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EVALUATION OF HEMATOLOGICAL PARAMETERS AND CHILD-PUGH SCORES IN PATIENTS WITH ALCOHOLIC LIVER DISEASE: A CROSS-SECTIONAL STUDY

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ABSTRACT **Introduction:** Alcoholic liver disease (ALD) present a significant global health challenge, ranging from initial stages like Alcoholic Fatty Liver (AFL) to severe conditions such as hepatocellular carcinoma (HCC). Child-Pugh scoring system is used to assess liver disease severity as reliable prognostic markers. Since this study aims to evaluate hematological parameters in diagnosed ALD patients, classify disease severity using Child-Pugh scores, and investigate hematological parameters among different classes of Child Pugh scores. **Material and Methods:** This cross-sectional observational study, conducted from October 2023 to March 2024. Total sample size calculated as 50 participants, with parameters including hemoglobin, platelet count, RBC indices, and ferritin, vitamin B12, and folic acid levels analyzed. Descriptive statistics and one-way ANOVA test is used to assess statistical significance at the level of 0.05. Data analysis was performed using IBM-SPSS version 27. **Results:** The distribution of Child-Pugh scores indicated a 40% class B, 30% class C and 24% class A. Increasing ALD severity was associated with declining hemoglobin ($p<0.05$) and platelet counts ($p< 0.05$), alongside rising MCV ($p< 0.05$) and vitamin B12 levels ($p<0.05$). MCH and MCHC showed no significant difference ($p=0.32$ and $p=0.113$), and serum folic acid levels remained consistent ($p=0.73$) across ALD severity groups. **Conclusion:** This study conclude that hematological variations in ALD progression, prevalence of anemia and thrombocytopenia as indicators of disease severity. Elevated MCV and vitamin B12 levels indicates macrocytic anemia and altered vitamin metabolism, while ferritin elevation reflects chronic inflammation.

KEYWORDS : Alcoholic liver disease, Hepatocellular carcinoma, Child-Pugh scores, Cross-sectional study.

INTRODUCTION

Liver diseases, such as alcoholic liver disease (ALD), are a major cause of death and disability worldwide. AFL is the first stage of alcoholic liver disease (ALD), which can develop to ASH, fibrosis, cirrhosis, and, in the most advanced instances, hepatocellular carcinoma (HCC).[1] Worldwide, liver illnesses are responsible for over two million fatalities every year, or about 4% of all deaths. Recent years have seen an uptick in cases of alcohol-related hepatitis, which is especially dangerous for women and young people. Heavy drinking is also associated with an increased risk of death.[2] Socioeconomic status and healthcare access are two of the many variables that cause the financial burden of ALD to differ across nations.[3] To measure the severity of liver illness, scoring systems are utilized, such as the Model for End-Stage Liver illness (MELD) and the Child-Pugh (CP) scores.[4] Iron status, as measured by serum ferritin, is used as a prognostic marker in liver illnesses to indicate the severity of the disease and the risk of consequences.[5] As a measure of the severity of the disease and the probability of complications, serum ferritin has emerged as a prognostic indicator in patients with liver disease. Increased ferritin levels may also indicate an iron overload disease, which is associated with an increased risk of early death and serious illness.[6] Up to 70% of cirrhotic individuals have platelet counts < 100,000/mm, a typical abnormality in both the count and function of platelets. [7] An indicator of platelet function and activity, mean platelet volume (MPV) is linked to systemic inflammation and cardio metabolic risk factors: it is derived from whole blood count analysis.[8] Therefore, this study was conducted with an aim to investigate the hematological profile in alcoholic liver disease (ALD) patients and explore its association with the severity of the disease.

OBJECTIVES:

1. To assess various hematological parameters in ALD patients.
2. To classify ALD patients based on disease severity using validated scoring systems such as Child-Pugh score.
3. To investigate the variations in hematological parameters among different classes of Child Pugh scores indicating severity of ALD.

MATERIAL AND METHODS

This cross-sectional, hospital-based observational study was conducted at the Department of Medicine, Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly, from October 1, 2023 to March 31, 2024. The study population comprised all diagnosed cases of alcoholic liver disease (ALD) admitted to the wards of the Department of Medicine during the study period.

SAMPLE SIZE: A complete enumeration process was adopted in the study period that all patients with ALD included in the study period.

Inclusion criteria include previously diagnosed ALD patients and newly diagnosed patients admitted to the wards during the study period who were willing to participate. Exclusion criteria included ALD patients presenting with associated co-morbidity such as chronic renal failure (CRF) and congestive heart failure (CHF), as well as anemic patients already receiving medication or iron supplements.

A predesigned, pretested semi-structured questionnaire was utilized to gather information from study participants after obtaining consent. Selection of chronic liver disease patients based on predefined criteria, obtaining written consent, eliciting history, conducting physical examinations, and performing investigations. Determination of Child-Pugh scoring to assess liver disease severity was done and patients were classified into Class A, B, or C. This was followed by observation of laboratory reports (including hemoglobin, platelet count, RBC indices, ferritin level, serum vitamin B12 level, and serum folic acid level) to identify any association with increasing liver disease severity as per Child-Pugh score.

Statistical analysis was conducted using SPSS version 27, with descriptive statistics (mean and standard deviation) utilized to express data. One-way ANOVA were applied to compare results for various parameters in the subject group. A probability value of less than 0.05 was considered statistically significant in all statistical analyses.

RESULTS:

In current study comprising 50 participants, age distribution revealed that 7(14.0%) fell within the age group of 18 to 30 years, 10(20.0%) were between 31 to 40 years, 15(30.0%) were aged 41 to 50 years, and the majority, constituting 18(36.0%o), were between 51 to 65 years old**.** Gender distribution showed that 42(84.0%) of the participants were male, while the remaining 8(16.0%) were female. Figure 1 shows

the distribution of Child-Pugh scores revealed that 24.0% of the patients were classified as Class A, 46.0% as Class B, and 30.0% as Class C. This suggests that a substantial portion of the participants exhibited moderate to severe liver disease, with Class B being the most prevalent category.

Figure 1: Distribution of patients into groups as per Child Pugh Score

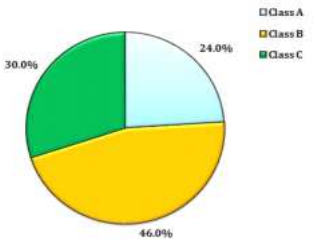

Table 1 shows the findings from a study investigating various parameters in different severity groups of alcoholic liver disease. As the severity of ALD increases from Group A to Group C, there is a significant decrease in hemoglobin levels (p=0.00), indicating worsening anemia with disease progression.

Table 1: Comparison of Blood parameters between the classes of Child Pugh Score

Parameter	Group A (Mean ± SD)	Group B (Mean ± SD)	Group C (Mean ± SD)	p-value
Hemoglobin (g/dl)	10.1 ± 1.16	9.47 ± 1.01	6.57 ± 1.54	0.01**
Platelet count (×10^3/µl)	1.81 ± 0.413	1.582 ± 0.444	0.958 ± 0.185	0.01**
MCV (fl)	83.15 ± 7.61	89.14 ± 6.94	93.58 ± 8.52	0.001*
MCH (pg)	29.82 ± 1.59	30.84 ± 2.94	28.68 ± 6.65	0.32
MCHC (g/dl)	36.24 ± 5.41	34.84 ± 4.63	35.27 ± 8.97	0.124
Serum Vitamin B12 (pg/ml)	874.82 ± 344	1144.58 ± 145.313	1338.05 ± 277.271	0.001**
Serum Folic Acid (ng/ml)	8.42 ± 3.64	7.34 ± 3.49	5.25 ± 1.75	0.64

**p < 0.05 (significant), ANOVA test.

There is a decreasing trend in platelet count with increasing severity of ALD (p=0.00). Group C has significantly lower platelet counts compared to Group A and Group B, suggesting worsening thrombocytopenia as liver disease severity increases. MCV levels increase with the severity of ALD (p=0.005). Group C demonstrates the highest MCV levels compared to Group A and Group B, indicating the presence of macrocytic anemia, often associated with liver disease. These parameters show statistically insignificant changes across different severity groups of ALD (p=0.32 for MCH and p=0.113 for MCHC). However, there's a slight decrease in MCH and MCHC levels in Group C compared to Group A and Group B. Vitamin B12 levels increase with disease severity (p=0.00). Group C has the highest mean vitamin B12 levels, suggesting a potential association between ALD severity and elevated serum vitamin B12 levels. There are no significant changes in serum folic acid levels across different severity groups of ALD (p-0.73). However, there's a slight decrease in folic acid levels in Group C compared to Group A and Group B, although this difference is not statistically significant.

DISCUSSION:

The findings of this study reveal hematological alterations associated with the severity of alcoholic liver disease (ALD). Anemia emerges as a notable concern, with hemoglobin levels declining significantly as the disease progresses through Child-Pugh groups A to C. This aligns with previous research by Khare S et al.9 and Qamar AA et al.10 indicating a consistent association between worsening liver disease and decreased hemoglobin levels, particularly in ALD cases. Anemia in ALD patients often manifests as normochromic and normocytic anemia due to factors such as variceal bleeding, bone marrow suppression, and hypersplenism, or as macrocytic anemia resulting from deficiencies in folic acid and vitamin B12.

Platelet count exhibits a diminishing trend with increasing ALD severity, a phenomenon also observed in prior study by Qamar AA et al.10 Thrombocytopenia is common in ALD and can serve as a predictor of adverse outcomes such as death or transplant, as demonstrated by the study's findings. Moreover, mean corpuscular volume (MCV) levels demonstrate a progressive increase across ALD severity groups (p = .005), consistent with the observations of Khare S et al.9 This suggests the prevalence of macrocytic anemia in ALD patients, particularly in alcoholic cases. However, mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentration (MCHC) levels exhibit no significant trend with disease severity (p =.320 and p=.113, respectively).

Serum vitamin B12 levels significantly rise with ALD severity, while serum folic acid levels show no significant change. A study done by Fredrerick A et al.11 on ALD patients corroborates these findings, indicating the potential implications of altered vitamin B12 and folate metabolism in liver disease. Lastly, serum ferritin levels demonstrate a notable increase with disease severity consistent with the observations of Büyükaşik NS et al.12 This elevation in serum ferritin levels, coupled with decreased hemoglobin levels, suggests a chronic inflammatory state in ALD patients, potentially leading to impaired ferritin utilization by the suppressed bone marrow.

CONCLUSION:

The study conclude that hematological variations in ALD progression, prevalence of anemia and thrombocytopenia as indicators of disease severity. Elevated MCV and vitamin B12 levels indicates macrocytic anemia and altered vitamin metabolism, while ferritin elevation reflects chronic inflammation. These findings underline the significance of implementing thorough evaluation and control measures that are specifically designed to meet the changing requirements of individuals with ALD. In order to better understand the reasons for these connections and to develop new treatments for the blood-related issues caused by ALD, it is necessary to do additional study.

LIMITATIONS:

This study has drawbacks include a small sample size, which could potentially limit the robustness and generalizability of the results. Because study is single centred, variation and wider application are limited.

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