



The neutrophil to lymphocyte ratios of our pediatric patients with Bell's palsy



Aylin Eryilmaz^{a,*}, Yesim Basal^a, Ayse Tosun^b, Imran Kurt Omurlu^c, Sema Basak^a

^a Department of Otorhinolaryngology, Adnan Menderes University, Faculty of Medicine, Aydın, Turkey

^b Department of Pediatric Neurology, Adnan Menderes University, Faculty of Medicine, Aydın, Turkey

^c Department of Biostatistic, Adnan Menderes University, Faculty of Medicine, Aydın, Turkey

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ABSTRACT

Background: Neutrophil to Lymphocyte Ratio (NLR) is considered to be a reliable indicator in etiological investigation and identification of the disease severity in inflammatory disorders. There are numerous observations or evidences suggesting that Bell's palsy is an inflammatory disorder.

Objectives: Our aim was to investigate the presence of any clue which might suggest inflammatory etiology and also the presence of compliance between NLR elevation and inflammation severity in children.

Methods: Patients younger than 18 years with Bell's palsy and who had not another inflammatory disorder in addition to Bell's palsy were included. A total of 25 patients and 25 healthy individuals were taken. The patient group and the control group were compared in terms of NLR, neutrophil and lymphocytes. The relationship of NLR with pre-treatment House-Brackmann classification was evaluated.

Results: The mean age was 9.86 ± 5.07 in the patient group and 9.14 ± 5.94 in the control group. In all members of the patient group, oral prednisolone (1 mg/kg/d) was administered for 7 days. The post-treatment House-Brackmann classification of all patients was determined as grade 1. The average neutrophil values were significantly higher in the patient group. In terms of average lymphocyte values, no statistically significant difference was found. The average NLR value was 1.78 (0.93–4.58) in the pediatric patient group and 1.1 (0.6–2.05) in the control group. NLR was significantly higher in the patient group. NLR and pre-treatment House-Brackmann classification showed no statistically significant correlation ($r = 0.173$, $p > 0.05$). When cut-off value was taken as 3 for NLR, no statistically significant difference was found between groups.

Conclusions: High NLR values determined in pediatric patients with Bell's palsy support the inflammatory feature of this disease. NLR is recommended as a supportive parameter in the diagnosis of pediatric patients with Bell's palsy.

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1. Introduction

Neutrophil to lymphocyte ratio (NLR) is considered to be a reliable indicator in etiological investigation and identification of the disease severity in inflammatory disorders [1–9]. NLR, an easy and inexpensive parameter which can be calculated by using the complete blood count, has been investigated in many inflammatory disorders [1–4]. There are studies showing that NLR is a valuable indicator in disorders such as sudden hearing loss,

vestibular neuronitis, rheumatoid arthritis, cystic fibrosis, premature retinopathy and Bell's palsy, in which the inflammatory processes are considered to participate in the etiology [1–9].

Bell's palsy is the most common cause of facial paralysis in both adults and children [10,11]. There are numerous observations or evidences suggesting that Bell's palsy is an inflammatory disorder of the facial nerve [12–18]. Firstly, patients appear to benefit from corticosteroid therapy [13]. Murakami et al., in their study, detected the *Herpes simplex* type 1 genome in endoneurial fluids and posterior auricular muscles of patients with Bell's palsy [14]. *Herpes simplex* is considered to cause an inflammation which results in acute, benign cranial neuropathy [15,16]. In magnetic resonance imaging of patients with Bell's palsy, increased involvement of the facial nerve was found, showing inflammation

* Corresponding author at: Mimar Sinan Mah, 2321 Sokak, Güvenkent Sitesi, A Blok, No: 5, 0900 Aydın, Turkey. Tel.: +90 5458451352.

E-mail address: draylineryilmaz@gmail.com (A. Eryilmaz).

[17]. Additionally, the inflammation of the nerve was revealed when facial nerve decompression was performed in patients with Bell's palsy [18]. It is considered that inflammation of the facial nerve is related either to a new virus or to the reactivation of a virus present in the body [19]. Another evidence supporting inflammatory etiology is the high NLR found in adult patients with Bell's palsy [5–7]. In these studies, the compliance between elevation of NLR and disease severity was investigated [5–7]. In this study, our aim was to investigate the presence of any clue which might suggest inflammatory etiology and also the presence of compliance between NLR elevation and inflammation severity in children as determined in the adult group.

2. Material and method

Patients who were younger than 18 years and diagnosed with Bell's palsy between January 2013 and April 2015 in outpatient clinics of Otorhinolaryngology and Pediatric Neurology in Adnan Menderes University Medical Faculty, were retrospectively investigated. Patients who had another inflammatory disorder in addition to Bell's palsy were excluded from the study. A total of 25 patients were found who met this criterion. 25 healthy individuals who were admitted to outpatient clinics of Pediatrics for routine follow-up were taken as the control group. Not to bias the results the control group excluded the children with acute, chronic infectious diseases, diabetes mellitus, obstructive sleep apnea. The demographic characteristics, complete blood count values prior to the initiation of treatment, the performed treatment, and the data of follow-up examination of the patients were collected. House–Brackmann classification results were collected [20]. Demographic characteristics and complete blood count values of the control group were also collected. For complete blood count, automated blood cell counter (Sysmex) was used. NLR was calculated by division of the value of neutrophils in complete blood count to the value of lymphocytes in complete blood count. In addition to NLR, the patient group and the control group were compared in terms of neutrophil and lymphocytes.

Moreover, the relationship of NLR with pre-treatment House–Brackmann classification was evaluated. The approval of Adnan Menderes University Ethics Committee was obtained for this study.

3. Statistical analysis

Kolmogorov–Smirnov test was used to determine whether quantitative variables were distributed normally or not. In terms of normally distributed quantitative variables, groups were compared by independent samples *t*-test and descriptive statistics were given as mean \pm standard deviation.

In terms of variables not having normal distribution, groups were compared using the Mann–Whitney *U* test and the descriptive statistics were given as median (25–75 percentile). The chi-square analysis was used for analysis of categorical variables and descriptive statistics were given as frequency and percentage. SPSS 19.0 (SPSS, 10241440, Istanbul, Turkey) was used.

4. Results

The mean age was 9.86 ± 5.07 in the patient group and 9.14 ± 5.94 in the control group. Male: female ratio was 10:15 in the patient group and 11:14 in the control group. The age and gender data of the patient and control groups were compatible. Pre-treatment House–Brackmann classification revealed grade 2 in 6 patients, grade 3 in 2 patients, grade 4 in 12 patients and grade 5 in 5 patients. In all members of the patient group, oral prednisolone

(1 mg/kg/d) was administered for 7 days and then it was gradually tapered off in the next 5 days.

The post-treatment House–Brackmann classification of all patients was determined as grade 1, indicating full recovery.

Demographic characteristics and complete blood count parameters were given in Table 1.

The average neutrophil count was 6.36 ± 3.58 in the patient group, and 3.53 ± 1.71 in the control group. When the average neutrophil values were compared, it was statistically significantly higher in the patient group ($p = 0.001$). The average lymphocyte value was 3.05 ± 1.43 in the patient group and 3.14 ± 1.18 in the control group. In terms of average lymphocyte values, no statistically significant difference was found between the two groups ($p > 0.05$).

The average NLR value was 1.78 (0.93–4.58) in the pediatric patient group and 1.1 (0.6–2.05) in the control group. The difference between the two groups was statistically significant ($p = 0.024$) (Fig. 1).

NLR and pre-treatment House–Brackmann classification showed no statistically significant correlation ($r = 0.173$, $p > 0.05$). When cut-off value was taken as 3 for NLR, the median value was 4 (2.25–4) for patients with NLR < 3 and 4 (3–4.5) for patients having NLR ≥ 3 . In this regard, no statistically significant difference was found between the two groups ($p > 0.05$).

5. Discussion

NLR, which is an easily available and inexpensive parameter, is a novel marker which has recently started to be used in inflammatory disorders. It is considered to indicate inflammatory pathology and also to provide valuable information about prognosis [1–9]. Neutrophils are important for cytokine production in inflammatory disorders [21]. Lymphopenia is related to early apoptotic properties of lymphocytes during inflammation [22]. Neutrophil to lymphocyte ratio may primarily provide information on whether the present clinical features are manifested as a result of an inflammatory process or not [1–9]. Additionally, it is considered to be a predictor of the prognosis in some disease groups [2,7,9]. There are numerous studies investigating NLR as an inflammatory and prognostic indicator in inflammatory disorders [1–9].

Neutrophil to lymphocyte ratio has been found to be significantly higher in patients with active rheumatoid arthritis, when compared to patients who were in remission [1]. In the same study, NLR was determined to be usable as an indicator of activity in this inflammatory disorder. In another study, among children having acute tonsillitis, NLR was found to be higher in patients who developed deep neck infection, when compared to those who did not develop [8]. In this study, the sensitivity and specificity of NLR for showing the complications of acute tonsillitis were determined to be high [8].

NLR and low lymphocyte count were both determined to be significant for showing premature retinopathy [4]. In patients with vestibular neuronitis, NLR was found to be high also [9]. In these patients, the elevation of NLR was found to be compatible with nystagmus lasting for more than 5 days and necessitating drug treatment [9].

Table 1

Demographic characteristics and variables in pediatric Bell's palsy patient and control group's.

	Control group (n=25)	Patient group (n=25)	<i>p</i>
Neutrophil ($10^9 L^{-1}$)	3.53 ± 1.71	6.36 ± 3.58	0.001
Lymphocyte ($10^9 L^{-1}$)	3.14 ± 1.18	3.05 ± 1.43	0.813
NLR	1.1 (0.6–2.05)	1.78 (0.93–4.58)	0.024
Age (year)	9.14 ± 5.94	9.86 ± 5.07	0.646

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