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BLINK REFLEX IN MIGRAINE: A PROSPECTIVE STUDY IN A TERTIARY CARE CENTRE.

Neurology

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ABSTRACT

Introduction: Trigemino-vascular system is postulated to play a role in the initiation and propagation of migraine headache by sensitisation of brainstem trigeminal connections. This study was conducted to investigate the blink reflex which is a non-invasive assessment modality of the trigeminal nerve to determine its involvement in patients with migraine headache.

Aims: To investigate the involvement of trigeminal nerve in migraine patients by performing the Blink reflex test on migraine patients. Latencies recorded form the test was used to evaluate the changes in migraine patients.

Methods and Material: 50 migraine patients and 40 controls were included in the study after application of the inclusion and exclusion criteria and baseline characteristics were recorded. The study was conducted using an EMG device with blink reflex software, and blink assessment was done and latencies were recorded and analysed.

Results: On comparison of latencies between the control and the patient groups, significantly prolonged latencies were observed in the R1 and R2 recordings of migraine patients ($p<0.005$). There was no statistically significant correlation between the recorded latencies and age, gender, attack duration and frequency.

Conclusions: As demonstrated in the previous studies, trigemini-vascular system is found to be involved in migraine patients.

KEYWORDS

Blink Reflex, Blink Reflex Recovery, Migraine, Chronic Migraine, Trigeminal System

INTRODUCTION:

Migraine is one of the most prevalent disease with high morbidity in the world, with its incidence up-to 26% in south India[1]. Diagnosis of migraine is made clinically and its pathophysiology is linked to neuronal dysfunction presently. Sensitization of trigemino-vascular system has been hypothesised to be the cause for pain felt during the initial period of migraine, and evidence for its potential subclinical continuation during interictal phase is present[2,3]. Blink reflex is a non-invasive neurophysiological test which can be used in the evaluation of trigemino-vascular system by stimulating the supraorbital nerve and evaluating the excitability of interneurons in the brainstem,its synaptic transmission function at this level and the facial and trigeminal pathways[4]. This study aims to investigate the latency prolongation in patients with migraine using the BR test.

SUBJECTS AND METHODS:

Fifty patients from the outpatient department, diagnosed with migraine without aura according to IHS classification, were included in the study after institutional ethics approval. 40 normal subjects were also included as controls. The exclusion criteria of the patients included history of pain within the last 72 hours, having another disease affecting the electrophysiological evaluations or the fifth or seventh cranial nerves, history suggestive of primary or secondary headaches or having abnormal structure of the brainstem by cranial imaging. The tests were done during the interictal (at least 7-day pain-free) period. Written and verbal informed consent were obtained from all patients along with data on gender, type of migraine, last headache attack, headache frequency and lateralisation of the headache. Test was done by using NIHON KHODEN NEUROPACK S1(NCS, EP& EMG) equipment. Patients were asked to avoid smoking, alcohol or any drug consumption, 3 hours prior to EMG recording. Patients were tested, resting on a bed or comfortable chair, relaxed with eyes closed Surface plate electrode (non-invasive), were used, with the recording electrode over the orbicularis oculi muscle, at the lower lid of the eye, the reference electrode over the nasal wings and the ground electrode between the stimulator and active electrode. Stimulation was given over the supraorbital foramen and the response elicited were early component (R1); late component ipsilateral (R2i) and late component contralateral (R2c). Responses were elicited 5 times, consecutively from both sides: Average values of R1, R2, and R2c latencies were calculated.

Descriptive results were explained using tables and Bar charts. Continuous variables expressed as mean ± standard deviation and discrete variables expressed as number (%). Data between cases and controls were analysed by paired t test, Chi-square test, ANOVA(Analysis of variance) and Pearson correlation as appropriate. A p value < 0.05 was considered statistically significant. Analysis was done by software SPSS version 17.

RESULTS:

Mean age of patients with migraine headache was 26.9 ± 6 years and the control group were 27.9 ± 5 years. Migraine headache group comprised 34 female and 16 male patients, whereas the control group comprised 28 females and 12 males. All included patients were migraine without aura patients. The mean latency of blink response of overall 50 cases obtained on right side R1(11.1±0.6); R2i (31.5 ± 2.1) and R2c (32.6±1.8) and on left side obtained were R1(11.7±0.7); R2i (33.1±2.5) and R2c (32.2±1.6).

In the patient group, the mean latency of blink response of 40 patients on the right side R1(9.9 ± 1.2); R2i (31.1 ± 1.6) and R2c (31.5 ± 2.2) and on left side obtained were R1(10.1 ± 0.6); R2i (30.1±2.5) and R2c (29.0 ± 1.6) (table 1). A statistically significant ($p<0.005$) prolongation of latencies was found between the control and the patient group for bilateral R1 latencies and left R2i and R2c latencies.

DISCUSSION:

Involvement of trigeminal nerve in in the pathophysiology of migraine has been detected in experimental studies on animals and humans[5].Recently functional imaging of the brain has also shed light on its involvement[6]. This was secondary to the understanding that the trigeminal system innervated the extra and the intracranial arteries and the nociceptive pathways[7]. Furthermore, migraine brains are postulated to be deviant from the norm in terms of functional capacity and organisation.

This study was conducted to investigate the trigeminal nerve involvement non-invasively.

Studies conducted with regards to blink reflex in migraine have priory shown differences in inference[8]. In a study by Banket al[9], 43 migraine patients and 31 healthy individuals were studied using blink reflex, and R1 latency elicited by a supraorbital stimulation did not differ significantly from those of the control group, while significantly longer R2 latencies were found in 22 (51.2%) of Migraine patients, leading to the inference that trigeminal afferents and/or polysynaptic pathways were involved in the brainstem. In a Recent study by ZynepUnal et al[10] blink reflex responses of the both sides were compared with control group, significantly longer latency were detected. They stated that predominantly prolongation of latency during ictal phase implies that brain in passing through different excitability phases and increase sensitization of trigeminal neuron during migraine attack.

In our present study, right and left sided R1 as well as R2i and R2c latency were compared with the control group, and significantly longer R1 latencies and Left stimulated R2 latencies were detected. These findings were noted in the migraine patients, who had not experienced any headache for the last one week, suggesting that trigemino-vascular dysfunction in patients with migraine headache is not a transient phenomenon. Moreover, our results conclude that latencies are prolonged in both early and late component. R1 early response is secondary to the trigeminal nerve involvement, R2i , R2c latency prolongation may be secondary to the again the delay or diminution of the impulse conduction via the trigeminal afferents. A limitation of our present study includes the fact that amplitudes of the blink reflex responses were not evaluated.

CONCLUSION:

The results obtained in blink reflex in the present study demonstrates presence of dysfunction in trigemino-vascular system or in its connections with the brain stem in patients with migraine headache and support trigemino-vascular hypothesis in migraine. This dysfunction is also present in the interictal period.

Table 1: latency responses in patients and controls after blink reflex testing

	Latency	Migraine	Control
R1	Right	11.1 ±0.6	9.9 ± 1.2
	left	11.7±0.7	10.1 ± 0.6
R2	Right R2i	31.5±2.1	31.1 ± 1.6
	Right R2c	32.6±1.8	31.5 ± 2.2
	Left R2i	33.1 ±2.5	30.1±2.5
	Left R2c	32.2±1.6	29.0 ± 1.6

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