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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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IMPLEMENTING NEW TECHNIQUE TO EVALUATE COGNITIVE FUNCTION IN PATIENTS WITH MIGRAINE DURING THE ATTACK

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Abstract.

Background: Ten to 12 percent of the adult population globally suffers from migraine, which is the second most frequent type of primary headache, according to the American Academy of Neurology. Even though pain and attack-related impairment scored first, cognitive symptoms were the second most common. **Objectives:** The current study intended to measure the latency of P300 wave during and after an acute attack of migraine among a group of patients known to have migraine in order to introduce an objective method to measure the cognitive function of migraineurs during migraine attack.

Patients and Method: This is a potential cohort study conducted at the neurological outpatient's clinics of Basra hospitals to the period from January until August 2021. The total number of subjects included in the study were forty-eight (48), thirty (30) patients and eighteen (18) age and gender matched control subjects. Patients were examined and selected by senior neurologist and diagnosed as having common migraine, then refereed to the neurophysiology clinic to perform cognitive function tests, for each patient two tests were done; first one during the acute migraine attack and second one after one month far ahead from the end of the migraine attack. In addition, one cognitive function test was done for the control group.

Results: We discovered a highly important variance of the mean P300 latency of the patients during the acute attack of migraine as compared to the same group of the patients after repeating the exam one month far ahead from the end of the last migraine attack and one week ahead of being medication free. Also, we found the mean P300 latency of the patients during the acute attack of migraine is significantly higher than the mean P300 latency of the control subjects (P. value <0.00).

Conclusion: We found that all migraineurs in our study are having higher P300 latency values than control group during moderate migraine attack and this difference was significant which indicates that during moderate migraine attacks there is obvious impairment of cognitive performance abilities of those patients.

Key words. Migraine, cognitive functions, P300 test.

Introduction.

MIGRAINE is the second most common type of primary headache in adults, with a worldwide prevalence of 10 to 12 percent in adults, according to the World Health Organization [1]. Headaches and neurological care center's witness a high number of persons suffering from migraine, which is a distressing ailment [2].

In addition to physical symptoms, migraine sufferers frequently report difficulties with their mental health, particularly in the areas of attention and memory. A lot of studies have looked into the cognitive problems that migraine sufferers experience [3].

In comparison to the general population, migraine sufferers are more prone to suffer from a decline in cognitive ability. The cognitive impairment experienced by migraine sufferers, particularly in the areas of focus and memory, is a common complaint. Although this is the case, cognitive symptoms are not considered to be a component of migraine's core symptomology. During the premonitory and headache stages of a migraine episode, recurring mental symptoms occur, which may linger until the postdrome stage of the disease [4].

Migraine sufferers may also encounter cognitive difficulties that are unrelated to the occurrence of migraine attacks. Acute assault therapies are not usually effective in alleviating cognitive difficulties. Aside from physical disability, migraine attack-related disability is compounded by cognitive dysfunction, including executive function impairment [5].

In fact, cognitive symptoms were rated second only to pain in terms of intensity and attack-related handicap, making them a significant target for migraine management strategies [2]. Increased levels of attack-related impairment were compounded by lower cognitive function in the aftermath of the attack. As the severity of a migraine headache grows, it is predicted that cognitive decline will occur. This is frequently associated with heightened emotions of melancholy and worry, as well as a lack of restful sleep, among other things [3,6-10].

Summarizing, cognitive function can be characterized as the ability to utilize and integrate core capacities such as perception, language acquisition and expression as well as actions, memory, and thinking. There are several definitions of cognitive function, as well as numerous mental tasks that fall under its purview [11]. It took several years before computer techniques were created that allowed researchers to analyze information processing in the human brain at a physiological level. Detecting event related potentials (ERP), a small phasic brain potential associated with information processing and connections in the brain, can be done non-invasively using a non-invasive technique [12,13].

The most prominent and reproducible waves gained from these potentials called P300 latency wave.

In our study, we have focused to measure the latency of the P300 wave during and after an acute attack of migraine among a group of patients known to have migraine to introduce objective evidence to measure the cognitive function of migraineurs during their acute attacks in order to test their subjective impairment of cognition that are reported repeatedly by those patients.

In addition, we might implement the use of P300 test as a routine test to those patients that are having migraine and state to have cognitive impairment and follow their response to treatment weeks or months later.

Methodology.

This is a prospective cohort study conducted at the neurological outpatient's clinics of Basra hospitals to the period from January until August 2021.

patients who presented with a headache attack were examined by a senior neurologist who diagnosed them with common migraine and determined that they were experiencing a migraine attack based on the diagnostic criteria of the International Classification of Headache Disorders [14], which are as follows:

A. A minimum of five attacks that meet the requirements B-D

B. Headache bouts that last between 4 and 72 hours (untreated or unsuccessfully treated)

C. At least two of the four traits listed below are present in the Headache :

1. unilateral.
2. pulsating nature.
3. the intensity of moderate to severe pain
4. aggravation caused by or resulting in avoidance of regular physical activity (eg, walking or climbing stairs)

D. During headache at least one of the following exist:

1. nausea and/or vomiting
2. photophobia and phonophobia

We included 30 patients in our study, 12 males and 18 females, all of them had been selected according to the following inclusion criteria:

1- Has a common migraine.
2- Migraine duration between 1-5 years.
3- Age between 30 and 50 years.
4- Graduated from a collage.
5- No clinical evidence of tension component.
6- No other chronic diseases like hypertension or DM.
7- No present or past history of epilepsy.
8- Not on chronic drug use of any type including prophylactic anti migraine drugs.
9- Not on analgesic drugs for the last 6 hours.
10- Normal brain MRI at time of study.

After patients consent obtained to participate in the research, they were referred to the neurophysiological clinic to perform cognitive function test (P300). First, they fill a questionnaire including name, age, sex, address, email or telephone number, duration of illness and present and past medical and surgical history, then cognitive function test done. Patients were instructed to complete a computerized cognitive test while they were symptomatic.

Patients performed first P300 test during acute attack of migraine without using analgesia for at least six hours, and usually those patients come during migraine attack before using analgesic drugs or they already used some analgesic drugs during previous days but without benefit. We chose those patients with moderate severity attack, and we avoided those with mild attacks or those with severe attacks that need immediate treatment. In addition, we stopped the test and excluded patients that could not tolerate headache pain during the test and gave them analgesia.

We assessed the severity of the migraine attack depending on the assessment of the severity of pain according to 0-10 numerical scale, and we chose those patients with pain scale from 4-6 at time of presentation [14]. But because the pain of migraine attack sometimes is rapidly changing so we stopped the test for those patients that developed more pain severity during the test.

To test for migraine risk, we performed the P300 test to 18 healthy volunteers, seven males and eleven females, using the identical inclusion criteria as above, except that they were not migraineurs.

A computerized Nihon Khoden EMG/EP Neuropack X1-JB2300 system was used to evaluate the P300 evoked response for the cognitive function test (P300). In addition, a 120cm cable and a touch proof connector were used to connect an auditory stimulation system (Agcl) to cup surface electrodes (Agl) (ELTPCO).

After properly cleaning the electrodes with rectified spirit, they were placed to the scalp. In accordance with the 10-20 global system of EEG electrode placement, electrodes were inserted in the Fz, Cz, and Pz regions using EP (MT60) adhesive paste paste. Two linked mastoid process electrodes (M1 and M2) offer reference electrodes, while a forehead (FPz) process electrode provides a ground electrode. For aural stimulation, a headphone with a minidin connector (EPCAP mini) was used that had been calibrated (see Figure 1) [15].

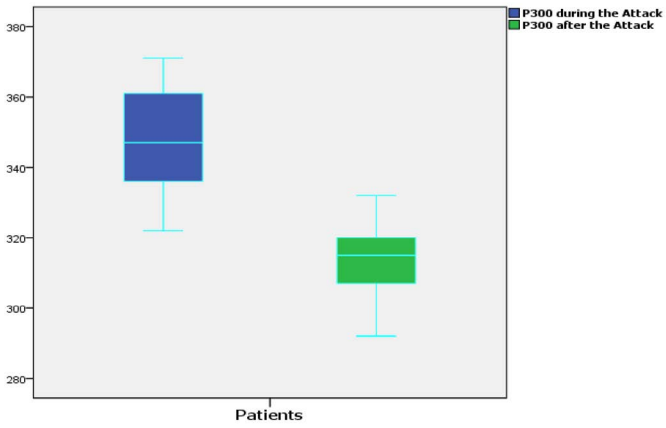

Figure.1. *Shows the mean P300 latency of patients during the acute migraine attack and one month later after being migraine attack free.*

Auditory discrimination tasks based on the "Odd Ball" paradigm were used to collect event-related potentials.

Non-target (frequent 1000Hz tone) and target (frequent 3000Hz tone) tones were transmitted through a headphone binaurally (non-frequent 2000Hz tone). Target tone: 85db, non-target tone: 70db, with a rise/fall duration of 10msec and a plateau period of 40msec for each. A red piece of paper on the wall was used as a reference point for the patient, who was asked to keep her eyes open and fixated on the paper. The silence was deafening, and the light was dim. For our safety, we instructed him to count the number of targets on the board in a discrete manner (infrequent tones). The first positive peak following stimulation was identified as P200, and the highest positive peak following P200 among potentials between 250 and 500 msec was identified as P300. A total of fifty trials were recorded in ten minutes total recording time due to the difficulty in maintaining subject attention for longer periods of time. To avoid subjects becoming distracted, we were able to record 50

trials in the allotted ten minutes of recording time. To ensure that the results are consistent, the test should be repeated at least twice [15]. After completing the P300 test, which took no more than fifteen minutes, the prescriptions for the patient were given to them. After at least a month without headaches, the patients were given another appointment for the P300 test [16-18].

For the second P300 test, the patient must have been free from migraine for at least a month, as well as medication-free for at least a week prior to the test, in order to be eligible to participate.

Statistical Analysis: The data analysis was carried out with the help of the SPSS version 22 (manufactured by Norman H. Nie, C. Hadlai Hull and Dale H. Bent at the university of Stanford, USA) computer tool. In each dataset, the descriptive statistics are provided as mean 2 standard deviations for all data. P300 latency was measured using an independent sample t-test to determine if there was a difference in mean P300 latency between patients and control individuals. Statistical significance was defined as a P value lower than 0.05.

Results.

The total number of subjects included in the study were forty-eight (48), thirty (30) patients and eighteen (18) age and gender matched control subjects.

Of the total number of patients twelve (40%) were male and eighteen (60%) were female. The mean age of patient group was (39.13±2.532) years which show no significant difference when compared to control groups mean age (38.61± 6.5 years) table (1).

Table 1. *Mean age of patients and control group.*

Group	Mean age±SD	P. value
Patients	39.13±2.532	0.768
Controls	38.61± 6.5	

Findings of table 2 shows no significant difference seen in P300 latency for males and female's patients during acute migraine attacks (p. value >0.05).

Table 2. *Comparison of mean P300 latency between males and female's patients during acute migraine attack.*

Patients	No.	Mean P300 during the attack (msc)	P. value
Female	18	346.28±13.70	
Male	12	348.83±14.2	
Total	30		0.625

And after one month of being free from last migraine attack the mean P300 latency still shows no significant difference between males and female's patients and the p. value were >0.05 as illustrated in table 3.

Table 3. *Comparison of mean P300 latency between males and females patients after being one month migraine attack free.*

Patients	No.	Mean P300 during the attack (msc)	P. value
Male	12	315.83±7.98	
Female	18	311.67±9.53	
Total	30		0.221

Moreover, when we compared means of P300 latency between males and females in control group we found no significant difference obtained and the P.value was > 0.05 as clarified in table (4).

Table 4. *Comparison of mean P300 latency between males and females in the control group.*

Control	No.	Mean P300 latency (msc)	P. value
Male	7	309.86±14.21	
Female	11	307.37 ± 11.71	
Total	18		0.69

However, the results in table (5) shows a highly significant difference of mean P300 latency of patients during acute attack of migraine (= 347.30±13.72) as compared to the same group of patients after repeating the P300 test for them one month far ahead from last migraine attack and one week ahead of being medication free (= 313.33±9.03), the p. value was < 0.01. This finding had been illustrated in figure (1) also.

Table 5. *Changes of mean P300 latency for patients' group during and one month after being free from last migraine attack.*

Group	No.	P300 latency during the attack (msc)	P300 latency after the attack (msc)	P.value
Patients	30	347.30±13.72	313.33±9.03	0.00

The mean P300 latency of migraine patients during acute attack of migraine were (347.30±13.72) which is higher than the mean P300 latency of control subjects (308.33±12.39) and this difference is highly significant (P.value<0.01). Meanwhile the mean P300 latency of migraine patients after being one month attack free was (313.33±9.03/ms) which show no significant difference as compared to control group (P.value>0.05) (Table 6).

Table 6. *Evaluation of mean P300 latency between patients' group - during and after being one month migraine attack free - and control group.*

Group	No.	P300 latency during the attack (msc)	P300 latency after the attack (msc)
Patients	30	347.30±13.72/ms	313.33±9.03/ms
Control	18	308.33±12.39/ms	308.33±12.39/ms
P. value		<0.01	0.113

Discussion.

In the current study, we have focused on an objective cognitive function test (namely P300 test) during migraine attack as an attempt to use this objective method to measure the cognitive function of patients during their illness. For that reason, we were highly selective in choosing patients group and control group to get more homogenous P300 readings for both patients and control groups and this is obvious from our inclusion criteria.

For example, we chose a specific age group in order to get more homogenous P300 readings by choosing age group in which the brain reaches its maximum biological development,

in addition, we chose migraine duration not too long to minimize the possible long effect of migraine on the P300 results. Also, both patients and control groups graduated from a collage to minimize the normal difference of P300 result between people [19], and so on with other points in the inclusion criteria [20].

It is clear that there is no significant difference of P300 values between males and females in both patients group (table 2 and 3) and control group (table 4). Also, there is no significant difference of P300 values between patients; out of migraine attack; and control group (table 6), and this can be attributed to our method of selection of both patients and control groups as we explained above.

During the attack of migraine, we found all patients were having P300 latency values higher than the control group and the difference was significant; as showed in table 6; and this indicate that the attack of migraine obviously affects cognitive function of patient which may affect their performance abilities during migraine attacks.

The second cognitive function test that performed for the patients showed a significant lower P300 latency value as compared with the first P300 test (table 5) and this result gives clear evidence to the impairment of cognitive function (represented by P300 latency) during migraine attack. It also points to the transient effect of migraine attack on cognitive function of our patients in the view that the second P300 test of the patients that performed to them one month after the end of migraine attack shows no significant difference when we compare it with that of the control group (table 6).

Although there are many theories behind the effect of migraine on different brain functions but the relative associated ischemia of brain secondary to vaso-spasm is still the most plausible one and it can fairly explain the results of our study regarding cognitive function test (i.e., P300 latency results) [21].

We could not assess the duration that needed to return to pre migraine attack level of cognitive function, but because in our study we found no significant difference of mean P300 latency values between patient and control group after one month from the attack; as shown in table 6; we might conclude that one month may be the maximum time that needed by migraineurs to regain their usual cognitive performance abilities after a moderate attack of migraine.

Even though we couldn't find similar studies to compare with them, we revised some other studies that used different ways to evaluate the long-term effect of migraine on cognitive function, some of them they followed migraineurs for many years [20]. In addition, others tried to know which part of cognitive function affected more by migraine [4]. In general, the vast majority of those studies estimated a clear long-term effect of migraine on the cognitive function. In our study, we did not test the long-term effect of migraine on cognitive functions, but we found that P300 return to normal in our patients; in comparism to control group; after one month from being free from the acute attack of migraine and this could be attributed to relatively short duration of migraine illness in our patients (between 1 and 5 years)

Conclusion.

There is a significant reduction of the cognitive functions of migraineurs during moderate migraine attacks and this mean that those patients should have an effective therapy and enough time for rest to regain their normal cognitive functions as rapid as possible, but whether this reduction is critical to the point that it may affect the cognitive performance of the migraineurs in doing certain activities like driving or pass in to an exam during migraine attack might need further evaluation.

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