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Impact of Elevated Liver Enzymes on Platelet Counts in NAFLD Patients

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Abstract
Background- Non-Alcoholic Fatty Liver Disease (NAFLD) is a growing health concern worldwide, often accompanied by metabolic and hematological alterations. Elevated liver enzymes, a common biomarker of liver dysfunction in NAFLD, may influence platelet counts, contributing to coagulopathies. This study aims to evaluate the impact of elevated liver enzymes on platelet counts in NAFLD patients.
Materials and Methods- A retrospective analysis was conducted involving 100 NAFLD patients from the Kosi region over two years. Clinical and laboratory data, including liver enzyme levels (ALT, AST) and platelet counts, were collected from medical records. Patients were grouped based on liver enzyme levels (elevated vs. normal). Statistical comparisons were performed using t-tests and chi-square tests, with a p-value < 0.05 considered significant.
Results-The mean platelet count in patients with elevated liver enzymes (Group A, n=60) was significantly lower (mean ± SD: $150 \pm 35 \times 10^3/\mu L$) compared to those with normal liver enzyme levels (Group B, n=40; mean ± SD: $190 \pm 25 \times 10^3/\mu L$; $p < 0.01$). A strong negative correlation ($r = -0.42$, $p = 0.003$) was observed between liver enzyme levels and platelet counts in Group A. Gender and age distributions did not significantly differ between the groups.
Conclusion- Elevated liver enzyme levels in NAFLD patients are associated with a significant reduction in platelet counts, suggesting potential hematological complications. These findings underscore the importance of routine platelet monitoring in NAFLD patients with elevated liver enzymes to manage potential coagulopathies effectively.

Keywords- Non-Alcoholic Fatty Liver Disease, Elevated Liver Enzymes, Platelet Count, Retrospective Study, Hematological Alterations

INTRODUCTION

Non-Alcoholic Fatty Liver Disease (NAFLD) is a spectrum of liver disorders characterized by excessive fat accumulation in the liver, not caused by significant alcohol consumption. It is increasingly recognized as a leading cause of chronic liver disease globally, with a prevalence rate of approximately 25% in the general population (1,2). The condition encompasses a range of liver pathologies, from simple steatosis to non-alcoholic steatohepatitis (NASH), fibrosis, and cirrhosis (3).

Elevated liver enzymes, particularly alanine aminotransferase (ALT) and aspartate aminotransferase (AST), are commonly used biomarkers to detect liver dysfunction in NAFLD (4). These enzymes indicate ongoing hepatic injury and inflammation, and their levels are often correlated with disease severity (5). In addition to hepatic consequences, NAFLD has systemic implications, including alterations in hematological parameters. Platelet count, a critical component of hemostasis is influenced by liver function due to the liver's role in thrombopoietin production and platelet turnover (6).
Several studies have reported an association between liver dysfunction and hematological abnormalities, including thrombocytopenia, in chronic liver diseases (7,8). However, limited data are available on the specific relationship between elevated liver enzymes and platelet counts in NAFLD patients. Understanding this relationship is crucial, as thrombocytopenia may contribute to increased bleeding risk and impact clinical decision-making in these patients.

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This study aims to evaluate the impact of elevated liver enzymes on platelet counts in NAFLD patients. By investigating this relationship, we hope to provide insights into the potential hematological complications associated with NAFLD and emphasize the importance of routine monitoring of platelet counts in these patients.

MATERIALS AND METHODS

Study Design and Setting

This retrospective study was conducted over a period of two years in the Kosi region, analyzing medical records of NAFLD patients from a tertiary care hospital. Ethical clearance was obtained from the institutional ethics committee prior to data collection.

Study Population

A total of 100 NAFLD patients were included in the study. Inclusion criteria were patients aged 18 years or older, diagnosed with NAFLD based on ultrasonographic findings, and with available data on liver enzyme levels and platelet counts. Patients with a history of significant alcohol consumption, viral hepatitis, autoimmune liver disease, or hematological disorders were excluded.

Data Collection

Demographic details, clinical history, and laboratory results were retrieved from medical records. Liver enzyme levels, including alanine aminotransferase (ALT) and aspartate aminotransferase (AST), were recorded. Platelet counts were also collected and categorized as normal or reduced based on standard reference ranges.

Grouping of Patients

The patients were divided into two groups:

- **Group A**: Patients with elevated liver enzyme levels (ALT > 40 U/L and/or AST > 35 U/L).
- **Group B**: Patients with normal liver enzyme levels (ALT ≤ 40 U/L and AST ≤ 35 U/L).

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS version 25. Descriptive statistics, including means and standard deviations, were used to summarize continuous variables. The relationship between liver enzyme levels and platelet counts was assessed using the independent t-test for group comparisons and Pearson correlation analysis for continuous variables. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations

Confidentiality of patient data was maintained throughout the study, and all protocols adhered to the Declaration of Helsinki. No patient-identifiable information was used.

RESULTS

Demographic and Clinical Characteristics

A total of 100 NAFLD patients were analyzed, with 60 patients in Group A (elevated liver enzymes) and 40 in Group B (normal liver enzymes). The mean age of patients in Group A was 45 ± 10 years, while in Group B, it was 42 ± 12 years. There was no significant difference in the gender distribution between the groups ($p = 0.48$).

Platelet Counts in Groups

The mean platelet count in Group A was significantly lower ($150 \pm 35 \times 10^3/\mu L$) compared to Group B ($190 \pm 25 \times 10^3/\mu L$; $p < 0.01$). Among Group A patients, 40% (n = 24) had platelet counts below the normal range ($<150 \times 10^3/\mu L$), whereas only 10% (n = 4) of Group B patients showed reduced platelet counts ($p < 0.001$) (Table 1).

Correlation Analysis

A strong negative correlation was observed between liver enzyme levels and platelet counts in Group A ($r = -0.42$, $p = 0.003$). The correlation was not statistically significant in Group B ($r = -0.12$, $p = 0.24$) (Table 2).

Tables

Table 1: Comparison of Platelet Counts Between Groups

Parameter	Group A (n=60)	Group B (n=40)	p-value
Mean Platelet Count	$150 \pm 35 \times 10^3/\mu L$	$190 \pm 25 \times 10^3/\mu L$	<0.01
Platelets < $150 \times 10^3/\mu L$	24 (40%)	4 (10%)	<0.001

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(Table 1 shows the significant difference in platelet counts between groups with elevated and normal liver enzyme levels.)

Table 2: Correlation Between Liver Enzyme Levels and Platelet Counts

Group	Correlation Coefficient (r)	p-value
Group A	-0.42	0.003
Group B	-0.12	0.24

(Table 2 demonstrates the negative correlation between liver enzyme levels and platelet counts in Group A, which was not significant in Group B.)

These findings suggest a significant association between elevated liver enzymes and reduced platelet counts in NAFLD patients, as illustrated in Tables 1 and 2.

DISCUSSION

This study evaluated the impact of elevated liver enzymes on platelet counts in patients with Non-Alcoholic Fatty Liver Disease (NAFLD). The results demonstrated a significant reduction in platelet counts among patients with elevated liver enzymes compared to those with normal levels, suggesting that hepatic dysfunction in NAFLD may influence hematological parameters.

Platelet counts are a critical component of hemostasis and reflect both bone marrow activity and peripheral consumption. The liver plays a central role in thrombopoiesis through the production of thrombopoietin (1,2). In NAFLD, chronic inflammation and hepatocellular injury may impair thrombopoietin production, contributing to thrombocytopenia (3). Elevated liver enzymes, particularly alanine aminotransferase (ALT) and aspartate aminotransferase (AST), are biomarkers of hepatic injury and are often associated with the severity of NAFLD (4,5).

The findings of this study align with previous research that observed decreased platelet counts in patients with chronic liver diseases, including NAFLD and cirrhosis (6,7). In our study, Group A (elevated liver enzymes) had significantly lower platelet counts than Group B (normal liver enzymes). This is consistent with the hypothesis that liver damage, as indicated by elevated enzyme levels, disrupts the balance of thrombopoiesis and platelet clearance (8).

A negative correlation between liver enzyme levels and platelet counts was observed in this study, particularly in patients with elevated liver enzymes. This supports earlier reports suggesting that liver dysfunction leads to increased platelet sequestration in the spleen or reduced production due to impaired liver function (9,10). In advanced stages of NAFLD, such as fibrosis or cirrhosis, splenomegaly and portal hypertension further exacerbate thrombocytopenia (11).

Hematological abnormalities in NAFLD, including thrombocytopenia, have significant clinical implications. Low platelet counts increase the risk of bleeding, particularly during invasive procedures, and may complicate the management of NAFLD patients (12). Furthermore, thrombocytopenia has been associated with worse outcomes in chronic liver diseases, emphasizing the importance of monitoring platelet counts as part of routine care (13,14). Our study highlights the need for further research to explore the underlying mechanisms linking elevated liver enzymes and platelet counts in NAFLD. It also underscores the importance of comprehensive management strategies, including monitoring of hematological parameters, to improve patient outcomes (15).

Conclusion

This study demonstrates a significant association between elevated liver enzyme levels and reduced platelet counts in patients with Non-Alcoholic Fatty Liver Disease (NAFLD). The findings suggest that hepatic dysfunction, as indicated by elevated ALT and AST levels, negatively impacts platelet production and turnover, potentially leading to hematological complications. These results underscore the importance of routine monitoring of platelet counts and liver enzyme levels in NAFLD patients to identify and manage coagulopathy risks effectively. Further research is warranted to explore the underlying mechanisms and develop targeted interventions to improve patient outcomes.

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