



The change of neutrophils/lymphocytes ratio in migraine attacks: A case-controlled study



Keziban Ucar Karabulut ^{a,*}, Tomris Ugur Egercioğlu ^{b,1}, Mehmet Uyar ^{c,2}, Yildiz Ucar ^{d,3}

^a Department of Emergency Medicine, Baskent University, Faculty of Medicine, Ankara, Turkey

^b Department of Neurology, Baskent University, Faculty of Medicine, Ankara, Turkey

^c Department of Public Health, Necmettin Erbakan University, Meram Medical Faculty, Konya, Turkey

^d Department of Pulmonary Disease, Diyarbakır Memorial Hospital, Diyarbakır, Turkey

HIGHLIGHTS

- A migraine headache is a frequent reason for emergency departments.
- During migraine attacks it is not fully understood that there is an inflammatory process.
- We think that the role of inflammation during attack.
- We think that this inflammation process increases the severity of the pain.

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ABSTRACT

Objective: As commonly seen symptoms, headaches are among the most frequently encountered health challenges in emergency rooms by healthcare professionals. Among one of the most commonly seen and primary headaches is migraine. Migraines are mostly accompanied by functional deficits.

Aims: To observe the changes of neutrophil/lymphocyte ratio occurring during migraine attacks.

Method: This is a retrospective study where hospital records of patients previously diagnosed with migraine and admitted to the emergency with the complaints of attacks between May 2014 and January 2015 were investigated. All patients in the study were evaluated as to age, gender and complete blood count. Additionally, a healthy control group was formed with individuals with no disorders. By also evaluating the same features in the controls, the values found in the patients and controls alike were compared.

Results: The values of white blood cell, lymphocyte, neutrophil, hemoglobin, thrombocyte and neutrophil/lymphocyte ratio determined in the patient group (n = 92) were statistically compared with those of the controls (n = 67). Neutrophil/lymphocyte ratio during the attacks was found higher in the patients, compared to the controls.

Conclusion: Neutrophil/lymphocyte ratio is a sign of inflammation, and we consider that this ratio will also increase during migraine attacks, as with other inflammatory and acute processes.

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1. Introduction

Headaches are among the most commonly encountered complaints in the emergency. Nearly one million cases are admitted to the emergency rooms with the complaint of headaches in the United States each year, and the admissions due to headaches to the emergency constitute more than 4% of all emergency admissions [1]. As a general approach, headaches can be grouped into two as primary headaches, such as migraines where no underlying cause can be defined, and secondary or organic headaches, like

* Corresponding author. Baskent Universitesi, Konya Hastanesi, Hocacihan mah, Saray caddesi No:1, Selcuklu, Konya 42080 Turkey. Tel.: +90 3322570606.

E-mail addresses: dr_kezi@hotmail.com (K.U. Karabulut), durubatu@gmail.com (T.U. Egercioğlu), mehmetuyardr@hotmail.com (M. Uyar), yildiz-ucar@hotmail.com (Y. Ucar).

¹ Tel.: +90 3322570606.

² Tel.: +90 3322236000.

³ Tel.: +90 5057400982.

subarachnoid hemorrhages, led by an underlying reason [2].

The most common of the conditions affecting individuals is headaches. As well as neurological disorders, headache is a symptom accompanied by cardiovascular disorders, hypertension and gastrointestinal system diseases, and systemic diseases, such as otolaryngeal problems, eye defects and psychiatric disorders. Almost all individuals experience headaches during lifetimes. Headache is one of the most frequently seen symptoms in adolescence and adulthood. Most of the patients with headaches are admitted to the emergency rooms due to primary headache syndrome, and become ameliorated with rapid and effective treatment modalities. Secondary headaches are seen in 3.8% of all patients admitted to the emergency rooms [3].

The existence of moderate or severe headache affecting routine activities is one of the diagnostic criteria of migraine and observed in nearly 70% of the patients [4]. Migraine is classically seen as throbbing and one-sided headaches; however, it is unlikely to distinguish migraine from other types of headaches through the characteristics and site of the pain. So, accompanying symptoms and signs are required to be known. Such symptoms as photophobia, phonophobia, nausea (90%), anorexia (75%), vomiting (60%) and diarrhea (15%) are common symptoms observed in patients with migraine. Constitutional alterations, such as personal changes before and after the pain, exhausting, fatigue, myalgia, bulimia and irritability, and neurological symptoms, like aura or visual phenomena, are also observed in migraine patients. Although less frequently, motor deficits, including hemiparesis, ophthalmoplegia and aphasia, emotional disorders and brainstem findings, such as vertigo and ataxia, may be seen during aura [5].

During attacks, migraine sufferers are known either to give a break to their jobs at work sites or go home. Therefore, migraine leads to a decrease or loss of productivity in organizations. The World Health Organization (WHO) has been defined the condition as a disability restricting or preventing individuals from performing their daily activities [6]. Many different mechanisms are considered to be responsible for the pathogenesis of migraine. Although it is known that an association exists between hematologic disorders such as anemia and polycythemia, and headaches, the number of studies where the relationships between features of headaches such as frequency, severity or duration and hematologic parameters are investigated is limited [7].

Upon evaluating oxidative stress, the pathophysiology of vessels and inflammation markers in migraine patients, it was concluded that deficient and decreasing antioxidant levels in patients increase oxidative stress, and thus leading to inflammation and changes in the pathophysiology of vessels. Shown among the primary headaches under the criteria defined by the International Headache Association (IHA), migraine is generally described as a neurovascular disorder where neurogenic inflammation, contractile dysfunction of cranial blood vessels and depression mechanisms starting from cerebral cortex and extending other organs play a role. In various studies, it is reported that neuroinflammatory conditions, cytokines, different neuropeptides and vasomotor changes are responsible for the pathogenesis of migraine. Vasoactive peptides forming as a result of trigeminal nerve stimulation with the initiation of migraine attacks lead blood flow to increase, protein to leak out of vessels and a neurogenic inflammation to take place. So, sterile inflammation plays a part in the pathogenesis of migraines [8].

The response to stress by leucocytes in circulation causes an increase in the number of neutrophils and a decrease in the number of lymphocytes. Hence, the proportion of these two subgroups to each other is used as a marker of inflammation [9]. Recently started to be used, neutrophil/lymphocyte ratio (NLR) is a cheap and useful marker that can easily be calculated from complete blood count (CBC). As a subclinical inflammatory marker, NLR is associated with

the prognosis and mortality of many diseases [10,11].

In light of literature, we aimed here at observing the changes of NLR, known as a significant inflammatory marker occurring during migraine attacks.

2. Material and method

In this study, 92 patients previously diagnosed with migraine and admitted to the Emergency Department of Konya Training and Research Hospital, Baskent University with the complaint of new headache attacks between May 2014 and January 2015 were retrospectively evaluated. Among our subjects, those using analgesic drugs, exposed to blood transfusion or other blood products, with uncontrolled hypertension, intracranial space-occupying lesion, treated due to anemia or polycythemia within the last one year, and those with the history of hemorrhages or an operation during the last six months, hematologic disorders, chronic kidney or liver diseases, the history of pregnancy or fever in the last one month and any other disorders such as oncologic diseases, iron deficiency anemia, thalassemia, a metabolic disorder and anti-inflammatory bowel disease were excluded out of the study. A total of 45 patients with neurologic deficits, vertigo and any chronic disorder, along with migraine attacks, were also excluded out of the criteria. In short, those with no other complaints rather than migraine-type headaches were included into the study.

In order to investigate complete blood count (CBC), blood samples were drawn from 92 patients admitted to the emergency with the complaints of migraine attacks. The values of white bloodcell count (WBC), neutrophil, lymphocyte, hemoglobin and thrombocyte of all patients were recorded, and patients were referred to the clinic to be treated. Standard symptomatic treatment was commenced as a modality. In addition, for comparisons, a control group was formed from 67 healthy volunteers admitted to the check-up clinic due to their check-ups. By informing all participants on study design, written consent forms were obtained from all participants to investigate CBC samples. Blood samples were drawn with the reference amount defined in routine CBC kit. As well as age and gender, the values of leucocytes (WBC), neutrophil, lymphocyte, hemoglobin, thrombocyte and NLR of all patients were compared. While a group of patients were discharged because their complaints were improved in the emergency, another group was hospitalized and followed-up in the neurology department due to the fact that no regression was observed in complaints while observing in the emergency room.

3. Laboratory analysis

To perform the investigation of CBC samples, routine electronic CBC device was used (Cell-Dyne 3700, Abbott, Abbott Park, IL, USA).

4. Statistical analysis

Collected data were recorded into previously prepared forms, and the statistical analyses were performed with SPSS 18.0 software package. The analyses of appropriateness for the data showing normal distribution were carried out with the Shapiro-Wilk Test. For comparisons between both groups, the student's *t*-test was used. Numeric values were reported as mean \pm standard deviation (SD). $p < 0.05$ was accepted as significant.

5. Results

The study was performed in the emergency department of Konya Training and Research Hospital of Baskent University between May 2014 and January 2015. A total of 92 patients admitted to

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