

Research Article

Neutrophil and platelet lymphocyte ratio in diabetes mellitus

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Submitted: October 25, 2022

Approved: October 29, 2022

Published: October 31, 2022

How to cite this article: Özdin M, Yazar H, Mundan D. Neutrophil and platelet lymphocyte ratio in diabetes mellitus. Ann Adv Chem. 2022; 6: 056-059.

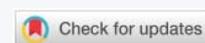
DOI: 10.29328/journal.aac.1001033

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Keywords: Type II diabetes mellitus; Neutrophil lymphocyte ratio; Platelet lymphocyte ratio

Abbreviations: NLR: Neutrophil Lymphocyte Ratio; PLR: Platelet Lymphocyte Ratio; Type II DM: Type II Diabetes Mellitus; HIMS: Hospital Information Management Systems; SUTRH: Diayabet Polyclinics of Sakarya University Training and Research Hospital



Abstract

Background: This study, it was aimed to investigate the relationship between Neutrophil Lymphocyte Ratio (NLR) and Platelet Lymphocyte Ratio (PLR) in Type II Diabetes Mellitus (Type II DM) patients.

Methods: The data of the study were obtained from 108 patients, 61 women and 47 men, who were diagnosed with Type II DM, who applied to the Diabetes Polyclinics of Training and Research Hospital between 01.01.2020 and 30.06.2020 and a healthy control group without Type II DM. The data of the patients were obtained retrospectively via the Hospital Information Management System (HIMS).

Results: The mean age of the Type II DM patient meeting the study criteria were 57.9 ± 12.69 years. The mean age of the control group was determined as 55.8 ± 8.81 . There was no significant difference between the patient and control groups in terms of age and gender. The NLR of type II DM patients was 2.96 ± 1.15 and that of the control group was 1.91 ± 0.81 . The PLR of type II DM patients was found as 179.29 ± 61.81 and the PLR of the control group was found as 121.21 ± 51.33 . When NLR and PLR values of type II DM patients and the control group were compared found that it was statistically significant ($p < 0.05$).

Conclusion: Although more analysis is needed to prove that NLR and PLR are associated with type II DM disease, our study's high NLR and PLR values in Type II DM patients should suggest that these parameters are essential in the diagnosis and follow-up. Also, NLR and PLR inflammatory diseases, acute coronary syndrome, rheumatoid arthritis, etc., is higher, suggesting that this is related to unsanitary conditions rather than a specific disease.

Background

Type II DM is related to the insulin hormone and is seen when this hormone is incomplete or inadequate. Type II DM is a chronic disease characterized by hyperglycemia, and its incidence and serious complications have increased in recent years [1,2]. Type II DM usually begins in humans after age 40 and is associated with obesity [3]. Leukocytes take part in our body's immune system; it consists of two cell groups, granulocytes, and agranulocytes. As a result of the joint effect of granulocytes and agranulocytes in the body, they protect living things against harmful factors and fulfill the duty of the immune system against diseases. Granulocytes consist of neutrophils, eosinophils, basophils, mast cells, dendritic cells, monocyte-macrophages and phagocytes. Lymphocytes, on the other hand, consist of natural killer cells and some specialized cells under the "T" and "B" lymphocyte groups [4].

Lymphocytes make up about half of the circulating leukocytes. The circulating life span of lymphocytes can last from a few weeks to several years, and their lifespan is considerably longer compared to neutrophils [5]. Platelets produced in the bone marrow; are essential blood elements effective in coagulation. Platelets, besides their coagulation functions, secrete mediators against infectious agents. These mediators have been shown to coordinate inflammatory cell movements, with platelets contributing to chemotaxis and phagocytosis.

In the absence or insufficiency of platelets, there is a delay in the migration of leukocytes to the inflammation region, which reveals how essential their functions are [6,7]. NLR and Platelet-lymphocyte ratio are important markers used in the diagnosis of general inflammatory conditions in the human body [8]. It is stated that NLR and PLR are cheap and easily calculable markers that correlate with the prognosis of

systemic inflammatory diseases and are frequently used in laboratories. This frequency of use can also be compared to the ratio of De-Ritis and R obtained from biochemical tests [9-11]. It has been reported that NLR and PLR have more common usage areas. Cardiovascular, rheumatological and cancer cases, especially inflammatory diseases, have been shown [12-15]. Neutrophils, lymphocytes and platelets are essential to the blood elements involved in the inflammation process. Type II DM is strongly associated with inflammation. In this study, we aimed to investigate the relationship between NLR and PLR, which are among the parameters of complete blood count and Type II DM.

Materials and methods

Study setting, design and period

It consists of 108 patients, 61 women and 47 men diagnosed with type II DM, who applied to the Diayabet Polyclinics of Sakarya University Training and Research Hospital (SUTRH) between 01.01.2020 and 30.06.2020. Patient data were obtained retrospectively via the HIMS. One hundred eight healthy persons, 59 women and 49 men without rheumatic disease, allergic disease, autoimmune disease, infection, diabetes, or cancer, were included in the control group. Relationships and differences between the patient and control groups were investigated. Neutrophil, lymphocyte and platelet tests were performed on the CELL-DYN 3700 (ABBOTT, USA) device.

Data processing and analysis

For the statistical analysis of the data obtained from the studies, IBM SPSS Windows 20.0 (SPSS, Chicago, USA) program was used. Student t-test was used for comparisons between groups. Data are expressed as mean \pm standard deviation. Values of $p < 0.05$ were considered significant in all results.

Ethical considerations

The ethics committee report of our study was obtained from the Faculty of Medicine and its date and number are (04.09.2020-E.7742).

Results

The average age of type II DM patients meeting the study criteria was 57.9 ± 12.69 years. The average age of the individuals in the control group was determined as 55.8 ± 8.81 . There was no significant difference between the patient and control groups in terms of age and gender. The NLR of type II DM patients was 2.96 ± 1.15 and that of the control group was 1.91 ± 0.81 . The PLR of type II DM patients was 179.29 ± 61.81 and that of the control group was 121.21 ± 51.33 . When NLR and PLR values of type II DM patients and the control group were compared, it was found that it was statistically significant ($p < 0.05$) (Table 1).

Table 1: Data of Type II DM Patients and Control Group.

| | Patient | Control | p |
|-----------------------------------|---------------------|---------------------|--------|
| Age | 57.9 ± 12.69 | 55.8 ± 8.81 | 0.302 |
| Neutrophil ($10^3/\text{mm}^3$) | 4.81 ± 2.09 | 4.21 ± 0.88 | 0.298 |
| Lymphocyte ($10^3/\text{mm}^3$) | 1.91 ± 3.21 | 2.29 ± 0.72 | 0.092 |
| Platelet ($10^3/\text{mm}^3$) | 275.69 ± 130.11 | 257.01 ± 145.30 | 0.602 |
| NLR | 2.96 ± 1.15 | 1.91 ± 0.81 | 0.041* |
| PLR | 179.29 ± 61.81 | 121.21 ± 51.33 | 0.049* |

*: $p < 0.05$; p: significance

Discussion

Neutrophils, lymphocytes and platelets are essential to blood elements in the inflammation process. Type II DM is strongly associated with inflammation. Chronic inflammation contributes to the development and progression of chronic complications from micro and macroangiopathic changes in diabetic patients [16,17].

Studies on NLR and PLR are new and their relationship with diseases has not been sufficiently investigated. Today, it is used in some infectious and tumoral formations. Systemic inflammation triggers lymphopenia, causing an increase in NLR levels. NLR and PLR correlate with the prognosis of systemic inflammatory diseases [18]. In a study of Pfada patients, the NLR was high but not statistically significant [19]. In the study conducted on patients with nasal polyps, NLR values and thrombocyte values were found to be high [20]. An increase in NLR and PLR values was found in a study conducted with patients with acute coronary syndrome [21]. In a study conducted on 245 patients with a viral infection and positive for COVID-19, NLR values were found to be high [22]. In a study conducted on 77 people with rheumatoid arthritis, the rates of NLR and PLR were found to be statistically significant in the patient group [23]. In a study conducted on 70 patients with acute sensorineural hearing loss disease, it was found that NLR and PLR levels were significantly higher when compared with the control group [24]. In studies performed in patients with squamous cell carcinoma of the esophagus [25] and diseases with inflammation [26], it was reported that NLR and PLR values showed a significant relationship. In a study conducted on 313 patients with colorectal carcinoma, NLR and PLR values were found to be statistically significant compared to the control group [27]. In a study conducted with 92 type II DM patients, the NLR was higher than the control group and was reported to be statistically significant [28]. In a study conducted on prediabetic and diabetic patients, it was determined that NLR values increased significantly. In addition, NLR and PLR values, important markers for inflammation, are important markers of inflammation and can be reliable predictive markers in prediabetes and diabetes [29]. In one study, it was found that in inflammatory diseases, the number and quality of complete blood count parameters changed, and there was a decrease in lymphocyte counts, significantly.

In contrast, neutrophil and platelet counts increased [30].

A study in patients with COVID-19 has shown that there may be a relationship between the severity of the disease and high NLR [31]. High NLR was found in a study of 300 patients with ST-segment elevation myocardial infarction [32]. In a survey conducted with 100 patients with Sjögren's Syndrome, NLR and PLR values were found to be statistically significant compared to the control group [33].

In the study we conducted with type II DM patients, we found higher and statistically significant NLR and PLR values compared to the control group. Considering the limitations of our study, it can be stated that it is a retrospective, single-laboratory-centered study that includes a relatively small number of patients. In addition, the inability to obtain any information about the duration of diabetes in patients is among the limitations of our study.

Conclusion

The high and statistically significant NLR and PLR values in patients revealed that these parameters are essential in diagnosing and following Type II DM disease. These values have also shown that they can be vital biomarkers in Type II DM disease. Therefore, more research is required to establish the connection between the pathogenesis of Type II DM and the NLR and PLR. Moreover, NLR and PLR values, inflammatory diseases, acute coronary syndrome, rheumatoid arthritis, etc., considering that it is higher in many diseases, it can also think that this condition is related to unhealthy conditions rather than a specific disease.

Declarations

Ethics Committee Approval: Approval for the study was obtained from the Sakarya University Faculty of Medicine Ethics Committee (Date: 04.09.2020, Number: E.7742). The Declaration of Helsinki conducted the study.

Author contributions

Concept – MO, HY; Supervision – MO, HY; Materials – MO; Data Collection and Processing – MO, DM; Analysis and Interpretation – MO, HY; Writing –DO, MY, HY.

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