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Research Article

ROLE OF PROPRANOLOL IN DECOMPENSATED LIVER DISEASE: CLINICAL PROFILE SAFETY AND EFFICACY

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ABSTRACT

Decompensated Chronic Liver Disease (DCLD) is a life-threatening condition characterized by complications like ascites, variceal bleeding, and hepatic encephalopathy. This study aimed to assess demographics, clinical complications, and propranolol therapy outcomes in DCLD patients. This 6-month prospective observational study was conducted at Government General Hospital, Kurnool, involving 120 DCLD patients. Patient demographics, clinical complications, propranolol therapy, and liver disease severity were assessed using Child-Pugh and MELD scoring systems. Most patients were middle-aged males, presenting with ascites (common complication), esophageal varices, and hepatic encephalopathy. Propranolol was continued in 58.3% of patients. Treatment resulted in significant clinical improvements, notably in Child-Pugh scores. Adverse events led to discontinuation in some patients. The study highlights the substantial burden of DCLD in India and underscores the therapeutic utility of propranolol. Early detection and intervention, along with vigilant clinical monitoring and tailored management strategies, are crucial to reduce morbidity and mortality, particularly in alcohol-related liver disease.

Keywords: Acute Kidney Injury, Endoscopic Variceal Ligation, Hepatorenal Syndrome, MELD, DCLD.

INTRODUCTION

Decompensated chronic liver disease (DCLD) represents the most advanced stage of chronic liver injury, where the liver loses its ability to maintain normal physiological functions such as metabolism, detoxification, protein synthesis, and immune regulation (Ge PS, 2014). The disease typically evolves gradually, beginning with inflammation and fibrosis, eventually progressing to cirrhosis characterized by distorted liver architecture and nodular regeneration. As compensatory mechanisms fail, patients develop decompensated features including ascites, hepatic encephalopathy, variceal bleeding, and hepatorenal syndrome (Jakab SS, 2020). Portal hypertension is a key hallmark of DCLD, resulting from increased resistance to portal blood flow within the cirrhotic liver. This leads to the formation of collateral vessels, particularly esophageal varices, which are dilated veins prone to rupture and life-threatening bleeding. Varices are graded from I to IV based on size and bleeding risk (Suk K. T, 2007). Preventive strategies include non-selective beta-blockers like propranolol and endoscopic variceal ligation (Ferrarese A, 2018). Acute variceal bleeding is managed with vasoactive drugs such as octreotide or terlipressin, along with resuscitation and endoscopic therapy. Refractory cases may require advanced interventions like TIPS or balloon tamponade. Hepatorenal syndrome (HRS), especially HRS-AKI, is a severe complication characterized by renal failure due to circulatory dysfunction. It is triggered by factors such as infections, gastrointestinal bleeding, and overuse of diuretics. Management includes intravenous albumin, vasopressors like terlipressin, and treating underlying causes, though liver transplantation remains definitive. Hepatic encephalopathy results from accumulation of toxins like ammonia, leading to neuropsychiatric disturbances ranging from mild confusion to coma. Treatment involves lactulose, rifaximin, and correction of precipitating factors. Early recognition and management of

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these complications are crucial to improve survival outcomes (Hernández-Gea V, 2012).

The study on Decompensated Chronic Liver Disease is important because it addresses a serious and life-threatening condition with high morbidity and mortality, especially in India. It helps in understanding the clinical profile and common complications like ascites, portal hypertension, and variceal bleeding. The project highlights the role of Propranolol in reducing portal hypertension and preventing variceal bleeding, which are major causes of death. It also evaluates the safety of propranolol by identifying adverse effects such as hypotension and hepatorenal syndrome (D'Amico G, 1986) he use of Child-Pugh Score and MELD Score helps in assessing disease severity and monitoring treatment response. This study is useful for improving clinical decision-making and guiding individualized therapy. It emphasizes the importance of early diagnosis and continuous monitoring in DCLD patients (Jalan R, 2014). The findings support evidence-based use of propranolol in real clinical settings. Overall, the project contributes to better patient management and reduction of complications. It is also valuable for future research and improving healthcare strategies in liver disease (Serreau R, 2022).

MATERIALS AND METHODS

Study Site

The present study is prospective observational study with subjects are involved from patients Gastroenterology department at government general hospital, Kurnool. The subjects are selected on the basis of the inclusion and exclusion criteria (Cromer M, 2024). Study Design: Prospective observational study. Department of Gastroenterology, GGH, Kurnool. Study Duration: - 6 months. Sample Size: -120. Study Materials: - Patient data collection proforma.

Methods

This study uses Child-Pugh and MELD scores to determine the severity of liver disease. The Child-Pugh Score evaluates liver function as mild (A), moderate (B), or severe (C), which helps guide treatment and predict survival (Bhutta A. Q, 2018). The MELD score, which is based on lab data, predicts 3-month mortality and helps prioritize liver transplants. The data was analyzed using SPSS 26, including tests such as Kruskal-Wallis and Chi-square (Srinivasan A. V, 2019). The study examines the usage of propranolol in decompensated chronic liver disease (DCLD) patients, adverse events, variceal bleeding incidence, clinical outcomes such as death and hospitalization, and patient quality of life (Turco L, 2022).

Data selection

In patients of both genders above 18 yrs of age who are attending in the Gastroenterology unit and having DCLD are selected in the study.

Data collection

All the data of the subject are collected by using the case proforma after signing the consent form. The data collection includes demographic details, past medical history, personal habits, laboratory investigations, drug chart, adverse drug reactions

Statistic analysis

Data was entered in Microsoft Excel 2019. All categorical variables were presented as frequenes and percentage. Kruskal wallis test was used to test the normality of the data. Chi-square test was used to test the significant difference between proportions as appropriate. p-value <0.05 was considered here the as statistically significant. Statistical analysis was done using the software Statistical Package for Social Sciences (SPSS) 26.0 version (Hofer B. S, 2022).

RESULTS AND DISCUSSION

In our study, the total of 120 participants. The bulk of participants (54.2%) were between the ages of 40 and 60 (n=65), with those under 40 accounting for 25.8% (n=31). Participants over the age of 60 accounted for 20% of the sample (n=24). The participants' average age was 49.18 years, with a standard deviation of 11.70 years. In our study, we observed a variety of complications among the 120 patients. The most commonly reported combination was portal hypertension (PH) with ascites (A) and esophageal varices (EV), which affected 43 people (37%). This was followed by ascites with PH and hepatic encephalopathy (HE) in 23 people (19%), and ascites with EV, HE, and PH in 22 people (18%). Less common consequences included PH with EV and PH with ascites, which affected 6 participants (5%). Rare problems, such as ascites alone (1%), and various combinations involving bleeding e.g., PH with ascites and bleeding, PH with EV and bleeding, and ascites with PH, EV, HE, and bleeding were observed in lesser proportions of the population, ranging from 2 to 4%.

In this study, it shows the distribution of ascites severity across 120 people. Ascites was absent in 5.8% of the patients, with the remaining 94.2% exhibiting different degrees. Grade 1 ascites, indicating modest fluid accumulation, were found in 21.7% of the patients. Grade 2, which represents moderate ascites, was the most common, accounting for 47.5% of cases. Grade 3, which is defined by substantial fluid buildup, was present in 25% of the participants. In our study, it depicts the distribution of hepatic encephalopathy (HE) among 120 persons. Nearly half (46.7%) had no HE, whereas 53.3% had varied levels of the disease. Grade 2 HE was the most prevalent in affected patients (28.3%), followed by Grade 1 (23.3%). Severe cases (Grades 3 and 4) were rare, affecting only 0.8% of people. The table depicts the distribution of esophageal variceal ligation prophylaxis among 120 participants. Approximately 29.2% of patients were not given any preventive therapy. 35% of patients received

primary prophylaxis, which was designed to prevent first-time variceal hemorrhage. Secondary prophylaxis, which is intended to avoid re-bleeding in individuals with a history of variceal bleeding, was the most commonly utilized method, accounting for 35.8%.

Table 1. Age Wise Distributions.

Age group	Frequency	Percentage
<40 years	31	25.8
40-60 years	65	54.2
>60 years	24	20
Total	120	100
Mean age	49.18±11.70	

Table 2. Liver Disease Complications.

S. No	Complications	No. of people affected	Percentage N=120
1	ASCITES	1	1%
2	A+EV+PH+Bleeding	4	3%
3	A+EV+HE+PH	22	18%
4	A+PH+HE	23	19%
5	A+PH+EV	43	37%
6	PH+EV	6	5.%
7	A+PH	6	5%
8	PH+A+HE+ Bleeding	2	2%
9	PH+EV+ Bleeding	2	2%
10	PH+A+ Bleeding	4	3%
11	PH+EV+HE	2	2%
12	A+PH+EV+HE+ Bleeding	5	4%
	TOTAL	120	100%

Table 3. Ascites According to Grades.

Ascites	Frequency	Percentage
Absent	7	5.8
Grade 1	26	21.7
Grade 2	57	47.5
Grade 3	30	25
Total	120	100

Table 4. Hepatic Encephalopathy According to Grades.

Hepatic Encephalopathy	Frequency	Percentage (%)
Absent	56	46.7
Grade 1	28	23.3
Grade 2	34	28.3
Grade 3	1	0.8
Grade 4	1	0.8
Total	120	100

Table 5. Esophageal Varices According to Grades.

Esophageal varices	Frequency	Percentage (%)
Absent	18	15
Grade 1	34	28.3
Grade 2	52	43.3
Grade 3	16	13.3
Total	120	100

Table 6. Comparison Between Before and After Treatment.

Child Pugh Score Before	Child Pugh Score after			Total	Chi-Square P value
	A	B	C		
A	5 (83.3)	1 (16.7)	0 (0)	6	
B	15 (37.5)	25 (62.5)	0 (0)	40	<0.001
C	5 (6.8)	43 (58.1)	26 (35.1)	74	
Total	25	69	26	120	

The table indicates a significant improvement in Child-Pugh scores after treatment in 120 participants. The majority of patients in Class A remained in Class A, whereas a significant number of those in Classes B and C improved to Class A or B. Notably,58.1% of Class C patients switched to Class B, while only 35.1% remained in Class C. The Chi-Square value of 41.702 and p-value of <0.001 show statistically significant increases in liver function, indicating the treatment was beneficial.

Table 7. Propranolol Treatment.

Propranolol Treatment	Frequency	Percentage
Continued	70	58.3
Discontinued	50	41.7
Total	120	100

In our study, the table shows the distribution of propranolol medication among 120 individuals. The vast majority, 58.3%, continued to take propranolol, showing that it was still being used to manage their illness. In contrast, 41.7% of patients discontinued using propranolol.

Table 8. Reasons for Stopping Propranol.

Reasons for stopping propranolol	Frequency	Percentage
HRS AKI	34	68
ASCITES	2	4
HYPO +HRS AKI	8	16
HRS AKI +ASCITES	3	6
HYPO + HRS AKI+ASCITES	3	6

The table displays the reasons for discontinuing propranolol medication in 50 patients, with the majority of instances due to complications such as HRS AKI (68%), hypotension and HRS AKI (16%), and combinations of HRS AKI with ascites (6%) or hypotension, HRS AKI, and ascites (6%). Ascites alone accounted for 4% of the cases. Despite these concerns, practically all patients recovered from their complications. This demonstrates that discontinuing propranolol was a critical step in addressing severe symptoms, and the recovery rate indicates that these concerns are reversible.

Table 9. Model for End Stage Liver Disease Score.

MELD score	Frequency (n=120)	Percentage
<9	3	2.5
10-19	54	45.
20-29	45	37.5
30-39	15	12.5
>=40	3	2.5
Total	120	100

In our study, the table depicts the MELD (Model for End-Stage Liver Disease) score distribution across 120 patients. Only 2.5% of patients had scores less than 9, indicating relatively minor liver disease. The majority (45%) had scores ranging from 9 to 19, while 37.5% had values between 20 and 29, indicating significant liver impairment. A smaller group, 12.5%,

got scores of 30 to 39, suggesting serious liver disease. Only 2.5% had MELD values of 40 or above, indicating severe liver impairment.

Table 10. Kruskal -Wallistest ; Meld Score Comparison.

Comparison	Comparison With MELD Score	Kruskal Wallis Test p -Value
Child-Pugh score classes	Comparing MELD Score between child-Pugh classes (A, B, C) Liver disease severity stages	P<0.001 Significant difference
Ascites presence	Comparing MELD Score between patients with and without ascites	P<0.05 Significant difference

In our study, the table shows the results of a Kruskal-Wallis test that compared MELD score differences based on clinical criteria. There is a substantial difference ($p<0.001$) in MELD scores across Child-Pugh score classes (A, B, C), which indicate liver disease severity stages. Furthermore, the presence of ascites was related with significantly different MELD scores. These data show the link between MELD score, liver function categorization, and ascites status. The data reveals that the MELD score varies significantly with disease progression signs. The study of 120 chronic liver disease patients showed a strong male predominance (91.7%) with a mean age of 49.18 years. Most patients (54.2%) were in the 40-60-year age group, indicating a need for targeted screening in this population. Portal hypertension and its complications were common, with 37% having ascites, esophageal varices, and PH together. A high proportion had advanced disease, with Grade 2 esophageal varices (43.3%) and Grade 2 ascites (47.5%) (Hayes PC, 1987). Variceal prophylaxis was given in 70.8% of patients as per standard guidelines. Significant improvement in Child-Pugh class was observed after treatment ($p < 0.001$). Class C patients reduced from 61.7% to 21.7%, indicating better prognosis with intervention. Propranolol was stopped in 41.7% due to complications like HRS, AKI, and hypotension. Most patients (95%) had MELD ≥9, with 15% showing very high mortality risk (MELD >30) (Yoo J J, 2020). A strong correlation between MELD score, Child-Pugh class, and ascites severity was confirmed, supporting combined prognostic use (Rodrigues SG, 2019).

CONCLUSION

This study underscores DCLD as a serious health issue with high mortality, especially in males. Portal hypertension and ascites were common complications. Propranolol was effective in reducing variceal bleeding and improving Child-Pugh scores. However, caution is needed in advanced cases due to reversible risks like HRS-AKI and hypotension. MELD scores reliably assessed disease severity and potential for stabilization. Post-treatment results showed marked improvement. Both MELD and Child-Pugh scores were useful in guiding therapy. Individualized treatment and further research are essential to improve safety and outcomes.

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CONFLICT OF INTERESTS

The authors declare no conflict of interest

ETHICS APPROVAL

Not applicable

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AI TOOL DECLARATION

The authors declares that no AI and related tools are used to write the scientific content of this manuscript.

DATA AVAILABILITY

Data will be available on request

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