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Original Article

INPATIENT DECOMPENSATED CHRONIC LIVER DISEASE: EPIDEMIOLOGY AND HOSPITAL OUTCOMES IN TERTIARY CARE

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Background: decompensated chronic liver disease (DCLD) is the leading cause of global mortality and morbidity with varied aetiological factors and inconsistent outcomes. Extensive literature exists on its clinical and management aspects, but little on epidemiological outcomes; therefore, this study aims to characterise the epidemiology and hospital outcomes of patients admitted with DCLD in a tertiary care hospital. **Methods:** This analytical cross-sectional study was conducted at Khyber Teaching Hospital & Hayat Medical Complex from March 2019 to April 2021 among adult inpatients with confirmed cirrhosis. Data on demographic and disease characteristics were recorded and analysed using SPSS-26. The primary outcome, i.e., discharge status (improved vs. died), was tested using independent t-tests and chi-square/Fisher's exact tests with $p<0.05$. **Results:** A total of 61 diagnosed cases of DCLD, male 36 (59%), with an overall mean age of 49.61±14.028 years, a mean duration of disease of 3.94±3.649 years, and 4.02±1.576 days of LOS were included. The mortality rate of in-patient DCLD patients was 12 (19.7%). Only aetiology was significantly associated with patient outcomes. Patients who improved had a longer hospital stay. **Conclusion:** Outcomes in DCLD are strongly influenced by non-clinical forces. Social class was more important in predicting death than clinical factors, while gender and disease duration mattered less than expected. The high death rate from Hepatitis C needs immediate action to improve access to care. Also, staying longer in the hospital may help save lives by allowing better management of complications.

Keywords: Decompensated chronic liver diseases; DCLD; epidemiology; disease outcome

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INTRODUCTION

Chronic liver disease (CLD) represents a leading cause of global morbidity and mortality, with over two million deaths annually, with cirrhosis alone responsible for about one million deaths.[1,2] Progression to decompensated chronic liver diseases (DCLD)-characterised by the development of ascites, hepatic encephalopathy, visceral haemorrhage, or jaundice- marks a critical inflection point.[3] The DCLD signifies advanced liver dysfunction and occurs in more than 50% of cirrhotic patients within 10 years.[4] It is associated with a 1-year mortality exceeding 20% after initial decompensation, rising to 43.8% with >2 complications.[5] In Bhopal, India, 46.4%, Nepal 18.9%, Nothingin, UK, 38.8% and Philadelphia, USA, 10.9% mortality is documented.[6–9]

The literature on different aspects of DCLD is extensive. Regarding aetiology and management, the literature suggests that the distribution of aetiologies and approaches to managing them varies globally. A recent review article reported that liver cirrhosis is caused mostly by Hepatitis C (24%), and alcohol-related (27.9%), whereas in Pakistan, it is Hepatitis C, i.e., 86%.[10,11] The management burden is increased by the complication of DCLD. The complications, e.g., variceal bleeding, hepatorenal syndrome, are well-studied; however, a comprehensive analysis of non-clinical determinants of outcome in general DCLD admissions remains limited.[12] Existing research prioritises aetiology-specific studies or interventions over non-clinical determinants. Key determinants such as socioeconomic status (SES), disease duration, length of stay (LOS), and aetiology distribution are underreported despite their profound impact.[13]

Evidence suggests that the non-clinical determinants matter significantly in DCLD.[13] Lower SES correlates with 34–43% higher hospitalisation rates for alcohol-related DCLD in high-income countries and has a 7.4-fold higher mortality in deprived populations.[14] Moreover, the time from chronic liver disease diagnosis to decompensation predicts outcomes and determines LOS at the hospital. A DCLD patient with more complications stays for a prolonged time in a hospital with higher

mortality rates. No doubt, these factors play a crucial role in shaping disease patterns, healthcare utilization, and overall population health, yet they are overlooked in epidemiological studies.[13]

Despite these trends, integrated analysis linking demographics, SES, disease duration, LOS, and aetiology to dichotomous inpatient outcomes (improved vs dead) in a tertiary-care DCLD cohort is scarce. This gap hinders risk stratification, particularly in resource-limited settings where DCLD mortality rates vary. Therefore, this study aims to characterise the epidemiology (including demographic profile, disease duration, LOS, and aetiology) and hospital outcomes (discharge status) of patients admitted to a tertiary care hospital with decompensated chronic liver disease. By defining these characteristics and their relationships to survival, this study seeks to provide valuable insights for risk stratification, resource allocation, prognostication, and the development of targeted management strategies for hospitalised DCLD patients in a tertiary care setting.

METHODOLOGY

This analytical cross-sectional study was conducted at a tertiary care hospital from March 2019 to April 2021. Using the WHO sample size calculator (version 2.0), with absolute precision (d=0.10), an inpatient mortality rate of 18.9% for DCLD patients, and ±10% absolute precision (95% CI), a minimum of 62 samples was calculated. The precision balances feasibility and validity, and subgroup analyses are exploratory due to reduced power for effects with an absolute difference <25%. A total of 61 adult in-patients (≥18 years) with clinically, radiologically, or histologically confirmed cirrhosis were consecutively enrolled. Patients unable to consent due to encephalopathy or cognitive impairment, those with prior liver transplantation or co-existing malignancies (other than hepatocellular carcinoma), and individuals with significant comorbidities (e.g., advanced cardiac, renal, or pulmonary disease) were excluded.

After obtaining ethical approval from the institute's IRB and patient consent, data were collected and recorded on a structured pro forma. The independent variables included age, gender, duration of cirrhosis (years since diagnosis), LOS in days, disease aetiology (e.g., Hepatitis B, C, alcohol, others), and SES based on Collis D's social grade classification.[15] Whereas the dependent or outcome variable included discharge status, which was dichotomised as "improved" or "died". Data entry and analysis were performed using SPSS-26.

The normality of continuous variables (such as age, disease duration, and LOS) was confirmed by the Kolmogorov-Smirnov test (p>0.005). Inferential analysis included an independent *t*-test to assess the significance of the difference between the continuous and outcome variables. Chi-square or Fisher's exact tests to assess associations between categorical variables (gender, aetiology, and SES) and outcome. Two-tailed p<0.05 were considered statistically significant. Statistical methods were chosen to align with participants' normal variable distributions and small cell counts, in accordance with the STROBE guidelines for observational research reporting.

RESULT

A total of 61 diagnosed cases of DCLD with a mean age of 49.61±14.028 years, a mean duration of disease of 3.94±3.649 years, and 4.02±1.576 days of LOS. Among the 61 patients, males were more prevalent, i.e., 36 (59%). The social class grade was E in 28 (45.9%) patients. Hepatitis C was the most common cause of DCLD, affecting 47 (77.0%) patients. The mortality of in-patient DCLD patients appeared 12 (19.7%), as in Table-1.

The Chi-square and/or Fisher's exact test revealed that only aetiology had a significant p-value, whereas gender and SES showed no association with DCLD, Table-2. The independent *t*-test revealed a significant difference in hospital stay and patient outcomes, with discharged patients staying longer than those who died, t (59) = 2.96, p=0.036, with a mean difference of 1.06 days (95% CI [0.07, 2.04]), indicating length of hospitalisation may be associated with discharge status. Whereas no significant difference in age, t (59) = -1.84, p=0.070, 95% CI [-17.03, 0.70], nor in disease duration, t (12.72) = -1/37, p=0.196, 95% CI [-17.03, 0.70], between improved and died patients was observed, Table-3.

Table-1: Demographic and clinical characteristics of patients (n=61)

Variable	Mean±SD OR n (%)
Age	49.61±14.028
Duration of disease?	3.94±3.649
LOS (in days)	4.02±1.576
Gender	
Male	36 (59%)
Female	25 (41%)
Socio economic status	
Middle class (B)	5 (8.2 %)
Lower middle class (C1)	9 (14.8 %)
Skilled working class (C2)	7 (11.5%)
Working class (D)	12 (19.7 %)
Lowest level (E)	28 (45.9%)
Cause of DCLD	
Hepatitis B	5 (8.2 %)
Hepatitis C	47 (77.0 %)
NAFLD/ ALD	2 (3.3%)
Wilson's disease	3 (4.9%)
Others	4 (6.6%)
Status at discharge	
Improved	49 (80.3%)
Died	12(19.7%)
Total:	61(100%)

Table-2: Association between gender and aetiology with discharge status, Chi-square/Fisher's exact test

Category	Improved (n=49)	Died (n=12)	*p*
Gender			
Male	29 (80.6%)	7 (19.5%)	0.957[1]

Female	20 (80%)	5 (20%)	
Aetiology			
Hepatitis C	36 (73.5%)	11 (91.7%)	0.032[2]
Hepatitis B	4 (8.2%)	1 (8.3%)	
NAFLD/ ALD	2 (4.1%)	0 (0.0%)	
Wilson's disease	3 (6.1%)	0 (0.0%)	
Others	4 (8.2%)	0 (0.0%)	
Socio economic status			
Middle class (B)	4 (8.2%)	1 (8.3%)	0.474
Lower middle class (C1)	8 (16.3%)	1 (8.3%)	
Skilled working class (C2)	4 (8.2%)	3 (25.0%)	
Working class (D)	9 (18.4%)	3 (25.0%)	
Lowest level (E)	24 (49.0%)	4 (33.3%)	
Total	49	12	61

[1] Chi-square test | [2] Fisher's exact test (for small, expected counts)

Table-3: Comparison of age, disease duration, and stay at hospital by discharge status (independent *t*-test)

	Variance	df	*t*	Two-tailed *p*	Mean Difference	95% CI [Min-Max]
Age	Equal	59	-1.84	.070	-8.166	[-17.03–0.70]
Duration of disease	Unequal	12.72	-1.37	.195	-2.205	[-5.70–1.29]
LOS	Equal	59	2.96	.036	1.058	[0.071–2.04]

DISCUSSION

DCLD remains a leading cause of global mortality, with studies reporting 1-year mortality rates of 20–57%.[16] Despite extensive research on pathophysiological mechanisms and clinical management, non-clinical determinants of outcome, such as SES, LOS, and disease aetiology in our province, remain underexplored. This study addresses this gap by analysing 61 DCLD inpatients, revealing an overall mortality rate of 19.7%, which is very close to 20.91% reported by Shah AS *et al*, from India, and 19.8% reported by Bhattarai S from Nepal.[7,17] However, our findings showed higher mortality compared to another study done in the same-study place, i,e.8% among cirrhotic inpatients.[18] our findings align with global burdens highlighted by Asrani *et al*, where cirrhosis accounts for 1.32 million annual deaths.[19] This underscores an urgent need for holistic patient profiling beyond traditional clinical metrics.

Contrary to the literature suggesting gender-based survival differences, this study found near-identical mortality rates between males (19.5%) and females (20%), which is supported by Mazumder NR, who found no association between females and cirrhosis-related mortality.[20] This contrasts with Devarbhavi H *et al,* and Mellinger JS *et al*, who noted higher male mortality in alcohol-related liver disease and global data where men constitute two-thirds of cirrhosis deaths.[1,21] Moreover, Bhattarai S also found 78.2% of total 754 DCLD inpatients were males.[7] However, Volk *et al,* similarly reported no gender-based outcome differences in decompensated cirrhosis re-admissions.[22] Our results may reflect evolving etiology patterns or equitable healthcare access in the setting, or more care and attention provided to the male counterpart. This parity underscores that gender alone is not a definitive prognostic marker in DCLD

Hepatitis C Virus-associated DCLD exhibited the highest mortality (91%) in our cohort, which is quite high compared to Samonakis DN *et al*, who reported 41%. [23] This discrepancy may arise from regional factors: late diagnosis, limited access to direct-acting antivirals (DAA), or advanced disease at presentation. For instance, Verna EC *et al* demonstrated that DAA-treated HCS patients with decompensated cirrhosis still face high mortality if baseline MELD scores exceed 20.[24]. Conversely, alcohol-related DCLD showed lower mortality (27.3%) here versus 48% by Shah AS *et al,* possibly due to practising more religious values here. [17] These findings highlight etiology-specific risks necessitating tailored management.

Patients in the lower SES stratum (Level E) had a mortality rate 3.3 times that of higher SES groups. This corroborates Qazi AFA *et al*, who linked low SES to poorer outcomes and mortality in CLD due to medication non-adherence, nutritional deficits, and delayed care seeking.[18] Kardashian A *et al*, further identified SES as a structural driver of health inequalities, where deprivation exacerbates comorbidities and limits treatment access.[19] Our data reinforces that SES interventions, e.g., subsidised care, community support, are as critical as medical management in improving DCLD outcomes.

Unlike Al-Smadi K *et al*, we found no association between disease chronicity and outcomes.[20] However, LOS significantly differed by outcome: discharged patients stayed 1.06 days longer than those who died (p=0.036), with overall LOS as 4.02±1.576 days, which is very close to 6.3 days reported by Bhattarai S.[7] Khan HA *et al*, among liver cirrhotic patients, having total LOS as 7±4.12 days, concluded that the inpatients' mortality increases with increased LOS.[21] But may reflect our cohort's therapeutic responsiveness. Extended stays could enable the management of complications, such as infection control and electrolyte correction, and turn high-risk admissions into survivable events.

This study is limited by a modest sample size (n=61) and a single-centre design, which restricts generalizability and may introduce potential seasonal biases due to consecutive sampling. Future research should validate findings in multi-centre cohorts, integrate molecular and socioeconomic factors, develop targeted community interventions, and apply results in prospective cohorts, such as PREDICT, to improve outcome prediction.

CONCLUSION

Outcomes in DCLD are strongly influenced by non-clinical forces. SES was more important in predicting death than clinical factors, while gender and disease duration mattered less than expected. The high death rate from Hepatitis C needs immediate action to improve access to care. Also, staying longer in the hospital may help save lives by allowing better management of complications. To improve survival, we need to focus on fair and accessible care, not just medical treatments.

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