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Utility of neutrophil-to-lymphocyte ratio and platelet-to-lymphocyte ratio in non-alcoholic liver cirrhosis

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Abstract

The purpose of this research is to determine whether or not there is a correlation between a high neutrophil-to-lymphocyte ratio (NLR) and a high platelet-to-lymphocyte ratio (PLR) and nonalcoholic fatty liver disease (NAFLD).

Methods: This was a retrospective study in the medicine department of a tertiary care facility. The demographic and clinical data was retrieved in a methodical fashion from the case records. Along with this, the data regarding the biopsy and other laboratory parameters was recorded to. This data was compared with non-NAFLD patients.

Results: The non-NAFLD participants were separated from the NAFLD subjects and placed in one of the two groups. According to the findings of our investigation, a low PLR score was connected with a higher risk of NAFLD (P 0.001), whereas a high NLR score was not significantly linked to NAFLD (P > 0.05). While there was shown to be a positive correlation between NLR and NAFLD, a negative association between PLR and NAFLD was discovered to exist.

Conclusion: The findings of this study indicated that a strong association exists between NLR and PLR and NAFLD. we According to the findings, a lower PLR and NLR could be a risk factor for morbidity in NAFLD patients.

Keywords: Nonalcoholic fatty liver disease; Neutrophil-to-lymphocyte ratio; Platelet-to-lymphocyte ratio

1. Introduction

The condition known as non-alcoholic fatty liver disease (NAFLD) comprises a spectrum that ranges from simple steatosis to non-alcoholic steatohepatitis (NASH), which can eventually lead to liver fibrosis, cirrhosis, and hepatocellular cancer. Simple steatosis lies at the beginning of this spectrum. It is believed that 25% of people in the world have NAFLD, with the highest frequency being found in South America and the Middle East, and Africa having the lowest prevalence. It is estimated that 1.5%–6.5% of people in the United States have NASH.1 According to the Global Burden of Disease Study (GBD) 2017, the annual incidence of NASH cirrhosis was predicted to be 367,780 in 2017. This number has almost doubled since it was first measured in 1990. [2] It is anticipated that NASH will become the most prevalent cause of chronic liver disease and the main basis for liver transplantation in the near future. [2]

The use of biomarkers found in peripheral blood is a method that is widely acknowledged and deemed convenient for monitoring the progression of disease. Indicators of inflammatory index in many chronic conditions, such as neutrophil-to-lymphocyte ratio (NLR) and platelet-to-lymphocyte ratio (PLR), which might represent inflammatory reactions and immune response, are utilised. They are linked to the morbidity and mortality of a number of different chronic diseases, including hepatic echinococcosis [4], chronic hepatitis B infection [5], and chronic obstructive pulmonary disease [6],

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and they are also used as new prognostic indicators in a number of different malignant tumours, including HCC [7], gastric cancer [8], and colorectal cancer [9].

NAFLD is characterized by an excessive accumulation of lipid molecules in the hepatocytes, while toxic buildup of lipid molecules contributes to the recruitment of inflammatory cells and causes harm to the hepatocytes [10].

There have been reports that the prevalence of adult NAFLD in India ranges anywhere from 6.7% to 55.1%. [10,11] It is possible that nonalcoholic fatty liver disease is responsible for roughly one-third of all cases in which there is an asymptomatic increase of liver enzymes. [12] In addition, data on explant histology obtained from liver transplant centers indicate that around two-thirds of patients diagnosed with 'cryptogenic' cirrhosis had NAFLD. [13-15]

There are very few studies that have been performed to analyze the prognostic factors associated with NAFLD/NASH, especially in the Indian population.

Hence, we performed this retrospective study to assess the utility of NLR and PLR in NAFLD, and compared it with the same for healthy non-NAFLD group.

2. Material and methods

This was a retrospective study performed in a tertiary care hospital from January 2018 to January 2023. All the case records of patients that were diagnosed with NALFD (group A) and age-matched non-NAFLD patients. Those patients with evidence of hepatic steatosis in liver biopsy, in the absent of significant alcohol or hepatotoxic drug consumption, or any other cause of liver failure, were included for analysis.

Those patients with hepatocellular carcinoma in the background of steatosis were excluded.

Within the scope of this investigation, the medical files of all 102 NAFLD and non-NAFLD healthy patients were investigated. Collecting and analysing demographic data such as gender and age, as well as the results of laboratory tests such as routine blood tests and biochemistry tests, and the outcomes of biopsy procedures such as histological assessments, were among the tasks. An automated haematology analyzer was utilised to evaluate the levels of white blood cells (WBC), lymphocytes, monocytes, neutrophils, haemoglobin (HB), red blood cell distribution width (RDW), platelets (PLT), and mean platelet volume (MPV) in full blood samples. Using an Automatic Biochemical Analyzer, measurements were taken of serum levels of aspartate transaminase (AST), aspartate aminotransferase (ALT), gamma-glutamyl transferase (GGT), albumin (ALB), fasting blood glucose (FGB), triglyceride (TG), and low-density lipoprotein cholesterol (LDL-C).

The reports of all the liver biopsies were re-assessed to rule out any evidence of malignancy.

Student t test and Mann Whitney U test were used for the comparison; the predictive value of NLR and PLR was evaluated with receiver operating characteristic curve. Any p value less than 0.05 was considered statistically significant.

3. Results

The non-NAFLD participants were separated from the NAFLD subjects and placed in one of the two groups i.e Group consists of NAFLD subjects, while group B consists of healthy, non-NAFLD participants.

Mean age of the groups was comparable i.e. 45.81 +/- 9.86 years vs 48.37 +/- 11.94 years. There was no statistically significant difference between the two groups. (p value 0.13)

The male to female distribution was 1.3:1 in group A, and was 1.5:1 in group B. however, there was no statistically significant difference between the two groups. (p value 0.92)

In the present study, majority of the participants were from the Urban locality in group A, while from the rural locality in group B. The difference, however, was not found to be statistically significant. (p value 0.84)

In the present study, 68.7% of the study population had BMI more than 24.9 kg/m2 in group A, while 35.8% had BMI > 24.9 k/m2. This difference was statistically significant. (p <0.001)

When we compared the NLR between the groups, we found that the NLR was significantly higher in the NAFLD group as compared to the non-NAFLD group. (two-tailed P value is less than 0.0001, By conventional criteria, this difference is considered to be extremely statistically significant.)

Table 1 NLR values between groups

NLR	GROUP A	GROUP B
NORMAL	13	40
HIGH	38	11
Column Totals	51	51

Table 2 Mean differences in PLR between two groups

GROUP	GROUP A	GROUP B
MEAN	3.89	1.23
SD	0.86	0.41
SEM	0.1204	0.0574
N	51	51

When we compared the PLR between the groups, we found that the PLR was significantly higher in the non-NAFLD group as compared to the NAFLD group. (two-tailed P value is less than 0.0001, By conventional criteria, this difference is considered to be extremely statistically significant.)

Table 3 Mean differences in PLR between two groups

GROUP	GROUP B	GROUP A
MEAN	168.31	121.55
SD	23.02	16.41
SEM	3.2234	2.2979
N	51	51

According to the findings of our investigation, a low PLR score was connected with a higher risk of NAFLD (P 0.001), whereas a high NLR score was not significantly linked to NAFLD (P > 0.05). While there was shown to be a positive correlation between NLR and NAFLD, a negative association between PLR and NAFLD was discovered to exist.

4. Discussion

NAFLD in India has a substantially high burden in comparison to the global statistics. However, the diagnostic modalities depend only on invasive techniques such as liver biopsy, which is operator dependent, and based on the yield. [1-3] In a meta-analysis by Shalimar et al [16] revealed that the overall pooled prevalence of NAFLD in India is 38.6% among adults and 35.4% among children.

The prevalence was higher in males than in females, which is contradictory to the findings as per Shalimar et al [16], where the male to female distribution was nearly equal. In the current study, we also observed that NAFLD was higher in the urban population. Shalimar et al [16] in their analysis suggested that the prevalence of NAFLD in Indian urban and rural populations is higher than the average estimated global prevalence of 25%.

Shalimar et al. [16] conducted a meta-analysis, and their findings did not indicate any significant difference in the prevalence of NAFLD between males (39.4%; 95% CI 27.7–51.7%) and females (35.4%; 95% CI 23.5–48.3%). In contrast, the incidence of NAFLD was shown to be lower in women, but they had a greater chance of progressing to more severe fibrosis in a global meta-analysis by Chalmers et al in Trivandrum. [17] It is interesting to note that the prevalence of NAFLD in rural populations was 29.2%, whereas the prevalence in urban populations was 40.0%. 44 out of the 50 studies that were included in our meta-analysis came from the urban cohort, 40 of which were hospital-based, and the remaining 4 came from the community. In contrast, six of the fifty participants came from rural areas, and their locations ranged from community to hospital-based care.

Only a very small number of studies have simultaneously investigated the prevalence of NAFLD in both urban and rural cohorts. [18] In hospital-based research, the prevalence of NAFLD was found to be 40.8%, with a 95% confidence interval ranging from 32.6–49.3%, whereas in community-based studies, the prevalence was found to be 27.2%, with a 95% confidence interval ranging from 15.7–40.6%. As a result, the prevalence of NAFLD in our study may have been underestimated as a result of this. Having a lifestyle that is more sedentary, engaging in less physical activity, eating a diet high in calories, and having a higher prevalence of obesity are some of the reasons why the disease is more common among urban populations. [18-20].

5. Conclusion

NAFLD is more commonly seen in males living in urban areas in our study. It was also observed that higher BMI is an important risk factor for NAFLD. NLR was positively correlated with NAFLD, while PLR was negatively correlated with NAFLD. This shows that these two simple biomarkers have the potential in diagnosis and prognosis of NAFLD.

Limitations

Retrospective, limited sample size, imaging details are not available in detail

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest.

Statement of ethical approval

Retrospective study, so no ethical clearance sought.

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