IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 14, Issue 4 Ver. VII (Apr. 2015), PP 49-52
www.iosrjournals.org

Effect of Myopia on Visual Evoked Potential

Dr. Anju Thakur Jha[1], Dr. Parveen Siddiqui Yousuf[2],
Dr. Swarna Biseria Gupta[3].
Department of Physiology, L. N. Medical College & Research Center, Bhopal. M. P.
PG in Physiology LN Medical College & Research Center.
Professor & HOD Department of Physiology LNMC&RC.
Dean & Professor Department of Ophthalmology LNMC&RC.

Abstract: *Objective-Latency and amplitude of P100 of VEP recording is affected by various variables like age, refractive errors, eye dominance, sex hormones etc. so we tried to evaluate the effect of refractive error on VEP by using LED goggle as stimulation source.*
Method: *We studied 130 healthy volunteers of age between 17-21yrs of both sex and they grouped as without refractive error N=69 (F=36 & M=33) and with refractive error N=61 (F=31 & M=30). We evaluated the results.*
Result: *Normative value for latency of P100 for LED goggle recording is 87.3ms. Mean value of latency of P100 for subjects without refractive error was 86.062ms for right eye and 87.172 for left eye and p-Value was 0.6442 which is not statistically significant. The mean value of latency of P100 for subjects with refractive error was 85.851ms for right eye and for left eye 94.461 ms and p-Value equals 0.0047 which is very statistically significant. Unpaired student t-test for latency of P100 of group without refractive error and with refractive error was highly significant as p-Value equals 0.0079.*
Conclusion: *our results suggested that there were significant changes in VEP in cases of error of refraction. While performing the VEP study, we should consider the refractive error and visual acuity.*
Keywords: *VEP, Latency of P100, Amplitude (N75-P100), Myopia.*

I. Introduction

The visual evoked potential is defined as the electrical response, evoked by visual stimulation , from neurons in visual cortex[1]. A normal VEP is generally associated with normal visual examination however an abnormal VEP study may or may not be associated with normal clinical findings. Various variables can affect recording of VEP like refractive errors, age, sex hormones, eye dominance & illumination. It has been established by various studies that P100 wave latency is one of the major discriminator between normality and abnormality of visual Pathway[2]. The VEP is more sensitive to small refractive changes then ERG, perhaps because the VEP heavily emphasizes the foveal region while the ERG is more broadly representative of entire stimulus field[3]. Now a days use of LED-goggle in place of monitor has been increased for VEP recording for stimulation but previous studies are with the use of monitor. While using monitor subjects or patients were instructed to use there corrective lenses during tests but procedure with LED-goggle these lenses can not be used(excepting contact lenses) and the real effect of refractive error on VEP can be established. Objective of this study is to find effect of myopia on VEP by using LED goggle and compare it with previous studies.

II. Materials & Method

This study was carried out in Department of Physiology (Neurophysiology laboratory) in L.N.Medical College and Research Center, Bhopal. 130 healthy candidates were enrolled for the study after approval from Institutional Ethical committee. Candidates were aged between 17yrs -21yrs of both sex. They were grouped in two. First group was of 69 candidates who were without refractive errors (F=36 & M=33) and second group was of 61 candidates who were with refractive error (myopia) (F=31 & M=30).
Exclusion criteria for selection of the candidates were
H/O eye surgery
Color-blindness.
H/O seizures.
Candidates on anti-depressants.
Device used for recording of VEP was EMG Octopus by Clarity Medical Private Limited ISO9001 & ISO13485.
Daily 5-7 candidates were called for recording between 10AM to 1PM.
All subjects were instructed for –

- Washing of hairs to make hairs oil free and not to apply oil or any type of lotion before test.
- To take good sleep and normal meal.
- To remove contact lenses during procedure.

Technical setting for recording of VEP used was-
Channels –

- Active – Mid-Occiput - Oz.
- Reference – Mid Frontal - Fz.
- Ground – On hair line of fore-head - Cz.
  Band Pass –
- Low filter = 2Hz.
- High Filter = 200 Hz.

Number of epochs given = 200.
Rate of stimulation was 2Hz.

After fulfilling exclusion criteria and history and examination for visual acuity for confirmation of refractive error along with written consent candidate was asked to sit on a comfortable chair facing in opposite direction from the recording monitor. Candidate was well informed about the procedure. Electrodes were placed with the gel over the positions mentioned above after cleaning the area before hand.LED goggle has been worn to the candidate and impedence check was done which was maintained below 5KΩ. Stimulation was given to eyes one after another at above mentioned rate and epochs. Recording done and collection of data was done according to the group. Statistical analysis done by using two tailed independent Student t-test to find the significant difference of the basic characteristic of both eyes of both groups. Software used for analysis was Graph-pad Online Calculator. Microsoft word and Microsoft excel have been used to generate tables and graphs.

III. Result

Normative value for latency of P100 for LED goggle recording is 87.3ms (as per manual of device). Results are following as per tables –

Table no. 1

Paired t-test result Latency of P100 for candidates without Refractive error		
	Right Eye	Left Eye
Mean	86.062	87.172
SD	12.462	15.217
SEM	1.500	1.832
N	69	69
Two tailed p Values equals 0.6442 which is not statistically significant.		

Table no.- 2

Paired t-test result Latency of P100 for the subjects with Myopia		
	Right Eye	Left Eye
Mean	85.851	94.461
SD	17.280	15.531
SEM	2.213	1.989
N	61	61
Two tailed p Values equals 0.0047 which is very statistically significant.		

Table no. – 3

Paired t-test result amplitude (N75-P100) for the subjects with Myopia		
	Right Eye	Left Eye
Mean	0.817	0.607
SD	0.657	0.464
SEM	0.079	0.056
N	61	61
Two tailed p Values equals 0.0024 which is very statistically significant.		

Table no. – 4

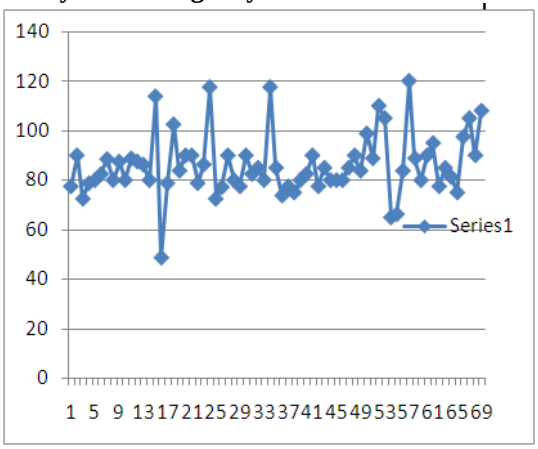
Paired t-test result amplitude (N75-P100) for the subjects without Refractive error		
	Right Eye	Left Eye
Mean	0.769	0.679
SD	0.722	0.542
SEM	0.092	0.069
N	69	69

Two tailed p Values equals 0.2687 which is not statistically significant.

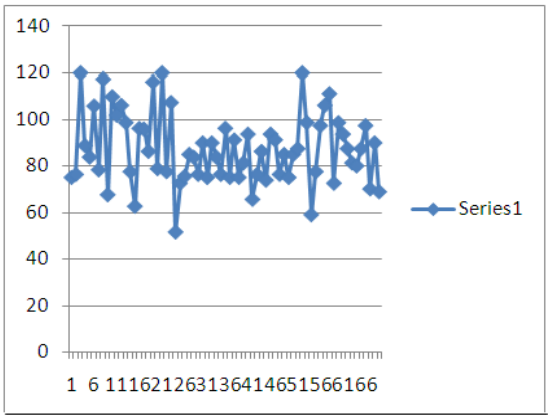
Table no. – 5

Un-Paired t-test result Latency of P100		
	Without refractive error	With Myopia
Mean	87.172	94.461
SD	15.217	15.531
SEM	1.832	1.989
N	69	61
Two tailed p Values equals 0.0079 which is very statistically significant.		

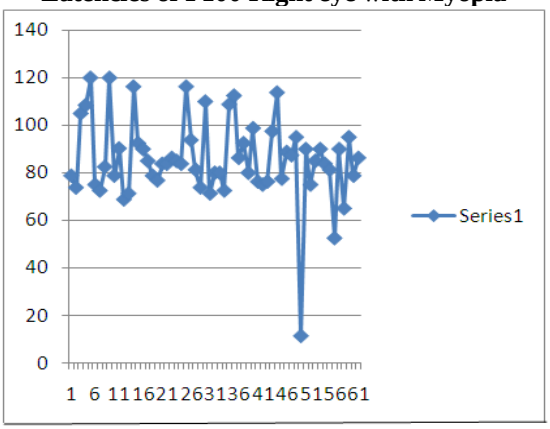
Latency of P100 right eye without refractive error



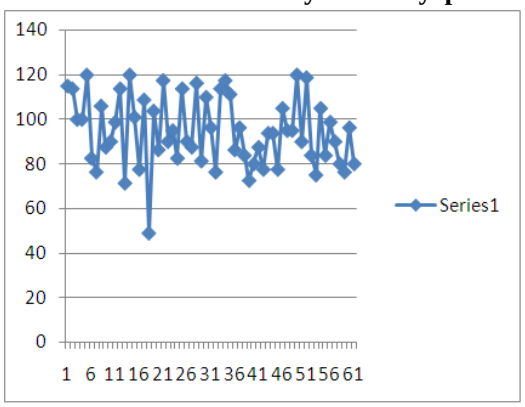
Latency of P100 left eye without refractive error



Latencies of P100 Right eye with Myopia



Latencies of P100 left eye with Myopia



IV. Discussion

In this study VEP response were determined in both group ie group of candidates without refractive error and group with refractive error. The result of study has shown that there is no statistical significant difference in latency of P100 between both eyes in group without refractive error but in group with refractive error it is statistically highly significant. N75-P100 amplitude difference has been shown high statistical significance in the group with refractive error but not in candidates without refractive error. Inter-individual difference of P100 latency is also shown significant difference as other studies has show[4,5]. A study done by Aashish Anand et al shown strong negative correlation with P100 amplitude and strong positive correlation with P100 latency[6]. B J Winn had proved the same changes in latency and amplitude of P100 by artificially simulating refractive error[7]. N N Sorokina RS also demonstrated that even congenital myopia also affects P100 component values as above[9].

V. Conclusion

Prolongation of latency and decreased amplitude of P100 often found in cases of Multiple Sclerosis, Optic Neuritis ,Ischemic Optic Neuropathy and so many other neuropathic diseases involving Optic pathway. Our results suggested that there were significant changes in VEP in cases of myopia so we emphasize that while doing diagnostic VEP for optic pathway evaluation refractive error should be kept in mind so we can be able to minimize false positive results. Results of this study also favours that use of LED goggle stimulation can be done which is easy to handle and distraction of subject from the stimulation source is extremely less.

References

[1]. B Jorn Johansson ; A study of some temporal properties of the human visual evoked potential & their relation to binocular function, Linkoping University Medical dissertations No 964, 2006.
[2]. Truette Allison , Charls C. Wood; Brainstem auditory, pattern reversal visual and short latency somatosensory evoked potentials: Latencies in relation to age, sex & brain and body size; Electroencephalography & Clinical Neurophysiology 1983,55 : 619-636.
[3]. Ruchi Kothari, Pradeep Bokariya; Refractive errors and their effects on visual evoked potentials; Journal of Clinical Ophthalmology & Research 2014, vol-2, issue 1,pg 3-6.
[4]. Kothari Ruchi, Bokariya Pradeep; Influence of refractive error on Pattern reversal VEPs of Myopes and Hypermetropes; International Journal of Physiology ,2013,vol-1,issue-1,pg 57-61.
[5]. S A Montgomery, R McAuley;Effect of refractive error on the visual evoked response; British Medical Journal, 1979,231-232
[6]. Aashish Anand, Carlos Gustavo; Short-duration transient visual evoked potential for objective measurement of refractive errors; Doc Ophthalmol (2011) 123: 141-147.
[7]. B J Winn, E Shin; Interpreting the multifocal visual evoked potential: the effects of refractive errors, cataracts and fixation errors; British Journal of Ophthalmology 2005:89:340-344.
[8]. Jihoon Jeon, Seiyul Oh; Assessment of visual disability using visual evoked potentials ; BMC Ophthalmology 2012,12:36
[9]. N N Sorokina RS ; Possibilities of the use of visual evoked potentials in the evaluation of visual acuity in congenital myopia in children; Vestnik Oftalmologii, 1992,108(1):35-37.
[10]. UK Mishra & J Kalita. Visual evoked potential. In Clinical Neurophysiology 3rd ed New Delhi: Elsevier.2014: 283-296.