Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 7, Issue, 08, pp.19631-19633, August, 2015

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

COMPARISON OF P100 LATENCY AND AMPLITUDE BETWEEN DOMINANT AND NON DOMINANT EYE

***Dr. Vinodha, R., Dr. Precilla Catherine, A., Dr. Arrthy, S. and Dr. Bobby, D.**

Department of Physiology, Thanjavur Medical College, Thanjavur

ARTICLE INFO

Article History:
Received 15th May, 2015
Received in revised form
22nd June, 2015
Accepted 09th July, 2015
Published online 31st August, 2015

Key words:
Ocular dominance,
Miles test,
VEP-latency & Amplitude

ABSTRACT

Introduction: Ocular dominance may be especially important in sports which require aim, such as archery, darts or shooting and it is an important consideration in predicting patient satisfaction with monovision correction in cataract surgery, refractive surgery and contact lens wear. The present study was therefore conducted to determine the ocular dominance.

Materials and Methods: 41 normal healthy subjects, 17 male and 24 female were participated in this study. All were aged between 17 to 21 .Subjects with corneal opacity, squint, color blindness, those on miotic and mydriatic drugs and those with other neuromuscular disorders were excluded. Ocular dominance was first tested by Miles test and then to confirm the eye dominance VEPs (Visual Evoked Potential) were performed by checker board pattern reversal stimuli system.

Results: In this study Miles test revealed that, out of the 17males, 15 were right eye dominant and 2 were left eye dominant. Out of the 24 females, 15 were right eye dominant and 9 were left eye dominant, and the results were confirmed by VEP analysis. It was found that P100 Latency obtained by stimulating the dominant eye was significantly shorter with a P value of 0.0017 and Amplitude greater with a significant P value of 0.0001 compared to the non dominant eye.

Conclusion: The results of this study demonstrate that eye dominance occurs in individuals. It may be beneficial in monovision correction of certain ophthalmic surgeries like, cataract surgery, refractive surgery and in contact lens wear and also useful in sports which require aim, such as archery, darts or shooting.

***Citation*:** Dr. Vinodha R., Dr. Precilla Catherine, A., Dr. Arrthy, S. and Dr. Bobby, D. 2015. "Comparison of P100 latency and amplitude between dominant and non dominant eye" - A 5 years follow up case report", *International Journal of Current Research*, 7, (8), 19631-19633.

INTRODUCTION

Most people have a dominant eye, or one eye that works a little bit harder than the other. Although we use both eyes to look at an object, we use our dominant eye more (Chaurasia *et al.,* 1976; Porta, 1593). Ocular dominance, sometimes called eye dominance or eyedness, is the tendency to prefer visual input from one eye to the other (Khan *et al*., 2001). During Binocular viewing, the dominant eye plays a primary role with an increased static tonus of its ciliary muscle compared with that of the non dominant eye. The preferential use of the dominant eye for viewing might allow the dominant eye more myopic than non dominant eye. If ocular dominance has a role in the mechanism of myopia, this effect is apparent in those with anisometropic myopia (Gwiazda *et al.*, 1993). However certain studies found that ocular dominance had no significant effect on spherical equivalent (Audrey chia *et al*., 2007; Zhikuan yang *et al*., 2008). Ocular dominance may be especially important in sports which require aim, such as archery, darts or shooting and it is an important consideration in predicting patient satisfaction with monovision correction in cataract surgery, refractive surgery and contact lens wear. The present study was therefore conducted (Laby *et al*., 1998; Jain *et al*., 1996; Wright *et al*., 1999).

Corresponding author: Dr. Vinodha, R.,
Department of Physiology, Thanjavur Medical College, Thanjavur

MATERIALS & METHODS

This study was done at physiology research laboratory, Thanjavur medical College, Thanjavur from 2010 to 2014. 41 normal healthy subjects, 17 males and 24 females were participated in this study. All were aged between 17 to 21. Subjects with corneal opacity, squint, color blindness, those on miotic and mydriatic drugs and those with other neuromuscular disorders were excluded. Ocular dominance was first tested by Miles test and then to confirm eye dominance VEPs (Visual Evoked Potential) were performed by checker board pattern reversal stimuli system. Informed written consent was obtained

from all the participants and experimental protocol was approved by the college ethical committee.

Miles test

In 1928, Miles W.R established the basis for how eye dominance is determined (Einat Shneor *et al.,* 2006; Miles, 1928; Miles, 1930). It is easy to determine which eye is the dominant or sighting eye by doing the simple test called Miles test. The following method is simple and accurate way to check eye dominance for both adults and children.

- Extend both arms forward of your body and place the hands together making a small triangle (approximately 1/2" to 3/4" per side) between your thumbs and the first knuckle.
- With both eyes open look through the triangle and center something such as doorknob or the bull's eye of a target in the triangle.
- Close your left eye- If the object remains in view, you are right eye dominant. If your hands appear to move off the object and move to the left, then you are left eye dominant.
- To validate the first test, look through the triangle and centre the object again with both eyes open.
- Close your right eye- If the object remains in view, you are left eye dominant. If your hands appear to move off the object and move to the right, then you are right eye dominant.

VEP

VEPs are visually evoked electrophysiological signals recorded from human scalp. It depends on the functional integrity of central vision at any level of visual pathway including retina, optic nerve, optic chiasma & occipital cortex (Pal, 2010; Misra *et al*., 2008)

Pre test Instructions (Pal, 2010; Misra *et al*., 2008)

1. About the procedure of the test and got informed consent.
2. To avoid hair spray or oil after the last hair wash.
3. The room parameters should be maintained constant throughout the experiment.
4. Not to use any eye drops (miotic/ mydriatics) 12 hrs before the test.

The study was done with 4 channel Digital Polygraph. Digital intex colour monitor, 17 ½ model- no: IT-173SB.

VEP- Experimental Design and Recording

VEPs were performed by checkerboard pattern reversal displayed on a TV monitor subtending 15°×12° at a viewing distance of 90cm and individual squares in the checkerboard pattern subtended a visual angle of 60°. The stimuli reversal rate was 2 per second. Electrode scalp placement and recording parameters were carried out according to the standard of the International Society for Clinical Electrophysiology of Vision (ISCEV) (Misra *et al*., 2008). Standard disc EEG electrodes were placed at the Oz position (active electrode) and reference electrode was placed at Fz position & ground electrode on the patient's vertex (Cz). The subject was instructed to fix his gaze at the center of the screen. The latency of P_{100} and amplitude were measured.

Statistical Analysis

Results were analyzed by Student's t test. P< 0.01was considered significant for statistical evaluation. Graphpad statistical software was used for data analysis.

RESULTS

The mean age for 41 subjects was 18.38.Miles test revealed that, out of the 17 males, 15 were right eye dominant and 2 were left eye dominant. Out of the 24 females, 15 were right eye dominant and 9 were left eye dominant, and the results were confirmed by VEP analysis. It was found that P100 Latency obtained by stimulating the dominant eye was significantly shorter with a P value of 0.0017 and Amplitude greater with a significant P value of 0.0001 compared to the non dominant eye (table1).

Table 1. Comparison of P100 Latency & Amplitude between dominant &non dominant eye

Parameters	Mean±SD	Value
P100-L (ms) n=41		
Dominant eye	99.110±3.478	0.0017*
Non dominant eye	101.232±3.821	
P100-Amplitude (μv) n=41		
Dominant eye	11.4990±3.1696	0.0001*
Non dominant eye	10.0139±2.3892	

*P<0.01significant

DISCUSSION

Ocular dominance concept was first introduced in 1593 by Giovanni Battista Porta (Chaurasia *et al.,* 1976; Porta, 1593). It is somewhat analogous to the laterality of right or left handedness. This is attributed to the neuroanatomic asymmetry in human visual cortex (Pal, 2010; Misra *et al*., 2008).

Kinds of Ocular dominance (Rahul Bhola, 2006)

The various types of ocular dominance tasks may be divided in to three sub-categories

1. Sensory dominance
2. Oculomotor dominance
3. Directional dominance

Sensory dominance: Occurs when there is a difference in the two retinal images that might lead to rivalry or some binocular interaction. For eg there may be differences in image clarity, brightness or colour saturation.

Oculomotor dominance: refers to the eye that fixes an object under binocular condition.
Directional dominance: is the most familiar, sometimes referred as sighting dominance. Ocular dominance can be tested in various ways. Miles test is an important one.

Rae-young park *et al.* (2011) studied the effect of dominant versus non-dominant vision in postural control and found that the equilibrium score did not differ in young subjects. However, for elderly over 60 years, the equilibrium score in dominant vision was higher than non dominant vision. Ching-Yu cheng *et al.* (2004) examined the association of ocular dominance and anisometropic myopia and report that the dominant eye has a greater degree of myopia than the non dominant eye in subjects with high anisometropia .However Audrey chia *et al.* and Zhikuan yang *et al.* found that ocular dominance had no effect on spherical equivalent. Similar results were observed in our previous study. We sought to investigate the correlation between ocular dominance and anisometropic myopia and confirmed that there was no significant association between ocular dominance and anisometric myopia with the mean interocular difference of 0.4897D and also in anisometropia of <0.5D and ≥0.5D (vinodha *et al*., 2014). Approximately 2/3rd of the population is right eye dominant (Ching-yu-cheng *et al*., 2004). Ocular dominance is somewhat analogous to the laterality of right or left handedness. This is attributed to the neuroanatomic asymmetry in human visual cortex (Pal, 2010; Misra *et al*., 2008). In the present study, Miles test revealed that, 73.2% were right eye dominant and 26.8%were left eye dominant and was confirmed by VEP analysis. It showed that P100-L was significantly lesser and the amplitude was greater in the dominant eye.

Conclusion

The results of this study demonstrate that eye dominance occurs in individuals. It may be beneficial in monovision correction of certain ophthalmic surgeries like, cataract surgery, refractive surgery and in contact lens wear and also useful in sports which require aim, such as archery, darts or shooting. Further study can also be carried out in different age groups.

Acknowledgement

I would like to thank Dr. T.B. Umadevi, former Dean, Thanjavur medical college, and the present Dean i/c Dr.M. Singaravelu.

Conflict of interest: No conflict of interest applicable for this study.

Source of funding: Not applicable.

REFERENCES

Audrey chia, Arlie Jaurigue, Gus Gazzard *et al*. 2007. Ocular dominance, Laterality & Refraction in Singaporean children.doi:10.1167/iovs.06-1489 Invest. *Ophthalmol. Vis.Sci*., Vol.48 no.8:3533 – 3536.

Chaurasia, B.D., Mathur, BB. 1976. Eyedness. Acta Anat (Basel); 96(2): 301-305.

Ching-yu-Cheng, May-yung yen, Hsin-yi Lin, Wei-wei Hsia & Wen-ming Hsu, 2004. Association of ocular dominance and anisometropic myopia. *Invest Ophthalmol Vis Sci*., 45(no.8):2856-2860

Einat Shneor, Shaul Hochstein, 2006. Vision Research. Eye dominance effects in feature search. *Vision Research*, 46(25), 1:4258-4269

Gwiazda, J., Thora, F., Bauer, J., Held, R. 1993. Myopic children show insufficient accommodative response to blur. Invest ophthalmol *Vis.Sci.,* 34:690-694.

Jain, S., Arora, I., Azar, DT. 1996. Success of monovision in presbyopes: review of the literature & potential application to refractive surgery. *Surv. Ophthalmol*., 40: 491-499.

Khan, AZ., Crawford, 2001. Ocular dominance reverses as a function of horizontal gaze angle. *Vision Res*., June 41(14): 1743-8.

Laby, DM., Kirschen, DG., Rosenbaum, AL., Mellman, MF. 1998. "The effect of ocular dominance on the performance of professional baseball players". *Ophthalmology,* 105(5):864-6.

Miles, W.R. 1930. Ocular dominance in human adults, *Journal of General Psychology*, Vol 3. Issue 3:412-420.

Miles, W.R. 1928. Ocular dominance-method & result. Psychological Bulletin, 25:155-156. Cross ref: vision research. Nov 2006; 46(25),1:4258-4269

Misra, UK., J. Kalita, 2008. Clinical Neurophysiology; 2nd ed: 309-315

Pal, G. K. 2010. Textbook of Practical Physiology- Practical Manual; 3rd ed: 303-306

Porta, J.B. 1593. Defractioneopticsparte: Libernovem. Naples: carlinum & Pacem. cross reference: Alistair P. Mapp, Hiroshiono, and Raphael Bar Beito. What does the dominant eye dominate. A brief and somewhat contentious review. Perception & Psychophysics. 2003; 65(2):310-317.

Rae-young park, M.D., Hoi-sung Kee, M.D. & Kwang-IK Jung, M.D. 2011. Effect of dominant versus non dominant vision in postural control. *Ann Rehabil Med*., 35(3):427-431

Rahul Bhola, 2006. Vision Science Lecture III-Binocular Vision, Lecture 11-Ocular dominance. Online document.; Steinman chapter 2; p: 24-27; Chapter 3; p: 56-57.

Vinodha, R., Shanmuga priya, C., Arthy, S. 2014. Influence of ocular dominance on anisometropic myopia. Research and Reviews: *Journal of Medical and Health Sciences*, vol3/issue4:88-94

Wright, KW., Guemes, A., Kapadia, MS., Wilson, SE. 1999. Binocular function and patient satisfaction after monovision induced by myopic photorefractive Keratectomy. *J Cataract Refract Surg*., 25:177-182.

Zhikuan Yang, Weizhong Lan, Wen Lin, Xiang Chen *et al*., 2008. Association of ocular dominance and myopia development. A two year longitudinal study. *Invest. Ophthalmol. Vis. Sci*., Vol.49 No.11:4779-4783.

****