

Predictors of Three-Month Mortality and Hospital Re-Admissions in Patients with Liver Cirrhosis

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ABSTRACT

Background: The percentage of re-admissions to the hospital & death rates within three months is used as a quality indicator for hospitalized patients with advanced disease of the liver; however, this area of research has not been thoroughly studied in Pakistan.

Material & methods: This longitudinal study was conducted from January 2021 to June 2021 in the Medicine department of Sialkot Medical College, Sialkot. The study included individuals with cirrhosis of liver who were admitted to the Inpatient gastroenterology department. A total of 160 patients were studied, & their frequency, diagnostic, and biological variables, as well as re-admission prestige and results after three months of assessment, were all documented. Multi-variate logistic study was used to inspect the impact of these factors on re-admissions and mortality rates.

Results: The occurrence of hydro-thorax, Hepato Renal Syndrome (HRS), & portal vein thrombosis was markedly related to the risk of re-admissions within 3 months. The Child turcotte pugh (CTP) C grade, Maddrey's discriminant function (DF), and the model for end-stage liver disease (MELD) score all noticeably raises the probabilities of re-admissions. The area under curve (AUC) for MELD and DF were 0.928 and 0.927, correspondingly. Both MELD and DF raise the risk of mortality markedly.

Conclusion: The current study found that parameters similar to DF and MELD as well as problems like hydro-thorax, hepatorenal syndrome, and PVT, are the most prognostic signifiers of liver cancer side effect to determine the proportion of re-admissions & death rates within three months of patient liberation.

Keywords: cirrhosis, liver Disorder, re-admission, MELD

INTRODUCTION

Cirrhosis of the liver affects between 4.5 and 9.5 percent of the global inhabitants¹⁻³. This occurrence might be an underestimation of the actual disease load because up to 1/3 of individuals persist undiagnosed until the disease develops to a higher state. It is similarly the main reason of death in both established and emerging nations. Cirrhosis of the liver is anticipated to develop the 12th greatest reason of death worldwide by 2020⁴. Cirrhosis of the liver correspondingly adds considerably to death due to problems, rise strain on the Health Care System, repeated re-admissions, & financial, mental, & social impact on patients and household members⁵⁻⁶.

Multiple admissions not only raise the economic load on patients, but also make them subvert & apprehensive their trust in the managing doctor. Early readmissions are well documented in several long-lasting disease conditions and are partially prevented due to successful therapies⁷⁻⁹. However, in the case of liver cirrhosis, the features of re-admission & death are continuously changing. To recognize the analysts of re-admission and death, it is critical to investigate the profile of admitted cirrhosis cases. Several researchers from around the world have attempted to investigate such factors¹⁰⁻¹⁵. However, there is a scarcity of information; our research will look into the factors of re-admission rates & death within three Months of hospital discharge. It has always been difficult for clinicians to develop trustworthy techniques for forecasting the fate of chronic diseases such as cirrhosis.

The majority of the tools created for morbidity assessments, short-term mortality & predictions. For years, the accessible methodologies comprised tools such as the CTP score, which depended on a restricted number of characteristics and is now frequently used to estimate the diagnosis of patients with restricted accomplishment in the immediate environment based on clinical experience. However, more attention has subsequently been placed on variables that have been demonstrated to be strongly & freely connected to the consequence by Multi variate study. MELD score is one of the best shared examples, and it is now favored over CTP score at several Centre's¹⁶. According to existing

information, roughly half of patients are readmitted within three months of hospital discharge due to problems connected to liver cirrhosis. Many readmissions can be attributed to controllable variables. As a result, efforts are made to release essentially emphasis on this higher-risk category of patients in order to prevent readmissions.

MATERIALS AND METHOD

This longitudinal study was conducted from January 2021 to June 2021 in the Medicine department of Sialkot Medical College, Sialkot. Patients hospitalized to a tertiary healthcare Centre with liver cirrhosis were comprised in this research subsequently informed agreement was obtained from the patient or the family member if the patient was unable to give agreement. Patients who were admitted for a non-emergency reason, had an ambiguous diagnosis of liver cirrhosis, & refused to contribute in the research were eliminated.

Following the collection of initial information such as Age, name, sexual category, and the liver cirrhosis etiology, biological factors such as CBC, LFT, RFT, Pro thrombin time, (INR), and so on were collected. Cirrhosis & portal hypertension complications included gastro-intestinal hemorrhage, & hepatic hydro-thorax. In addition, the existence of contaminations and related comorbidities was reported.

The conventional formula was used to compute MELD, Maddrey's DF & CTP score. Patients were monitored for three months by telephone calls & medicinal records. There was documentation of readmissions and deaths. Patients' clinical, biochemical and demographic characteristics were concise based on 2 independent result variables: (a) re-admission within three months & (b) death.

For categorical data, the statistical significance of change was determined using Pearson's Chi-Square Test, while for continuous parameters, the independent samples' t test was utilized.

The factors that showed an important alteration between groups in univariate study were taken into account for the multi-variate logistic reversion model. To determine the goodness-of-fit

of a multi-variate model, the Hosmer–Lemeshow test was used. The attuned odds ratio (OR) derived from the multi-variate model was used to calculate the events risk linked with various factors. The prognosis correctness of constant factors with an important influence on the result variables was determined using Receiver–Operating Characteristic study. The parameters' cutoff values were determined, as well as their sensitivity and specificity.

All analyses were carried out with SPSS version 20.0 & statistical implication was verified at the 5% level.

RESULTS

The patients had an average age of 50.10 ± 11.20 years. Among the 160 cases, one 110 were men and 50 were females.

In terms of re-admission, 36.2% patients were re-admitted within three months. The overall population of hospitalized and non-admitted patients varied non - significantly. The majority of participants with Gastro intestinal bleeding and their allocation according to the grade of varices varied non - significantly between the 2 Groups. The percentage of cases with HE in the re - admission group was majorly enhanced (32.8 percent) than in the non-readmission group. Moreover, the percentage of readmitted patients with hydro-thorax, hepatic renal syndrome, & hepatocellular carcinoma was statically important.

In terms of mortality, the study sample had 15 (9.4 percent) fatalities. The demographic outline of death cases differed slightly from that of non-mortality patients. The percentage of cases with gastro intestinal bleed was (26.7 percent) in the mortality group linked to the other group (25.9 percent), which was statistically

important. The patient's distribution according to the grade of varices differed inconsequentially between the 2 Groups. Other indicators, such as hydro-thorax, Hepato Renal Syndrome, portal vein thrombosis, & Hepato cellular carcinoma, indicated a substantially greater percentage in the death group when matched to the other groups (p 0.05).

Furthermore, all of the factors were investigated with mortality as an outcome. Except for AST/ALT, albumin, and Na, the values that showed a major change among the death and non-mortality groups were nearly identical to those examined for re-admission within three months. Furthermore, the metrics gastric intestinal bleed Potassium displayed a major change between the 2 groups. Multivariate logistic reversion investigation was also used to estimate the threat of consequences connected with demographic, medical, and chemical factors. The multivariate model incorporated the parameters that showed a significant difference between comparison groups. Because PT and INR had considerable collinearity with discriminant Function, they were removed from the project. Furthermore, because over-all & direct Bilirubin had a significant association, merely whole Bilirubin was reserved in the model. The occurrence of hydrothorax and HRS was strongly linked with the probability of readmission within 3 months, with odds ratio of 18.5 and 22.8, correspondingly, as linked to those who did not have such symptoms. The PVT was also related with a considerably higher risk of re-admission, with ORs of 4.9. In addition, each unit rise in discriminant function & model for end liver disease score enhanced the chance of re-admission by 1.1 and 1.5 times, correspondingly.

Table 1A: Descriptive statistics for several parameters conferring to the status of readmission

Parameters		No (n = 102)	Yes (n = 58)	P value
Age in years (mean ± SD)		50.10 ± 11.20	48.11 ± 10.90	0.76
Sex [no. (%)]	Female	28 (27.5)	9 (15.5)	0.11
	Male	74 (72.5)	49 (84.5)	
Etiology [no. (%)]	EHPVO	2 (1.9)	0 (0)	0.129
	HBV	25 (24.5)	5 (8.9)	
	HBV + HCV	15 (14.7)	7 (12.1)	
	HCV	42 (41.2)	29 (50)	
	HIV + HBV	3 (2.9)	1 (1.7)	
	NAFLD	13 (12.7)	12 (20.7)	
	NCPF	2 (1.9)	4 (6.9)	
GI bleed [no. (%)]	No	93 (91.2)	43 (74.1)	0.28
	Yes	9 (8.8)	15 (25.9)	
Grade of varices [no. (%)]	I	63 (61.8)	36 (62.1)	0.28
	II	27 (26.5)	14 (24.1)	
	III	12 (11.8)	8 (13.8)	
HE [no. (%)]	No	95 (93.1)	39 (67.2)	<0.0001
	Yes	22 (6.9)	19 (32.8)	
Hydrothorax [no. (%)]	No	99 (97.1)	42 (72.4)	<0.0001
	Yes	3 (2.9)	16 (27.6)	
HRS [no. (%)]	No	91 (89.2)	50 (86.2)	<0.0001
	Yes	11 (10.8)	8 (13.8)	
PVT [no. (%)]	No	88 (86.3)	37 (63.8)	<0.0001
	Yes	14 (13.7)	21 (36.2)	
HCC [no. (%)]	No	94 (92.2)	52 (89.7)	0.002
	Yes	8 (7.8)	6 (10.3)	

When compared to grade I, the CTP C grade had an increased risk of re-admission with an odds ratio of 17.2. According to the multivariate model, the left-over factors had no influence on the consequence. The receiver operating characteristic study was used to assess the cutoffs and analytical precision of the constant factor's discriminant function & model for end stage liver disease, which had a substantial influence on hospital re-admission.

The receiver operating characteristic charts for the two parameters are shown in Figure 1. The AUCs for discriminant function & model for end stage liver disease were 0.927 (95 percent CI: 0.90–0.962; p <0.0001) and 0.930 (95 percent CI: 0.892–0.959; p <0.0001), correspondingly, which were practically identical. According to youden's index, a beginning score of 49.96 showed a sensitivity of 0.81 and a specificity of 0.91 for DF. A

threshold score of 17.5 for MELD had a sensitivity of 0.92 & a specificity of 0.79.38.2 percent of the 89 cases of re-admission within three months died during their hospital stay. When compared to individuals who did not have HRS, the risk of death was 8.652 (95 percent CI: 1.946–38.463; p= 0.005) times higher. Furthermore, a unit rise in discriminant function and model for end stage liver disease raised the probability of mortality by 1.025 (95 percent CI: 1.005–1.044; p = 0.013) and 1.115 (95 percent CI: 1.000–1.246; p = 0.048) times, respectively. The left-over factors had a statistically negligible impact on death. The receiver operating characteristic investigation was likewise carried out on these 2 factors, with death as an incident. The AUC for DF and MELD was 0.884 (95% CI: 0.805–0.962; p 0.0001) and 0.902 (95% CI: 0.841–0.963; p 0.0001), respectively. The DF verge was 64.10, with a sensitivity of 0.88 & a specificity of 0.85, and the

model for end stage liver disease threshold was 26.5, with a sensitivity of 0.74 and a specificity of 0.92. The DF and MELD measures can be used in combination to determine the diagnosis of consequences.

Table 1B: Descriptive statistics for several parameters conferring to the status of mortality

Parameters		No (n = 143)	Yes (n = 15)	
Age in years (mean ± SD)		50 ± 13	49 ± 10	0.69
Sex [no. (%)]	Female	23 (16.1)	5 (33.3)	0.454
	Male	120 (83.9)	10 (66.7)	
Etiology [no. (%)]	EHPVO	2 (1.4)	0 (0)	0.49
	HBV	15 (10.5)	2 (13.3)	
	HBV + HCV	28 (19.6)	2 (13.3)	
	HCV	74 (51.7)	9 (60)	
	HIV + HBV	1 (0.7)	0 (0)	
	NAFLD	16 (11.1)	1 (6.7)	
	NCPF	7 (4.9)	1 (6.7)	
GI bleed [no. (%)]	No	112 (78.3)	11 (73.3)	0.030
	Yes	31 (21.7)	4 (26.7)	
	I	100 (69.9)	4 (26.7)	
Grade of varices [no. (%)]	II	22 (15.4)	6 (40)	0.84
	III	21 (14.7)	5 (33.3)	
HE [no. (%)]	No	105 (73.4)	4 (26.7)	<0.0001
	Yes	38 (26.6)	11 (73.3)	
Hydrothorax [no. (%)]	No	135 (94.4)	10 (66.7)	0.001
	Yes	8 (5.6)	5 (33.3)	
HRS [no. (%)]	No	119 (83.2)	6 (40)	<0.0001
	Yes	24 (16.8)	9 (60)	
PVT [no. (%)]	No	130 (90.9)	10 (66.7)	0.012
	Yes	13 (9.1)	5 (33.3)	
HCC [no. (%)]	No	138 (96.5)	8 (53.7)	<0.0001
	Yes	5 (3.5)	7 (46.6)	

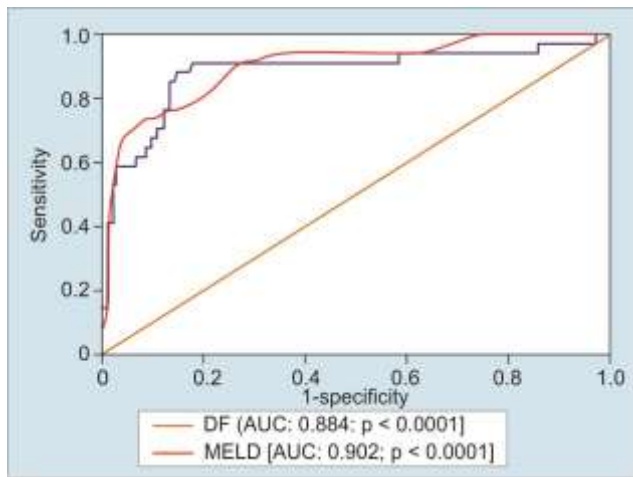


Fig 1: Receiver operating characteristic graphs for death

DISCUSSION

Cirrhotic patients admitted to the hospital for non-elective reasons were consented to participate in the current study and were monitored for three months after discharge. In three months, hospital readmission and short-term death were investigated. This research discovered that primary re-hospitalizations (38.36 percent) & death (14.65 percent) between patients with cirrhosis are shared within 3 months of hospital release. The published literature from India indicated a 42.30 percent hospital readmission rate after three months, but no statistics on death for over-all cirrhosis patients are available. 17 The mortality rate among Indian patients with acute liquor Hepatitis was 44 percent. 18 In comparison, readmission rates at three months are often greater than in the western population^{13,14}, & the death rate was said to be equivalent^{19,20}.

However, other recent studies have found a nearly same age group with a range of 45–51 years²¹⁻²². Age did not appear to be a factor in mortality or hospital readmission in the current

investigation. Although the 3-month mortality rate of 14.65% was great, it was sustained by the point that younger patients had further acute disease at the time of hospitalization, as showed by the model for end stage liver disease score²³.

Despite the fact that it was recognized that cirrhosis in elderly patients above the age of 65 resulted in a worse prognosis, with death found in more than 20% of admitted patients²³⁻²⁴, and the tendency does not appear to favor only the elderly. We have no explanation for this unusual discovery, but we believe that either the physiology of cirrhosis varies in young adults from that of older patients, or that young patients are hospitalized eventually in the course of the illness.

Gender showed a comparable lack of significance. According to published clinical study findings, women need fewer concentrated care managing and have improved outcomes than males; however, this finding does not apply to chronic and essential conditions such as cirrhosis²⁵. Women gender can't be regarded a caring aspect in & of itself, and in cirrhosis, the re-admission & death rates were shown to be comparable to those of male patients.

Cirrhosis etiologies did not appear to calculate patient Re-admission or death in the short term. Cirrhosis is the most difficult hurdle because it is an irreversible illness with no known therapy. The current study found no prognostic significance of cirrhosis etiologies for instant death or Re-admission. It is well documented that precautionary interventions such as Hepatitis B immunization & less liquor intake are effective. Though, the actions are ineffective once cirrhosis has developed²⁴The parameters of liver function tests are regularly employed for patient observing, but their prognostic standards for lasting patient results are best assessed. In the absence of obvious liver disease, high results are more significant²⁷. The current study's findings did not reveal any deviations from the recognized notion. Among cirrhotic consequences, HE has been identified as a significant analyst of instant death & illness.

It is an important element of the child-Pugh score. Because of the reversible nature of the illness, extensive data on its relevance and management have been published, resulting to HE becoming the primary midpoint of cure for cirrhosis patients¹⁶. Triggering variables & HE control are thoroughly monitored at several sites, comprising ours. This could explain why many recent studies have not found HE to be an important indicator of instant death and illness^{17,20}. Even though the initial assessment revealed a substantial change in HE & hepatic cellular carcinoma in individuals with cirrhosis, the chances were found to be non-statistically important in multivariate analysis. Hydrothorax, HRS, and PVT are three more major sequelae that have been demonstrated to be potential analysts of hospital Re-admission within three months under the present standard of care. Only HRS had the highest and most significant odds of both Readmission (24.573) & death (8.652). Only a little research has found hepatic renal syndrome to be a significant analyst of one month or three-month Re-admission or death^{11,13,24}. The significant disparity can be attributable to differences in the percentage of individuals studied as well as differences in etiologies and illness features. Several studies have been conducted particularly to investigate these issues, with varying degrees of success. HRS cases accounted for 19.39 percent (45) of all cases in the current study. In one of the investigations, merely hepatic liver syndrome was revealed to be the strongest analyst of instant death in patients with liquor liver disease²⁵. These findings are consistent with previous research. Last-stage liver cirrhosis is frequently linked with hepatorenal syndrome. HRS patients have a bad prognosis and have a lower likelihood of surviving. Even with well-established treatments, income leftovers elusive²⁹Hydro-thorax is one of the slightest common cirrhosis consequences, yet it is a proven predictor of readmission¹⁵. Only with a three-Month hospital Re-admission and an odds ratio of 18.386 did we observe the predictive nature of hydrothorax. There are no statistically significant probabilities of death. Recent results suggest the

increased importance of Hepatic hydro-thorax, as the majority of such applicants are deemed orthotopic liver transplant candidates.

For of the minor sample size of the study population, portal vein thrombosis is rarely mentioned as a relevant predictor. We found it to have a lower impact than hydro-thorax & hepatic renal syndrome, with an odds ratio of 5.306. A meta-analysis indicated that PVT would play a role in death and the growth of ascites²⁵.

Further importance attached to these patients, in the style of more cautious release preparation & more stringent take assessment, and if appropriate, aimed toward a greater MELD score, can certainly advantage patients. In the present study, control variables such as patient age, sex, and cirrhosis etiology did not arise as indicators of three-month re-admission or death. Interestingly, elements of the Child–Pugh score such encephalopathy, & PT did not determine brief readmission or death.

Though, the importance of model end stage for liver disease & discriminant function scores, as well as complications such as hydro-thorax, hepatic renal syndrome, & PVT, revealed as the best prognostic instruments & cirrhosis complications in determining the rate of Re-admission & death within three months of patient release.

The study's asset is that the study results differed from the general consent, which can be related to current changes in evaluation methodologies & center-specific patient managements. There are numerous boundaries to this research. Although the findings might not be generalizable to a larger inhabitant, the patient variety described in experimental trials highlights center-specific assessment of risk factors & therapeutic techniques.

Though etiology did not indicate readmission in this study, it does play a significant impact in illness progression. The duration of cirrhosis was not considered in this study, regardless of the fact that it could be an important risk factor for both Re-admission & death. The study of cirrhotic patients' commitment to treatment and characteristics impeding adherence to treatment would have given greater weightage to cirrhotic patients' Re-admission & death.

CONCLUSION

The current research discovered that model for end stage liver disease, discriminant function score, & problems such as hydro-thorax, hepatic renal syndrome, & PVT are the strongest indicative markers of cirrhosis problem to determine the level of Re-admission & death within three months of patient release.

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