires multi-drug therapy to manage its complications. Prescribing patterns in this study were largely guideline-based and complication-specific, focusing on hepatic encephalopathy, ascites, and infection management. However, low generic prescribing and high reliance on injections highlight opportunities to improve rational drug use. Optimizing these practices can enhance treatment safety, cost-effectiveness, and overall patient outcomes in ALD management.

Conflict of Interest: The authors declare no conflict of interest related to this study.

Limitations of the study:

- Single-center study, limiting generalizability
- Long-term outcomes not assessed
- Patient adherence not measured
- Small sample size.

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