ClinicSearch

Archives of Clinical and Experimental Pathology

Faruk Incecik *

Open Access

Research Article

Neutrophil-to-Lymphocyte and Platelet-to-Lymphocyte Ratio in Children with Multiple Sclerosis

Faruk Incecik[1*], Ozlem M. Herguner[1]

Divisions of 1Pediatric Neurology, Çukurova University Faculty of Medicine, Adana, Turkey

***Corresponding Author:** Faruk Incecik, Divisions of 1Pediatric Neurology, Çukurova University Faculty of Medicine, Adana, Turkey

Received: September 16, 2022 | **Accepted:** September 23, 2022 | **Published:** September 29, 2022

Citation Faruk Incecik1, Ozlem M. Herguner. (2022). Neutrophil-to-Lymphocyte and Platelet-to-Lymphocyte Ratio in Children with Multiple Sclerosis. Archives of Clinical and Experimental Pathology. 1(1); DOI:10.31579/2834-8508/003

Abstract

Introduction: Multiple sclerosis (MS) is a chronic, inflammatory condition that affects the central nervous system. MS in children often manifests with a relapsing-remitting disease course. Recently, blood neutrophil-to-lymphocyte ratio (NLR) and platelet to lymphocyte ratio (PLR) have proposed as a potentially useful markers of clinical outcome in autoimmune/inflamatory diseases. The aim of this study was to clarify the association of NLR and PLR in children with MS.

Materials and Methods: Ten patients with MS and 11 healthy controls were enrolled in the study. NLR and PLR were calculated using complete blood count data.

Results: The serum NLR and PLR level in relaps period with MS patients were significantly higher than those of remission period with MS patients and controls ($P < 0.001$).

Conclusions: To our knowledge, this is the first study which investigated the role of NLR and PLR as inflammatory biomarkers in patients with MS. Our results demonstrate that NLR and PLR levels are higher in patients with relaps period compared with controls and remission period. NLR and PLR, a simple and easily obtainable parameters, can be used to identify relaps period in MS.

Keywords: NLR and PLR; inflammatory markers; multiple sclerosis

Introduction:

Multiple sclerosis (MS) is a chronic, inflammatory condition that affects the central nervous system (CNS). MS is typically considered to be a disease of young adults. However, an increasing number of children and adolescents are being diagnosed. Pediatric MS is often characterized by a relapsing-remitting disease course at onset. The diagnosis is confirmed by recurrent clinical episodes consistent with demyelination of CNS and supported by magnetic resonance imaging evidence for new lesions involving different regions of the CNS [1]. Early consideration of MS in appropriate clinical cases is important for the timely confirmation of diagnosis and initiation of treatment.

Although its aetiology remains elusive it is now known that environmental factors and susceptible genes are involved in disease pathogenesis. Results from immunological, genetic and histopathology studies of patients with MS support the concept that autoimmunity plays a major role in disease pathogenesis. However, it is also well accepted that MS is not only an inflammatory disease, but also a neurodegenerative condition. Oligoclonal band positivity and high IgG index in cerebrospinal fluid (CSF) are important inflammatory parameters in the diagnosis of MS [2].

Complete blood count (CBC) is a cheap and easily available blood test. Neutrophil lymphocyte ratio (NLR), platelet-lymphocyte ratio (PLR) and systemic immune inflammatory index are biomarkers calculated from CBC and have been reported recently to be useful in the diagnosis, follow-up and survey of many systemic inflammatory/autoimmune processes [3-7]. In our opinion, there is not a study established the association with NLR and PLR in MS. We aimed to evaluate the relationship of NLR and PLR as a inflammatory marker in MS.

Methods:

Patients who were diagnosed with relapsing-remitting MS were included in the study. The study involved two groups; one group composed of patients with relapsing-remitting MS and a control group composed of healthy individuals. The data were retrospectively collected from the clinic files and included age, sex, clinical findings, cerebral magnetic resonance imaging (MRI), and cerebrospinal fluid (CSF) findings, oligoclonal band, IgG index, CBC, white blood cell (WBC), NLR, PLR, and treatment.

NLR was calculated by dividing the absolute neutrophil count by the absolute lymphocyte count. PLR was calculated by dividing the platelet count by the absolute lymphocyte count. All tests have been obtained

during relapse and remission periods. All patients were on subcutaneous interferon Beta-1a.

The data were analyzed using descriptive statistical methods, student's t-test, equivalents, and variance analysis. In addition to these, relationships between the variables were evaluated with Pearson's correlation analysis and a p-value below 0.05 was considered significant.

Results:

A total of 10 MS patients (3 males and 7 females) and 11 healthy controls (5 males and 6 females) were evaluated. All patıents receıved subcutaneous interferon Beta-1a treatment and have a relaps period at least once. Overall, the mean age of MS participants and control group was 15.70 ± 1.33 and 15.64 ± 1.28 years, respectively. There was no statistically significant difference between pediatric MS, and control group in terms of mean age and gender distribution (Table 1).

The mean NLR levels at relaps, and remission time with MS patients, and control group were 2.70 ± 0.17, 1.92 ± 0.90, and 1.86 ± 0.08, respectively. The mean PLR levels at relaps, and remission time with MS patients, and control group were 121.88 ± 6.71, 101.51 ± 8.71, and 90.65 ± 3.11, respectively. The NLR levels of relaps period with MS patients were significantly higher than those of remission period and control group ($p<0.05$). Table 2 shows the serum NLR and PLR levels of the study participants.

Discussion:

Multiple sclerosis is a chronic inflammatory autoimmune demyelinating disease of the CNS. MS in children manifests with a relapsing-remitting disease course. Incidence ranges from 0.07 to 2.9 per 100,000 children [8]. Early accurate diagnosis of MS in childhood is important for the overall management of physical, cognitive, and quality of life issues. MS remains a diagnosis based on clinical findings, supported by MRI, CSF, and other laboratory results, and is predicated on the exclusion of other disorders [2].

Inflammation of central nervous system is the primary cause of damage in MS. The specific elements that start this inflammation are still unknown. Studies have suggested that genetic, environmental and infectious agents may be among the factors influencing the development of MS [9]. The anti-inflammatory agents for relapsing forms of MS target different parts of the immune system, with the end goal of decreasing and avoiding further inflammation. Oligoclonal band and IgG index are used as anti-inflammatory markers.

NLR and PLR, which are ratios that can be easily measured from a CBC for a low cost. In literature, NLR and PLR were investigated in many diseases as a marker of inflammation [5-7]. The use of both NLR and PLR as a part of evaluation for disease activity in Behçet's disease has been proposed by many authors since both have shown favorable results [10,11]. Hammad et al. also reported a study comparing NLR and PLR values in active and inactive Behçet disease patients. They described that NLR was superior to PLR as an indicator of disease activity [12]. Arpaci et al. found that NLR and PLR were significantly different in a group of Hashimoto's thyroiditis patients compared to healthy individuals in a study [7]. Recently several reports have suggested the potential utility of the NLR and PLR, as diagnostic biomarkers in patients with rheumatoid arthritis [5,13]. Erre et al. reported that NLR and PLR were significantly higher in patients with rheumatoid arthritis when compared to controls [5]. In another study, Ozdemir found that NLR and PLR level were statistically significant biomarkers in Guillain-Barre´ syndrome subtype in adults [14]. In our study, we detected that NLR and PLR levels were significantly higher in relaps period than remission and control group. To the best of the authors' knowledge, this is the first clinical study to evaluate the association of MS with the NLR and PLR level in children.

In conclusion, our results demonstrate that high NLR and PLR ratios corralate relaps period in MS. The main finding of our study relates to the identification of the NLR and PLR ratios as novel noninvasive marker of disease activity in patients with MS. Unlike many other inflamatory markers of MS, the NLR and PLR ratios are inexpensive and readily available. Further studies are needed to determine their potential clinical use.

Ethics Committee Approval: Ethical approval was obtained. Cukurova Univesity Clinical Research Ethics Committee (2021/8 number)

Conflict of Interest: There is no conflict of interest.

Funding: No financial support was received.

References

1. Waldman A, Ness J, Pohl D, et al. (2016). Pediatric multiple sclerosis: Clinical features and outcome. Neurology. 87:74-81.
2. McFarland HF, Martin R. (2007). Multiple sclerosis: a complicated picture of autoimmunity. Nat Immunol. 8:913-919.
3. Huang Z, Fu Z, Huang W, Huang K. (2020). Prognostic value of neutrophil-to-lymphocyte ratio in sepsis: A meta-analysis. American Journal of Emergency Medicine. 38:641-647.
4. Celikbilek M, Dogan S, Ozbakır O, et al. (2013). Neutrophil-Lymphocyte Ratio as a Predictor of Disease Severity in Ulcerative Colitis. J Clin Lab Anal. 27:72-76.
5. Erre GL, Paliogiannis P, Castagna F, et al. (2019). Meta-analysis of neutrophil-to-lymphocyte and platelet-to-lymphocyte ratio in rheumatoid arthritis. Eur J Clin Invest. 49:13037.
6. Wu Y, Chen Y, Yang X, Chen L, Yang Y. (2016). Neutrophil-to-lymphocyte ratio (NLR) and platelet-to-lymphocyte ratio (PLR) were associated with disease activity in patients with systemic lupus erythematosus. Int Immunopharmacol. 36:94-99.
7. Arpaci D, Gurol G, Ergenc H, et al. (2016). A Controversial New Approach to Address Hematological Parameters in Hashimoto's Thyroiditis. Clin Lab. 62:1225-1231.
8. Banwell B, Kennedy J, Sadovnick D, et al. (2009). Incidence of acquired demyelination of the CNS in Canadian children. Neurology. 72:232-239.
9. Renoux C, Vukusic S, Mikaeloff Y, et al. (2007). Natural history of multiple sclerosis with childhood onset. N Engl J Med. 356:2603-2613.
10. Lee YH, Song GG. (2018). Neutrophil-to-lymphocyte ratio, mean platelet volume and platelet-to-lymphocyte ratio in Behçet's disease and their correlation with disease activity: A meta-analysis. Int J Rheum Dis. 21:2180-2187.
11. Alan S, Tuna S, Türkoğlu EB. (2015). The relation of neutrophil-to-lymphocyte ratio, platelet-to-lymphocyte ratio, and mean platelet volume with the presence and severity of Behçet's syndrome. Kaohsiung J Med Sci. 31:626-631.
12. Hammad M, Shehata OZ, Abdel-Latif SM, El-Din AMM. (2018). Neutrophil/lymphocyte ratio and platelet/lymphocyte ratio in Behçet's disease: which and when to use? Clin Rheumatol. 37:2811-2817.
13. Fu H, Qin B, Hu Z, et al. (2015). Neutrophil- and platelet-to-lymphocyte ratios are correlated with disease activity in rheumatoid arthritis. Clin Lab. 61:269-273.
14. Ozdemir HH. (2016). Analysis of the albumin level, neutrophillymphocyte ratio, and platelet-lymphocyte ratio in Guillain-Barre´syndrome. Arq Neuropsiquiatr. 74:718-722.