**How to Cite**:
Rani, E., Tomar, S., Sharma, S., & Tewari, S. (2022). Mortality prediction by prognostic scoring in Hepatitis C- associated or non- associated cirrhotic patients. *International Journal of Health Sciences*, *6*(S5), 11405–11413. https://doi.org/10.53730/ijhs.v6nS5.11034

# Mortality prediction by prognostic scoring in Hepatitis C- associated or non- associated cirrhotic patients

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***Abstract*---**Objectives: Hepatitis C virus (HCV) is a hepatotropic virus that is one of the most common causes of liver disease and a potential cause of substantial morbidity and mortality worldwide. There is a paucity of data on the etiological profile of cirrhosis with HCV association in western Uttar Pradesh. Methodology: The observational type of study was carried out from June 2021 to May 2022 on patients attending in Medicine department at Lala Lajpat Rai Memorable Medical College, Meerut in collaboration with the Microbiology Department at National Capital Region Institute of Medical Sciences, Meerut, Uttar Pradesh, India. We included 247 patients who were diagnosed with cirrhosis, informed consent was taken with a 5 ml blood sample collected from each patient. The sample was screened


*Manuscript submitted: 9 March 2022, Manuscript revised: 18 May 2022, Accepted for publication: 27 June 2022*

for the qualitative detection of HCV-specific antibodies using 3rd generation Enzyme-linked immunosorbent assay (ELISA) from all the participants and Scored by the MELD score system. Result: A total of 247 confirmed cirrhosis patient's, 52 (21%), patients were positive with the association of HCV in the age group of 41-60 and the mean age was 50 years. The 31 (59.6%) were males, and 21 (40.3%) were females positive for HCV in the low-status family. Conclusion: In this study, the prevalence of HCV in cirrhosis patients was reported high in our region. The MELD-Na scores were a very good predictor of mortality at 3 months among patients with end-stage liver disease. Preventive measures are urgently required to control these factors to decrease morbidity and mortality.

***Keywords*---**Blood borne infection, Cirrhosis, ELISA, Hepatitis C virus, MELD scoring, Prevalence.

## I. Introduction

Hepatitis C virus (HCV) is a hepatotropic virus which is one of the major causes of liver disease and a potential cause of substantial morbidity and mortality worldwide. The virus, estimated to infect about 3% of the world population, is primarily transmitted via the parentral route which includes injection drug use, blood transfusion, unsafe injection practices, and other healthcare related procedures. HCV causes acute hepatitis which is mostly subclinical, but which gradually evolves into chronic hepatitis in about 80% of those infected.[1] HCV infected people are at risk for developing chronic liver disease (CLD), cirrhosis, and primary hepatocellular carcinoma (HCC). It has been estimated that HCV accounts for 27% of cirrhosis and 25% of HCC worldwide.[2]

An estimated 325 million people worldwide are living with hepatitis C virus (HCV) infection. The *WHO Global hepatitis report, 2017* indicates that the large majority of these people lack access to life-saving testing and treatment. As a result, millions of people are at risk of a slow progression to chronic liver disease, cancer, and death. Approximately 1.75 million people were newly infected with HCV in 2015, bringing the global total of people living with hepatitis C to 71 million.[3]The patients who develop chronic hepatitis C, after a gap of ten to twenty years may develop cirrhosis in 5-20 % of patients and around 25% of them can advance to End stage liver disease and hepatocellular carcinoma.[4]As no vaccine is available for hepatitis C, it is necessary to diagnose and treat the infected person after appropriate analysis.[5]

The standard & screening method of diagnosis is antibody detection by ELISA. Currently available, third generation immunoassay, which incorporates proteins from the core, NS3, and NS5 regions, detect anti-HCV antibodies during acute infection. This test has sensitivity of 97%. It detects antibodies within 6-8 weeks of infection i.e. during the initial phase of elevated aminotransferases activity.[6] The Model for End Stage Liver Disease (MELD) scoring system used in the allocation of liver transplants that has many advantages including objectivity, simplicity, ease of use, sensitivity to the dynamic changes of liver cirrhosis and

reproducibility. According to Wiesner R et al, the study suggest that the MELD score is able to accurately predict 3-month mortality among patients with chronic liver disease on the liver waiting list and can be applied for allocation of donor livers. MELD-Na is the more specific compared to the MELD score.[7, 8] This study aims to give an overview of the viral infection in cirrhosis patients, their prevalence and diagnosis in tertiary care centre of Western Uttar Pradesh, India.

## II. Materials & Methods

An prospective observational type of study was carried out from June 2021 to May 2022 on patients attending in Medicine department at LLRM Medical college Meerut in collaboration with Microbiology Department of NCRIMS, Meerut (Uttar Pradesh) India. We included 247 cirrhosis patient's in our study, an informed consent was taken from all the participants. The study had been approved by the ethical committee of research institute.5 ml blood sample was collected from each patients and serum was separated from the sample which was screened for qualitative detection of HCV-specific antibody by using 3rd generation ELISA assay. [5, 6]
Statistical analysis was done by software IBM SPSS STATISTICS 21.

**Components of the MELD Score**:

- **The MELD-Na score was calculates according to the formula:**
  $MELD_{(i)}$ = round[1][ 0.378 * $\log_e$(bilirubin)) + (1.120*$\log_e$(INR)) + (0.957*$\log_e$(creatinine)) + 0.643 ] * 10
  [1] rounded to the tenth decimal place.
  MELD = $MELD_{(i)}$ + 1.32 * (137-Na) - [0.033*$MELD_{(i)}$*(137-Na)]
- **The original MELD score was calculates according to the formula:**
  Original MELD Score= (0.957 * In(Serum Cr) + 0.378 * In(Serum Bilirubin) + 1.120* In(INR) + 0.643) * 10 (if hemodialysis, value for creatinine is automatically set to 4.0)[8, 9]

**Exclusion criteria include:**

- Patients with any chronic liver disease other than HCV.
- Patients received liver transplantation before.

## III. Result

A total of 247 confirmed cirrhosis patients' blood samples were included in the study. Out of these 52(21.0%), patients was associated with HCV. **(Fig.1)**

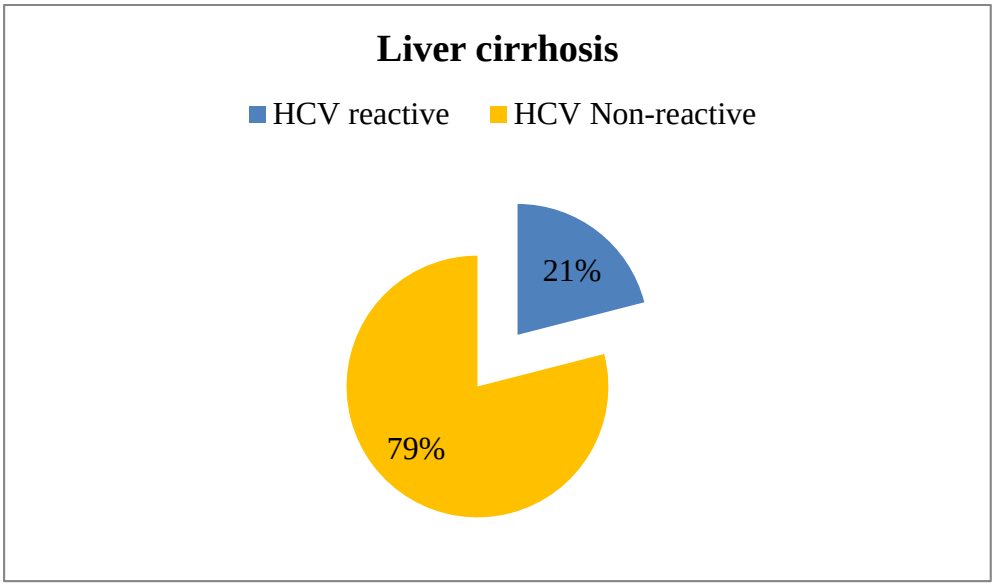


Fig 1: Distribution of cirrhosis according to association of HCV

Out of 52 HCV associated liver cirrhosis patients, 41-60 (44.23%) was the most common infected age group. Followed by 21-40 (38.46%), >61 (17.38%), and the 0-20 age group was not associate HCV with cirrhosis. The mean age was 45.9 (50) years.Among 52 patients, 31(59.61%) were males, and 21(40.38%) were females positive for HCV. The male: female ratio was 3.1:2.1.While we compare the family status of patients with HCV associate cirrhosis we found that 33 (63.46%) lower-class societiesis more prevalent compared to high and middle class status.Among 52 positive HCV-associated cirrhosis patients, Ascites 33 (63.46%) was the most common examination finding seen. Followed by the second most common examination findingwere Pedal Edema 09 (17.30%) and palpable Liver02 (3.84%). While 08 (15.38%) cases no such finding was there. (Table 1)

Table 1: Demographic characteristics of the patients with HCV Associated Cirrhosis

| S. No. | Characteristics | HCV Positive<br>N (%) |
|---|---|---|
| 1. | Liver Cirrhosis<br>(By ELISA) | 52 (21.00%) |
| 2. | Age<br>0-20<br>21-40<br>41-60<br>>61 | <br>0 (0%)<br>20 (38.46%)<br>23 (44.23%)<br>09 (17.30%) |
| 3. | Sex<br>Male<br>Female | <br>31 (59.61%)<br>21 (40.38%) |
| 4. | Family status<br>High | <br>09 (17.30%) |

| | | |
|---|---|---|
| | Middle<br>Low | 10 (19.23%)<br>33 (63.46%) |
| 5. | Examination<br>Liverpalpable<br>Ascites<br>Pedal Edema<br>Notexamined | <br>02 (3.84%)<br>33 (63.46%)<br>09 (17.30%)<br>08 (15.38%) |

While we compare liver cirrhosis with HCV association by MELD-Na soring parameter we found that both score percentage was approximately same.And 52.6% mortality rate was higher in both categories and the p-value is not significant, the data are shown in [Table 2].

Table 2: Analysis of 3-month mortality according to MELD scoring

| S. NO. | MELD Score | Mortality Probability | HCV Reactive N=52 | HCV Non- Reactive N=195 |
|---|---|---|---|---|
| 1. | 40 | 71.3% mortality | 4 (7.7%) | 14 (7.2%) |
| 2. | 30-39 | 52.6% mortality | 25 (48.1%) | 96 (49.2%) |
| 3. | 20-29 | 19.6% mortality | 18 (34.6%) | 74 (38.0%) |
| 4. | 10-19 | 6.0% mortality | 2 (3.8%) | 8 (4.1%) |
| 5. | 9 or less | 1.9% mortality | 3 (5.8%) | 3 (1.5%) |

Mean values of the MELD-Na was higher comparison to old MELD scoring method. The Scoring models and their mean values shown in [Table 3].

Table 3: Mean value of scoring models

| Parameter | MELD-Na Score | Original old MELD Score |
|---|---|---|
| Mean value | 28.75 | 17.93 |
| SD | 6.63 | 7.86 |
| p-value | <0.0001 | |

The p-value result is significant at $p<0.05$

## IV. Discussion

Cirrhosis develops after prolonged infection in patients with HCV.[10]In the present study reported that 21.0% HCV-associated cirrhosis patient cases. Other authors reported a very high and low prevalence according the diverse region. A study reported by Londoño MC et al.[11] 44%, followed by D'Amico et al., HCV (35%)[12], Ray G et al., and Mokdad AA et al., hepatitis C (14.9%).[13, 14]The Hepatitis C virus infection is one of the most modest causes of parentally acquired hepatitis worldwide. HCV infection is associated with a significant risk of development of cirrhosis. The high prevalence of HCV associated cirrhosis due to the western

Uttar Pradesh prevalent area for HCV. Some had reported low prevalence asAcharya G et al., 6.4%,[15] as follow5.5% by Rajani M &Jais M[16] followed by Sood A et al.,reported 5.2%[17],Trimukhe R &Rai R., hepatitis C 3.2% [18], by Sharma B et al. 2.8%[19], by Chakraborty A et al., reported 1.5%.[20]

In our study most of the patients were ranged 41-60 years of age. This shows that liver diseases are more common after the fourth decade of life in our region.Our findings are support with the findings of that study conducted by Shrestha et al. at a tertiary care centre in Nepal, 130 patients with diagnosed liver disease were analysed; most of the patients were in the range of 41–50 years of age.[21] The outcome of our study gender did not significant. The male prevalence was 59.6% with HCV associated cirrhosis. This is in concordance with other studies; O'Brien AJ et al.,[22] reported male preponderance 60%. Parkash O et al.,[23] reported men with liver disease 60%, Similarly, Nafeh H et al.,[24]were reported 85%, Acharya G et al., reported 83.62%.[15]

While we discuss about scoring methodology, we found that MELD-Na more significant compare to original MELD scoring system. Similarly,some study contrast to our study as by Wiesner R et al.,[8] suggested that the superiority of the MELD score compare to other scoring system due to was probably the result of selection bias. While DupontB et al., [25] in France;reported that both MELD and MELD-Na scores to be better than other scoring system in predicting in-hospital mortality among cirrhotic patients.

## V. Conclusion

Our analysis highlights that the prevalence of HCV-associated cirrhosis has reached very high proportions among cirrhosis infections. We found that there were no significant differences in patients with HCV associated Cirrhosis and HCV Non- associated cirrhosis. In addition,the association of HCV in cirrhosis cases is important to measures as this data may help to understand the requirements of such patients for better care delivery. It is estimated that changing pattern of care delivery to such patients may improve their status of health. MELD is a continuous scoring system, which makes it more convenient for scoring individuals within large populations based on the diagnosis. The C-statistics of these scores differed significantly for 3-month mortality, and the MELD-Na score was better than the original MELD ($p < 0.0001$). All these reasons make the MELD-Na score likely to be the core tool for assessing the prognosis of cirrhosis in the future diagnosis.

**Acknowledgment:** None
**Conflict of Interest**: none declared

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