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Blink Reflex Response in Migraine - A Clinical Study

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Abstract Blink reflex is a polysynaptic reflex. It is a non-invasive method that can provide information on peripheral and central neurological functions of trigemino-vascular mechanisms for migraine. Numbers of studies are done by the researchers of western countries on habituation responses of blink reflex and its importance in the treatment of migraine. In our study indicate the small changes in latency, amplitude and interval of blink reflex among migraine patients, but the values are not statistically significant. This may be due to a difference in the patients approach after the migraine attack to the neurology department. Most of the migraineurs are out patients, so further study on the important of blink reflex could not be done. Habituation of the trigemino-vascular system by electrical stimulation of the supra-orbital nerve is an important for bio-feedback mechanisms in controlling migraine.

Keywords *Blink Reflex, Electrical Stimulus, Migraine*

1. Introduction

In the past days, acupuncture method is used for the treatment for the migraine. The other method of treatment is by applying hot or cold water to the head and the patient is placed in a dark and quite room. In the recent days surgical treatment is used for the migraine. It is by severing corrugator's supercilious muscle and zygomatigo temporal nerve. The diagnosis of migraine is difficulty. Now-a-days electrophysiological methods are used to differentiate the neurological and vascular theories of migraine [1]. Blink reflex is a non-invasive method that can provide information on peripheral and central neurological functions of trigemino-vascular mechanisms for migraine. Numbers of studies are done by the researchers of western countries on habituation responses of blink reflex and its importance in the treatment of migraine. A Reflex is defined as an involuntary or automatic response to a threshold stimulus obtained by stimulating sensory nerve [1]. Milena De Marinis et al. stated that the R1, R2 and amplitude areas were similar in patients and controls in the basal assessment [2]. After habituation, the blink reflex responses were markedly reduced. The data suggests that the brain stem pathways involve the blink reflex may be activated in the premonitory phase of migraine attack. In the present study the R3 and R4 amplitude is more whereas R1 amplitude is less. This can be

explained that all the migraine patients are in the 3rd stage that is post dromal phase of migraine when the test is done. Other reasons are a state of hypo activity may be present in caudal trigeminal nucleus neurons in the symptomatic side [3]. It has been suggested that sensitization of the trigeminovascular system, which innervates the meanings may be responsible for pain in the initial phase of migraine. The development of alloying later in the attack has been attributed to sensitization of the central trigeminal nuclei. The blink reflex provides information on peripheral and central neurological functions [4]. In particular R2 component of the reflex reflects the excitability of brain stem interneuron and the functions of synaptic transmission in the brainstem. This component may also be influenced by abnormalities elsewhere that indirectly influence the excitability of the polysynaptic connections.

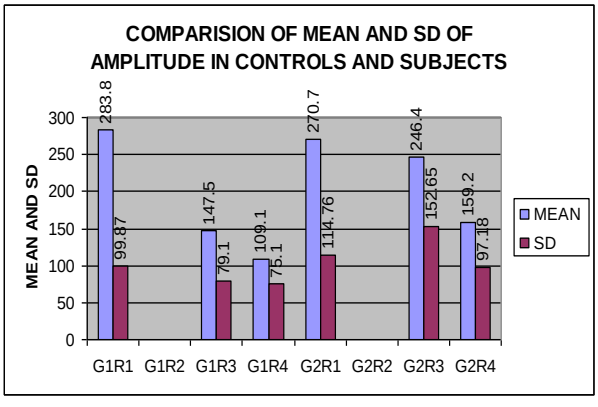
2. Materials & Methods

After attending the Neurology OP for treatment of headache, neurologists screened and identified the patients with migraine and recommended for blink reflex response as electro – physiological study. Consent is obtained from selected subjects as well as controls after explaining the test programme. The test programme conducted in the Electro physiology laboratory of Neurology department in SVIMS Hospital. A number of 10 subjects were taken up for the study by inclusion criteria of headache, Aura, vomiting and family history of migraine: smoking, alcoholism, diabetes, hypertension, diseases of 5th and 7th nerves and ophthalmic diseases were excluded in this study. The blink reflex is performed on the right side, left side and bilaterally recorded. The filter settings were between 30 to 3000 Hz, the sensitivity was 200 µvolts/division and analysis time was 200 milliseconds. An electromyography device was used to record the blink reflex.

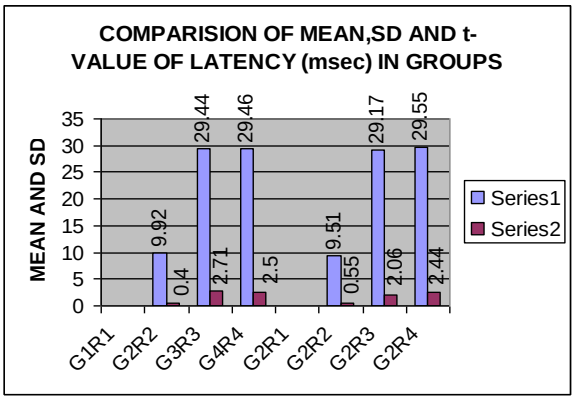
In adult subjects, the mean latency of R_1 is 10 milliseconds and that of R_2 is 30 milliseconds. R_1andR_2 are delayed with the exceed 13 milliseconds and 41 milliseconds. The difference between the two sides greater than 1.5 milliseconds for $R_1$and 8 milliseconds for R_2 should not exceed is considered as abnormal. In addition the ipsilateral and contra lateral R2 should not exceed 5 to 8 milliseconds. Amplitudes may vary considerably from one subject to the next.

Graphic recording of blink reflex responses are analyzed and calculated latency, amplitude and intervals of potential changes.

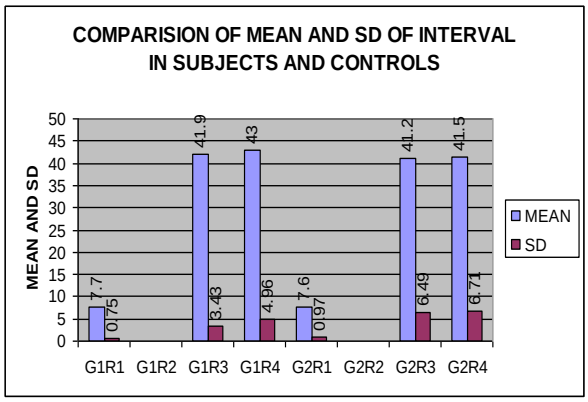
On Right Side Stimulation on Left Side Stimulation



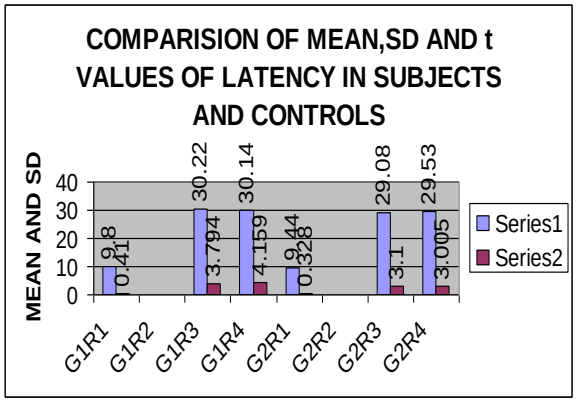
Graph 1



Graph 2



Graph 3



Graph 4

The Blink reflex is a polysynaptic reflex, the reflex is analyzed in electrophysiological studies by calculating latency, amplitude and intervals of both eyes (stimulated and non-stimulated). In the pathway the fibers cross to the opposite side and stimulate the centers in both sides. So the responses are seen in both sides with a small change. In adult subjects, the mean latency of R1 is 10 milliseconds and that of R2 is 30 milliseconds. Delayed R1 and R2 with the values more than 13 milliseconds and 41 milliseconds is abnormal, the difference between the two sides is greater than 1.5 milliseconds for R1 and 8 milliseconds for R2 is considered as abnormal. In addition, the ipsilateral and contra lateral R2 should not exceed 5 to 8 milliseconds. Amplitude may vary considerably from one subject to other [6]. Trigeminal nerve is the afferent nerve and facial nerve is the efferent path. The trigeminal nerve is also the sensory nerve for the meninges. So any change in the function of the trigeminal nerve is measured by blink reflex response. Migraine is more common in females than in males. The number of females in total number of subjects is 6. The pain is felt predominately on left side. Migraine headache has 3 phases Aura, Headache followed by Postdromal phase. All the subjects are in Postdromal phase when they enter into the electrophysiology lab. In most of the headache cases, it is of throbbing type. After the attack some patients have started medicine and attended the neurology department. Some are without taking medicine. In right side R2 is absent in both the groups. It is because the R2 component is the contra lateral response when the stimulation is on right side the values of latency on of blink reflex response are less in (R1,R3,R4) Group-II. The range of latency is 9.2 to 32.6 milliseconds. When the stimulation is on right side, and on left side it is from 8.4 to 32.6 milliseconds. These results are statistically not significant. J. Bank et al., had studies that in some migraine patients had latencies above 35 milliseconds. The R2 latency was statistically, significantly different between controls and subjects (migraineurs). (P<0.0001).Their findings indicate that the trigeminal afferents or polysynaptic pathway in brainstem may be altered in migraine.

According to T-sand and JA. Zwart, there were no R1 and R2 latency difference between the four groups. The results suggest that a state of hyper activity may be present in the ipsilateral trigeminal nucleus in cervicogenic headache patients [7]. The mean values of amplitude is more in R3 and R4 components of Group-II and R1 component is less. It is not statistically significant. These results are similar to the work done by Milena De.marinis et.al, the values range between 15µv-700µv on both sides [8]. Theodoros G. Avramidis *et al*. observed that “significant lower values of r2 and R2 amplitude and size were found in migraine group compared with healthy controls [9]. The R2 is the response on the contra lateral side. These differences were found independent of the stimulation side. The abnormalities of R2 (Ipsilateral) and R2$^{!}$ (Contralateral) amplitude and size were found only during headache, phase of migraine and it is normal in between attacks. The findings indicate that the brainstem inter neuron part of the blink reflex arc may be diffusely suppressed in migraine.

According to T-sand et al., R2 amplitude was not significantly affected in migraine. This is due to a state of hypo activity may be present in caudal trigeminal nucleus neurons in the symptomatic side.

The early response is R1 and is due to pontine reflex. R2 is the late response and is of bilateral. This is due to Brainstem interneuron's excitability conditioned by preceded by habituation.

3. Conclusion

The results of the present study indicate the small changes in latency, amplitude and interval of blink reflex among migraine patients, but the values are not statistically significant. This may be due to a difference in the patients approach after the migraine attack to the neurology department. Most of the migraineurs are out patients, so further study on the important of blink reflex could not be done. Habituation of the trigemino-vascular system by electrical stimulation of the supra-orbital nerve is an important for bio-feedback mechanisms in controlling migraine.

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