ORIGINAL RESEARCH

Analysis of Renal Dysfunction in Patients with Liver Cirrhosis: An Institutional Based Study

[1]Jainish Kamlesh Kumar Modi, [2]Alpesh Vadher

[1]Assistant Professor, [2]Associate Professor, Department of General Medicine, Dr. N.D. Desai Faculty of Medical Science & Research, Dharmsinh Desai University, Nadiad, Gujarat, India

Correspondence:
Jainish Kamleshkumar Modi
Assistant Professor, Department of General Medicine, Dr. N.D. Desai Faculty of Medical Science & Research, Dharmsinh Desai University,Nadiad, Gujarat, India
Email: jainishmodi1988@gmail.com

ABSTRACT

Introduction: Liver disease is a common disorder affecting multiple system. It accounts for approximately 2 million deaths every year worldwide and 1 million due to complications of cirrhosis. Current epidemiological trends show that common liver diseases in Asia–Pacific countries are alcohol-related liver diseases, non-alcoholic fatty liver disease (NAFLD), hepatitis B and C, etc. Most of them lead to cirrhosis of liver. Renal dysfunction is one of the most common complications of cirrhosis with high morbidity and mortality.

Materials and Methodology: This study was adopted to be conducted as hospital-based study was carried on 133 cirrhotic patients admitted in the Tertiary care centre. Patients details that includes their demographic data, clinical examination findings and results of laboratory investigations were collected. CTP (Child Pugh) score and MELD (Model for End Stage Liver disease) Score of patients were also briefed. End results for continuous variables were expressed as means and standard deviation. Categorical variables were described as percentages. Significant factors that were associated with the presence of renal dysfunction was analysed using binary logistic regression analysis Bivariate analysis was carried out using pearsons coefficient of correlation. Odds Ratio (OR) was enabled to ascertain the strength of relationship between two variables.

Results: A total of 133 patients were included in this study. Male patients were in majority constituting 85.3% (n=113) of the total population, the rest were females (14.7%). Mean age of patients in the study group was 51.32 years (+ 13.72). The most common aetiology of cirrhosis was found to be alcohol, comprising of about 74.5%. 22 patients had more than 1 aetiology for cirrhosis, the most common of which has combined alcohol and NASH (Non-Alcoholic Steato Hepatitis) related, observed in 9 patients.

Conclusion: The present study has found significant correlation between the severity of liver dysfunction and some parameters of renal dysfunction. However, there is no such significant association was observed between the distribution of various renal parameters among different aetiologies of chronic liver disease.

Keywords: Chronic Liver Disease, Alcohol Related Liver Disorders, Renal Failure, Hepato-Renal Syndrome.

INTRODUCTION

The term 'cirrhosis' is a condition that could be defined histo-pathologically which has a numerous entity of clinical manifestations and complications where some of them could be potentially life threatening. In the earlier days, it has been suggested that cirrhosis was never been reversible and could therefore become more apparent that when the underlying effect that has caused the cirrhosis has been removed, there can be possibility of reversal of fibrosis. The pathologic features of cirrhosis mostly consisted of structural distortion with the formation of regenerative nodules. This could result in the decrease in the hepatocellular mass and the alteration of blood flow. Hencethis leads to the induction of fibrosis with the activation of hepatic stellate cells.[1]

Liver disease contributes for approximately 2 million deaths per year globally. Recently, cirrhosis is the 11th most common causes of death worldwide and liver cancer is the 16th position in the leading cause of mortality among the affected individuals; when combined they account for 3.5% of all deaths across the world. As per the WHO assumptions, alcohol consumption comprisesof about 3.8% of the global mortality rate.[2,3]When hepatitis B taken into considerations, 27 million people (10.5% of all people estimated to be living with hepatitis B) were known about their infection, while 4.5 million (16.7%) of the people probably diagnosed were actively on treatment regime.[4]Across the world, an estimated 71 million people have been diagnosed chronic hepatitis C virus infection. A considerable number among those who are chronically infected will develop cirrhosis or liver cancer.[4]Recent epidemiological waves of the most common liver diseases in Asia–Pacific countries has possibly suggested that alcohol consumption, non-alcoholic fatty liver disease (NAFLD)and hepatitis B virus (HBV) remain the major cause of cirrhosis. The increasingvaccination schedule program of HBV has been effective in decreasing the incidence of liver cancer particularly in countries like India, China and other countries.[3]

Cirrhosis is briefed as either compensated or decompensated. Decompensation could be one or more of the following manifestations such as ascites, bleeding varices, hepatic encephalopathy and jaundice. Acute kidney injury, chronic kidney injury, hyponatremia, and spontaneous bacterial peritonitis are also identified as the key features of decompensation. Child Turcotte-Pugh (CTP) staging and model of end stage liver disease score implemented for prognosticating cirrhotic patients. Therefore, CTP is clinically convenient and easy to use.[5,6] Renal dysfunction is reported as one of the most common complications of cirrhosis with high morbidity and mortality.[7,8]An accurate evaluation of renal function is considered in all patients affected with cirrhosis. Indeed, the renal function evaluation guides in the management of patients and therefore helping them to define prognosis and to effectively plan transplant strategies. Though there are some limitations, serum creatinine is still the most used biomarker for the qualitative estimation of glomerular filtration rate (GFR) in patients with cirrhosis.[9] The most important chronic liver diseases (CLDs) associated with chronic renal disease are alcohol-related liver disease, NAFLD, and hepatitis B and C. The prevalence of CKD among patients with cirrhosis has greatly decreased due to the increased prevalence of CKD-associated comorbidities such as diabetes.[10]

MATERIALS AND METHODOLOGY

This study was conducted as hospital-based study was carried on 133 cirrhotic patients admitted in Department of General Medicine, Dr. N.D. Desai Faculty of Medical Science & Research, Dharmsinh Desai University, Nadiad, Gujarat, India. All cirrhotic patients were admitted and above 18 years were included in this study. Patients reported earlier with already known renal disease, any organ transplant, any malignancy were excluded from the study. Patients details that includestheir demographic data, clinical examination findings and results of laboratory investigations were collected. CTP (Child Pugh) score and MELD

(Model for End Stage Liver disease) Score of patients were also briefed.The study started after seeking the permission confirmed by the ethical guidelines and was approved by the institutional review board. End results for continuous variables were expressed as means and standard deviation. Categorical variables were described as percentages. Significant factors that were associated with the presence of renal dysfunction was analysed using binary logistic regression analysis Bivariate analysis was carried out using pearsons coefficient of correlation. Odds Ratio (OR) was enabled to ascertain the strength of relationship between two variables. A p value of less than 0.05 was considered statistically significant. SPSS-21 software was effectively applied for statistical analysis.

RESULTS

A total of 133 patients were included in this study. Male patients were in majority constituting 85.3% (n=113) of the total population, the rest were females (14.7%). Mean age of patients in the study group was 51.32 years (+ 13.72). The most common aetiology of cirrhosis was found to be alcohol, comprisingof about 74.5%. 22 patients had more than 1 aetiology for cirrhosis, the most common of which has combined alcohol and NASH (Non-Alcoholic SteatoHepatitis) related, observed in 9 patients. Various aetiologies of cirrhosis have been depicted in Table - 1. Only 2.9% of the population belong to CTP class A.Other parameters of patients are depicted in table II. Renal failure was observed in 45.1% of the total population. The Odds ratio was calculated for various parameters (Table III) and the ratio was significant for spontaneous bacterial peritonitis and renal failure with the odds ratio of 4.31 (1.09- 4.39) and p value <0.05is considered to be significant.

Table 1: Etiological factors for cirrhosis

Aetiological factors	N (%)
Alcohol	99 (74.5%)
HBV related	19 (14.7%)
HCV related	16 (11.8%)
NASH related	19 (14.7%)
Others	5 (3.9%)

Table 2: Various Parameters in the cirrhotic patients (N- 133)

Parameters	N (%)
SBP	15 (11.7%)
Infections	43 (32.34%)
Renal dysfunction	60 (45.1%)
Hepatic encephalopathy	47 (35.2%)
Ascites	112 (84.3%)
CTP score	
Class – A	4 (2.9%)
Class – B	48 (36.3%)
Class – C	81 (60.8%)

Table 3: OR for renal dysfunction and various factors

Parameters		Renal failure	Normal	OR	P – value
Gender	**Male**	55	58	2.59 (0.77–8.69)	0.13
	Female	6	14		
Alcohol	**Alcoholic**	44	55	1.19 (0.49-2.87)	0.78
	Non-alcoholic	16	18		
HBV	**Positive**	6	13	0.47 (0.13-1.34)	0.17

	Negative	53	61		
HCV	**Positive**	4	12	0.88 (0.26-2.93)	0.83
	Negative	56	61		
NASH	**Positive**	13	6	2.12 (0.69-6.24)	0.24
	Negative	50	64		
Ascites	**Present**	48	64	1.52 (0.52-4.39)	0.54
	Absent	8	13		
SBP	**Present**	11	4	4.39 (1.11-17.04)	0.04
	Absent	52	66		
HE	**Present**	25	22	1.96 (0.85-4.42)	0.16
	Absent	42	44		
Infections	**Present**	24	19	2.66 (1.12-6.05)	0.05
	Absent	47	67		

DISCUSSION

All the demographic characteristics of those patients that were included in this study had closely resembled with the data observed in other studies that were conducted in India. In a study by Rathi et al (conducted across multiple centres in India), 1114 cirrhotic patients were effectively analysed. Their mean age was found to be 49.5 years and among them male comprised of about 81% of the total population.[7] In an another single-centre study that was carried in India done by Sethu Raman et al the mean age of patients was 49.58 years. This study had 92.23% male and 7.77% females. Mean age (50.49yrs + 13.70) and male predominance (85.3%) was almost closely replicated in our study.

The predisposing factors like alcohol was the commonest aetiology in a study, constituting of about 88.35% of all aetiologies this was followed by hepatitis B which constituted only at 4.85%.[13] Study conducted by A Jhajharia et al proposed that alcohol followed by the viral aetiology has observed to be the commonest aetiology among Indian population.[14] Alcohol related liver disease was the most common aetiologies involving 43.27% patients, in a multicentre Indian study.[12] Brij Sharma et al in their study where alcohol was the predominant cause of cirrhosis, NASH accounted for 7.9% of all cases that has been reported.[15] A cohort study conducted among the swedish population suggested that men had a higher incidence rate of cirrhosis when compared to women. Moreover, alcohol was the most common aetiology (50.5%), while NASH was the offender in 5.7%.[16] The data obtained from this study depicts that alcohol has been observed as the commonest culprit followed by viral aetiology and NASH respectively.[17] With the steep rise in the burden of NASH related cirrhosis, the liver related mortality is suggested to increase because of certain associated risk factors like diabetes mellitus and CKD. Also, it is also predicted that the aetiology of hepatocellular carcinoma will eventually show a rise in NASH levels, which currently is predominated by viral etiology.[2] In a study by R Keshav et al, it was observed that only 4% percent of all patients contributes to child A CTP class while the rest 96% belong to class B and class C.[18,19]

In a recent hospital-based study from India, renal disease was present in 28% of all cirrhotic patients. Researchers in this study revealed that an acute kidney injury (16%) was the commonest type of renal dysfunction among cirrhotic which was followed by HRS (8%) and least common was CKD.[19] In a study by Jaiprakash et al, it primarily shows that renal diseases were seen in considerable proportion (44%) in cirrhotic patients. Acute kidney injury was seen in 24.5% of the patients (ATN, HRS and Prerenal failure constituting 44.4%, 36.4% and 19.2% respectively). The prevalence of CKD was 15.6% in their cirrhotic patients.[21] Moreover, the occurrence of acute on chronic renal failure, nephrotic and nephritic syndrome was observed to be less than 5%.[21] In study by M Arora et al, the prevalence of AKI was

observed in 40.6%. Prerenal and HRS were the most common type of AKI constituting 67.6% and 23.8% of the all AKI respectively.[22] In study by S Shetty et al, Acute Tubular Necrosis (ATN) and Hepato-renal Syndrome were the most predominant types of AKI that comprising of about 42.3% and 43.9% of all cases.[18] In their study, Prerenal azotemia constituted of about 13.8% of all cases of AKI.[23] Study that had been conducted from Brazil had 57.79% cirrhotic patients with AKI, PRA was the main aetiology (59.55%) while HRS was seen in 10.11%.[19] This study has equally demonstrated that a high percentage of cirrhotic patients were reported to be having renal dysfunction (45%). The high prevalence of renal disorder can effectively be attributed to the very high number of decompensated cirrhosis patients in the study group and rising number of NASH related cirrhosis every year.

A statistically significant relationship was found between Child Pugh score (CPS) and Serum creatinine, suggesting that patients with higher severity of cirrhosis develop renal dysfunction much more commonly has been observed in the study conducted by Keshav R et al.[19] However, a study by Jaiprakash et al also proposed that renal diseases were more frequent with class B and Class C cirrhosis.[16] In this study, a positive correlation was significantly observed between CTP Score and renal failure, suggesting that more the patient is decompensated higher is the chances to get renal involvement. An odds ratio of 4.29 (p value - 0.03) was derived for SBP and renal failure, suggesting that patients reported with spontaneous bacterial peritonitis are more susceptible to renal failure. Moreover, OR concluded that an association for infections and renal failure with significant p value. Therefore, no significant correlation was seen with alcohol, as elucidated by M Arora et al in their study.

CONCLUSION

The present study has found significant correlation between the severity of liver dysfunction and some parameters of renal dysfunction. However, there is no such significant association was observed between the distribution of various renal parameters among different aetiologies of chronic liver disease.

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