



Electroencephalographic Findings in Women with Tension Headache and Migraine Without Aura

1. Kudratova Nigora Burkhanovna
2. Abdullaeva Nargiza Nurmatovna
3. Jurabekova Aziza Takhirovna

Abstract: Headache is one of the most common symptoms encountered in a variety of diseases that neurologists have to deal with, and TEA is the most common form of pain in the world.

Received 2nd Mar 2023,
Accepted 3rd Apr 2023,
Online 30th May 2023

¹ Doctoral student in the Department of Neurology, Samarkand State Medical University

² Dr. of Medicine, Professor of the Department of Neurology, Samarkand State Medical University

³ Doctor of Medicine, Professor, Head of the Department of Neurology, Samarkand State Medical University

According to the Institute for Health Metrics and Evaluation, USA, there were 1.89 billion headaches worldwide in 2016. According to the International Classification of Headache 3rd Revision. A distinction is made between primary, in which no organic cause is identified, and secondary Headache, due to organic damage to the central nervous system (CNS) or somatic diseases. Primary Headaches include tension headache, migraine, trigeminal vegetative cephalgia, and a group of other primary cephalgias associated with various conditions. Headache is a worldwide problem faced by people regardless of age, gender, race, or region of residence (1, 5, 9). WHO estimates that the global prevalence of headache among adults with clinical manifestations at least once in the past year is nearly 50%, with 1.7-4% suffering from a chronic form of headache (2, 8, 12). Headache is not regarded by the population as a serious disorder because it is episodic and its symptoms are not as dramatic as, for example, cardiovascular disease. Primary headache does not result in death or disability for patients, but more and more professionals are thinking about the socioeconomic burden of the problem (3, 11, 17). Headache is the cause of a significant reduction in work capacity, and missed work. The low rate of seeking medical care can also be explained by the fact that people suffering from TEA are unaware of the existence of effective treatment (6, 14, 18). There is also no consensus among specialists dealing with TEA, despite the available international and national recommendations. The difficulty lies in the fact that the effectiveness of treatment is assessed not in

the complete elimination of the pain syndrome, but in the reduction of its intensity and duration. On the other hand, due to the availability of over-the-counter analgesics in pharmacies and their uncontrolled self-administration, there is a problem of abusive health, which aggravates, and sometimes comes to the fore in the structure of the pain syndrome (7, 13, 15). Treatment of severe abusive pain in some cases even requires hospitalization for detoxification therapy and withdrawal of the "guilty" analgesic. Chronic forms of headache have a significant impact on people's quality of life, depriving them of their ability to function normally socially, professionally, and physically. At the state level, it leads to financial losses due to partial or full disability, reduction in the quality and volume of work performed in the days with TEA (4, 10, 16).

Among the most widespread primary cephalgias in the world population tension headache is the most frequent one - it affects from 48,4 to 80% of the population (Rasmussen WK, 1995; Jensen R, 1999; Rasmussen WK 1999; Vein A.M., 2001; Karakulova J.V., 2006; Markus DA, 2010). The disease is observed approximately 1.5-2 times more often in women (Chandra V., 1998; Amelin A.V. et al., 2001). Moreover, in women of reproductive age it occurs about 3 times more often than in post-reproductive women (Jensen K., Sandrini G., 1994; Rasmussen V.K. 1999). Headache, mainly develops in persons of young age, is characterized by a progressive, significantly reducing the quality of life, which determines its high social significance and predetermines the relevance of the study of questions of pathogenesis, as well as the development of new approaches to treatment (Strachunskaya E.Y, 1996; Jensen R, 1999; Vein A.M., 2002; Bendtsen L., 2002; Kanner P., 2006; Rolak L.A., 2008; Zakirova E.N., 2009). To date, there is no unified pathogenetic concept of Headache, and the central and peripheral mechanisms of sensitization and activation of nociceptors leading to a lower threshold of pain perception in this form of cephalgia remain insufficiently studied. The majority of authors believe that the underlying factors for the development of Cephalgia are chronic emotional stress, personality features, among which the role of depression is widely discussed, as well as the presence of pericranial muscle dysfunction, which supports chronic pain syndrome (Pfaffenrath V., 1993; Bendtsen L., 1996; Vasiliev V.N., 2000; Bendtsen L., 2002; Mular A.G. et al., 2005; Danilov A.B., 2007). The significance of sex hormones on the formation and development of HEA has been recently considered (Zaichik A.Sh., Churilov A.P., 2007; Litvitsky P.F., 2009; Savelyeva G.M. et al., 2009; Radzinsky V.E. et al., 2010). Certain influence on painful sensations has an imbalance, especially female sex hormones. Their excess reduces the analgesic effect. For example, in the course of the experiments it was found that prior introduction of estradiol to rats against the background of ovariectomy reduces analgesia analgin and promedol (Ovsyannikov V.G., 1990). The theory of the development of GOLF as a result of changes in the secretion of sex steroids by the ovaries (excessive secretion of estrogenic hormones) is proposed (Frank MM, Lawlcy T.J., 1994). At the same time some authors note a decrease in estradiol and progesterone in the luteal phase of the cycle in women with cephalgia (SV Apresyan, 2009; Galstyan G.R. et al., 2009; Dobrohotova Yu. E., 2009; Smirnov AP, 2009; Barinov V.V. et al., 2010). In this regard it is important to study the hormones of the pituitary-ovarian and pituitary-adrenal bark axes and the psychological status in women of reproductive age with head diseases not only from the position of increasing the understanding of the pathogenesis of HEAD DISEASES. Studying the problem of migraine, in the complexity of etiopathogenesis and the presence of various theories regarding the formation of its complicated forms: the biochemical theory, which states the hypoactivity of cell membranes, due to decreased serotonin levels in the blood, which causes the pulsating Headache. The prevalence of migraine attacks in women states the opposite - a change in plasma estrogen levels increases serotonin content (Sanayeva M.J., 2020). The results of studies devoted to the immunological aspects of M and Cephalgia are varied in the data obtained (Mueller L. et al., 2001; Munno I. et al., 2001; Empl M., 2003; Perini F. et al., 2005; Fidan I. et al., 2006; B0 S.H. et al., 2008; Bockowski L. et al., 2009). At the same time, most of them demonstrated the presence of an imbalance in the immune system in patients with primary cephalgia. The

accumulated factual material shows that the main efforts of the researchers were focused on the analysis of laboratory parameters rather than on the evaluation of clinical manifestations of immunopathology. The prevalence of immune system disorders in patients with different courses of primary headaches remains insufficiently studied. Only single works contain clinical and immunological comparisons, the significance of immunopathology for cephalgia progression is not defined (Kazmirchuk V.E., Maltsev D.V1, 2009; Sarchielli P. et al., 2006).

Only a few authors over the past decade have tried to summarize the available data and evaluate the influence of immunity factors on the development of primary headaches (Kemper R.H. et al., 2001; Bruno P.P. et al., 2007). Such an analysis was performed exclusively for migraine and did not address other cephalgia variants.

Headache and migraine, are closely related to hormone levels. That is why women suffer from it more often than men (about 3 times) (1, 6, 10, 15, 18, 16, 4, 8, 13). Some women forget about the discomfort with the onset of menopause, while others, on the contrary, learn about it or experience more pronounced attacks than before. It should be understood that migraine has a lot of accompanying symptoms, with such a headache patients also complain of sensitivity to light, nausea, vomiting, a general decrease in the quality of life. This reduces the ability to work, does not allow to fully rest, communicate with loved ones (2, 5, 7, 9, 3, 11, 14, 17, 12). Often physiological problems are followed by emotional problems. A woman becomes depressed, irritable, unable to concentrate, unable to solve simple tasks that previously took a minimum of time. It should be noted that the number of research works devoted to migraine is small, the study mainly focused on patients within the group of menstrual-associated migraine, there was no comparison of the clinical course of the disease in patients with different migraine subtypes (true menstrual migraine (IMM) menstrual-associated migraine (MAM), nonmenstrual migraine (NM)). Thus, headache in women is associated with many factors, which creates the need to create a unified diagnostic algorithm and optimize treatment depending on the results obtained, the relevance of this problem is undoubted and needs to solve many problems.

Study objective: To study electroencephalographic findings in women with tension headache and migraine without aura.

Material and methods of the study.

The study included 89 women who were treated, inpatient treatment in the City Hospital, Department of Neurology and private clinics in Karshi, for the period 2021-2023. The entire main group was divided into two subgroups - 50 of which had a diagnosis (according to the International Headache Classification Type 3 2018), headache directed migraine without aura. The age of the patients ranged from 25 to 45 years, mean age 33 ± 1 years. Exclusion criteria, were severe somatic, gynecological, psycho-neurological diseases identified during the initial examination and diagnosis phase. In addition, 26 healthy women without headache, selected during preventive examination in urban polyclinics, were included for purity of evidence study.

Study methods included, clinical and neurological examination in the dynamics before and after treatment. To assess the character of headache, the patients filled out a questionnaire, adolescent description of headache attacks (frequency, localization, intensity). Assessment of pain intensity was assessed by standard visual analogue scale (VAS), and by the McGill questionnaire. Electroencephalography was preferred among neurophysiological methods of investigation, before and after treatment. Statistical evaluation of the results of the study was performed on an individual computer, with a standard package of deviation and correlation criteria used Spearman, Mann-Whitney, where $p < 0.05$.

Results of the study. According to the anamnesis and completed questionnaire-questionnaire, the duration of disease, headache in the examined women was distributed as follows: from 1-2 years in 10%; 2-3 years in 15%; 3-5 years in 26%; pain of 5 years in 49%. According to the nature of clinical signs of headache.

In patients with migraine without aura, the presenting headache complaints were with characteristic throbbing pain, nausea and vomiting, in some cases accompanied by light or sound phobia. At the same time, patients with headache were diagnosed (according to the international classification) on the basis of headaches with episodic or chronic frequency, besides the main complaints presented, the intensiveness of the headache was determined with the help of scales - questionnaires, patients were subject to palpation, to detect the direction and soreness of the muscles. So the intensity of headache according to the HACS was 50 points on the average. Assessment of clinical and neurological symptoms revealed pericranial muscle tension in patients with Headache, it should be noted that the number of Headache attacks in patients with chronic character, the number of attacks varied up to 2 days a week (in patients with the duration of the disease more than 4 years). The duration of the course of headache was significantly longer in female patients compared with migraine without aura.

The comparison of changes on EEG between subgroups showed that the 2-rhythm was significantly less frequent in comparison with the group of healthy people without headache: the 2-rhythm was seen in 78% of patients with head buln and in 70% of patients with migraine without aura (MBA); the 2-rhythm was dominant but in comparison with HC (healthy people) it had a characteristic instability in patients with head buln 53%, in patients with MBA - 80%. And women with GOBA were detected on EEG, B-rhythm in 33%, and Theta-rhythm was detected along the anterior and posterior projection zones in 21%, with diffuse bioelectrical activity detected in 40% and sharpening in the L and B-rhythmic bands in 56%. As for women with MBA, the bioelectrical activity changed with loading, especially there was an increase in the synchronous bilateral slow wave position in 33%, at the same time in the patients with BWB this increase was detected in 45%. It is important to note that the EEG reading at rest in patients with MBA was virtually unchanged from the EEG of healthy controls (Fig. 1, 2). Thus, the result of the EEG study showed common and distinguishing features between the patients with HEALTH and MBA, and distinguishing features between the healthy controls.

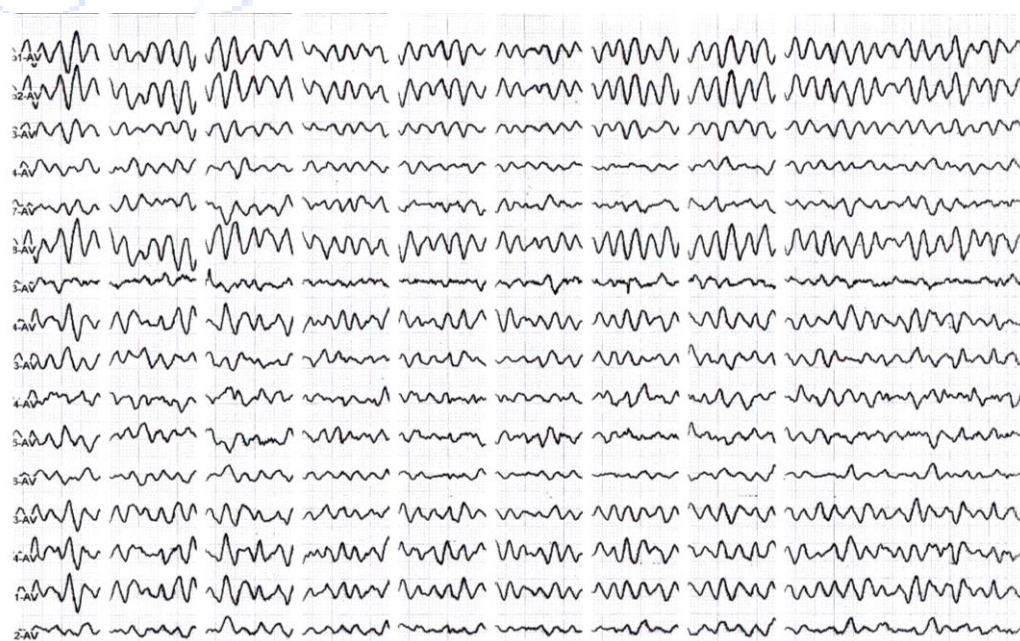


Fig. 1. Patient F., 29 years old. Migraine without aura during an attack

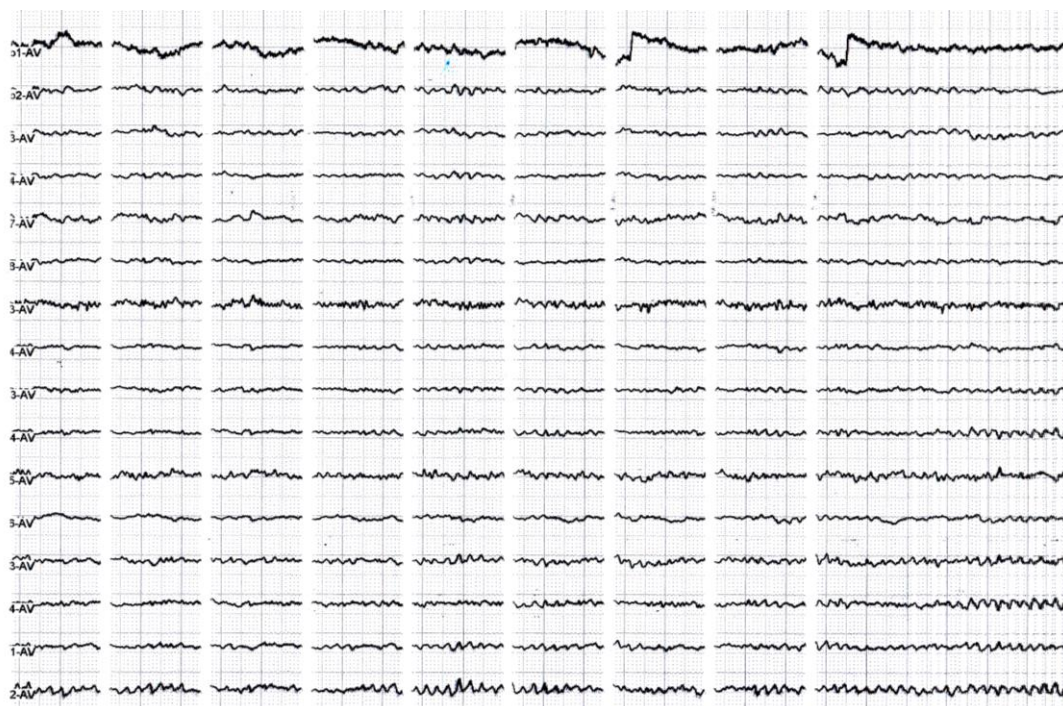


Fig. 2. Patient I., 28 years old. Interictal period of migraine without aura

A method of therapeutic exposure to electrical discharges, was used in ancient Rome. In the last century, the method of TMS in migraine therapy has not found wide application, but since 2017 there are many proven results of using TMS. Published in scientific journals, the clinical improvement was associated with increased levels of endorphins (B) in the blood; Kalita S. (2020), points to the improvement of somatosensory potentials, which changes the synchrony of the brain system and thus reduces pain. Shirshova E.V. (2021), after conducting a study, treating patients with HEALTH BOLDEN, conclude about the noticeable effectiveness of the TMC technique, in the matter of analgesic action.

The results indicate improvement of clinical and neurological signs in patients with headache, which before the treatment reduced activity and performance. Headache intensity according to the VAS, revealed a decrease in pain to 2.5 points on average in the OG. In addition, the patients had improved sleep (time of falling asleep, normalization of sleep duration, and problem-free awakening, no daytime sleepiness). During treatment (during the first TMS sessions), at repeated EEG study, L-rhythm values increased in all OS patients (up to 66 mc 2/Hz), and L-rhythm index activity increased up to 63%, which once again proves that TMS stabilizes cortical functions, with improvement of cortical and subcortical structures connections.

Conclusions: Thus, for women of fertile age with referral headache and with migraine without aura, general diffuse changes of bioelectrical activity on EEG marking them from healthy ones without headache, at the same time there are signs on EEG marking them from each other. So for patients with tension headache the high strength of diapason type, and for women with migraine without aura typical reduction of strength of alpha diapason clinical signs are accompanied by feature of parameters of bioelectrical activity, so at migraine without aura pulsating pain with a background headache, on EEG is absent, distribution of alpha rhythm; at patients with tension headache pressing nature of pain, is reflected on EEG - frontal area. Based on the EEG indices, we recommended a method of non-drug therapy for normalization of intergranular activity, in the form of transcranial magnetic stimulation. The dynamics of the EEG indices after TMS therapy indicates the effectiveness of the treatment by increasing the strength of the alpha diapason and decreasing theta diapason.

LITERATURE

1. Casula EP, Leodori G, Ibáñez J, Benussi A, Rawji V, Tremblay S, Latorre A, Rothwell JC, Rocchi L. The Effect of Coil Orientation on the Stimulation of the Pre-Supplementary Motor Area: A Combined TMS and EEG Study. // *Brain Sciences*. 2022; 12(10):1358.
2. Rajain M, Bhatia R, Tripathi M, et al. Low-Frequency Repetitive Transcranial Magnetic Stimulation for Chronic Tension-Type Headache: A Randomized Controlled Study. // *Cureus*, 2023, № 15(2): e34922. doi:10.7759/cureus.34922
3. Закирова Э.Н. Качество жизни больных мигренью и головными болями напряжения // Автореф.дис. ... к.м.н., Пермь, 2009 23 с.
4. Гаврилов Э.Л. Современные клиничко-диагностические и лечебные подходы при мигрени // Автореф. ... к.м.н., Москва, 2004, 32 с.
5. Кременчукская М.Р. Клиничко-электроэнцефалографический анализ при различных формах первичных головных болей // // Автореф. ... к.м.н., Москва, 2005, 28 с.
6. Федюнина Н.Г., Исакова О.И., Назаренко Н.В. Терапевтическая эффективность транскраниальной магнитной стимуляции при хронической головной боли дисгормонального характера у женщин пременопаузального периода // *Journal of Siberian Medical Sciences*. 2015; № 6, с. 48.
7. Поспелова М.Л., Касумова А.А., Фионик О.В., Алексеева Т.М., Самочерных К.А., Красникова В.В. Возможности применения метода транскраниальной магнитной стимуляции в лечении хронических болевых синдромов // *Современные проблемы науки и образования*. – 2021. – № 2. <https://science-education.ru/ru/article/view?id=30631> (дата обращения: 08.05.2023).
8. Беляев А.А. Исайкова Е.И. Сон А.С. Лечение мигрени методом транскраниальной магнитной стимуляции // *Международный неврологический журнал*, 2015, № 3(73), с. 85-89
9. Сорокина Н.Д., Перцов С.С., Селицкий Г.В. Нейробиологические механизмы транскраниальной магнитной стимуляции и ее сравнительная эффективность при головной боли напряжения и мигрени // *Российский медико-биологический вестник им.акад. И.П. Павлова*. 2018. Т. 26. №3. С. 417-429
10. Louise O'Hare *, Robyn Griffiths Transcranial Electrical Stimulation in Migraine – How Does It Work and What Can We Learn from It? *OBM Neurobiology* 2022; 6(4): 145; doi:10.21926/obm.neurobiol.2204145.
11. Wang H, Li B, Feng Y, Cui B, Wu H, et al. A Pilot Study of EEG Source Analysis Based Repetitive Transcranial Magnetic Stimulation for the Treatment of Tinnitus. // *PLOS ONE* 2015, № 10(10): e0139622.
12. Helling, R.M., Perenboom, M.J.L., Bauer, P.R. et al. TMS-evoked EEG potentials demonstrate altered cortical excitability in migraine with aura. // *Brain Topogr* 2023, 36, p. 269–281.
13. AbdElkader, A.A., Fahmy, E.M., Ahmad, A.A.F. et al. The efficacy of repetitive transcranial magnetic stimulation in treating patients with chronic daily headache. // *Egypt J Neurol Psychiatry Neurosurg* 2021, 57, № 21
14. Mattoo B, Tanwar S, Bhatia R, Tripathi M, Bhatia R. Repetitive transcranial magnetic stimulation in chronic tension-type headache: A pilot study. // *Indian J Med Res*. 2019; № 150(1): p. 73-80. doi:10.4103/ijmr.IJMR_97_18

15. Jurabekova A.T.; Shmyrina K.V.; Vyazikova N.F. A comprehensive approach to the diagnosis of impaired walking in patients with dyscirculatory encephalopathy. // Wor.Bul.Pub.Helt. 2023, № 19, p. 13-17.
16. Jurabekova A.T., Sanakulova D.A., Amonova Z.K. Comprehensive diagnosis of patients with post-traumatic epilepsy // CAJMNS 2023, № 04 (01), p. 168-172
17. Искра Д.А., Фрунза Д.Н., Бодрова Т.В. Транскраниальная магнитная стимуляция моторной коры при головных болях напряжения // Вестник российской военно-медицинской академии 2012, № 2(38), с. 79-83
18. Pavel Leahu, Manuel Bange, Dumitru Ciolac, Stefanie Scheiter, Alexandru Matei, Gabriel Gonzalez-Escamilla, Venkata C. Chirumamilla, Stanislav A. Groppa, Muthuraman Muthuraman, Sergiu Groppa Increased migraine-free intervals with multifocal repetitive transcranial magnetic stimulation // Brain Stimulation, 2021, № 14, p. 1544-1552

