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Research Article

Neutrophil-To-Lymphocyte and Platelet-To-Lymphocyte Ratio in Children with Autoimmune Encephalitis

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Abstract

Objective: Autoimmune encephalitis (AE) is a rapidly progressive encephalopathy caused by antibody-mediated neuroinflammation. There is no established specific inflammatory marker of AE. Recently, blood neutrophil-to-lymphocyte ratio (NLR) and platelet to lymphocyte ratio (PLR) have proposed as a potentially useful markers of clinical outcome in diseases with an inflammatory component. The aim of this study was to clarify the association of NLR and PLR in children with AE.

Method: Fourteen patients with AE (7 males and 7 females) were enrolled in the study. NLR and PLR were calculated using complete blood count data.

Results: The mean NLR and PLR were 2.68 ± 0.22, and 127.07 ± 9.30, respectively in patients pre-treatment. The mean NLR and PLR levels were 1.74 ± 0.67, and 121.25 ± 6.34, respectively in patients after treatment. NLR level was significantly higher in pre-treatment time than after treatment.

Conclusions: To our knowledge, this is the first study which investigated the role of NLR and PLR as inflammatory biomarkers in patients with AE. Our results demonstrate that NLR is higher in pre-treatment period compared with after improvement period. However, PLR level was not statistically significant. NLR, a simple and easily obtainable parameter, may be potential inflammatory marker in children with AE.

Keywords: NLR; PLR; inflammatory markers; autoimmune encephalitis.

Introduction

Autoimmune encephalitis (AE) is characterized by an acute to subacute onset of seizures, cognitive impairment, and psychiatric symptoms [1]. AE might be associated with antibodies against neuronal cell surface or synaptic proteins. Several antibodies have been demonstrated to be associated with paraneoplastic and nonparaneoplastic neurological syndromes. The most common antibody associated with AE in children is antibodies against N-methyl-D-aspartate receptor (NMDAR) [1,2]. Unlike adult AE, association with cancer is less frequent in children [3]. Early diagnosis and treatment leads to better neurocognitive outcomes. Therefore, the identification of useful biomarkers is imperative to provide timely and adequate interventions to patients with AE.

In recent studies, novel inflammatory biomarkers such as neutrophil to lymphocyte ratio (NLR) and platelet to lymphocyte ratio (PLR) have been proposed as indicators of systemic inflammation and infection [4-6]. NLR and PLR are easily measurable laboratory biomarkers affected by both natural immune response and acquired immune response [7,8]. There is not a study established the association with NLR and PLR with AE. The aim of this study was to determine a possible association between NLR and PLR level and AE in children.

Materials and Methods

Patients who were diagnosed with AE with antibody positivity between 2016 and 2020 were included in the study. The data were retrospectively collected from the clinic files and included age, sex, time of onset of symptoms, electroencephalogram (EEG), cerebral magnetic resonance imaging (MRI), and cerebrospinal fluid (CSF) findings, antibody type, complete blood count (CBC), white blood cell (WBC), NLR, PLR, and treatment.

Autoimmune encephalitis was diagnosed by pediatric neurologists in our hospital on the basis of clinical findings and the presence of specific

antibodies in serum or CSF. All suspected reasons of central nervous system infection were excluded as well as encephalopathy secondary to sepsis or systemic inflammatory response syndrome. All patients were screened for malignancy; no tumors were identified. First-line immunotherapy included high-dose intravenous methylprednisolone (IVMP) or intravenous immunoglobulins (IVIg), or combination of these.

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 before and after the treatment.

Statistical analysis was performed. For comparisons of the differences between mean values of before and after treatment groups, the paired Student's t-test or the Wilcoxon matched-pairs signed-ranks test were used with or without a normal distribution, respectively. To test whether the data showed a normal distribution, the Kolmogorov-Smirnov test was used. The chi-square test was used for calculation of the significance of differences in gender. The Pearson's test was used to identify the correlations. $P < .05$ was considered statistically significant.

This study was conducted in compliance with the ethical principles according to the Declaration of Helsinki, and it was approved by the Ethical Committee (Number: 2021/11).

Results

A total of 14 AE patients (7 males and 7 females) were evaluated. In all of them 11 patients (%78.5) had anti-GAD encephalitis, two patients (%14.2) had anti-NMDAR encephalitis, and one patient (%7.3) had anti-LGI1 encephalitis. The mean age of the patients was 10.50 ± 4.05 years. In treatment, IVIg plus IVMP therapy was performed in 9 patients (64.2%), IVIg plus plasmapheresis (PE) therapy was performed in 2 patients (14.2%), and IVIg plus plasmapheresis plus IVMP therapy was performed in 3 patients (21.6%). In prognosis, 10 patients (71.4%) had complete recovery, 3 (21.4%) patients had behavior disorder, and one (7,2.0%) patient had epilepsy.

The mean NLR levels of pre and after treatment were 2.68 ± 0.22, and 1.74 ± 0.67, respectively. The mean PLR levels of pre and after treatment were 127.07 ± 9.30, and 121.25 ± 6.34, respectively. The mean pre-treatment NLR level was significantly higher than after treatment ($p < 0.05$) in AE patients. However, PLR level was not statistically significant ($p > 0.05$) **(Table 1)**

	Before treatment	After treatment	*P* value
WBC	12.11 ± 1.06	8.68 ± 1.39	0.001
NLR	2.68 ± 0.22	1.74 ± 0.67	0.001
PLR	127.07 ± 9.30	121.25 ± 6.34	0.061

AE: autoimmune encephalitis, NLR: neutrophil-to-lymphocyte ratio, PLR: platelet-lymphocyte ratio, WBC: white blood cell

Table 1: Comparison of Laboratory Findings Of The Patients With Ae Before And After Treatment

Discussion

Autoimmune encephalitis is emerging as an important and relatively common cause of encephalitis in the developed world. Crucially, early recognition and prompt initiation of a range of immunotherapies is likely to improve the outcomes of patients with AE, particularly for those with identifiable antibodies against neuronal cell surface proteins. There are a rapidly growing number of specific autoantibodies and associated syndromes, but many of these remain very rare [1]. There is no specific inflammation marker for AE.

NLR and PLR, which are ratios that can be easily measured from a CBC for a low cost, were shown to be related to many medical pathologies [7,8]. In literature, recent studies have shown that an abnormal NLR and PLR level are related to autoimmune diseases [9-12]. Arpaci et al. [11] found that NLR and PLR were significantly different in a group of Hashimoto's thyroiditis patients compared to healthy individuals in a study. Erre et al. [5] reported that NLR and PLR were significantly higher in patients with rheumatoid arthritis when compared to controls. In another study, Ozdemir [12] found that NLR and PLR level were statistically significant biomarkers in Guillain-Barre´ syndrome subtype in adults. In our study, we detected that NLR level was significantly higher of in active state of the AE. However, there was no marked differences in PLR level. To the best of the authors' knowledge, this is the first clinical study to evaluate the association of AE with the NLR and PLR level in children.

In conclusion, recognition, evaluation, and treatment of AE are growing in the last years. To facilitate early diagnosis, pediatricians need to maintain a high level of suspicion. The importance of considering autoimmune pathogenesis in the differential diagnosis of encephalitis is crucial, as early recognition and treatment may affect the outcome. We detected that NLR level was found significantly higher active state of disease. This finding suggests that NLR may be a potential marker to evaluate the disease activity of AE. However, more study in future is needed to support this.

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Conflict of interest

The authors declare that there is no conflict of interest.

References:

1. Graus F, Titulaer MJ, Balu R, Benseler S, Bien CG, Cellucci T, Dalmau J. (2016). A clinical approach to diagnosis of autoimmune encephalitis. Lancet Neurol, 15:391-404.
2. Dalmau J, Gleichman AJ, Hughes EG, Rossi JE, Peng X, Lai M, Dessain SK, Lynch DR. (2008). Anti-NMDA-receptor encephalitis: case series and analysis of the effects of antibodies. Lancet Neurol, 7:1091-1098.
3. Armangue T, Petit-Pedrol M, Dalmau J. (2008). Autoimmune encephalitis in children. J Child Neurol, 27:1460-1469. 4. 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. Erre GL, Paliogiannis P, Castagna F, Mangoni AA, Carru C, Passiu G, Zinellu A. (2019) Meta-analysis of neutrophil-to-

lymphocyte and platelet-to-lymphocyte ratio in rheumatoid arthritis. Eur J Clin Invest, 49:e13037.

5. 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.
6. Korkmaz M, Korkmaz H, Küçüker F, Ayyıldız SN, Çankaya S. (2015). Evaluation of the association of sleep apnea-related systemic infl ammationwith CRP, ESR, and neutrophil-to-lymphocyte ratio. Med Sci Monit, 21:477-481.
7. Akbas EM, Demirtas L, Ozcicek A, Timuroglu A, Bakirci EM, Hamur H. (2014). Association of epicardial adipose tissue, neutrophil-to-lymphocyte ratio and platelet-to-lymphocyte ratio with diabetic nephropathy. Int J Clin Exp Med, 7:1794-801.
8. Abd-Elazeem MI, Mohamed RA. (2018). Neutrophil-lymphocyte and platelet-lymphocyte ratios in rheumatoid arthritis patients: relation to disease activity. Egypt Rheumatol, 40:227-231.
9. 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.
10. Arpaci D, Gurol G, Ergenc H, Yazar H, Tocoglu AG, Ciftci IH, Tamer A. (2016). A Controversial New Approach to Address Hematological Parameters in Hashimoto's Thyroiditis. Clin Lab, 62:1225-1231.
11. Ozdemir HH. (2016) Analysis of the albumin level, neutrophillymphocyte ratio, and platelet-lymphocyte ratio in Guillain-Barre´syndrome. Arq Neuropsiquiatr, 74:718-722.

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