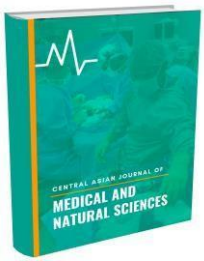

CENTRAL ASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES
https://cajmns.centralasianstudies.org/index.php/CAJMNS
Volume: 05 Issue: 03 | July 2024 ISSN: 2660-4159

Article

Study the Effect of Tumor Necrosis Factor-Alfa, Potassium and Some Physiological Parameters in People With Migraine in Samarra City

Marwa Abdall Qaddoori[1]* , Wijdan I.A. Abd-alwahab[2]

1,2 University of Samarra, Salah Al-din, Iraq
* Correspondence: eduhm230169@uosamarra.edu.iq

Abstract: The aim of the research was to find the relationship between certain physiological and biochemical variables and migraine, and to assess their impact on some physiological functions in the body. The experiment was conducted from the beginning of July 2023 until the end of October 2023. Samples were collected from outpatient clinics in the city of Samarra, where 70 blood samples were collected and divided into two groups: 30 controls and 40 patients. The results showed a significant increase in TNF-α levels in migraine patients compared to the control group, along with a significant decrease in Hb and HCT levels and an increase in potassium levels compared to the control group.

Keywords: Migraine, Tension-type headache, Headache classification

1. Introduction

Headaches are a prevalent experience for many individuals, occurring multiple times over their lifetimes. The primary indication is discomfort in the head and facial regions, with various headache classifications existing. Among these, tension headaches are the most frequently encountered. While the majority of headaches are benign, specific types may indicate underlying serious conditions(1). Headaches are categorized into two main types: primary and secondary. Primary headaches involve the headache itself as the primary disorder, such as migraine, tension-type headache, and cluster headache. Conversely, secondary headaches occur as a symptom of an underlying condition, such as toothache, subarachnoid hemorrhage, or brain tumor. During migraine diagnosis, physicians typically rule out any secondary causes for the patient's headache. Furthermore, they assess if the patient might be experiencing another primary headache, such as tension-type headache(2). Migraine stands as a multifaceted neurological disorder ranked by the World Health Organization as the seventh most incapacitating ailment globally, and the fourth among women. It holds the title of being the most prevalent neurological condition worldwide, impacting around 12-15% of the population. While it spans across all age demographics, it exhibits a higher prevalence among women, occurring thrice as often as in men, with a notable genetic influence.,(3)While certain individuals may encounter merely one or two occurrences annually, others endure frequent or weekly bouts of the condition,(4). Migraine commonly manifests as a throbbing headache affecting one side, coupled with heightened sensitivity to light and sound, along with feelings of nausea, vomiting, and occasionally diarrhea and disorientation. In rare

Citation: Marwa abdall qaddoori, Wijdan I.A. Abd-alwahab. Study the Effect of Tumor Necrosis Factor-Alfa, Potassium and Some Physiological Parameters in People With Migraine in Samarra City Central Asian Journal of Medical and Natural Science 2024, 5(3), 789-794.

Received: 17th June 2024
Revised: 19th June 2024
Accepted: 21th June 2024
Published: 02th July 2024

instances, temporary paralysis and speech difficulties may arise. The duration of migraine attacks can range from four to 72 hours. (5) Migraine with aura, referred to as classical migraine, is defined by visual disruptions during the aura phase, impacting approximately 20% of those with migraines. Both common migraine (migraine without aura) and classical migraine may include symptoms like nausea, vomiting, diarrhea, confusion, and, in rare instances, temporary paralysis and speech impairment. Sensitivity to light, noise, and intense smells is also commonly encountered during migraine episodes.,(6). Despite being highly prevalent, migraine remains a condition that is not fully comprehended and is frequently misdiagnosed, leading to frequent delays in accurate diagnosis. Apart from its personal impact on quality of life, migraine can also exert repercussions on familial and interpersonal relationships.(7). The length and recurrence of migraine episodes can profoundly influence an individual's daily functioning, potentially impacting their income and opportunities for career progression.,(8). Migraine, tension-type headache (TTH), and chronic migraine (TM) are prevalent and incapacitating conditions. While prevalence rates may differ globally, population-based studies among adults typically adhere to the revised criteria outlined in the International Classification of Headache Disorders,(9). The approximate prevalence rate of overall headache stands at nearly 46%, with migraine affecting around 11%, tension-type headache (TTH) impacting nearly 42%, and chronic daily headache accounting for 3%. Transformed/chronic migraine is estimated to have a prevalence rate of approximately 2%.,(10Headache disorders rank among the top ten most debilitating conditions for both genders, and they are listed among the top five most disabling conditions specifically for women.,(11)Delayed diagnosis is frequent because of delays in referrals to specialized consultants or headache clinics. (12While the majority of patients utilize medications for preventing and alleviating migraine headaches, the effectiveness of treatment varies, suggesting an overall lack of control over the condition.,(13).

Migraine headaches can arise from a multitude of triggers, including stress, irregular eating habits or insufficient food consumption, specific food items such as those containing caffeine, tyramine, alcohol, and monosodium glutamate, disruptions in sleep routines, hormonal fluctuations, excessive physical or mental strain, intense emotions like anger and sadness, environmental factors like loud noises, bright lights, and potent smells, as well as oppressive weather conditions such as extreme heat or cold, strong winds, and climatic changes. Additionally, obesity heightens the risk of transitioning from episodic migraine to chronic migraine. (14).

2. Materials and Methods

Study design

Samples were collected from outpatient medical clinics in Samarra city, from July 2023 to October 2023. The study included 70 individuals of both genders, males and females, aged between 20 and 40 years. They were divided into two groups as follows: 30 healthy samples (control group) and 40 samples of individuals with the condition.

Physiological and biochemical test:

A range of physiological and biochemical parameters were measured and included for the studied groups.

a. Determination of Tumor Necrosis Factor -ALFA

   A range of German manufacturing companies' products were used to conduct analysis using an ELISA device to determine TNF-α levels through immunoassay techniques using antibodies directed against various carriers on the antigen molecules.

b. Determining the potassium concentration in serum:

The concentration of serum potassium level was measured by the use of the ready-made potassium determination kit from the French manufacturer Biolabo, and potassium is spectrally determined by the kinase pyruvate assay system using potassium-based kinase pyruvate. Potassium is spectrally determined using kinase pyruvat. Pyruvate Kinase and Pyruvate are added to the sample(15). This enzyme Kinase responds to potassium and converts pyruvate into an active compound known as potassium-dependent Pyruvate Kinase phosphatase. NADH is then added to

Group	TNF-α	Potassium
Migraine	525.011±48.714	3.89±0.313
Control	105.027±11.860	3.460±0.224
Sig	0.000	0.000

the sample. This compound acts as an oxidant and reacts with the last enzyme to convert it into lactate and NAD+H+.

Determining the blood standards concentration in serum:

Taking blood drawn from a vein and keeping it in tubes containing anticoagulant (EDTA), the sample was shaken to prevent coagulation, and then placed in a rotator device for the purpose of mixing the sample completely, until the samples were examined by the device, where 1.5 ml of venous blood was placed in the device after providing the device with the patient's private information such as name, gender and age, and then the device read the required samples accurately and recorded the results.

Statistical analysis

Statistical analysis was performed utilizing a t-test at a significance level of 0.05, which involved comparing the means between two distinct groups.

3. Results

The results shown in Table (1) indicate a significant elevation ($P<0.05$) in TNF-a concentration in the migraine group with a mean of (525.011±48.714), which is higher compared to the control group (105.027±11.860). As for GABA, there is a significant increase ($P<0.05$) in the migraine group with a mean of (3.89±0.313), which is higher compared to the control group (3.460±0.224).

Table 1. Hb and HCT concentration in the studied groups.

Group	Hb	HCT
Migraine	12.647 ± 1.380	38.860±3.895
Control	13.313 ± 1.264	41.216±5.295
Sig	0.042	0.035

The findings presented in the table (2) The results depicted in the table reveal that the Hb concentration in the control group is notably elevated ($P<0.05$), with a mean value of (13.313 ± 1.264), in contrast to the migraine group (12.647 ± 1.380). Likewise, the iron concentration in the control group exhibits a significantly higher level ($P<0.05$), registering a mean of (41.216±5.295), compared to the migraine group (38.860±3.895).

Table (2) TNF-α and Potassium concentration in the studied groups.

4. Discussion

The present research has demonstrated a notable rise in TNF-α concentration among individuals with migraines in comparison to the control group. Inflammatory reactions in the body have been shown to contribute to the development of migraines (16), the molecule TNF-α, which causes inflammation, has attracted considerable attention. This versatile cytokine is a crucial part of the inflammatory mix released by microglia and stimulates a variety of inflammatory responses. (17). Microglia secrete TNF-α when activated by histamine and serotonin. Variations in TNF-α levels among individuals can significantly increase the risk of migraine susceptibility and severity. (18). The aim of this review is to gain a deeper understanding of migraines as an inflammatory neurological disorder, with a focus on TNF-α as an example. Obviously, inflammation is a broad topic that cannot be covered in one article. TNF-α is just a small part of the inflammatory response, yet it plays an important role that cannot be ignored (19). TNF-α plays a role in neuronal sensitivity by modulating the interaction between sensory neurons and resident glial cells (20). Chronic central nervous system inflammation is defined as a response triggered by events like the collapse of the blood-brain barrier (BBB), which activates immune cells in the brain, including microglia and astrocytes. (21) This activation results in the release of nitric oxide, glutamate and inflammatory cytokines. TNF-α is a prime example of these inflammatory cytokines, initiating inflammation and helping to maintain the body's balance. (21) It is undeniable that an excess of TNF-α can pose a significant threat to the body, potentially leading to various disorders. Because of its pivotal role in inflammation, it has been investigated for decades as an important molecule in this process, (22).Potassium showed a decrease in the infected group compared to the control, and the study agreed with (23) The relationship between potassium and migraines was observed as follows:,

Migraine is a primary headache disorder that is considered the leading cause of years of living with disability in individuals under the age of 50. The pathogen of migraines is complex and may involve several molecules with different signaling pathways. Recent studies suggest that potassium channels, mainly ATP-sensitive potassium channels and large potassium channels (BKCa), are involved in initiating migraine attacks. Basic research has shown that stimulation of potassium channels activates and stimulates trigeminal neurons. Clinical trials have shown that eating potassium channel openings causes headaches and migraine attacks associated with dilated vertical arteries. The present review highlights the molecular structure and physiological function of KATP and BKCa channels, provides recent insights into the role of potassium channels in the pathophysiology of migraines, and discusses the potential complementary effects and correlation of potassium ducts in initiating migraine attacks, (24). In addition, internal molecules involved in migraines, such as calcitonin-linked peptide (CGRP) and pituitary cyclase-activated peptides (PACAPs), rely on the activation of ion channels, in particular potassium channels (Christensen et al., 2020). Large calcium-activated potassium channels (BKCa) are expressed in migraine-related structures, such as the cranial arteries, trigeminal ganglion, and trigeminal spinal nucleus. These channels play an important role in vascular tension and excitability of nerve cells. In addition, BKCa channels are molecules in migraine signaling pathways that are activated by several compounds known to trigger migraines, such as calcitonin-linked peptide (CGRP), pituitary cyclase-activated peptide (PACAP) and glyceryl trinitrate (GTN). If the BKCa channel could be a potential new target for migraine treatment. Hence, randomized clinical studies and placebo-controlled control are needed to evaluate the effectiveness of BKCa channel openings or blockers in migraine patients (24). Through the study of the (CBC) test, the results showed that there were no

significant differences between the healthy and infected group, except for the HB and HCT variables. The results of the study agreed with the study of(25), as it was found that there is an association between increased migraine symptoms and low hemoglobin levels in the body, and this may be attributed to iron deficiency, which leads to many biochemical, physiological and morphological changes before the appearance of the traditional signs of anemia caused by low hemoglobin levels. It is worth noting that low hemoglobin levels can increase migraines, as the lack of oxygen that results from low hemoglobin may cause blood vessels in the brain to dilate, leading to migraine seizures. Studies suggest an association between iron deficiency anemia and increased frequency and severity of migraine attacks (27).regarding HCT ،The study agreed with (28), as it was found that there is a decrease in the proportion of red blood cells in the blood in those affected compared to healthy people, and the reason for this may be due to several factors, including lack of oxygen because there is less red blood cells to carry oxygen to tissues, including the brain, and that lack of oxygen in the brain can be a trigger for migraine attacks, as well as low hematocrit can lead to a general impairment in blood circulation, which may Migraines can be associated with physical and psychological stress, which in turn may affect the production of red blood cells in the body (29).

5. Conclusion

We conclude from the current study that high k+ and TNF-α along with low Hb and HCT can be considered indicators of migraine.

REFERENCES

1. AHMED, Fayyaz. Headache disorders: differentiating and managing the common subtypes. British journal of pain, 2012, 6.3: 124-132.
2. Al-Karagholi, M. A. M., et al. "The K ATP Channel in Migraine Pathophysiology: A Novel Therapeutic Target for Migraine." The Journal of Headache and Pain, vol. 18, 2017, pp. 1-9.
3. ALKARRASH, Mohamad Shadi, et al. Migraine and tension-type headache among undergraduate medical, dental and pharmaceutical students of University of Aleppo: A cross-sectional study. BMJ neurology open, 2021, 3.2.
4. Amiri, P., et al. "Migraine: A Review on Its History, Global Epidemiology, Risk Factors, and Comorbidities." *Frontiers in Neurology*, vol. 12, 2022, article 800605.
5. AMIRI, Parastoo, et al. Migraine: a review on its history, global epidemiology, risk factors, and comorbidities. Frontiers in neurology, 2022, 12: 800605.
6. BARANESS, Leeran; BAKER, Annalee M. Acute headache. 2020.
7. Bartley, J. "Could Glial Activation Be a Factor in Migraine?" Medical Hypotheses, vol. 72, no. 3, 2009, pp. 255-257.
8. Berry, M. N., Mazzachi, R. D., Pejakovic, M., and Peake, M. J. (1989). Enzymatic determination of potassium in serum. Clinical chemistry, 35(5), 817–820.
9. Bruno, P. P., et al. "An Overview on Immune System and Migraine." European Review for Medical & Pharmacological Sciences, vol. 11, no. 4, 2007.
10. BUSE, Dawn C., et al. Life with migraine: effects on relationships, career, and finances from the chronic migraine epidemiology and outcomes (CaMEO) study. Headache: The Journal of Head and Face Pain, 2019, 59.8: 1286-1299.
11. Edvinsson, L., Haanes, K. A., and Warfvinge, K. "Does Inflammation Have a Role in Migraine?" Nature Reviews Neurology, vol. 15, no. 8, 2019, pp. 483-490.

12. Franceschini, A., et al. "TNFα Levels and Macrophages Expression Reflect an Inflammatory Potential of Trigeminal Ganglia in a Mouse Model of Familial Hemiplegic Migraine." PloS One, vol. 8, no. 1, 2013, pp. e52394.
13. Frank, F., et al. "Migraine and Aura Triggered by Normobaric Hypoxia." *Cephalalgia: An International Journal of Headache*, vol. 40, no. 14, 2020, pp. 1561-1573.
14. GLOVER, Patrick A., et al. Treatment of migraine in patients with CADASIL: A systematic review and meta-analysis. Neurology: Clinical Practice, 2020, 10.6: 488-496.
15. Hamad, N., Alzoubi, K. H., Swedan, S. F., Khabour, O. F., and El-Salem, K. "Association between Tumor Necrosis Factor Alpha and Lymphotoxin Alpha Gene Polymorphisms and Migraine Occurrence among Jordanians." Neurological Sciences, 2021, pp. 1-6
16. Kalliolias, George D., and Lionel B. Ivashkiv. "TNF Biology, Pathogenic Mechanisms and Emerging Therapeutic Strategies." Nature Reviews Rheumatology, vol. 12, no. 1, 2016, pp. 49-62.
17. LEMPERT, Thomas, et al. Vestibular migraine: diagnostic criteria (update). Journal of Vestibular Research, 2022, 32.1: 1-6.
18. MARTIN, Vincent T.; FEOKTISTOV, Alexander; SOLOMON, Glen D. A rational approach to migraine diagnosis and management in primary care. Annals of Medicine, 2021, 53.1: 1969-1980.
19. Odeh, M. *Prevalence of Iron Deficiency Anemia among School Children in Salfeet District*. Doctoral dissertation, 2006
20. PERES, Mario FP; GONÇALVES, Andre Leite; KRYMCHANTOWSKI, Abouch. Migraine, tension-type headache, and transformed migraine. Current Pain and Headache Reports, 2007, 11.6: 449-453.
21. RATTANAWONG, Wanakorn; RAPOPORT, Alan; SRIKIATKHACHORN, Anan. Neurobiology of migraine progression. Neurobiology of Pain, 2022, 12: 100094.
22. Sari, U. S., and Ö. Kama Başci. "Association between Anemia Severity and Migraine in Iron Deficiency Anemia." *European Review for Medical and Pharmacological Sciences*, vol. 28, no. 3, 2024, pp. 995-1001.
23. SCHWEDT, Todd J. Chronic migraine. Bmj, 2014, 348.
24. SHANKAR KIKKERI, N.; NAGALLI, S. Migraine with aura. StatPearls Treasure Island (FL) StatPearls Publishing, 2022.
25. Soveyd, N., et al. "Molecular Mechanisms of Omega-3 Fatty Acids in the Migraine Headache." Iranian Journal of Neurology, vol. 16, no. 4, 2017, pp. 210.
26. Sudershan, A., et al. "A Comprehensive Investigation of Risk Association Between the-786 T> C,+ 884 G> A, VNTR, rs743506, rs3918226 of eNOS and Susceptibility of Migraine: An Updated Meta-Analysis Utilizing Trial Sequential Analysis." Journal of Molecular Neuroscience, vol. 73, no. 11, 2023
27. Taheri, Mohammad, et al. "Differential Expression of Cytokine-Coding Genes among Migraine Patients with and without Aura and Normal Subjects." Journal of Molecular Neuroscience, vol. 71, 2021, pp. 1197-1204.
28. WÖBER, Christian; WÖBER-BINGÖL, Çiçek. Triggers of migraine and tension-type headache. In: Handbook of Clinical Neurology. Elsevier, 2010. p. 161-172.
29. WONGSIRIROJ, Siriporn, et al. Management of migraine and the accessibility of specialist care: findings from an extended multinational survey (my migraine center survey). Neurology and Therapy, 2020, 9: 551-565.