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ORIGINAL ARTICLE

Assessment of Clinical Presentation and Prognosis of Patients with Acute-On-Chronic Liver Failure among Participants Admitted in the Intensive Care Units of Tertiary Care Hospitals in Pakistan

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ABSTRACT

Background: Acute chronic liver failure can be defined as a disease that is characterized as spontaneous deterioration of hepatic liver decompensation that was previously suffering from chronic liver conditions along with one or more than one organ failure extra hepatically which will consequently result in a risk of mortality. This study will focus on assessing the clinical and biochemical disease, cause, and outcomes of acute on chronic liver failure.

Methodology: This cross-sectional study was conducted on 60 acute-on-chronic liver failure patients in the department of Internal Medicine, Holy Family Hospital, Rawalpindi and Lahore General Hospital of Pakistan from July 2021 to December 2021. Participants recruited for the study were presented with chronic liver disease with cirrhosis. Participants were divided into two groups, following admission into ward and the ICU. The participants were further divided into three groups according to acute on chronic liver failure. Patients were assessed for clinical outcomes and biochemical profiles of participants.

Results: The outcomes of this study showed the primary etiology of chronic liver disease. The majority of participants forming group 2 of ICU had etiology of viral hepatitis C with a prevalence of 90% (n =27). The prevalence of viral hepatitis C etiology among participants was 96.7% with a number of participants being 29 of 30 in group 1. The most common aggravating factor for liver failure was bacterial origin in both ICU and ward with a prevalence of 80% and 76% respectively in both groups (n =24, n =23). The most common aggravating factor was observed to be a spontaneous bacterial infection in group two with a prevalence of 70% (n =21), whereas group one participants showed a prevalence of 63.3% (n= 19). The most common cause of organ failure among acute on chronic failure was most highly seen in the renal system with a prevalence of 60% among group 2 participants (n =18), whereas the incidence in group 1 was seen in 25 participants with a prevalence of 83.8%.

Conclusion: The study concludes that the most common cause of the chronic liver disease is hepatitis c virus followed by hepatitis B virus. The most common aggravating factor for acute on chronic liver failure was spontaneous bacterial infection followed by a chest infection. The most common organ failure seen in participants was renal failure followed by cerebral failure.

Keywords: Clinical Presentation, Prognosis, Acute-on-chronic liver failure, Intensive care unit

INTRODUCTION

Acute chronic liver failure can be defined as a disease that is characterized as spontaneous deterioration of hepatic liver decompensation that was previously suffering from chronic liver conditions along with one or more than one organ failure extra hepatically which will consequently result in a risk of mortality [1]. Acute chronic liver failure is characterized by rapid progression of the disease among people who were previously diagnosed or remain clinical dormant, these participants have a potential to revert to disease progression [2]. Many attempts have been made to classify and grade participants with acute on chronic liver failure. The most widely accepted attempt of gradation of these affected individuals is that made by the European Association who presented their classification in a study evaluating Liver-Chronic Liver Failure (EASL-CLIF) in CANONIC research [3].

Advances in literature enabled us to know about disease conditions more in-depth, however, the mechanism of how acute on chronic liver failure occurs remains unknown. Some evidence suggests that a variation in response mediated by the host towards injury caused by different aggravating factors has been advocated [4]. Therefore, the causative etiology of acute on chronic liver failure is aggravating pathology in already established liver cirrhosis [5]. These aggravating factors are characterized by hepatic and extra-hepatic etiologies. Hepatic etiologies include contraction of viral hepatitis, thrombosis, alcohol, and drug inflicted injuries to the liver, whereas extra-hepatic causes are injuries, trauma, and surgical procedures in vulnerable participants. Many individuals also present with no cause of aggravation. Acute on chronic liver failure is a reversible condition that is dynamic and can be expected to resolve or deteriorate or present as conditions that may advocate for liver transplantation [1]. Acute on chronic liver failure can be characterized by various clinical presentations, however, systemic inflammation remains the hallmark of the disease [6]. Therefore, it can be expected that serology outcomes among these participants present with high levels of leukocytes, C - reactive protein, and other inflammatory markers [7]. The prognosis and outcome of acute to chronic liver failure are related to aggravating factors and consequently the intensity of paresis of the immune system leading to organ failure.

Evidence suggests that individuals with more than two organ failures present as a direct indicator of mortality with respiratory failure posing the greatest risk of death [8]. Since the indicators of morbidity and mortality are associated with extra-hepatic organ failure and not hepatic cirrhosis, clinical outcomes of participants based on hepatic disease severity have limitations in assessing the prognosis of participants. Therefore, APASCHE II scores are a more reliable indicator of disease prognosis. This study will focus on assessing the clinical and biochemical disease, cause and outcomes of acute on chronic liver failure.

METHODOLOGY

This cross-sectional study was conducted on 60 acute-on-chronic liver failure patients in the department of Internal Medicine, Holy Family Hospital, Rawalpindi and Lahore General Hospital of Pakistan from July 2021 to December 2021. The sample size was calculated by estimating the prevalence of acute on chronic liver failure in Pakistan and an estimated sample size of 60 participants was selected. Recruited participants presented in the gastroenterology department in tertiary care hospital. Participants were recruited after meeting the inclusion criteria. All recruited participants were known cases of liver cirrhosis. CLIF-SOFA score was used for the diagnosis of organ failure among participants. renal failure was diagnosed if participants showed serum creatinine equal to or more than 2 mg/dL. Another criteria for renal

failure were the need for renal replacement. Liver failure was suspected among participants with serum bilirubin readings equal to or more than 12 mg/dL. Cerebral failure was marked by hepatic encephalopathy of grade III or grade VI. failure of coagulation was diagnosed if INR was observed to be more than or equal to 2.5 with or without platelet count of less than or equal to 20 × 109 /L. failure of the circulatory system was acknowledged by the need to use vasopressor agents. Lung failure was seen as PaO2/ FiO2 or SpO2/FiO2 of less than or equal to 200.

According to organ failure among participants, they were divided into three grades, Grade 1: these participants showed one or all of the following:

- Individual renal failure
- An individual failure of the hepatic system, coagulation system, circulatory system, and or respiratory system with a serum creatinine of 1.5 to 1.9 mg/d
- Cerebral failure along with serum creatinine levels varying from 1.5 to 1.9 mg/dL

Grade 2: participants with two organ failure

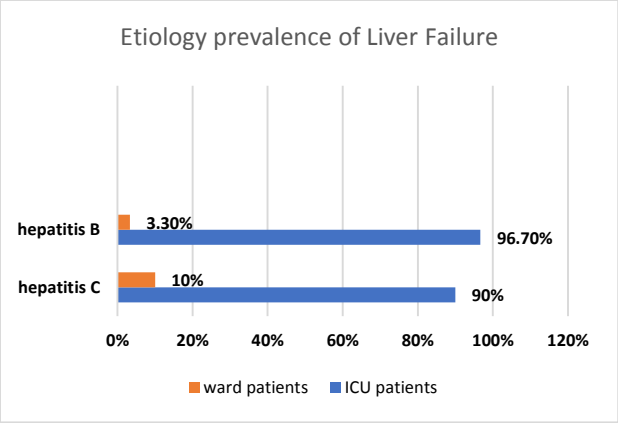
Grade 3: participants with 3 or more three organ failures

Recruited participants were restricted to the age group between 18 to 80 years, therefore participants falling out of the age group were excluded from the sample population. Participants who were known cases of hepatocellular carcinoma were excluded from the study, and participants who are undergoing therapy or underwent previous management, or experienced metastasis were also excluded from the study. Other exclusion criteria included cholangiocarcinoma, fulminating hepatic failure, viral hepatitis, and drug-induced liver failure with or without cirrhotic liver were all excluded from the study. Pregnant females were non-eligible for the study. The recruited participants were then subjected to two different groups with 30 participants in each group. The first group or group 1 were participants with acute on chronic liver failure that were enrolled in gastroenterology or hepatic wards in the hospital. The second group or group 2 were participants who were enrolled in the ICU of the same hepatic and gastroenterology department.

After recruitment participants underwent extensive examination. After taking an extensive history, participants were subjected to a general physical examination. Serology assessment included liver function tests, complete blood count, serum creatinine levels, electrolytes assessment, levels of C-reactive protein, and urine analysis. The participants if present with ascites were inspected for analysis of ascitic fluid. Complete viral marker analysis was conducted to eliminate all types of viral hepatitis pathology due to its high prevalence in the population. Child Turcotte Pugh (CTP), APACHE II SCORE, and CLIF-C-ACLF score were all used for the assessment of the prognosis of the participants.

RESULT

The study included a sample size of 60 participants that were divided into two groups of 30 participants each that were admitted to the gastroenterology or hepatic ward and intensive care unit, respectively. The participants of the second group who were admitted into ICU were further subdivided into three subgroups of stages of acute on chronic liver disease as mentioned above. 33.3% participants (n = 10) for each subgroup. Similarly, participants in the ward were divided into three groups according to acute on chronic liver failure with a prevalence of 33.3% in each group. The recruited participants were of similar demographic data in accordance with age, gender, and geographic location. The etiology of liver failure was similar in both groups. the majority of participants forming group two of ICU had etiology of viral hepatitis C with a prevalence of 90% (n =27). The prevalence of viral hepatitis C etiology among participants was 96.7% with a number of participants being 29 of 30. The second most common etiology for liver failure after hepatitis C was viral hepatitis B infection with a prevalence of 10% among ICU participants (n =10) whereas among ward participants prevalence was seen as 3.3% (n =1).



While assessing the cause of aggravating factors for acute on chronic liver failure was observed to be infections of bacterial origin in both ICU and ward with a prevalence of 80% and 76% respectively (n =24, n =23). The most common aggravating factor was observed to be a spontaneous bacterial infection in group two with a prevalence of 70% (n =21), whereas group one participants showed a prevalence of 63.3% (n= 19). The second most common aggravating factor was the incidence of chest infection with a prevalence of 10% in group 1 and 3.3% in group 2. The third most common aggravating factor which was appreciated was upper gastrointestinal bleeding with a prevalence of 10% among group 1 participants and 16.7% (n = 5 and 3, respectively). Paracentesis of large volume was seen as aggravating factor with a prevalence of 3.3% in each group.

Organ failure among acute on chronic failure was most highly seen in the renal system with a prevalence of 60% among group 2 participants (n =18), whereas the incidence in group 1 was seen in 25 participants with a prevalence of 83.8%. Following renal failure, the second most common organ failure was a cerebral failure with a prevalence in group 1 seen as 26.7% (n =8), whereas the prevalence in group 2 was 76.7% (n =23). Group 2 showed a higher prevalence of circulatory failure with a prevalence of 76.7%. Group 1 showed a higher prevalence of coagulopathy with a prevalence of 43.3%. When comparing subgroups of ICU and ward, it was observed that all the subgroups of group 2 participants showed an increased incidence of hepatic encephalopathy and a persistent lowering of GCS score in comparison to that of group 1. In acute on chronic liver failure subgroup 3 in group 2 showed a higher prevalence of increased respiratory rate in comparison to subgroup 3 of group 1.

When assessing the biochemical profiles of group 1 and group 2, no substantial variation was seen between the two groups. Both groups showed a marked deficiency of hemoglobin, whereas group 1 participants showed lower platelet counts in comparison to group 2 participants. Significant variation was seen among two groups in levels of albumin with group 1 showing 2.4 ± 0.6 SD and group 2 showing 2.1 ± 0.3 SD. It was observed that albumin levels were considerably low in group 2 participants in comparison to group 1. C- Reactive proteins were higher in group 1 in comparison to group 2 with a range of 65.5 ± 5.0 and 85.6 ± 26.1 respectively. Moreover, the study outcomes showed an increase in APASCHE scores among group 2 population in comparison to group 1 participants.

The outcomes of this study aid in the stratification of participants in accordance with their prognosis, treatment modality, monitorization of patients, the need for a liver transplant, and the need for admission to ICU. The first group will include candidates for intensive care. Eligible participants must have acute on chronic liver failure group of 1 or 2, with hepatic encephalopathy or renal failure. The second group will constitute possible candidates for intensive care and characteristics will include acute to chronic liver

failure grade two with organ failure following 3 days of intensive care. The last group will be unlikely to respond to intensive care and will constitute participants that are eligible for a liver transplant.

DISCUSSION

The outcomes of this study showed the primary etiology of chronic liver disease. The majority of participants forming group 2 of ICU had etiology of viral hepatitis C with a prevalence of 90% (n =27). The prevalence of viral hepatitis C etiology among participants was 96.7% with a number of participants being 29 of 30 in group 1. The most common aggravating factor for liver failure was bacterial origin in both ICU and ward with a prevalence of 80% and 76% respectively in both groups (n =24, n =23). The most common aggravating factor was observed to be a spontaneous bacterial infection in group two with a prevalence of 70% (n =21), whereas group one participants showed a prevalence of 63.3% (n= 19). The most common cause of organ failure among acute on chronic failure was most highly seen in the renal system with a prevalence of 60% among group 2 participants (n =18), whereas the incidence in group 1 was seen in 25 participants with a prevalence of 83.8%. this section of the study will discuss the outcomes in comparison to pre-existing literature.

Viral hepatitis is highly prevalent in Pakistan and is a major reason of death and mortality. This clinical study showed viral hepatitis C to be the most widespread etiology of chronic liver disease. The studies which signify the relationship between viral hepatitis C and chronic liver disease are as follows [9], [10], [11]. The second most common cause of chronic liver disease and liver cirrhosis was found to be hepatitis B. the literature suggests that hepatitis b has an important role in the cause of chronic liver disease. The studies which are in accordance with the findings are as follows [12], [13]. The most common aggravating factor of acute on chronic liver disease in this study was appreciated to be a bacterial infection. Similar findings were seen in the following studies [14], [15].

Our study showed that the most common extra-hepatic organ failure among acute on chronic liver disease was found to be a renal failure. These findings are similar to that seen in [16], [17]. The second common extra-hepatic organ failure was seen as a cerebral failure as seen in a study conducted by [18]. It was also appreciated that these extra-hepatic organ failures were determinants of severity or morbidity and mortality of participants instead of acute on chronic liver failure grade.

CONCLUSION

The study concludes that the most common cause of the chronic liver disease is hepatitis c virus followed by hepatitis B virus. The most common aggravating factor for acute on chronic liver failure was spontaneous bacterial infection followed by a chest infection. The most common organ failure seen in participants was renal failure followed by cerebral failure.

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