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COMPREHENSIVE HAEMATOLOGICAL ANALYSIS COUPLED WITH NON-INVASIVE PROGNOSTIC SCORING IN DETERMINING ALCOHOLIC LIVER DISEASE SEVERITY -A CROSS SECTIONAL OBSERVATIONAL STUDY.

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Abstract: Alcoholic liver disease [ALD], remains a important universal health presenting presenting a range from steatosis to cirrhosis. Precise evaluation of severity of illness is important for management and prognosis. This plan of this research work is to assess the usefulness of comprehensive haematological parameters coupled with non-invasive prognostic scoring systems, specifically the ABIC score, Maddrey's Discriminant function(MDF),Glasgow Alcoholic Hepatitis score(GAHS) and AST to Platelet ratio index(APRI) in determining the severity of ALD. **Materials and Methods**: This cross sectional study was conducted for 50 patients retrospectively in patients who were diagnosed with ALD. Detailed haematological parameters including complete hemogram, LFT and coagulation profiles were analysed. Non-invasive prognostic scores were evaluated for each patient. Correlations between haematological alterations and prognostic scores with clinical outcomes were assessed**. Results**:Significant hematological alterations were observed in ALD patients including alteration in Hb% levels , WBC , Platelet count and LFT. The ABIC score indicated low survival rates for 26 study cases and intermediate survival for 24 patients. The MDF score associated considerably with PT levels[$r=0.936, p<0.001$]identifying 26 participant with severe alcoholic hepatitis. The GAHS score demonstrated significant correlations with WBC count [$r=0.32, p<0.001$].Eleven patients had significant cirrhosis with complications, reflected by APRI score >1.0 with significant $p<0.005$.**Conclusion**: The findings in our study demonstrated that such an integrated approach enhances the accuracy of the disease staging, guides clinical decision making and improves patient outcomes in ALD.

Keywords: Alcoholic liver disease, ABIC, GAHS, MDF, Liver Biopsy

INTRODUCTION: Alcoholic liver disease (ALD) poses a major global health concern, comprising a range of liver ailments caused by prolonged alcohol intake.[1,2] ALD accounts for a considerable percentage of liver-related illness and death worldwide. The World Health Organization [WHO] reports that alcohol use is responsible for around 3 million deaths each year, with liver disease as a major factor. [3,4]ALD represents a significant portion of liver transplants and liver-related fatalities. The occurrence and rate of ALD differ worldwide, shaped by alcohol use patterns, genetic factors, and socioeconomic conditions. [4,5] Timely and precise evaluation of ALD severity is essential for proper management and outlook. Traditionally, liver biopsy has served as the benchmark for diagnosing and staging liver disease. Nonetheless, it is invasive, poses complications risks, and is susceptible to sampling errors. [5,6] Consequently, there is increasing interest in non-invasive techniques for evaluating the severity of liver disease. In this study, we concentrate on four specific scores: ABIC score, Maddrey's Discriminant Function (MDF), Glasgow Alcoholic Hepatitis score, and AST to Platelet Ratio Index (APRI) for assessing disease severity and forecasting clinical outcomes. Additionally, we intend to show that these methods can provide a safer, repeatable, and more thorough alternative to liver biopsy, ultimately improving patient care and management.

AIMS AND OBJECTIVES:

1.To evaluate the utility of comprehensive haematological analysis in evaluating the severity of alcoholic liver disease [ALD]

2.To assess the efficacy and validate the correlation of non-invasive prognostic scoring systems[ABIC,GAHS,MDF,APRI] and various clinical parameters in predicting disease severity and patient outcomes in ALD.

MATERIALS AND METHODS:

The study was permitted by institution scientific review board,and informed consent was obtained from all the participants. A retrospective observational analysis were done for a total of 50 patients who were clinically identified in Saveetha medical college and hospital,Thandalam with ALD over a period of one year [April 2023-April 2024].

Inclusion criteria:

- Adult male patients aged >18 years with a clinical diagnosis of ALD based on history of chronic alcohol consumption and clinical,biochemical and imaging findings.

Exclusion criteria:

- Patients with liver diseases of other causes like viral hepatitis, autoimmune hepatitis
- Patients with acute medical conditions or drug history that could affect the haematological parameters.

For the cases meeting the above selection criteria the required datas were collected from medical records, including demographic information, clinical history and laboratory results.2ml of EDTA samples were collected by using vacutainer system and a complete hemogram was done by using SYSMEX XN-1000,6 part hematology analyzer.The 2-level controls were run daily and the instruments were calibrated as per the instructions of the manufacturer. Biochemical parameters like Liver function tests [LFT] were analysed using Vitros 5600 and coagulation profile were analysed using ACLTOP350.Non-invasive prognostic scoring was calculated by the formulas

- ABIC score: The score is based on parameters like age, serum bilirubin, INR, and serum creatinine. ABIC score=(agex0.1) + (serum bilirubinx0.08)+(serum creatininex0.3)+(INRx0.8.Age in years, bilirubin(mg/dl)and creatinine(mg/dl).
  The cutoff values of 6.71 and 9 were recognized in assessing the survival rates at 90 days and 1 year. ABIC score<6.71-Low risk,6.71-9 -Intermediate risk and >9-High risk

- GAHS score: The score is based on the parameters like age,WBC count.serum urea, PT ratio and serum Bilirubin levels.Patients score from 5-12 points.Score >9 was associated with poor prognosis.

- Maddreys discriminant score:The score is based on PT and serum bilirubin MDF >32 is interpreted as severe alcoholic hepatitis.MDF<32-Mild to moderate hepatitis

- APRI score-The score is based on AST enzyme level and Platelet range and predicts the significant fibrosis and cirrhosis. APRI =AST/Platelet counts(10^9L)X10

  APRI of <5-No significant fibrosis,0.5-0.7 -Mild liver damage,>1-Cirrhosis
  Statistical analysis: Cross tabulation was performed on categorical data,Chi-square test and Pearson's correlation coefficient was applied for analysis.

RESULTS:

TABLE 1:Baseline characteristics of our study :

Variable	Mean
RBC	3.22
HB	10.16
PCV	31.62
MCV	94.33
MCH	31.29
MCHC	32.99
RDW	17.01
WBC	9175
PLT	149000
ESR	23.46
PT	19.31
INR	1.53
Biochemical parameters:	
Total Protein	6.29
S.Bilirubin	3.14
AST	109.68
ALT	55.14
ALP	135.10
Urea	22.64
Creatinine	1.17
Clinical parameters	
Alcohol consumption	18.26
Duration of hospital stay	8.82

Table 2:Distribution of clinical characteristics of our cases:

Clinical parameters	Number of cases	Percentage of cases
Alcohol consumption <20 years	37	74
Alcohol consumption >20 years	13	26
Smoking status		
YES	15	30
NO	35	35
Diabetes Mellitus	10	20
Hypertension	09	18

Bleeding varices	14	28
Splenomegaly	20	40

Table 3:Mean values of the different scores assessed for disease severity in this study:

Scores	Mean value
ABIC	6.62
GAHS	7.64
MDF	38.66
APRI	0.76

Table 4:Correlation table of different scores with various parameters analysed in our study:

Scores	Parameters	r value	P value
ABIC score	Age	0.284	0.03
GAHS	WBC	0.322	0.02
APRI	ALT	0.417	0.03
	AST	0.794	0.01
MDF	PT	0.936	0.01
	INR	0.876	0.01

Table 5:Significant prognostic factors associated with ABIC scoring system

Factors	ABIC [Low survival]	ABIC [Intermediate survival]	p-value
Duration of hospital stay			
<1 week	17	07	0.003
>1 week	09	17	

Table 6:Significant prognostic factors associated with MDF scoring system:

Factors	MDF score <32	MDF score >32	p-value
PT			
Normal	10	1	0.001
Abnormal	14	25	

Table 7:Significant aasociated factor with APRI scoring system:

Factors	APRI <1.0	APRI>1.0	p-value
Splenomegaly			
Yes	12	8	0.002
No	02	3	

In our study 50 patients who were clinically diagnosed weremale patients with alcoholic liver disease,with a average age of 46 years. The average values of haematological parameters,coagulation profile,LFT & RFT are summarized in Table 1.In our study,88% of the cases had moderate anemia and altered red cell indices with 40 patients showing elevated RDW.Nine cases had high WBC counts and 25 cases had moderate thrombocytopenia.Regarding liver function tests,11 cases had hypoproteinemia and 42 cases had elevated serum bilirubin levels.Notably,58 patients had deranged liver enzyme levels.The mean duration of hospital stay and alcohol consumption for study cohort are detailed in Table 1.

Table 2 represents the distribution of clinical characteristics, including duration of alcohol intake, smoker or not and the associated chronic disease present like type 2 DM and systemic HT ,along with associated clinical complications like splenomegaly and bleeding varices.

Table 3 shows the mean values of each of the prognostic scores evaluated in this study. Table 4 highlights the correlation between various parameters and each prognostic score utilized.

Key findings include:

- The ABIC score correlated with patient age[r=0.284,P=0.03]

The GAHS score had a significant positive association with WBC counts[r=0.322,p=0.02]

- The APRI score positively correlated with liver enzymes such as AST and ALT[r=0.417,p=0.01; r=0.794 ,p=0.03]
- The MDF score displayed a solid association with Prothrombin time [PT] & INR values, with significant p-values.[r=0.936,p=0.01;r=0.876,p=0.01]

The ABIC scoring system classified patients in to low and intermediate survival categories, showing a strong positive correlation with p=0.03 with the duration of hospital stay.

The MDF score categorized patients in to mild hepatitis [score <32]and severe hepatitis[score >32],with significant correlation to prothrombin time. Ten patients with mild hepatitis had normal PT,whereas 14 patients with severe hepatitis had abnormal PT.

The APRI score identified 39 patients without significant cirrhosis or liver damage and 11 patients with significant cirrhosis confirmed by radiological findings.Among these,12 patients had mild splenomegaly.

DISCUSSION: This study evaluated the utility of comprehensive hematological analysis and non-invasive prognostic scoring systems[ABIC,MDF,GAHS,APRI]in evaluating the severity of ALD. Our findings underscore significant alterations in hematological parameters and the effectiveness of non-invasive scores in predicting disease severity and clinical outcomes.

Hematological findings:

A significant proportion of our patients exhibited moderate anemia and altered red cell indices,consistent with previous studies[7,8,9] highlighting anemia as a common manifestation in ALD due to factors such as nutritional deficiencies, bone marrow suppression and gastrointestinal bleeding. Increased RDW was seen in 40 patients further supports the presence of anisocytosis, a marker of chronic disease and inflammation.[10,11,12]

Additionally,18% of the patients had high WBC counts,indicative of inflammatory response or infection which is frequently observed in alcoholic hepatitis[13,14].Moderate thrombocytopenia was present in 50% of cases likely due to hypersplenism or bone marrow suppression common in chronic liver disease.[15,16,17]

Liver function and coagulation profiles :

Deranged liver enzymes were observed in 58% of the patients reflecting the hepatocellular damage.[18,19]The significant correlation between MDF scores and prothrombin time and INR values highlights the effectiveness of MDF in evaluating the severity of liver dysfunction & coagulopathy,which is critical in managing ALD patients.

Noninvasive prognostic scores:

The ABIC score,which includes age,bilirubin ,INR and creatinine effectively stratified patients in to low and intermediate survival categories.The significant correlation between ABIC scores and duration of hospital stay underscores its prognostic value in predicting clinical outcomes and guiding treatment decisions.

The GAHS score,positively correlated with WBC counts,also demonstrated its effectiveness in identifying patients with severe alcoholic hepatitis,aiding in timely and appropriate therapeutic interventions.

The APRI score,which uses AST levels and platelet counts,distinguished between patients with and without significant cirrhosis.Our findings confirmed that 11 patients had significant cirrhosis as validated by radiological findings.This noninvasive score's ability to predict liver fibrosis stage without the need for biopsy is particularly advantageous in daily practice [20]

The MDF score plays a critical role in determining the requirement of corticosteroid in severe alcoholic hepatitis affected patients. .An MDF score greater than 32 typically point toward severe alcoholic hepatitis and suggests that the patient may benefit from corticosteroid therapy to reduce inflammation and improve outcomes[21].Many clinical studies does not recommend the use of corticosteroids in cases of active gastrointestinal bleeding and

infection thus the MDF score effectively helps in stratifying the patients and need for active clinical intervention.[22]In our study cases,MDF scores above 32 had significant correlations with abnormal PT values,underscoring the severity of their condition and the potential need and appropriate usage of corticosteroids.

CONCLUSION:

- This study underscores the significance of combining comprehensive hematological analysis with non-invasive prognostic scoring systems in measuring the severity of alcoholic liver disease.
- The findings demonstrate that these methods enhance the accuracy of disease staging, support clinical decision-making and improve patient outcomes offering a superior alternative to traditional liver biopsy.
- Further research is warranted to refine these diagnostic tools and validate their efficacy across broader patient populations.

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