International Journal of Research in Health and Allied Sciences

Journal home page: www.ijrhas.com

Official Publication of "Society for Scientific Research and Studies" [Regd.]

ISSN: 2455-7803

Original Research

Correlation of Visual and Brainstem Auditory evoked potentials among Migraine patients with the duration of disease

[1]Dr. Mridu Gupta, [2]Dr. Narinder Kaur, [3]Dr. Amar Jyoti, [4]Dr. Rakshanda Dhawan

[1]Prof and head, [2]Professor, [3]Associate Professor, [4]JR, Department of physiology, GMC, Amritsar

ABSTRACT:

Aim: To correlate visual and brainstem auditory evoked potentials among migraine patients with the duration of disease. **Materials & methods:** A cross-sectional study was conducted in the Department of Physiology, Government Medical College, Amritsar during the period of one year (from April 2021 to April 2022) after due approval of the ethical committee. The subjects were recruited from the Out-patient Clinic of Department of Medicine in Neurology OPD. The study group comprising of 50 Migraine patients out of which 35 were without aura and 15 were with aura of age group 19 to 52 years were selected according to International Headache Society Diagnostic Criteria for Migraine. The evoked potentials (both visual & auditory brainstem evoked potentials) were studied with duration of disease. The data was collected. The data thus obtained was analyzed and correlated using IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp. Results on continuous measurement was presented as Mean & SD and categorical as Frequency & percentage. Inferential statistics like the Mann-Whitney U test and Spearman's correlation test were applied. P <0.05 was considered statistically significant. **Results:** Among migraine patients with AURA, VEP P100 latency showed correlation with BAEP at wave V and IPL I-V. however; while correlating duration with VEP and BAEP (Left) among remaining wave forms, non-significant results were obtained; both for migraine patients with AURA and without AURA having symptoms on left side **Conclusion:** Correlation of latencies with the duration of disease showed statistical significance at wave V and IPL I-V in with aura patients.

Received: 15 Jan, 2023 Accepted: 22 Jan, 2023

Corresponding Author: Dr. Rakshanda Dhawan, JR, Department of physiology, GMC, Amritsar

This article may be cited as: Gupta M, Kaur N, Jyoti A, Dhawan R. Correlation of Visual and Brainstem Auditory evoked potentials among Migraine patients with the duration of disease. Int J Res Health Allied Sci 2023; 9(3):7- 10

INTRODUCTION

Headache is one of the most frequently encountered Neurological symptom.(1) Headache is caused by irritation of pain sensitive Intracranial structures like Dural sinuses, intracranial portions of Trigeminal, Glossopharyngeal,Vagus and upper Cervical nerves ;large arteries and venous sinuses. The structures which are insensitive to pain are Brain parenchyma, Ependymal lining of ventricles and the Choroid plexus.(2)According to the Global Burden of Disease (GBD) study, headache disorders are among the most prevalent and disabling conditions worldwide. The estimated global prevalence of active headache disorder was 52.0% (95%CI 48.9–55.4), of migraine 14.0% (12.9–15.2), of TTH 26.0% (22.7–29.5) and of H15+ 4.6% (3.9–5.5).(3) Migraine is the disorder of the brain characterized by complex sensory dysfunction.(4).It is an Episodic headache disorder and second most common type of primary headache.(2) Migraine occurs at any age either at childhood, adolescent and adult life, more common in Females than Males in the ratio of 3:1. 60% of patients have positive Family history.(5) Migraine has a great impact on mental, physical, functional and socioeconomic aspects of patient's life.(6) Migrainous have higher lifetime risk of Depressive disorder, Panic disorder, OCD, Generalised Anxiety disorder, phobias and Suicide attempts than the normal subjects.(7) Migraine is a common disabling primary headache disorder with a tremendous impact not only on professional, social and family lives but also on the economy .The Diagnosis of Migraine was based on headache characteristics and associated symptoms which is subjective.(2) Routine Clinical Examination and Testing for Visual function also appears to be normal in Migraine patients. So, Electrophysiological and

Psychophysical tests have been carried out in Migraine patients.[6] Due to frequent occurrence of visual symptoms and due to impairment of Visual processing in Migraine many studies are oriented towards evaluation of VEP changes in Migraine patients which is a simple and Non-invasive test.[8]Neuro-otological symptoms like vertigo, phonophobia, tinnitus, unsteadiness and hearing loss are also common in Migraine. There is a mild bilateral and reversible auditory & vestibular hypofunction during Migraine attack. So, BAEP can be done to assess the function of Brainstem structures traversed by auditory pathways. Brainstem auditory evoked potential (BAEP) recording is a physiological technique for evaluation of auditory pathway. The electrical activities from the activation of the eighth nerve, cochlear nucleus, tracts and nuclei of the lateral lemniscus and inferior colliculus are recorded.[9]Pattern visual evoked potentials (PVEPs) are electrical potentials that are generated by the occipital cortex as a response to a sensory stimulus. The responses obtained allow assessment of integrity and function of pathways from the eye photoreceptors to the visual cortex.[10]

MATERIALS & METHODS:

A cross-sectional study was conducted in the Department of Physiology, Government Medical College, Amritsar during the period of one year (from April 2021 to April 2022) after due approval of the ethical committee. The subjects were recruited from the Out-patient Clinic of Department of Medicine in Neurology OPD. The study group comprises of 50 Migraine patients- 35 patients migraine without aura and 15 pateints migraine with aura of age group 19 to 52 years which were selected according to International Headache Society Diagnostic Criteria for Migraine who were diagnosed as Migraine with episodes of headache for atleast 2 yrs and atleast 2 attacks per month in the last quarter year and the patients who had neurological,ophthalmic,ENT,systemic,visual & auditory diseases were excluded.Ethical committee approval was taken prior conducting the study.All the parameters (Latency & Amplitude) were recorded using EMG/EP Measuring System MEB-9400K..Electrodes were placed using 10-20 electrode placement system[11].For VEP, active electrode was placed at Oz - 10% from the inion using EEG paste,referance electrode was placed at FPz position & ground electrode was placed at vertex Cz .Pattern reversal stimuli in checker board pattern with reversal rate 2/sec , contrast 50-80 % , check size 28-32 of arc and average number of trials – 100 was shown to the patient and waveforms(N75,P100 &N145) were obtained.For BAEP Channel 1 was placed at Cz - Ai (ipsilateral ear),Channel 2 was placed at Cz - Ac (contralateral ear)& ground electrode was placed 20% from the Nasion – Fz position.[12] Auditory stimulus in the form of click sound was delivered through the headphones. Clicks were delivered at a rate of 8-10 /sec with Intensity of the stimulus set at 60db and about 100 averages were recorded and BAEP waveforms Wave I, II, III, IV & V were obtained .P100 latency was correlated with BAEP waveforms using IBM SPSS Statistics for Windows,Version 25.0. Armonk, NY: IBM Corp. Results on continuous measurement were presented as Mean & SD and categorical as Frequency & percentage. Inferential statistics like the Mann-Whitney U test and Spearman's correlation test was applied. P <0.05 was considered statistically significant.

RESULTS

While correlating duration with VEP and BAEP (Left) non-significant results were obtained; both for migraine patients with AURA and without AURA having symptoms on left side(table no. 1). Among migraine patients with AURA, VEP P100 latency showed correlation with BAEP at wave V and IPL I-V. however; while correlating duration with VEP and BAEP (Left) among remaining wave forms, non-significant results were obtained; both for migraine patients with AURA and without AURA having symptoms on left side.(table no. 2)

Table No.1: Correlation of duration with VEP and BAEP (Left)

Duration	WITHOUT AURA		WITH AURA	
	Correlation coefficient	P value	Correlation coefficient	P value
VEP P100 latency(ms)	0.119	0.497	0.113	0.689
VEP P100 Amp.(uv)	-0.286	0.096	-0.034	0.905
I	0.077	0.662	0.144	0.610
III	-0.080	0.648	0.131	0.641
V	-0.297	0.083	0.107	0.705
I-III	-0.133	0.445	-0.403	0.136
III-V	-0.075	0.667	0.068	0.809
I-V	-0.301	0.079	-0.301	0.276

Table No.2: Correlation of duration with VEP and BAEP (Right)

Duration	WITHOUT AURA		WITH AURA	
	Correlation coefficient	P value	Correlation coefficient	P value
VEP P100 latency(ms)	-0.115	0.510	0.357	0.192
VEP P100 Amp.(uv)	-0.115	0.512	-0.137	0.627
I	0.323	0.058	0.235	0.399
III	-0.155	0.373	0.042	0.882
V	-0.010	0.953	-0.526	0.044*
I-III	-0.221	0.201	-0.009	0.974
III-V	0.181	0.297	-0.009	0.974
I-V	-0.074	0.672	0.601	0.018*

* **Statistically significant (p<0.05)**

DISCUSSION

Migraine is a genetically influenced complex disorder characterized by episodes of moderate-to-severe headache, most often unilateral and generally associated with nausea and increased sensitivity to light and sound. Migraine can be classified into sub-types according to the headache classification committee of the International Headache Society. These sub-types are: Migraine without aura and Migraine with aura. The most common type of migraine is without aura (75% of cases).Migraine is highly prevalent, affecting 12% of the population, attacking up to 17% of women and 6% of men yearly. It is ranked as the second leading cause of disability worldwide. Migraine tends to run in families. There is a reported risk of 40% if one parent has a history of migraine, which increases to 75% when both parents have a migraine history.Migraine is mainly due to TVS activation generated within the brain without a peripheral sensory input. Migraine is the central sensory processing disorder, there is dysfunction of descending brainstem pain modulatory system. The hyperexcitability of the nociceptive circuitry downstream is responsible for the central sensitization in Migraine patients. Hence; the present study was conducted for correlation of visual and brainstem auditory evoked potentials among migraine patients with the duration of disease constituting 50 patients, Out of which 70 percent of the patients (35 patients) were without AURA while the remaining 30 percent of the patients (15 patients) were with AURA.While correlating duration with VEP and BAEP (Left) non-significant results were obtained; both for migraine patients with AURA and without AURA. Among migraine patients with AURA(Right), VEP P100 latency showed correlation with BAEP at wave V and IPL I-V. however; while correlating duration with VEP and BAEP (Right) among remaining wave forms, non-significant results were obtained; both for migraine patients with AURA and without AURA. In a study conducted by Khalil LM et al, Results for P100 amplitude showed that amplitude was slightly increased in the migraine group as a whole. When subjects were separated into MA and MO groups, amplitude in MO was 23% higher than in controls but in MA it was similar to controls. Amplitudes in MA were inversely correlated with duration of migraine but there was no such correlation in MO.The basis for the prolonged latencies is unclear. Kennard et al suggested that they might have a structural basis, due to ischaemic damage during repeated attacks.Thus; Migraine patients with and without aura show significant prolongation of latency in Electrophysiological studies probably due to subtle neuronal damage within the visual system especially in patients with aura due to recurrent cerebral hypoperfusion and due to cortical hyperexcitability. These findings suggest dysfunction of neuronal excitability due to defective neurotransmitter signaling and cerebral bioelectrical dysrhythmia.

SUMMARY & CONCLUSION

The present study results show that there is involvement of the central nervous system visual pathway and the brainstem structures in migraine patients. Correlation of latencies with the duration of disease showed statistical significance at wave V and IPL I-V in with aura patients. Thus, the migraine patients with and without aura show significant prolongation of latency and correlation between P100 latency and BAEP waves probably due to structural damage to brainstem and neuronal damage within the visual system especially in patients with aura due to cortical hyperexcitability. Hence, VEP and BAEP are considered as useful, non-invasive, reliable and diagnostic techniques for better understanding of the neurophysiological process involved in migraine patients which aid in the selection of adequate and effective treatment in migraine subjects.

BIBLIOGRAPHY

1. Nicholas A. Boon, Nicki R. Colledge, Brian R. Walker, John A. A. Hunter., Davidson's Principles & Practice of Medicine. 20th edition Elsevier 2008., pg..1160- 1163
2. Andreoli and Carpenter's Cecil Essentials of Medicine., Charles C.J. Carpenter, Robert C. Griggs, Ivor J. Benjamin. 7 th edition Saunders Elsevier, 2010, p: 1069-1073.
3. Stovner LJ, Hagen K, Linde M, Steiner TJ. The global prevalence of headache: an update, with analysis of the influences of methodological factors on prevalence

estimates. The journal of headache and pain. 2022 Dec;23(1):34.
4. Sprenger T, Peter J Goads by Mini review. Migraine pathogenesis and state of pharmacological treatment options. BMC Medicine 2009;
5. S N Chugh, Ashima Chugh, Textbook of Medicine for Medicine. Delhi Arya publications pg. 596 –99.
6. Khalil NM, Legg NJ, Anderson DJ. Long term decline of P100 amplitude in migraine with aura. Journal of Neurology, Neurosurgery & Psychiatry. 2000 Oct 1;69(4):507-11
7. El-Mosly L, Bayoumy A, Massoud H, Abdel-Moty M, Hafez M, Elshafie T, El Bialy R. Impact Of Migraine Headache On Quality Of Life In A group Of Female Patients Using Neurophysiological Assessment. AAMJ. 2012;10(2):1-7
8. Moghaddam AH, Syfaldiny R, Iranmanesh F, Mahadavy H. Visual Evoked Potentials in patients with Classic Migraine. ZJRMS 2013;15(4):25-28.
9. Chiappa KH, Martin JB, Young RR. Diagnostic Methods in Neurology: Disorders of Central Nervous System, in Harrison's principles of internal Medicine edited by J B Martin MC Graw-Hile, Inc. Hamburg 1987;1913- 1921
10. Whatham, A.R,Nguyen,V, Zhu,Hannessy,M,Kallomatis M, The value of electrophysiology in assessment of eye and the visual system in the era of advanced imaging. Clinical & experimental optometry, 2014,97(2),99-115.
11. Pal GK, Pravati Pal Textbook of Practical Physiology. 3rd edition 2019, p:298-303.
12. Misra UK, Kalita J. Clinical Neurophysiology Brainstem Auditory Evoked Potential.3 rd edition 2009. p:330-344.