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Research Article

FACTORS INFLUENCING THE OUTCOME OF HOSPITALIZATION AMONG PATIENTS WITH LIVER CIRRHOSIS

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Article Received: October 2020**Accepted:** November 2020**Published:** December 2020**Abstract:**

Objectives: To identify factors influencing the outcome of hospitalized patients with liver cirrhosis.

Methods: Data of patients with cirrhosis aged > 12 years who were hospitalized were included after informed consent were collected using the method of purposive sampling. There was a hospitalization score for "death" and "non-death". Statistical analysis was performed with SPSS version 25. Two-dimensional analysis and binary logistic regression were performed to determine the influence of various prognostic factors such as gender, age, diabetes history, liver cirrhosis etiology, presence of hepatic encephalopathy at presentation, presence of the upper gastrointestinal tract tracheobronchial bleeding and aspiration on the likelihood of death in patients with cirrhosis of the liver.

Results: Out of 1,304 patients, 15.7% died during hospitalization. The mean age of the deceased was 58.08 + 14.49 years. Two-dimensional analysis suggested that mortality was significantly higher in the group of patients with hepatic encephalopathy at presentation ($p < 0.01$), without upper gastrointestinal bleeding ($p < 0.01$). It was not significantly different between male / female genders ($p = 0.504$), diabetic / non-diabetic groups ($p = 0.652$), and viral / non-viral etiology of cirrhosis ($p = 0.918$). Binary logistic regression revealed that patients with tracheobronchial aspiration were 12.3 times more likely to die than patients without tracheobronchial aspiration. Similarly, in patients with hepatic encephalopathy, the likelihood of death was 7.862 times greater than in patients without hepatic encephalopathy.

Conclusion: Hospital mortality among patients with cirrhosis was high. Age, sex, history of diabetes, viral etiology of cirrhosis did not significantly affect the mortality of these patients. Patients who developed hepatic encephalopathy and who experienced tracheobronchial aspiration during hospitalization had a higher risk of death. Excellence in treating hepatic encephalopathy and preventing aspiration can effectively reduce the mortality rate of patients with cirrhosis in our hospitals.

Keywords: liver cirrhosis, hospitalization result, pulmonary aspiration, age groups, SPSS.

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INTRODUCTION:

Cirrhosis of the liver is an important public health problem in Pakistan. HCV infections are the most common etiology of liver cirrhosis in our country. Its worldwide distribution ranges from 4.5% to 9.5%. The reason for hospitalization of patients with cirrhosis of the liver are numerous complications of this disease, eg bleeding from the upper gastrointestinal tract (UGIB), hepatic encephalopathy (HE), etc. The result of hospitalization of these patients during convalescence or death is unsatisfactory. In-hospital mortality among patients suffering from cirrhosis is high worldwide, ranging from 13.5% to 35%. Various prognostic models such as the Child-Turcotte-Pugh Scoring System (CTP) and the End-Stage Liver Disease (MELD) model for end-stage liver disease were previously formulated. However, until now, the patient and hospital-related factors affecting the mortality or in-hospital mortality of patients admitted with cirrhosis are poorly understood. If our research revealed certain etiological factors, then the preventive measures would reduce the number of deaths among hospitalized patients with cirrhosis and thus improve hospitalization outcomes. This in turn will support clinical and health decision making as well as evidence-based policy making and adjustment. Therefore, the aim of this study was to determine the factors influencing the hospitalization outcome of patients with cirrhosis of the liver hospitalized in the 3rd degree hospital in Gujranwala, Pakistan.

METHODS:

This cross-sectional study was conducted at the East Medicine Department of Mayo Hospital, Lahore for one-year duration from August 2019 to August 2020. Following approval by the institution's Ethical Review Committee (ERC), all patients received written informed consent. The sample size calculation was performed using the Rao online calculator. With a population size of 20,000, a 50% distribution of responses and a confidence interval of 95%, the minimum recommended sample size was 377. Data were collected prospectively by purposive sampling using a structured proforma. All CLD patients over the age of 12 who were hospitalized for various complications of cirrhosis were included in

the study. The hospitalization score of all patients was also recorded for "death" and "non-death". The second group consisted of patients who had been discharged, referred to other institutes or left without medical advice. Pulmonary aspiration was assessed after tachypnea, wheezing, crackling on a chest exam, recovery of contents such as food particles during direct airway suction, with or without opacity on an anterior-anterior thoracic chest X-ray. Statistical analysis was carried out using the Statistical Package for Social Sciences (SPSS), version 25. The only quantitative variable was the age of the patients, while gender, diabetes history, viral or non-viral etiology of cirrhosis, presence of upper gastrointestinal bleeding, hepatic encephalopathy in time of diagnosis and tracheobronchial aspiration were qualitative variables. Continuous variables were expressed as mean and standard deviation during a descriptive interpretation of the data. Frequencies and percentages were calculated for various categorical variables. An independent trial T-test was used to compare the mean age of the patients in the two groups of results (death / non-death). A two-dimensional analysis was performed to find predictors of mortality among patients with cirrhosis using the chi-square test of independence. All p-values were two-sided and considered statistically significant if <0.05 . Odds ratios and confidence intervals were also calculated. A binary logistic regression was also performed to determine the effect of various predictors on the probability that death would result from hospitalization of patients with cirrhosis.

RESULTS:

Of 1,304 patients with cirrhosis of the liver, 15.7% (n = 205) died and 84.3% (n = 1099) did not die during hospitalization. The mean age of patients who died was 58.08 ± 14.49 years, and the mean age of patients who did not die during hospitalization was 53.85 ± 14.19 years. The mean difference in the hospitalization score for a patient who died and survived due to cirrhosis is 4.23, and the result of the comparison is statistically significant (p <0.01) (Table I).

Table-I: Comparison of mean age of patients suffering liver cirrhosis with outcome of hospitalization (death/no death) (n =1304)

<i>Outcome of hospitalization</i>	<i>Mean Age (Years)</i>	<i>Standard deviation</i>	<i>Mean difference</i>	<i>p-value</i>	<i>95% Confidence interval</i>
<i>Death</i>	<i>58.08</i>	<i>14.491</i>			
<i>No Death</i>	<i>53.85</i>	<i>14.191</i>	<i>4.238</i>	<i><0.01</i>	<i>2.113 – 6.363</i>

Two-dimensional analysis suggested that mortality was significantly higher in the group of patients with hepatic encephalopathy at presentation ($p < 0.01$), no upper gastrointestinal bleeding ($p < 0.01$) and who experienced tracheobronchial aspiration during the hospitalization ($p < 0.01$). It did not differ significantly between male / female genders ($p = 0.504$), diabetic / non-diabetic groups ($p = 0.652$), and viral / non-viral etiology of cirrhosis ($p = 0.918$) (Table II).

Table-II: Factors affecting the outcome of hospitalization in patients suffering liver cirrhosis (n = 1304)

Factors	Outcome of hospitalization		Total	p-value
	Death	No death		
Gender:				
Male	99 (48.3%)	528(48.0%)	627 (48.1%)	0.504
Female	106 (51.7%)	571(52.0%)	677 (51.9%)	
Diabetes Mellitus:				
Yes	29 (14.1%)	142(12.9%)	171 (13.1%)	0.652
No	176 (85.9%)	957(87.1%)	1133(86.9%)	
Etiology of cirrhosis				
Viral	173 (84.4%)	922(83.9%)	1095(84.0%)	0.918
No-viral	32 (15.6%)	177(16.1%)	209 (16.0%)	
Hepatic encephalopathy at presentation				
Yes	141 (68.8%)	153(13.9%)	294 (22.5%)	<0.01
No	64 (31.2%)	946(86.1%)	1010(77.5%)	
Presence of upper gastrointestinal bleed				
Yes	37 (18.0%)	472(42.9%)	509 (39.0%)	<0.01
No	168 (82.0%)	627(57.1%)	795 (61.0%)	
Tracheobronchial Aspiration during hospitalization				
Yes	79 (38.5%)	15 (1.4%)	94 (7.2%)	<0.01
No	126 (61.5%)	1084(98.6%)	1210 (92.8%)	

Logistic regression was performed to determine the effect of gender, age, diabetes history, etiology of liver cirrhosis, presence of hepatic encephalopathy at diagnosis, presence of upper gastrointestinal bleeding and tracheobronchial aspiration on the likelihood that death would be hospitalization in patients with cirrhosis. The logistic regression model was

statistically significant, $p < 0.05$. Patients who had tracheobronchial aspiration were 12.3 times more likely to die than patients without tracheobronchial aspiration. Similarly, in patients with hepatic encephalopathy, the likelihood of death was 7.862 times greater than in patients without hepatic encephalopathy (Table III).

Table-III: Binary logistic regression output with co-efficient, odds ratio and their 95% CI

Risk Factors	B	S.E.	Wald-Statistic	p-value	Odds Ratio	95% C.I. for EXP(B)	
						Lower	Upper
Age	-0.006	0.007	0.901	0.343	0.994	0.980	1.007
Gender (Male/Female)	-0.266	0.196	1.828	0.176	0.767	0.522	1.127
Diabetes mellitus (Yes/No)	0.337	0.262	1.646	0.199	1.400	0.837	2.342
Etiology of cirrhosis (Viral/non-viral)	-0.166	0.256	0.419	0.517	0.847	0.513	1.399
Hepatic encephalopathy at presentation (Yes/No)	2.062	0.253	66.538	<0.01	7.862	4.790	12.904
Upper gastrointestinal bleed (Yes/No)	0.353	0.262	1.811	0.178	1.423	0.851	2.380
Tracheobronchial aspiration (Yes/No)	2.517	0.341	54.625	<0.01	12.392	6.357	24.157
Constant	-1.813	0.626	8.387	<0.01	0.1643		

Nagelkerke R Square = 22.6%, Cox & Snell R Square = 38.8%.

DISCUSSION:

In the case of cirrhosis of the liver worldwide, the mortality rate among hospital patients is high. In 2016, Cristal L. Brown and his colleagues from North Carolina in the US reported 13.5% of hospital mortality among patients with cirrhosis. Similarly, in 2017, Zubieta-Rodriguez and colleagues from Colombia, and in 2011, Alsultan et al. I colleagues from Riyadh, Saudi Arabia, showed 23.5% and 35% mortality, respectively, among admitted patients with cirrhosis. In our study, we found a mortality of 15.72% among hospitalized patients with cirrhosis. Many factors influence the hospitalization outcome of these admitted cirrhotic patients. Alsultan MA et al. Observed worse hospitalization results in patients with cirrhosis who had a worse CTP result, worse MELD result and old age. They also found that advanced age ($p = 0.004$) was an independent risk factor for mortality in patients with cirrhosis. Similarly, Chen CY et al. Found that age > 75 years was significantly correlated with in-hospital mortality. In our study, the mean age of hospitalized cirrhotic patients who died was significantly higher than those who did not ($p < 0.01$). It appears that advanced age is always a risk factor for mortality in cirrhotic patients worldwide. When we applied logistic regression, only two factors (hepatic encephalopathy and tracheobronchial aspiration) were significant predictors of death in patients with cirrhosis. In 2017, Bajaj J. In our seven-predictor regression analysis, the maximum odds ratio was 12.39 times higher in aspirated patients than in non-aspirated patients. We know that tracheobronchial aspiration is a preventable event, but often occurs in critically ill patients and carries a 30% risk of mortality by itself. In hospitalized patients with cirrhosis of the liver, this tracheobronchial aspiration is multifactorial; The main reason for tracheobronchial aspiration in patients with coma and cirrhosis is high oral lactulose doses to reverse hepatic encephalopathy. The method of administering lactulose to reverse hepatic encephalopathy should be individualized to prevent aspiration. Second, tracheobronchial aspiration is observed during massive upper GI bleeding, which can be prevented by intubating patients if bleeding patients suddenly collapse. Some patients with cirrhosis show aspiration during endoscopic procedures, which can also be minimized by taking appropriate safety measures. Mortality from liver diseases is one of the main causes of death in our country. A large sample study at Shifa International Hospital Islamabad found that out of 8,529 admissions; in-hospital mortality was reported in 283 (3.31%) patients. The most common cause was, of which 160 deaths were of medical origin. Of these medical cases, 33 (20.6%)

patients died from chronic liver disease. Another study from the same institute found 1,294 (3.95%) deaths. Of which 966 (74.65%) were due to various medical reasons. Of 966 deaths, 99 (10.24%) were due to chronic liver disease. Our data suggest that hepatic encephalopathy and tracheobronchial aspiration are independent predictors of mortality among hospitalized cirrhotic patients in whom hepatic encephalopathy is manageable and aspiration is preventable. Accordingly, mortality among hospitalized cirrhotic patients can be reduced by the appropriate measures discussed above.

CONCLUSION:

Hospital mortality among patients with cirrhosis was high. Age, sex, history of diabetes, viral etiology of cirrhosis did not significantly affect the mortality of these patients. Patients who developed hepatic encephalopathy and who experienced tracheobronchial aspiration during hospitalization had a higher risk of death. Excellence in treating hepatic encephalopathy and preventing aspiration can effectively reduce the mortality rate of patients with cirrhosis in our hospitals.

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