Study of Clinico-Aetiological Profile in Patients of Liver Cirrhosis in a Tertiary Care Hospital of North India

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ABSTRACT

BACKGROUND

Cirrhosis is a chronic disease of liver marked by degeneration of cells, inflammation and fibrous thickening of the tissue. It is a common cause of morbidity and mortality. Globally, the incidence of liver cirrhosis is on the rise. Therefore, the exact knowledge of aetiology, mode of clinical presentation, and pattern of development of complications of cirrhosis will help in optimal and cost-effective control measures of this disease. We undertook this study to evaluate the cause and mode of presentation of patients with liver cirrhosis presenting in a tertiary care hospital of North India. We also wanted to determine biochemical changes in liver cirrhosis.

METHODS

This observational prospective study was conducted in the Department of Medicine over a period of one year, it included 122 cirrhotic patients of both sexes between 18 and 75 years irrespective of aetiology who fulfilled inclusion criteria. After detailed medical history and thorough physical examination, relevant laboratory investigations, ultrasound of abdomen, and upper GI endoscopy was done. Child-Turcotte-Pugh (CTP) score and model for end-stage liver disease (MELD) score was calculated. The recorded data was analysed statistically.

RESULTS

Out of 122 patients, 85.2 % were males and 14.8 % were females. Maximum number of patients 33.60 % were in 41 - 50 years of age. Alcohol was found to be the most common aetiological factor in 80.3 % patients. The most common presenting symptom was abdominal distension in 89.9 % patients. Various complications such as spontaneous bacterial peritonitis was present in 13.9 %, anaemia in 93.4 %, thrombocytopenia 75.4 %, deranged international normalized ratio (INR) 78.6 %, deranged renal function 45.9 %, hyponatremia in 35.2 % patients. Maximum number of patients 72.9 % were in CTP class C. 68 % patients had MELD score > 14.

CONCLUSIONS

Males are mainly affected by liver cirrhosis due to excessive alcohol consumption therefore proper preventive measures have to be taken. The raised total leucocyte count (TLC), serum bilirubin, serum creatinine, decreased serum albumin, serum sodium and coagulopathy were found to be poor prognostic markers.

KEYWORDS

Cirrhosis, Aetiology, Complications, Prognosis

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BACKGROUND

Cirrhosis is defined by the World Health Organisation (WHO) as a diffuse hepatic process characterized by fibrosis and conversion of normal liver architecture into structurally abnormal nodules that lack normal lobular organisation.[1] It is the final pathological result of chronic damage to liver parenchyma caused by wide variety of liver diseases.

The progression of liver injury to cirrhosis may occur over weeks to years. Cirrhosis is an increasing cause of morbidity and mortality in developed countries, being the 14th most common cause of death worldwide.[2] According to the Global Burden of Disease 2010 study, liver cirrhosis was the cause of 1.2 % of the global disability-adjusted life years and 2 % of all the deaths worldwide in year 2010.[3]

There are multiple aetiological factors responsible for liver cirrhosis but its epidemiology varies with geographical location and socioeconomic conditions. In developed countries, predominant aetiology includes alcohol consumption, chronic viral hepatitis C and non-alcoholic steatohepatitis (NASH). In developing countries, chronic viral hepatitis B and C are still common, but alcohol and autoimmune related cirrhosis is on increase.[4] Other rare causes are Wilson disease, haemochromatosis, Alpha-1-antitrypsin deficiency, primary biliary cholangitis and cardiac cirrhosis. The risk of developing cirrhosis depends on age, sex, duration of disease and immunological status.

Alcohol consumption is seen in almost all parts of the world and chronic liver disease due to alcohol is on the rise. As per World Health Organization, one fourth to one third of the male population drinks alcohol in India and the use amongst women is increasing. Alcohol use is quite common in India both in rural and urban areas with prevalence rate as per various studies varying from 23 % to 74 % in males and 24 % to 48 % in females.[5] It was also observed that hazardous use of alcohol is trending upward in India and it is estimated that 20 - 40 % of alcoholics develop fibrosis, 10-20 % eventually develop cirrhosis and 1 - 2 % cirrhotics are diagnosed with hepatocellular carcinoma every year.[6]

Hepatitis B virus infection is a global health problem and according to World Health Organisation, more than 2 billion people worldwide have been infected with Hepatitis B and more than 350 million suffer from chronic hepatitis B infection.[7] Approximately 15 - 40 % of patients infected with hepatitis B develop life threatening consequences as liver cirrhosis, hepatocellular carcinoma resulting in 600,00 to 1.2 million deaths per year.[8] Hepatitis C is another global challenge and according to WHO, 3 - 4 million people are newly infected with hepatitis C every year and 130 - 170 million people are chronically infected. It is estimated that over 350,000 people die each year from hepatitis C related liver diseases.[9] The profile of liver cirrhosis may vary with different age, geographical, social and etiological factors.

The clinical presentation of liver cirrhosis is variable, as patients of compensated liver cirrhosis may be asymptomatic where as patients with decompensated liver cirrhosis either present with non-specific symptoms such as right upper quadrant abdominal pain, fever, nausea, vomiting, anorexia or present with more specific complications associated with decompensated liver functions such as jaundice, ascites, spontaneous bacterial peritonitis, hepatic encephalopathy, coagulopathy, portal hypertension, hepatorenal syndrome, hepatopulmonary syndrome. The cardinal features of portal hypertension are splenomegaly, ascites, caput medusae and gastroesophageal varices.[10] Due to rupture of these varices, patient may present with haematemesis or melena. On physical examination, various signs of hepatocellular failure present are jaundice, parotid enlargement, fetor hepaticus, spider naevi, gynaecomastia, palmar erythema, duputyren's contracture, flapping tremors, leukonychia, testicular atrophy, loss of axillary and pubic hairs, pedal oedema and ecchymosis.[11]

Ascites in cirrhotic patients results from portal hypertension, hypoalbuminemia, peripheral vasodilatation caused by endotoxin induced release of nitric oxide from splanchnic and systemic vasculature and activation of renin-angiotensin-aldosterone axis.[12] Further impairment of free water excretion secondary to excessive antidiuretic hormone leads to hyponatremia due to excessive water retention.[13] Hyponatremia is the most common electrolyte abnormality in patients with advanced cirrhosis and pretends a poor prognosis with increased risk of mortality.[14]

Cirrhotic patients with ascites are highly susceptible to bacterial infections. Spontaneous bacterial peritonitis is the bacterial infection of ascitic fluid in the absence of any intrabdominal source and it is mainly due to bacterial translocation from intestine. The laboratory criteria for diagnosis of spontaneous bacterial peritonitis are presence of > 500 / mm^3 of leucocytes and presence of > 250 / mm3 neutrophils in ascitic fluid.[15] The development of spontaneous bacterial peritonitis increases chance of decompensation and the mortality rate in these patients ranges from 40 % - 70 %.[16]

The diagnosis of liver cirrhosis is based on clinical features, laboratory investigations and radiologically by ultrasonography and fibroscan. Liver biopsy is the gold standard for diagnosis of cirrhosis but it is an invasive procedure and associated with complications therefore not preferred routinely. The severity and prognosis of cirrhosis can be assessed by Child-Turcotte-Pugh score and MELD score. The one-year survival rate for patient with CTP class A, B, C are 100 %, 80 % and 45 % respectively.[17]

Further, MELD score is used to quantify end - stage liver disease for transplant planning.[18] The natural history of cirrhosis is dependent on both the aetiology and treatment of the underlying cause. The exact knowledge of aetiology, mode of clinical presentation and pattern of development of complications of cirrhosis will help in designing optimal and cost-effective control measures of this disease, resulting in improved management, quality of life and life expectancy of cirrhotic patients.

Therefore, the present study was conducted to study the cause of liver cirrhosis, mode of clinical presentation, pattern of development of complications and prognostic features in patients of liver cirrhosis presenting to a tertiary care hospital of North India.

METHODS

This observational prospective study was conducted from June 2017 to June 20018 in the Department of Medicine and it included 122 cirrhotic patients of both sex who were admitted in the hospital over a period of one year. Ethical approval was taken from institutional ethical committee and informed written consent was taken from each patient enrolled in the study. All cirrhotic patients diagnosed on basis of clinical features and ultrasonography irrespective of aetiology of cirrhosis between age group of 18 - 75 years were included in the study. Patients with malignancy and secondary peritonitis were excluded from the study.

A detailed medical history along with assessment of risk factors including duration and amount of alcohol consumption, history of blood transfusion, surgery, intravenous drug abuse and high-risk sexual behaviour was taken. Thorough clinical examination was also done to look for signs of liver failure. The relevant laboratory investigations including complete blood count (CBT), prothrombin time (PT), liver function test (LFT), total serum protein, serum albumin, renal function test, serum electrolytes, HBsAg and Anti HCV antibody were done. Diagnostic paracentesis was also done on the day of admission prior to administration of intravenous antibiotics and ascitic fluid was sent for biochemistry, cytological examination and culture sensitivity. Abdominal ultrasound was done for liver and spleen size, parenchymal echogenicity, portal vein diameter, ascites and other concomitant findings. Upper GI endoscopy was done in patients who gave consent for it and were hemodynamically stable. Prognosis was measured by calculating Child-Turcotte- Pugh score and MELD score. The Child-Turcotte-Pugh score was calculated by adding score of five factors including total bilirubin, INR, serum albumin, ascites, encephalopathy and can range from 5 - 15 with class A (score of 5 - 6), class B (score of 7 - 9), class C (score of 10 - 15).

Decompensation indicates cirrhosis with Child-Turcotte - Pugh score of 7 or more. MELD score determination is based on total bilirubin, INR, serum creatinine and it range from 6 - 40. MELD score = 11.2 loge (INR) + 3.78 loge [bilirubin (mg / dl)] + 9.57 loge [creatinine (mg / dl)] + 6.43.

Diagnostic Criteria

1. Patients were considered to have cirrhosis based on clinical features and ultrasound findings.
2. The diagnosis of alcoholic cirrhosis was made on the basis of history of amount of alcohol consumption > 80 g / dl in men and > 40 g / dl in women for minimum of 10 years.[19]

Statistical Analysis

The recorded data was processed and analysed with the help of statistical software statistical package (SSSP) for the social sciences version 20 and Microsoft Office Excel 2010.The statistical analysis was done by using Mann Whitney test (for variables which were not normally distributed) and unpaired t test (for variables which were normally distributed).

RESULTS

In the present study, maximum number of patients with liver cirrhosis, 41 (33.60 %) were in the age group of 41 - 50 years followed by 35 (28. 70 %) patients who were in age group of 51-60 years. The mean age of patients was 50.30 ± 10.98 years. Out of 122 patients, there were 104 (85.2 %) males and 18 (14.8 %) females. Among 122 patients, 62 (50.8 %) patients had only history of alcohol consumption of more than 80 g / day for at least 10 years and all of these patients were male. None of the female patient had history of alcohol consumption. 18 (14.7 %) patients were found to be infected with viral hepatitis C only and 6 (4.9 %) patients were found to have viral hepatitis B only.

2 8 (22.9 %) patients were infected with viral hepatitis C along with history of alcohol consumption. 8 (6.5 %) patients were found to have hepatitis B and had history of alcohol consumption. In our study, alcohol was found to be most common aetiology responsible for liver cirrhosis followed by viral hepatitis C. In the present study, abdominal distension was found to be most common symptom presented in 109 (89.9 %) patients followed by jaundice 47 (38.5 %), fever 38 (31 %), altered sensorium 25 (20.5 %), pedal oedema 23 (18.9 %), pain abdomen 20 (16.4 %) and upper GI bleed in 17 (13.9 %) patients. Among 122 patients, only 17 (13.9 %) patients of liver cirrhosis had spontaneous bacterial peritonitis and 105 (86.1 %) patients were without spontaneous bacterial peritonitis.

Out of 122 patients, anaemia was present in 114 (93. 4 %) patients out of which 99 (86.8 %) were males and 15 (13.1 %) were females. The mean total leucocyte count in patients with systolic blood pressure (SBP) (12316 ± 6650 cells / mm^3) was higher as compared to patients without SBP (10696 ± 7181 cells / mm^3). Out of 122 patients, thrombocytopenia was observed in 92 (75.4 %) patients. Among 122 patients, 96 (78.6 %) patients had INR > 1. The mean total serum bilirubin level in patients with and without SBP was 9.4 ± 5.8 mg / dl and 6.3 ± 4.7 mg / dl respectively which was higher in patients with SBP. The mean serum albumin level analysed by unpaired t test in patients with SBP (1.9 ± 0.46 g / dl) was significantly lower as compared to patients without SBP (2.4 ± 0.54 g / dl) ($P < 0.05$). Out of 122 patients, 56 (45.9 %) patients had serum creatinine more than 1.3 mg / dl. The mean serum creatinine analysed by unpaired t test in patients with SBP (2.1 ± 1.4 mg / dl) was higher than patients without SBP (1.5 ± 1.2 mg / dl). Among 122 patients, 43 (35.2 %) patients were observed to have serum sodium less than 135 mEq / L. The mean serum sodium levels in patients with and without SBP was 132 ± 8.5 mEq / L and 136 ± 7.9 mEq / L respectively, which was significantly lower in patients with SBP ($P < 0.05$). The decreased level of serum albumin and serum sodium were found to be poor prognostic marker of SBP. The ascitic fluid analysis by Mann Whitney test showed mean total leucocyte count in patients with SBP (1397 ±

3082 cells / mm^3) was significantly higher than patients without SBP (87 ± 96 cells / mm^3) (P < 0.05).

Age Group (Years)	Number of Cases	Percentage (%)
<20	0	0
21-30	1	0.80
31-40	25	20.49
41-50	41	33.60
51-60	35	28.70
61-70	16	13.10
>70	4	3.30
Total	**122**	**100**

Table 1. Age Distribution of Patients with Liver Cirrhosis

Aetiological Factor	Number of Cases	Percentage (%)
Alcohol	62	50.8
Hepatitis C	18	14.7
Hepatitis B	6	4.9
Alcohol and hepatitis C	28	22.9
Alcohol and hepatitis B	8	6.5

Table 2. Distribution of Patients with Cirrhosis According to Aetiology

Symptoms	Number of Cases
Abdominal distension	109 (89.9 %)
Jaundice	47 (38.5 %)
Fever	38 (31 %)
Pain abdomen	20 (16.4 %)
Pedal oedema	23 (18.9 %)
Upper GI bleed	17 (13.9 %)
Altered sensorium	25 (20.5 %)

Table 3. Distribution of Patients with Cirrhosis According to Symptoms

Laboratory Parameters	Parameters in Patients without SBP	Parameters in Patients with SBP	P-Value
Number of patients	105	17	
Sex (Female/ Male)	15 / 91	3 / 14	
TLC (cells / mm3)	10696 ± 7181	12316 ± 6650	0.287
Platelet count (lac / mm3)	1.17 ± 0.97	1.2 ± 0.65	0.331
INR	1.3 ± 0.48	1.7 ± 0.75	0.43
Total bilirubin (mg / dl)	6.3 ± 4.7	9.4 ± 5.8	0.18
Conjugated bilirubin (mg/dl)	2.7 ± 4.0	4.2 ± 3.9	0.13
AST (IU / L)	124 ± 251	133 ± 177	0.494
ALT (IU / L)	85 ± 223	77 ± 55	0.348
Alkaline phosphatase (IU / L)	183 ± 136	178 ± 108	0.547
BUN (mg / dl)	28 ± 21	36 ± 28	0.422
Serum creatinine (mg / dl)	1.5 ± 1.2	2.1 ± 1.4	0.164
Serum potassium (mEq / L)	5.4 ± 7.9	4.1 ± 0.87	0.50
Ascitic fluid parameters			
• Ascitic fluid TLC (cells / mm3)	87 ± 96	1397 ± 3082	0.001
• Ascitic fluid neutrophils (cells / mm3)	34 ± 51	1163 ± 2806	0.001
• Ascitic fluid glucose (mg / dl)	129 ± 69	101 ± 61	0.151

Table 4. Laboratory Parameters in Patients of Cirrhosis (Mann Whitney Test for Variables Which Were Not Uniformly Distributed)

Lab Parameters	Parameters in Patients without SBP	Parameters in Patients with SBP	P Value
Hb (g/dl)	9.3 ± 2.5	9.8 ± 1.7	0.309
Total protein (g/dl)	6.4 ± 0.83	6.1 ± 1.0	0.396
Serum albumin (g / dl)	2.4 ± 0.54	1.9 ± 0.46	0.044
Serum sodium (mEq / l)	136 ± 7.9	132 ± 8.5	0.048
Ascitic fluid protein (g / dl)	1.9 ± 0.8	1.5 ± 1.0	0.049
Ascitic fluid albumin (g / dl)	0.6 ± 0.3	0.81 ± 0.36	0.035

Table 5. Lab Parameters in Patients of Cirrhosis (Unpaired t Test for Uniformly Distributed Variables)

CTP Score	Number of Patients	Percentage (%)
Class A (5 - 6 points)	2	1.6
Class B (7 - 9 points)	31	25.4
Class C (10 - 15 points)	89	72.9

Table 6. Distribution of Patients with Cirrhosis According to Child-Turcotte-Pugh Score

MELD Score	Number of Patients
< 14	39 (32 %)
➢ 14	83 (68 %)

Table 7. Distribution of Patients with Cirrhosis According to MELD Score

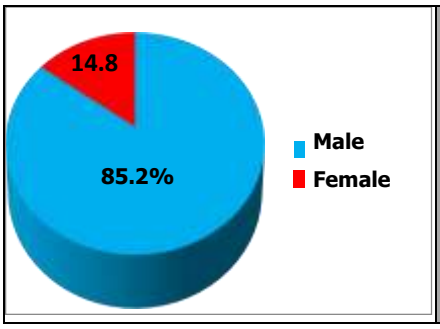

Figure 1. Sex Distribution of Patients with Liver Cirrhosis

The mean ascitic fluid neutrophils in patients with SBP (1163 ± 2806 cells / mm^3) was also significantly higher as compared to patients without SBP (34 ± 51 cells / mm^3) (P < 0.05). The mean ascitic fluid total protein analysis by unpaired t test in patients with SBP (1.5 ± 1.0 g / d) was significantly lower as compared to patients without SBP (1.9 ± 0.8 g / dl) (P < 0.05). Out of 17 patients with Spontaneous bacterial peritonitis (SBP), 3 (17 %) were ascitic fluid culture positive and all 3 showed growth of gram-negative bacteria. Out of 122 patients, upper GI endoscopy was done in 78 patients. Out of these 78 patients, 41 (52.5 %) patients had oesophageal varices, 32 (41 %) patients had portal hypertension gastropathy and 5 (6.4 %) patients had normal upper GI endoscopy. Out of 122 patients with cirrhosis, 89 (72.9 %) patients were in class C according to CTP score, 31 (25.4 %) in class B and 2 (1.6 %) patients in class A. Out of 17 patients with SBP, 15 patients were in class C and 2 patients were in class B which showed that risk of development of SBP is maximum in Class C. 83 (68 %) patients with cirrhosis had MELD score > 14 and 39 (32 %) patients had MELD score < 14 on admission. Out of 17 patients with SBP, 15 (88 %) patients had MELD score > 14.

DISCUSSION

In our study, 122 cirrhotic patients of both sexes irrespective of aetiology were taken, which include 104 (85.2 %) male patients and 18 (14.8 %) female patients. This finding was in accordance with study conducted by Pathak O K et al. in which 80.7 %among 181 patients were males.[20] This high male to female ratio was due to the fact that most of the men had cirrhosis due to alcohol intake and none of the 18 female patients who participated in the study had history of alcohol consumption.

Maximum number of patients 41 (33.60 %) were in the age group of 41 - 50 years followed by age group of 51 - 60 years which included 35 (28.70 %) patients. Mean age of patients was 50.30 ± 10.98 years and only 5 patients were less than 35 years of age. A study conducted by Nagarajaiah RB observed similar mean age of 50.7 years.[21]

A number of studies done in West and Japan, reported less than 5 % cirrhotic patients under 35 years of age.[22] Cirrhosis at younger age group prolonged morbidity.

In our study alcohol was the leading cause of cirrhosis in 98 (80.3 %) patients followed by hepatitis C in 46 (37.7 %) patients and hepatitis B in 14 (11.4 %) patients. This was in accordance with study done by Maskey R et al. who observed alcohol as the most common cause of cirrhosis in 86 % of patients.[23] In South East Asian countries like India, alcoholic cirrhosis is common as social tolerance to alcohol use is quiet high and so far alcohol consumption is not taken seriously either by government or by any social organization. The production, sale and consumption of alcohol are on increasing trends. The another most common cause of cirrhosis in our study was Hepatitis C, which is in concordance with study conducted by Chakravarti A et al. who observed HCV seropositivity in 25 % cirrhotic patients.[24]

In our study, abdominal distension was found to be most common symptom present in 109 (89.9 %) patients followed by jaundice in 47 (38.5 %) and fever in 38 (31 %) patients. This was consistent with study conducted by Bhattarai et al. who observed abdominal distension as main presenting symptom in 561 (93.5 %) patients of cirrhosis.[25] Another study by Maskey R et al. found similar finding of abdominal distension as main presenting symptom in 84.4 % patients.[23] The development of ascites is an important landmark in the natural history of cirrhosis as it is associated with 50 % mortality over two years and signifies the need to consider liver transplantation as a therapeutic option.[26]

In the present study, out of 122 patients SBP was present only in 17 (13.9 %) patients, among which 14 (82.3 %) were male patients and 3 (17.6 %)) were female patients. This was in accordance with study conducted by Tanushree Maitra et al. including 200 patients and observed SBP in 12.5 % patients.[27] All cirrhotic patients with ascites are at risk of developing SBP. The prevalence of SBP in cirrhosis patients range between 10-30 % and it is associated with poor prognosis.[28]

Out of 122 patients, anaemia was present in 114 (93.4 %) patients among which 99 (86.8 %) were males and 15 (13.1 %) were females. This was consistent with study conducted by Khan F et al. who observed anaemia in 94.8 % patients.[29] There are various causes of anaemia in cirrhosis including chronic GI blood loss, nutritional deficiencies, hypersplenism related to portal hypertension, direct suppressant effect of alcohol on bone marrow and vitamin B12 and folic acid deficiency.[30]

Out of 122 patients, thrombocytopenia was observed in 92 (75.4 %) patients and 96 (78.6 %) patients had INR > 1. This was in accordance with study conducted by Tanushree Maitra et al. who observed thrombocytopenia in 78 % patients and INR >1 in 82 % patients among 200 patients.[27] The main cause of thrombocytopenia in cirrhosis is splenic platelet sequestration and reduction in the level of hematopoietic growth factor thrombopoietin.[31] Liver plays a very important role in haemostasis as it is the site of synthesis of clotting factors, coagulation inhibitors and fibrinolytic proteins but due to vitamin k deficiency in liver cirrhosis, prothrombin time is increased leading to impairment in coagulation.[32]

In the present study, the significantly decreased level of serum albumin in patients with SBP as compared to patients without SBP ($P < 0.05$) were found to be poor prognostic marker of SBP. The ascitic fluid analysis showed that mean total leucocyte count and mean neutrophil count was significantly higher in patients with SBP as compared to patients without SBP ($P < 0.05$). The mean ascitic fluid total protein in patients with SBP was significantly decreased as compared to patients without SBP ($P < 0.05$). This was in concordance with study conducted by Syed et al. in 2007.[33] The ascitic fluid total protein < 1 g / dl and low serum albumin are important predictors for development of SBP.[34]

Albumin being the most important factor responsible for oncotic pressure, the difference between the serum and ascitic albumin concentration (SAAG) is used to differentiate ascitic fluid whether related to portal hypertension or not. SAAG > 1.1 g / dl is found in ascites due to portal hypertension. In our study, the mean SAAG in SBP patients was 1.6 g/dl. A study conducted by Kansal A et al. including 102 patients of ascites, reported that 77.4 % patients with liver disease had SAAG > 1.1 g / dl.[35] Out of 122 patients, 56 (45.9 %) patients had serum creatinine more than 1.3 mg/dl. The mean serum creatinine in patients with SBP was higher than patients without SBP but $P > 0.05$. Out of 17 patients with SBP, 12 (70 %) patients had serum creatinine more than 1.3 mg / dl. Terg et al. in his study showed renal failure in patients of cirrhosis.[36] Renal failure in cirrhosis is due to reduction in effective arterial blood volume caused by splanchnic vasodilatation and renal vasoconstriction due to activation of renin-angiotensin-aldosterone system and sympathetic nervous system.[37] Among 122 patients, hyponatremia was present in 43 (35.2 %) patients. The mean serum sodium levels in patients with SBP was significantly lower as compared to patients without SBP ($P < 0.05$). Out of 17 patients with SBP, 10 (58.8 %) patients had hyponatremia. Portal hypertension, diuretics, large volume paracentesis without albumin and infection are responsible for development or worsening of hyponatremia. The presence of hyponatremia complicates the management of cirrhotic patients and its severity correlates with the presence of severe complications of cirrhosis. A study conducted by Kim et al. observed that serum sodium level was strongly associated with severity of liver function impairment as assessed by Child Pugh and MELD score.[38] In one study, the serum sodium level before the onset of SBP was an independent predictor of renal failure triggered by SBP.[39] It has also been suggested that serum sodium is an earlier and more sensitive test than serum creatinine to detect circulatory dysfunction resulting in renal failure.[40]

The severity and prognosis of liver cirrhosis was assessed by Child-Turcotte-Pugh score and MELD score. Out of 122 patients, maximum number of cirrhotic patients 89 (72.9 %) were in class C followed by 31 (25.4 %) patients in class B and 2 (1.6 %) patients in class A. Out of 17 patients of SBP, 15 (88.2 %) were in class C and 2 (11.7 %) were in class B. In our study, 83 (68 %) patients had MELD score > 14 and 39 (32 %) patients had MELD score < 14. A study conducted by Tanushree Mitra et al. including 200 cirrhotic patients reported that 52.5 % patients were in class C, 41 % patients in class B and 6.5 % patients were in class

A.[27] This means that most of the patients are asymptomatic in their initial stage and develop symptoms when liver cirrhosis progress to advanced stage or it may be due to negligence of most of the cirrhotic patients seeking medical attention in the later stages. Also, CTP class C and MELD > 14 were found to be poor prognostic markers of liver cirrhosis and these patients can be considered for liver transplantation.

CONCLUSIONS

Cirrhosis of liver is a major health problem in North India and it is more prevalent in males due to increasing trend of alcohol consumption. Cirrhotic patients present to hospital at advanced stages with abdominal distension, and jaundice as the most common presenting symptoms. Ascites, SBP, anaemia, coagulopathy, hepatorenal syndrome, hyponatremia are common complications associated with liver cirrhosis. The decreased serum albumin, serum sodium and raised bilirubin, serum creatinine along with coagulopathy, CTP class C and MELD score > 14 were found to be poor prognostic markers of liver cirrhosis. Also, decreased level of ascitic fluid protein and serum sodium were found to be predisposing factors for development of SBP. Early diagnosis and timely management of liver cirrhosis and its complications can reduce morbidity and mortality. Preventive measures should be taken to prevent use of hazardous levels of alcohol by proper education and legislation.

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REFERENCES

[1] Anthony PP, Ishak KG, Nayak NC, et al. The morphology of cirrhosis. Recommendations on definition, nomenclature, and classification by a working group sponsored by the World Health Organization. J Clin Pathology 1978;31(5):395-414.
[2] Lozano R, Naghavi M, Foreman K, et al. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. The lancet 2012;380(9859):2095-128.
[3] Murray CJL, Vos T, Lozano R, et al. Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet 2012;380(9859):2197-223.
[4] McCormick PA, Jalan R. Hepatic cirrhosis. In: Dooley JS, Lok ASF, Garcia-Tsao G, eds. Sherlock's Diseases of the Liver and Biliary System. 13th edn. John Wiley & Sons Ltd 2018:107-26.
[5] Obot SI, Room R. Alcohol, gender and drinking problems: Perspectives from low and middle income countries. Department of Mental health and Substance abuse. Geneva: World Health Organization 2005.
[6] Teli MR, Day CP, James OF, et al. Determinants of progression to cirrhosis or fibrosis in pure alcoholic fatty liver. The Lancet. 1995;346(8981):987-90.
[7] World Health Organization (2012). Hepatitis B. World Health Organization Fact Sheet 20 (Revised August 2008). [Online] http://who.int/inffs/en/fact204.html.
[8] Lavanchy D. Hepatitis B virus epidemiology, disease burden, treatment, and current and emerging prevention and control measures. J Viral Hepatitis 2004;11(2):97-107.
[9] World Health Organization. Secretariat. Viral hepatitis. Sixty third world health assembly. Geneva: World Health Organization 2010.
[10] Garcia-Tsao G. Current management of the complications of cirrhosis and portal hypertension: variceal hemorrhage, ascites, and spontaneous bacterial peritonitis. Gastroenterology 2001;120(3):726-48.
[11] Fauci AS, Kasper DL, Hauser SL, et al. Longo DL, ed. Harrison's principles of internal medicine. New York: McGraw-Hill 2012.
[12] Dudley FJ. Pathophysiology of ascites formation. Gastroenterology Clin North Am 1992;21(1):215-35.
[13] Arroyo V, Clària J, Saló J, et al. Antidiuretic hormone and the pathogenesis of water retention in cirrhosis with ascites. Semin Liver Dis 1994; 14(1):44-58.
[14] Arroyo V, Rodés J, Gutiérrez-Lizárraga MA, et al. Prognostic value of spontaneous hyponatremia in cirrhosis with ascites. Am J Dig Dis 1976;21(3):249-56.
[15] Runyon BA. Management of adult patients with ascites due to cirrhosis. Hepatology 2004;39(3):841-56.
[16] Nobre SR, Cabral JEP, Gomes JJF, et al. In-hospital mortality in spontaneous bacterial peritonitis: a new predictive model. European J Gastroenterol Hepatol 2008;20(12):1176-81.
[17] Infante-Rivard C, Esnaola S, Villeneuve JP. Clinical and statistical validity of conventional prognostic factors in predicting short-term survival among cirrhotics. Hepatology 1987;7(4):660-4.
[18] Wiesner R, Edwards E, Freeman R, et al. Model for end-stage liver disease (MELD) and allocation of donor livers. Gastroenterology 2003;124(1):91-6.
[19] Podolsky DK, Isselbacher KJ, Braunwald E, et al. Cirrhosis and alcoholic liver disease. Chap - 298. Harrison's principles of internal medicine. 15th edn. McGraw-Hill Education 2001:1752-3.
[20] Pathak OK, Paudel R, Panta OB, et al. Retrospective study of the clinical profile and prognostic indicators in patients of alcoholic liver disease admitted to a tertiary care teaching hospital in Western Nepal. Saudi J Gastroenterol 2009;15(3):171-5.
[21] Nagarajaiah RB. A clinico-epidemiological profile of liver cirrhosis patients-a hospital based study. International Journal of Health Sciences and Research (IJHSR) 2014;4(2):21-5.
[22] Yoshida T. Cirrhosis of liver in Japan. Nihon Naika Gakkai zasshi. The Journal of the Japanese Society of

Internal Medicine 1963;52:291-301.
[23] Maskey R, Karki P, Ahmed SV, et al. Clinical profile of patients with cirrhosis of liver in a tertiary care hospital, Dharan, Nepal. Nepal Med Coll J 2011;13(2):115-8.
[24] Chakravarti A, Ashraf A, Malik S. A study of changing trends of prevalence and genotypic distribution of hepatitis C virus among high risk groups in North India. Indian J Med Microbiol 2013;31(4):354-9.
[25] Bhattarai S, Gyawali M, Dewan KR, et al. Demographic and clinical profile in patients with liver cirrhosis in a tertiary care hospital in central Nepal. J Nepal Med Assoc 2017;56(208):401-6.
[26] D'Amico G, Morabito A, Pagliaro L, et al. Survival and prognostic indicators in compensated and decompensated cirrhosis. Dig Dis Sci 1986;31(5):468-75.
[27] Maitra T, Das SP, Barman P, et al. Spectrum of Complications of chronic liver disease in Gauhati Medical College and Hospital: a hospital based study. Journal of Clinical & Diagnostic Research 2019;13(6):OC07-12.
[28] Sherlock S, Dooley J. Spontaneous bacterial peritonitis. In: Sherlock S, Dooley J, eds. Sherlock and Dooley's diseases of the liver and biliary system. 11th edn. Oxford: Blackwell 2002:132-4.
[29] Khan F, Samad M, Arif F. The burden of chronic liver disease patients: their clinical and laboratory profiles at Jinnah postgraduate medical centre, Karachi. J Med Res Health Educ 2018;2(1):3.
[30] Ioannou GN, Dominitz JA, Weiss NS, et al. The effect of alcohol consumption on the prevalence of iron overload, iron deficiency, and iron deficiency anemia. Gastroenterology. 2004;126(5):1293-301.
[31] Afdhal N, McHutchison J, Brown R, et al. Thrombocytopenia associated with chronic liver disease. J Hepatol 2008;48(6):1000-7.
[32] Blonski W, Siropaides T, Reddy KR. Coagulopathy in liver disease. Curr Treat Options Gastroenterol 2007;10(6):464-73.
[33] Syed VA, Ansari JA, Karki P, et al. Spontaneous bacterial peritonitis (SBP) in cirrhotic ascites: a prospective study in a tertiary care hospital, Nepal. Kathmandu Univ Med J 2007;5(1):48-59.
[34] Andreu M, Sola R, Sitges-Serra A, et al. Risk factors for spontaneous bacterial peritonitis in cirrhotic patients with ascites. Gastroenterology 1993;104(4):1133-8.
[35] Kansal A, Aharwar S, Trikha S, et al. The diagnostic utility of serum ascites albumin gradient against ascitic fluid total protein for detection of liver disease in patients of ascites-A comparative study. International Journal of Medical Research and Review 2015;3(8):861-5.
[36] Terg R, Gadano A, Cartier M, et al. Serum creatinine and bilirubin predict renal failure and mortality in patients with spontaneous bacterial peritonitis: a retrospective study. Liver Int 2009;29(3):415-9.
[37] Schrier RW, Arroyo V, Bernardi M, et al. Peripheral arterial vasodilation hypothesis: a proposal for the initiation of renal sodium and water retention in cirrhosis. Hepatology 1988;8(5):1151-7.
[38] Kim JH, Lee JS, Lee SH, et al. The association between the serum sodium level and the severity of complications in liver cirrhosis. Korean J Intern Med 2009;24(2):106-12.
[39] Follo A, Llovet JM, Navasa M, et al. Renal impairment after spontaneous bacterial peritonitis in cirrhosis: incidence, clinical course, predictive factors and prognosis. Hepatology 1994;20(6):1495-501.
[40] Ruf AE, Kremers WK, Chavez LL, et al. Addition of serum sodium into the MELD score predicts waiting list mortality better than MELD alone. Liver Transpl 2005;11(3):336-43.