Section: Microbiology

Original Research Article

INFLAMMATORY MARKERS (ESR, CRP, NLR AND FERRITIN) AND THEIR CORRELATION TO CHILD PUGH SCORING IN CHRONIC LIVER DISEASE (CLD)

Brajesh Kumar[1], Bharti Kumari[2], Poonam Kumari[3]

[1]Tutor, Department of Microbiology, SKMCH Muzaffarpur, Bihar, India
[2]Senior Resident, Department of Obs & Gynae SKMCH Muzaffarpur, Bihar, India
[3]Assistant Professor, Department of Microbiology, SKMCH Muzaffarpur, Bihar, India

Received : *23/12/2023*
Received in revised form : *28/01/2024*
Accepted : *14/02/2024*

Keywords:
Inflammatory Markers, Child Pugh Scoring, Chronic Liver Disease.

Corresponding Author:
Dr. Bharti Kumari,
Email: bhartiraj47@gmail.com

DOI: 10.47009/jamp.2024.6.1.237

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (1); 1196-1202

Abstract

Background: Our study aimed to determine whether there was a significant correlation between high ESR, CRP, Ferritin and NLR ratios with severity of decompensate liver cirrhosis based on CTP score, as this was a point-time approach study, the information related to the prognosis was not noted. **Materials and Methods:** This study was a Correlation Crossectional observational study that was approved by Thesis & Ethical Committee of Tertiary Care Centre and constitutes the patients diagnosed with chronic liver disease (compensated or decompensate) during the study period. The study participants who fulfilled inclusion criteria will be included in the study. This study was carried out over a period of 12 months, from July 2021 to June 2022. Total 60 Patients included in this study. The study used the hospital medical records to collect the details of basic demographic data, Clinical histories and other lab investigations. **Result:** The study showed that ESR, CRP, NLR and Ferritin at a lower sensitivity level can still be useful in the prediction of infection in patients with chronic liver disease. **Conclusion:** The study showed that ESR, CRP, NLR and Ferritin was useful in the prediction of the severity of liver disease in agreement with Child Turcotte Pugh score. So, ESR, CRP, NLR and Ferritin can be used as a marker of the severity of liver disease.

INTRODUCTION

Cirrhosis is the leading cause of liver-related death globally. It is the end stage of progressive liver fibrosis, in which the hepatic architecture is distorted. In the initial stages, cirrhosis is compensated. Most patients are asymptomatic at this stage, and cirrhosis is usually discovered incidentally during medical encounters for other reasons. Decompensation in patients with compensated cirrhosis usually defined as the first occurrence of ascites, esophageal variceal bleeding, and hepatic encephalopathy and in some individuals, increased bilirubin concentration. Because of the nature of Decompensation, these patients are rapidly brought to medical attention, and thus reports on the prevalence of decompensate cirrhosis are probably much more accurate than those of compensated cirrhosis.[1] Once Decompensation occurs, the mortality and morbidity resulting from cirrhosis increase sharply, and depending on the cause of Decompensation, the 1-year case-fatality rate can be as high as 80%. Such patients need frequent medical attention and an increasing amount of medication over the disease course. Quality of life is affected and frequent hospitalizations (admissions and stays) are required. As the disease progresses, hospital stay become more frequent and more prolonged. Finally, patients either die or receive a liver transplant, which is a high-burden option for patients, health-care systems, and health financing and governance.[1]

Globally, 1.5 billion persons had CLD in 2017, most commonly resulting from NAFLD (60%), HBV (29%), HCV (9%), and ALD (2%). Also, globally, cirrhosis caused more than 1·32 million (95% UI 1·27–1·45) deaths in 2017, with 440,000 deaths (416 000–518 000; 33·3%) in females and 883,000 (838,000–967,000; 66·7%) in males, compared with less than 899,000 (829,000–948,000) deaths for both sexes in 1990. These deaths constituted 2·4% (2·3–2·6) of all deaths globally in 2017 compared with 1·9% (1·8–2·0) in 1990.[2]

Conventional parameters for diagnosing SIRS lack sensitivity and specificity in patients with advanced cirrhosis because of hypersplenism, hyperventilation associated with encephalopathy, hyperkinetic circulation, or the use of beta-blockers.[3] C-reactive protein (CRP) is considered a surrogate marker for acute or chronic systemic inflammation and bacterial infection, although elevated levels have been described in many other conditions, the long-term associations between CRP and liver cancer and chronic liver disease mortality, however, are not

ISSN (O): 2687-5365; ISSN (P): 2753-6556

known. Rouleaux formation (and thus the ESR) is affected by the amounts of immunoglobulins and acute phase proteins (Prothrombin, plasminogen, Ferritin, fibrinogen, C-reactive protein, complement proteins) that are present in several inflammatory conditions.[4] The ESR result establishes the presence of an inflammatory condition within the body, but the test is not specific for any disease process. It must be combined with other modalities in an attempt to define an underlying ailment. The use of the ESR as a screening test in asymptomatic patients is limited due to the low sensitivity and specificity.[5] NAFLD and virus-related chronic liver diseases. In a patient of chronic liver disease without iron overload, serum Ferritin levels are related to the histological liver parenchymal damage rather than iron accumulation.[6]

As emerging laboratory marker, NLR could be used as accurate prognostic marker to predict severity of the infection process or several types of malignancies.[7] Therefore, NLR is able to provide the information related to severity of damaged hepatocyte during fibrosis formation.[8-9]

The Child-Pugh scoring system (also known as the Child-Pugh-Turcotte score) was designed to predict mortality in cirrhosis patients. A - Good hepatic function, B - moderately impaired hepatic function, and C - advanced hepatic dysfunction.[10]

Our study aimed to determine whether there was a significant correlation between high ESR, CRP, Ferritin and NLR ratios with severity of decompensate liver cirrhosis based on CTP score, as this was a point-time approach study, the information related to the prognosis was not noted.

Aims and Objectives

1. To study the correlation of serum level of C-reactive protein (CRP), Ferritin, Erythrocyte sedimentation rate (ESR), and Neutrophil-to-Lymphocyte Ratio (NLR) with Child Pugh Score.
2. Usefulness of the markers in predicting short term outcomes (including ascites, variceal bleeds, mortality) within a given Child Pugh class.

MATERIALS AND METHODS

This study was a Correlation Crossectional observational study that was approved by Thesis & Ethical Committee of Tertiary Care Centre and constitutes the patients diagnosed with chronic liver disease (compensated or decompensate) during the study period. The study participants who fulfilled inclusion criteria will be included in the study. This study was carried out over a period of 12 months, from July 2021 to June 2023. Total 60 Patients included in this study. The study used the hospital medical records to collect the details of basic demographic data, Clinical histories and other lab investigations.

Inclusion Criteria

Cases of chronic liver disease (compensated or decompensate) above the age of 18 years.

Exclusion Criteria

1. The existence of any concurrent infectious or systematic inflammatory diseases, significant hematologic disorders, thyroid dysfunction, and/or severe renal insufficiency (end-stage renal disease or chronic dialysis treatment) and non-hepatic malignant tumors.
2. Patients on warfarin, steroids, hormone replacement therapy.

Data collection techniques and tools: All patients admitted in the hospital during this time interval and meeting the inclusion criteria will be included in the study. Further data was obtained such as demographical data (identity, history of certain disease, and history of blood transfusion) and laboratory findings (complete blood count, liver function tests, electrolyte, glucose level-both for random and fasting, lipid profile, albumin, globulin, viral marker, ESR, CRP, Ferritin and haemostasis function tests). Neutrophil and lymphocyte levels were, then, be transformed into NLR. Additionally, data on outcomes and decompensatory complications such as variceal bleeds, ascites, and hepatic encephalopathy during the course of hospital stay were collected. The severity of liver cirrhosis was evaluated using Child-Pugh Turcotte Score. The scale ranges from 5 to 15 points and stratified into three categories, class A (5-6), B (7-9) or C (10-15).

Data entry and analysis: All the data was tabulated, and then analyzed with appropriate statistical tools "MedCalc and SPSS". Data was presented as a mean with standard deviation or proportions as appropriate. Mean, standard deviation and variance was calculated and following statistical significance tests was applied. "Chi – square Test" and "Fisher's exact test" will be used for statistical significance test. Test of Significance for Difference of Proportions. Student's T-test and ANOVA was used as the statistical tool to test for significance of observed mean differences. Finally, the calculated value was compared with the tabulated value at particular degree of freedom and finds the level of significance. A "p-value" was considered to be non-significant if > 0.05 and significant if <0.05. The probability of error at 0.05 will be considered significant, while at 0.01 and 0.001 are highly significant.

RESULTS

Present study was Correlation Crossectional observational conducted at Department of Medicine, Tata Main Hospital on patients diagnosed with chronic liver disease (compensated or decompensate) over a period of 12 months, 60 each in CTP Class A, B & C.

Based on age distribution in all patients studied, most common age group was 51-60 years i.e., 63 (35.00%) followed by 51-50 years i.e., 51 (28.33%) respectively. Mean age for all patients in all three CTP classes were 55.42 ± 10.57 years respectively. [Table 1]

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Most common gender in studied CLD patients was males i.e., 144 (80%). [Table 2]

Based on age distribution in all CTP classes, we found that most patients belong to 51-60 years age group with 17, 20 and 26 cases i.e., 28.33%, 33.33% and 43.33% in Class A, B and C respectively. [Table 3]

Maximum patients show generalized weakness at presentation i.e., 165 (91.67%). [Table 4]

Most common clinical signs found in our study is ascitis i.e., 120 (66.67%) followed by icterus i.e., 111 (61.67%). [Table 5]

Maximum alcohol related CLD came to our study i.e., 96 (53.33%) followed by NAFLD i.e., 36 (20.00%). [Table 6]

Child Turcotte Pugh score was taken 60 each in each class as per our material and methods. [Table 7]

Based on ascites status, most commonly found in class C i.e., all 60 cases. Similarly, for esophageal varices, HE and HRS also Class C shows the greatest number of cases i.e., 49 (81.67%), 16 (26.67%) and 18 (30.00%) respectively. [Table 8]

Based on metal state of studied patient on admission shows mostly with HE came under grade I HE i.e., 15 (55.55%) followed by grade II HE i.e., 05 (18.52%) respectively. [Table 9]

out of that most common were portal hypertensive gastropathy i.e., 135 (75%) followed by grade I varices i.e., 63 (35%) respectively. [Table 10]

Most common hematological abnormalities were anemia i.e., 166 (92.22%). [Table 11]

Above tables shows different demographical and laboratory findings with respect to different classes of CTP and it was found that all findings were statistically significant with p-value <0.001 but Serum creatinine and serum potassium level shows statistically insignificant results. [Table 12]

Based on inflammatory markers in different classes of CTP shows all statistically significant results with p-value <0.001 respectively. [Table 13]

Most number of death cases belong to CTP class C i.e., 24 (54.54%). [Table 14]

Inflammatory markers also calculated with respect to outcome in terms of dead and survived and found all results statistically significant with p-value <0.001. [Table 15]

Based on Demographic and laboratory data in survived and died patients, it was found that all result shown statistically significant results with p-value <0.05 except ALT and serum potassium levels. [Table 16]

Table 1: Age distribution of studied chronic liver disease (compensated or decompensate) patients

Age in years	Number of patients	Percentage
<20 years	03	01.67%
21-30 years	06	03.33%
31-40 years	30	16.67%
41-50 years	51	28.33%
51-60 years	63	35.00%
61-70 years	21	11.67%
>70 years	06	03.33%
Total	180	100.00%

Table 2: Gender distribution in studied patients

Gender	Number of patients	Percentage
Male	144	80.00%
Females	36	20.00%
Total	180	100.00%

Table 3: Age distribution of studied chronic liver disease of each CTP classes (compensated or decompensate) patients

Age in years	CTP Class A	CTP Class B	CTP Class C	Number of patients	Percentage
<20 years	02	01	00	03	01.67%
21-30 years	03	03	00	06	03.33%
31-40 years	15	10	05	30	16.67%
41-50 years	14	15	22	51	28.33%
51-60 years	17	20	26	63	35.00%
61-70 years	07	08	06	21	11.67%
>70 years	02	03	01	06	03.33%
Total	60	60	60	180	100.00%
p-value	The chi-square statistic is 13.8934. The p-value is 0.03085. The result is significant at $p < 0.05$.				

Table 4: Spectrum of symptoms at presentation

Spectrum of symptoms*	Number of patients	Percentage
Generalized weakness	165	91.67%
Jaundice	81	45.00%
Pedal edema	27	15.00%
Pain abdomen	12	06.67%
Reduced urine output	15	08.33%
Fever	06	03.33%
Abdominal distension	78	43.33%
Blood in vomiting or black stool	60	33.33%
Altered sensorium	27	05.00%

ISSN (O): 2687-5365; ISSN (P): 2753-6556

* Symptoms were overlapping

Table 5: Clinical signs shown by selected patients

Clinical signs*	Number of patients	Percentage
Icterus	111	61.67
Edema	99	55.00
Clubbing	00	00.00
Asterixis	06	03.00
Ascitis	120	66.67

*Clinical signs are overlapping

Table 6: Etiology of CLD in selected patients

Etiology	Number of patients	Percentage
Hepatitis B virus	30	16.67%
Hepatitis C virus	12	06.67%
Primary Biliary Cirrhosis	06	03.33%
Alcohol related	96	53.33%
NAFLD	36	20.00%
Total	180	100%

Table 7: Child Turcotte Pugh Class

Child Turcotte Pugh Class	Number of patients	Percentage
Class A	60	33.33%
Class B	60	33.33%
Class C	60	33.34%
Total	180	100%

Table 8: Various status with respect to CTP Class in selected patients

Variables	CTP Class A	CTP Class B	CTP Class C	Total	p-value
Ascites	12	48	60	120	<0.05
Esophageal Varices	24	41	49	114	<0.05
Hepatic encephalopathy	00	11	16	27	<0.05
Hepato-renal syndrome	00	08	18	26	<0.05

Table 9: Mental presentation in studied CLD patients according to WEST HAVEN grading system

Hepatic encephalopathy (HE)	Number of patients	Percentage
Grade I HE	15	55.55%
Grade II HE	05	18.52%
Grade III HE	03	11.11%
Grade IV HE	04	14.81%
Total	27	100.00%

Table 10: Upper GI Endoscopy Findings in the Present Study

UGI endoscopy findings	Number of patients	Percentage
Normal	12	06.67%
Mild or Severe PHG	135	75.00%
GAVE	13	07.22%
Grade I varices	63	35.00%
Grade II varices	26	14.44%
Grade III varices	18	10.00%
Grade IV varices	09	05.00%
Portal hypertensive Duodenopathy	17	09.44%

Table 11: Presence of Hematological Abnormalities in studied cases

Hematological Abnormalities	Number of patients	Percentage
Anemia	166	92.22%
Thrombocytopenia	117	65.00%
Neutropenia	19	10.55%

*Hematological abnormalities were sometimes overlapping also

Table 12: Demographic and laboratory data in different classes of CTP

Variables	CTP Class A	CTP Class B	CTP Class C	p-value
Mean age in years	55.24 ± 10.24	61.24 ± 05.62	63.17 ± 06.24	<0.001
Males	46	49	49	<0.05
Females	14	11	11	
Bilirubin in mg/dl	02.14 ± 00.87	02.67 ± 01.07	03.65 ± 01.57	<0.001
Albumin in gm/dl	03.07 ± 01.11	02.32 ± 01.01	01.92 ± 00.72	<0.001
ALT (IU/L)	41.24 ± 10.54	47.24 ± 09.82	44.11 ± 06.54	<0.001
AST (IU/L)	47.81 ± 07.63	58.47 ± 09.77	51.24 ± 10.24	<0.001
Hemoglobin	10.12 ± 02.12	09.14 ± 02.54	08.41 ± 02.55	<0.001

ISSN (O): 2687-5365; ISSN (P): 2753-6556

WBC (x103/ml)	07.55 ± 05.11	08.41 ± 04.21	08.74 ± 03.87	<0.001
Platelets (x103/ml)	102.50 ± 24.12	98.20 ± 31.24	78.24 ± 21.14	<0.001
INR	01.41 ± 00.41	01.51 ± 00.54	01.87 ± 00.77	<0.001
Serum creatinine (mg/dl)	01.21 ± 00.21	01.31 ± 00.57	01.61 ± 00.65	0.524
Serum urea (mg/dl)	87.51 ± 17.54	89.12 ± 15.24	91.52 ± 13.29	<0.001
Na (mEq/l)	128.54 ± 03.21	126.41 ± 03.11	125.41 ± 02.41	<0.001
K (mEq/l)	04.41 ± 01.11	04.25 ± 01.23	04.88 ± 01.57	0.624

*One-way ANOVA

Table 13: Inflammatory markers in different CTP classes

Variables	CTP Class A	CTP Class B	CTP Class C	p-value
ESR (mm/h)	19.24 ± 04.21	21.14 ± 04.57	22.11 ± 05.24	<0.001
CRP	30.24 ± 05.77	32.14 ± 05.41	36.87 ± 05.88	<0.001
NLR	02.02 ± 00.47	03.12 ± 00.89	05.07 ± 01.25	<0.001
Ferritin (ng/mL)	390.14 ± 30.24	403.12 ± 35.24	445.24 ± 30.18	<0.001

*One-way ANOVA

Table 14: Outcome of studied cases

Outcome	CTP Class A	CTP Class B	CTP Class C	Total
Death	00 (0.00%)	10 (16.67%)	24 (40.00%)	44 (24.44%)
Survival	60 (100.00%)	50 (83.33%)	36 (60.00%)	136 (75.56%)
Total	60 (100.00%)	60 (100.00%)	60 (100.00%)	180 (100%)

Based on outcome, total death cases were 44 i.e., 24.44%.

Table 15: Inflammatory markers in survived and died patients

Variables	Survived	Dead	t-value	p-value
ESR (mm/h)	21.41 ± 04.29	23.24 ± 04.44	4.214	<0.001
CRP	33.14 ± 04.88	37.59 ± 05.22	3.547	<0.001
NLR	02.68 ± 00.88	05.42 ± 00.77	3.057	<0.001
Ferritin (ng/mL)	398.84 ± 30.66	435.12 ± 35.29	5.872	<0.001

*Independent t-test

Table 16: Demographic and laboratory data in survived and died patients

Variables	Survived	Dead	t-value	p-value
Mean age in years	54.16 ± 10.33	66.51 ± 07.22		<0.001
Males	108	36	----------	<0.05
Females	28	08		
Total Bilirubin in mg/dl	02.99 ± 01.57	04.47 ± 01.17	5.753	<0.001
Albumin in gm/dl	02.17 ± 01.17	01.66 ± 00.87	2.661	0.009
ALT (IU/L)	42.24 ± 10.54	45.11 ± 06.54	1.701	0.091
AST (IU/L)	52.81 ± 07.34	65.24 ± 10.10	8.855	<0.001
Hemoglobin	10.64 ± 02.20	08.59 ± 02.10	5.431	<0.001
WBC (x103/ml)	08.55 ± 05.11	12.74 ± 03.87	5.051	<0.001
Platelets (x103/ml)	98.50 ± 24.11	73.24 ± 21.14	6.217	<0.001
INR	01.67 ± 00.41	02.87 ± 00.77	13.298	<0.001
Serum creatinine (mg/dl)	01.11 ± 00.21	02.61 ± 00.65	23.494	0.524
Serum urea (mg/dl)	80.51 ± 17.54	95.52 ± 13.20	5.215	<0.001
Na (mEq/l)	133.54 ± 03.47	126.41 ± 02.22	12.795	<0.001
K (mEq/l)	04.12 ± 01.11	04.32 ± 01.57	0.513	0.609

DISCUSSION

Based on age distribution in all patients studied, most common age group was 51-60 years i.e., 63 (35.00%) followed by 51-50 years i.e., 51 (28.33%) respectively. Mean age ± Standard deviation (SD) for all patients in all three CTP classes was 55.42 ± 10.57 years respectively.

Sreenivas PS et al,[11] study included 50 patients with CLD admitted to GGH KAKINADA. Out of the 50 patients 46 males 4 females. The mean age of presentation is 43.84 with a of SD 10.4 years. Max age of presentation is 68years and minimum age of years is 23 years.

Cai J et al,[12] study found, mean age for liver cirrhosis case found to be 48.27 ± 11.90 years and for acute on chronic liver disease it was 51.14 ± 11.77 years.

Sungkar T et al,[13] study enrolled 54 liver cirrhosis patients, including 37 males and 17 females. Serologically, it proved that hepatitis B virus infection (53.7%) was the major infection followed by unknown causative agent (Non-B and C), 44.4%. mean age for all patients was 52.76 ± 12.57 years.

Acharya G et al study shown out of the total of 171 patients, 24 (14.03%) expired, while 147 (85.96%) survived. The patients' age range was 20–80 years and their mean age (±SD) was 48.94 ± 12.63 years (median age 50 years; range 60). There was no significant difference in median age between survivors and non-survivors (median age 48 years, range 60, and median age 54.5 years, range 49, respectively; p = 0.118).[14-17]

ISSN (O): 2687-5365; ISSN (P): 2753-6556

In present study, most common gender in studied CLD patients were males i.e., 144 (80%).

Sreenivas PS et al,[11] study included 50 patients with CLD admitted to GGH KAKINADA. Out of the 50 patients 46 males i.e., 92% and 4 females i.e., 08%.

Cai J et al,[12] study found in liver cirrhosis cases males were 73.41%.

Sungkar T et al,[14] cross-sectional study enrolled 54 liver cirrhosis patients, including 37 males (68.52%) and 17 females (31.48%).

Zakareya T et al,[16] study shows that out of 238 recruited patients, 200 were eligible and included, and males were 120 i.e., 60% and females were 80 i.e., 40% respectively.

In present study, maximum patients show generalized weakness at presentation i.e., 165 (91.67%).

In contrast to present study, Sreenivas PS et al,[11] study included 50 patients with CLD admitted to GGH KAKINADA. Most common clinical presentation was abdominal distension followed by jaundice i.e., 94% and 56% respectively.

In present study, most common clinical signs found in our study is ascites i.e., 120 (66.67%) followed by icterus i.e., 111 (61.67%).

In contrast to present study, Acharya G et al,[17] study shows, most common signs seen among the patients with end-stage liver disease were icterus (69.00%), pallor (28.07%), splenomegaly (25.14%) and parotid enlargement (23.39%).

In present study, maximum alcohol related CLD came to our study i.e., 96 (53.33%) followed by NAFLD i.e., 36 (20.00%).

Sreenivas PS et al,[11] study included 50 patients with CLD admitted to GGH KAKINADA and shows that, for 41 patients cause of CLD is alcohol, for 3 patients the cause of CLD is HCV infection, for 1 patient the cause of CLD is HBV, for other 3 patients the cause of CLD is ALCOHOL &HBV infection, for 1 patient the cause of CLD is ALCOHOL & HCV infection.

In contrast to present study, Sungkar T et al,[14] cross-sectional study enrolled 54 liver cirrhosis patients and found that, hepatitis B virus infection (53.7%) was the major infection followed by unknown causative agent (Non-B and C), 44.4%.

Sungkar T et al,[14] study, enrolled 54 decompensated liver cirrhotic patients, 17 females and 37 males, with a mean age of 52.76 ± 12.57 years. Most patients had viral-related cirrhosis of hepatitis B and C since the serologic marker for viral infection was positive (HBsAg and anti-HCV) (n = 30 patients, non-hepatitis B and C patients were 24).

In present study, based on metal state of studied patient on admission shows mostly with HE came under grade I HE i.e., 15 (55.55%) followed by grade II HE i.e., 05 (18.52%) respectively.

Sreenivas PS et al,[11] study included 50 patients with CLD admitted to GGH KAKINADA and shows that, at presentation 36 patients has normal mental status at presentation, 5 had grade 1 HE according to WEST HAVEN grading system, 4 had grade 2 HE, 1 had grade 3 HE, 4 had grade 4 HE.

Based on UGI endoscopy findings, studied CLD cases show overlapping findings, out of that most common were portal hypertensive gastropathy i.e., 135 (75%) followed by grade I varices i.e., 63 (35%) respectively.

Sreenivas PS et al,[11] study included 50 patients with CLD admitted to GGH KAKINADA and shows that, most patient shows normal UGI endoscopy i.e., 18 (38%) followed by Grade II varices i.e., 13 (28.5%) and Grade IV varices i.e., 5 (11.60%) respectively.

In present study, most common hematological abnormalities were anemia i.e., 166 (92.22%).

Sreenivas PS et al,[11] study included 50 patients with CLD admitted to GGH KAKINADA and shows that, most common hematological abnormality was anemia i.e., 92%. Findings shows different laboratory results with respect to different classes of CTP and it was found that all findings were statistically significant with p-value <0.001 except serum creatinine and serum potassium level shows statistically insignificant results.

In present study, based on inflammatory markers in Class A, B and C i.e., Mean ESR was 19.24 ± 04.21, 21.14 ± 04.57 and 22.11 ± 05.24, Mean CRP was 30.24 ± 05.77, 32.14 ± 05.41 and 36.87 ± 05.88, Mean NLR was 02.02 ± 00.47, 03.12 ± 00.89 and 05.07 ± 01.25, Mean ferritin was 390.14 ± 30.24, 403.12 ± 35.24 and 445.24 ± 30.18 respectively. Based on inflammatory markers vales in different classes of CTP shows all statistically significant results with p-value <0.001 respectively.

Sreenivas PS et al,[11] study included 50 patients with CLD admitted to GGH KAKINADA and shows that, Patients with CRP levels more than or equal to 10 had a higher mean value of child pugh score that is 12 with a SD of 1.9 mg/dl when compared to patients with CRP levels less than 10, who had a child pugh score of 9.37 with a SD of 1.8 either significant P value of 0.001. In patients who had documented evidence of infection tend to have a higher level of CRP that is 18.13 with a SD of 6.2 compared to patients with a mean of 5.6 with SD OF 4.9 in patients who had no such evidence.

Chen W et al study, presents the associations between serum C- reactive protein concentrations and the risks of liver cancer incidence. There were significant associations between serum C- reactive protein levels and risk of liver cancer incidence. Compared to the lowest quartile, subjects in the fourth quartile had a 63% higher risk (OR=1.63, 95%CI= 1.06 to 2.51), with evidence of a statistically significant monotonic trend (Ptrend=0.01). We also found a significant association between higher serum C- reactive protein and higher risk of chronic liver disease mortality. Compared to the lowest quartile, subjects in the fourth quartile had a nearly 3-fold higher risk of chronic liver disease deaths (OR=2.95, 95%CI= 1.90 to 4.57), with evidence of a statistically significant monotonic trend (Ptrend<0.001). Generally similar findings were observed in analyses stratified by gender, HBV/HCV status, and trial and we found no statistical evidence for heterogeneity across these

ISSN (O): 2687-5365; ISSN (P): 2753-6556

sub-groups. Similar findings were also found among events occurring close to and many years after CRP measurement. However, we had a modest sample size for these analyses, particularly among HCV positive participants.

Sungkar T et al,[14] study, enrolled 54 decompensated liver cirrhotic patients, NLR level were categorized into three groups: group A (NLR≤2.0), group B (2<NLR<5), and group C (≥5). There was no significant difference between laboratory results and NLR ratio, not withstanding, several variables including age, albumin, creatinine, bilirubin and CTP score was higher in NLR ≥5 group patients. In addition, a significant correlation between NLR and CTP score was demonstrated in this study (r=0.326; p 0.008) using Spearman correlation test.

In present study, based on outcome, total death cases were 44 i.e., 24.44%. Most number of death cases belong to CTP class C i.e., 24 (54.54%).

In present study, based on inflammatory markers in survived and death cases i.e., Mean ESR was 21.41 ± 04.29 and 23.24 ± 04.44, Mean CRP was 33.14 ± 04.88 and 37.59 ± 05.22, Mean NLR was 02.68 ± 00.88 and 05.42 ± 00.77 & Mean Ferritin (ng/mL) was 398.84 ± 30.66 and 435.12 ± 35.29 respectively. Inflammatory markers also calculated with respect to outcome in terms of dead and survived and found all results statistically significant with p-value <0.001. Zakareya T et al,[16] study, Cai J et al,[12] study and Kwon JH et al,[18] study also shows comparable results with respect to present study.

CONCLUSION

The study showed that ESR, CRP, NLR and ferritin at a lower sensitivity level can still be useful in the prediction of infection in patients with chronic liver disease. ESR, CRP, NLR and ferritin also shown to have an effect on the prediction of mortality, since patients with higher levels of ESR, CRP, NLR and ferritin, eventually succumbed to death. The addition of ESR, CRP, NLR and ferritin to the traditionally used Child Pugh score can be more useful in the prediction of short-term mortality that is proved in the current study. The study showed that ESR, CRP, NLR and ferritin was useful in the prediction of the severity of liver disease in agreement with Child Turcotte Pugh score. So, ESR, CRP, NLR and ferritin can be used as a marker of the severity of liver disease. Positive correlation with severity and mortality has also been found with advanced hepatic encephalopathy (grade 3 and 4), serum bilirubin, PT-INR, and CTP score.

REFERENCES

1. Sepanlou SG, Safiri S, Bisignano C, Ikuta KS, Merat S, Saberifiroozi M, Poustchi H, Tsoi D, Colombara DV, Abdoli A, Adedoyin RA. The global, regional, and national burden of cirrhosis by cause in 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. The Lancet gastroenterology & hepatology. 2020 Mar 1;5(3):245-66.
2. Moon AM, Singal AG, Tapper EB. Contemporary epidemiology of chronic liver disease and cirrhosis. Clinical Gastroenterology and Hepatology. 2020 Nov 1;18(12):2650-66.
3. Cazzaniga M, Dionigi E, Gobbo G, Fioretti A, Monti V, Salerno F. The systemic inflammatory response syndrome in cirrhotic patients: relationship with their in-hospital outcome. Journal of hepatology. 2009 Sep 1;51(3):475-82.
4. Cervoni JP, Thévenot T, Weil D, Muel E, Barbot O, Sheppard F, Monnet E, Di Martino V. C-reactive protein predicts short-term mortality in patients with cirrhosis. Journal of hepatology. 2012 Jun 1;56(6):1299-304.
5. Tishkowski K, Gupta V. Erythrocyte sedimentation rate. InStatPearls [Internet] 2022 May 8. StatPearls Publishing.
6. Pandey JC, Prasad CK. Study of acute phase proteins in liver disease. Asian Journal of Biomedical and Pharmaceutical Sciences. 2016 Jan 1;6(53):35.
7. Liu D, Huang Y, Li L, Song J, Zhang L, Li W. High neutrophil-to-lymphocyte ratios confer poor prognoses in patients with small cell lung cancer. BMC cancer. 2017 Dec;17(1):1-8.
8. Chen S, Zhang L, Yan G, Cheng S, Fathy AH, Yan N, Zhao Y. Neutrophil-to-lymphocyte ratio is a potential prognostic biomarker in patients with ovarian cancer: a meta-analysis. BioMed research international. 2017 Jul 26;2017.
9. Sato Y, Gonda K, Harada M, Tanisaka Y, Arai S, Mashimo Y, Iwano H, Sato H, Ryozawa S, Takahashi T, Sakuramoto S. Increased neutrophil-to-lymphocyte ratio is a novel marker for nutrition, inflammation and chemotherapy outcome in patients with locally advanced and metastatic esophageal squamous cell carcinoma. Biomedical reports. 2017 Jul 1;7(1):79-84.
10. Tsoris A, Marlar CA. Use of the Child Pugh score in liver disease. InStatPearls [Internet] 2022 May 18. StatPearls Publishing.
11. Sreenivas PS, Sandhyarani L, Naidu RJ, Bhargavi KS, Raja AS. CRP Levels in Chronic Liver Disease and CRP+ CHILD Pugh Score in Liver Disease Patients. IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 20, Issue 3 Ser.5 (March. 2021), PP 52-58.
12. Cai J, Wang K, Han T, Jiang H. Evaluation of prognostic values of inflammation-based makers in patients with HBV-related acute-on-chronic liver failure. Medicine. 2018 Nov;97(46).
13. Sungkar T, Rozi MF, Dairi LB, Zain LH. Neutrophil-to-Lymphocyte Ratio (NLR) and its Correlation with Severity of Decompensated Liver Cirrhosis based on Child-Turcotte Pugh (CTP) Score. Journal of Clinical & Diagnostic Research. 2019 Feb 1;13(2).
14. Sungkar T, Rozi MF, Dairi LB, Zain LH. Serum ferritin levels: a potential biomarker to represent Child-Turcotte-Pugh score among decompensated liver cirrhosis patients. The Malaysian journal of medical sciences: MJMS. 2019 Mar;26(2):59.
15. Tawfik NA, El-Gendy NA, Abou Elhassan HA, Ebrihem EE, Saleh RA. Inflammatory biomarkers as prognostic indicators for liver cirrhosis. Al-Azhar Assiut Medical Journal. 2019 Jan 1;17(1):68.
16. Zakareya T, El-Razek A, Mohamed W, Akl Rady M, Abdallah HM, El-Awady AA, Abbasy MA. Clinical, Biochemical and Inflammatory Predictors of Mortality in Patients with Spontaneous Bacterial Peritonitis. The Egyptian Journal of Hospital Medicine. 2022 Jan 1;86(1):228-37.
17. Acharya G, Kaushik RM, Gupta R, Kaushik R. Child-Turcotte-Pugh score, MELD score and MELD-Na score as predictors of short-term mortality among patients with end-stage liver disease in Northern India. Inflammatory intestinal diseases. 2020;5(1):1-0.
18. Kwon JH, Jang JW, Kim YW, Lee SW, Nam SW, Jaegal D, Lee S, Bae SH. The usefulness of C-reactive protein and neutrophil-to-lymphocyte ratio for predicting the outcome in hospitalized patients with liver cirrhosis. BMC gastroenterology. 2015 Dec;15(1):1-7.

ISSN (O): 2687-5365; ISSN (P): 2753-6556