International Journal of Life Sciences, Biotechnology and Pharma Research Vol. 13, No. 8, August 2024 Online ISSN: 2250-3137
Print ISSN: 2977-0122

DOI: 10.69605/ijlbpr_13.8.2024.24

ORIGINAL RESEARCH

Effect of different phases of menstruation cycle on visual evoked Potential (V.E.P)

Dr. Supreet Kaur Balgir [1], Dr. Aditya Jain[2], Dr. Avnish Kumar[3], Dr. Gagneen Sandhu[4], Dr. Parminder Kaur Balgir[5]

[1]Senior Resident, Department of Physiology, Govt. Medical College Patiala, Punjab, India
[2,4]Associate Professor, Department of Physiology, Govt. Medical College Patiala, Punjab, India
[3]Professor, Department of Physiology Cum Director Research and Medical Education, Mohali, Punjab, India
[5]Assistant Professor, Department of Anaesthesiology, Hind Institute of Medical Science, Safedabad Road, Barabanki, U.P., India

Corresponding Author
Dr. Parminder Kaur Balgir
Assistant Professor, Department of Anaesthesiology, Hind Institute of Medical Science, Safedabad Road, Barabanki, U.P., India

Revised date: 10 June, 2024 Acceptance date: 22 July, 2024

ABSTRACT

Background: Visio-menstrual research and findings date well back into the 19th century. In 1887 Finkelstein a physician made some interesting observations and reported a concentric narrowing in the visual fields of healthy women during the pre-menstrual/ menstrual phases. The other sensory modalities of olfaction,auditory,taste, and touch generally show increased sensitivity and enhanced performance at midcycle with the opposite being evident in the premenstrual/menstrual phase.

Aims and Objectives: To evaluate latency of visual evoked potential in healthy girls in different phases of menstruation.

Material and Methods: The present study was conducted on 40 MBBS students(girls) in age group 18-25 years. V.E.P was performed in three different phases of menstrual cycle.

Results: P100 latency(in milliseconds) in menstrual phases in left eye (77.4875) and right eye (76.5325)was significantly increased as compared to proliferative phase left eye(71.6200) and right eye(69.7245). P Value<0.01. The amplitude of N75 -P100 (in milliseconds) in secretory phase in right eye(mean=2.1542) and left eye(1.8022) was significantly higher as compared to proliferative phase in right eye (mean=1.4017) and left eye(1.3388).P Value<0.05.

Conclusion: Prolonged V.E.P latency in menstrual and secretory phase as compared to proliferative phase indicates high progesterone levels, may have an inhibitory effect on optic nerve conduction velocity.

Key Words: Menstrual cycle, visual Evoked Potential,Different Phases,P100 Latency.

INTRODUCTION

Visio-menstrual research and findings date well back into the 19thcentury. In 1887, a physician by the name of Finkelstein made some interesting observations. He reported a concentric narrowing in the visual fields of healthy women during the pre-menstrual/ menstrual phases.The constriction of field began one to three days prior to menstruation and peaked at about the third day of bleeding[1].The other sensory modalities ofolfaction,auditory,tasteand touch generally showincreasedsensitivity and enhanced performance at midcycle with the opposite being evident in the premenstrual/menstrual phase. Visualevoked potential (V.E.P)has beenused to investigate the neuro-physiology of visual pathways.[2-4]Changes in the latency and amplitude ofV.E.P patterns during menstrual cycle have been reported.[5-9]

Visual evoked potential (V.E.P) is an electrical signal generated by the occipital visual cortex in response to stimulation of the retina either by light flashes /pattern stimuli. V.E.P can evaluate the integrity of the visual pathway and help in the diagnosis of optic nerve disorders.[10,11] it has been reported that technical and physiological factors such as pupil diameter, refractive error, type of stimulus, age and sex, electrode position, and anatomical variations may affect V.E.P.[12] These are non-invasive studies that:(a) measure evoked responses to visual stimuli (b) assess visual conduction pathways through optic nerves and brain (c) Quantitative determination of visual function and highly sensitive to lesions of optic nerve and anterior chiasm. A normal transient V.E.P to a pattern reversal checkerboard is a positive mid-occipital peak mean latency of 100ms.

DOI: 10.69605/ijlbpr_13.8.2024.24

Waveform consists of three separate phases:-
1. An initial negative deflection (N1 or N75).
2. A prominent positive deflection (P1 or P100).
3. Later negative deflection (N2 or N145).
Peak latency and peak to peak amplitudes of these waves are measured.P100 waveform isgenerated in the striate and per striate occipital cortex due to activation ofprimary visual cortex and due to discharge of thalamocortical fibres. It is the most reproducible and clinically used waveform in normal persons.Abnormality in V.E.P latencies are more important diagnostically than abnormalities of V.E.P amplitude.

CLINICAL APPLICATIONS

1. V.E.P is a sensitive non-specific diagnostic tool for diagnosing abnormalities in the anterior visual pathway before optic chiasm.
2. It contributes important information on visual pathways in patients with optic neuritis, multiple sclerosis, optic nerve and chiasm compression lesions,non-compressive lesions affecting the visual pathways and neurodegenerative lesions not primarily involving visual pathways.

AIMS AND OBJECTIVES

To study the effect of proliferative, secretary and menstrual phases on V.E.P

MATERIAL AND METHODS

The present study was conducted on 40 M.B.B.S. students(girls)in age group 18-25 yrs.V.E.P was performed in 3 different phases of menstrual cycle.They were interviewed in accordance with enclosed performa. The correct procedure of the test was explained to all subjects and findings were recorded on a predesigned proforma.

Inclusive criteria :-
Girls aged 18-25 yrs.
Eumennorheic i.e. regular normal cycles of 26-34 days.

Exclusive criteria :-
Girls with irregular menses (stress,pcod).
Those on any medication (ocps).
Pregnancy.
Endocrine disorder.
Menorrhagia.
History of multiple sclerosis.
Ophthalmic condition like retinopathy, cataract, glaucoma, vitreous opacities, optic atrophy, visual acuity(<6/18)

Methods of Recording:
V.E.P was recorded with the help of physiopac machine. Following V.E.P parameters were recorded:-
(a) Latency of waves N70, P100 and N155(in millisec).
(b) Amplitude (in microvolts).

RESULTS

Table No. 1: Parameters Mean age of the girls was 18.62 ± 0.74 years, Mean BMI was 23.93 ± 1.71

	Range	Min.	Max.	Mean	S.D
Age	2.00	18.00	20.00	18.6250	0.74032
Height	15.00	150.00	165.00	157.08	3.81890
Weight	20.00	50.00	70.00	58.9500	4.41414
B.M.I	7.81	19.53	27.34	23.9330	1.71738
B.S.A	.70	1.03	1.73	1.5757	0.10837
H.C	4.00	52.00	56.00	53.6250	1.21291

DOI: 10.69605/ijlbpr_13.8.2024.24

Table No.2 :Proliferative Vs Secretory Phase P <0.05 Significant, P < 0.01 Very Significant and P <0.001 Highly Significant NS= Non-significant

			Mean	S.D	P value	Significance
Left Eye	N75	PROLIF.PHASE	45.5000	14.21447	0.277	NS
		SECRETORY PHASE	48.9250	13.75544		
	P100	PROLIF.PHASE	71.6200	13.70557	0.332	NS
		SECRETORY PHASE	74.9975	17.07743		
	N145	PROLIF.PHASE	118.76	24.56954	0.598	NS
		SECRETORY PHASE	121.94	28.96886		
	N75-P100	PROLIF.PHASE	1.3388	0.56633	0.047	S
		SECRETORY PHASE	1.8022	1.40937		
Right Eye	N75	PROLIF.PHASE	43.1250	7.59955	0.151	NS
		SECRETORY PHASE	46.0700	10.36766		
	P100	PROLIF.PHASE	69.7425	8.80128	0.247	NS
		SECRETORY PHASE	72.4875	12.00560		
	N145	PROLIF.PHASE	114.96	34.21524	0.612	NS
		SECRETORY PHASE	118.99	36.46611		
	N75-P100	PROLIF.PHASE	1.4017	1.03038	0.024	S
		SECRETORY PHASE	2.1542	1.77724		

Table No. 3: Secretory Phase Vs Menstrual Phase

			Mean	S.D	P value	Significance
Left Eye	N75	SECRETORY PHASE	48.9250	13.75544	0.764	NS
		MENSTRUAL PHASE	49.6500	6.45616		
	P100	SECRETORY PHASE	74.9975	17.07743	0.447	NS
		MENSTRUAL PHASE	77.4875	11.56059		
	N145	SECRETORY PHASE	121.94	28.96886	0.398	NS
		MENSTRUAL PHASE	127.26	27.00380		
	N75-P100	SECRETORY PHASE	1.8022	1.40937	0.242	NS
		MENSTRUAL PHASE	3.9738	11.56049		
Right Eye	N75	SECRETORY PHASE	46.0700	10.36766	0.727	NS
		MENSTRUAL PHASE	46.9875	12.90721		
	P100	SECRETORY PHASE	72.4875	12.00560	0.161	NS
		MENSTRUAL PHASE	76.5325	13.52201		
	N145	SECRETORY PHASE	118.99	36.46611	0.365	NS
		MENSTRUAL PHASE	125.98	31.87414		
	N75-P100	SECRETORY PHASE	2.1542	1.77724	0.190	NS
		MENSTRUAL PHASE	4.6938	12.01758		

P <0.05 Significant, P < 0.01 Very Significant and P <0.001 Highly Significant NS= Non-significant

Table No. 4 : Proliferative Vs Menstrual Phase

			Mean	S.D	P value	Significance
Left Eye	N75	PROLIF.PHASE	45.5000	14.21447	0.097	NS
		MENSTRUAL PHASE	49.6500	6.45616		
	P100	PROLIF.PHASE	71.6200	13.70557	0.042	S
		MENSTRUAL PHASE	77.4875	11.56059		
	N145	PROLIF.PHASE	118.76	24.56954	0.145	NS
		MENSTRUAL PHASE	127.26	27.00380		
	N75-P100	PROLIF.PHASE	1.3388	.56633	0.154	NS
		MENSTRUAL PHASE	3.9738	11.56049		
Right Eye	N75	PROLIF.PHASE	43.1250	7.59955	0.107	NS
		MENSTRUAL PHASE	46.9875	12.90721		
	P100	PROLIF.PHASE	69.7425	8.80128	0.009	HS
		MENSTRUAL PHASE	76.5325	13.52201		
	N145	PROLIF.PHASE	114.96	34.21524	0.140	NS
		MENSTRUAL PHASE	125.98	31.87414		
	N75-P100	PROLIF.PHASE	1.4017	1.03038	0.088	NS
		MENSTRUAL PHASE	4.6938	12.01758		

P <0.05 Significant, P < 0.01 Very Significant and P <0.001 Highly Significant NS= Non-significant

DOI: 10.69605/ijlbpr_13.8.2024.24

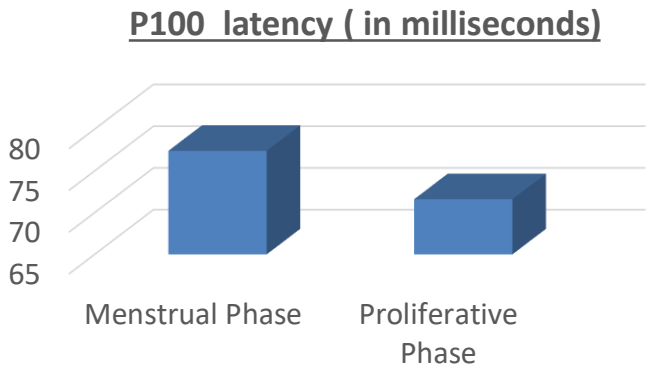
OBSERVATIONS AND DISCUSSION

The results of this study show that the latency and amplitude of V.E.P change significantly during the menstrual cycle**.**

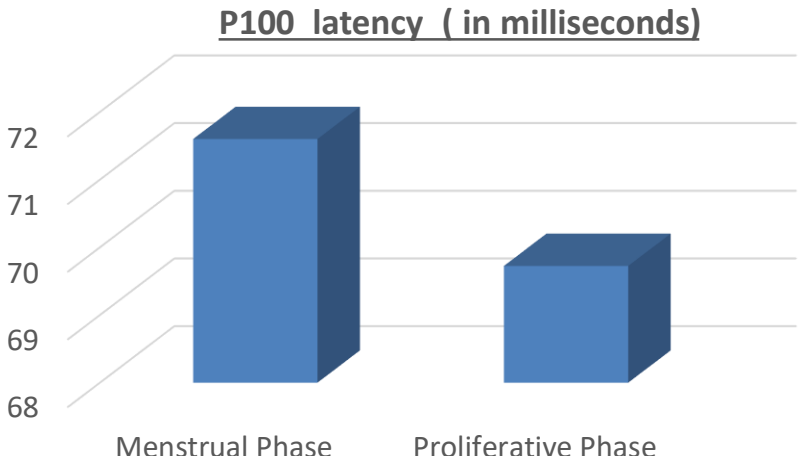
P100 latency (in milliseconds) in menstrual phase in left eye (77.4875) and right eye (76.5325) was significantly increased as compared to proliferative phasein left eye (71.6200) and right eye (69.7245). P Value<0.01 (table No. 4).

The amplitude of N75-P100 (in milliseconds) in secretory phase inright eye (mean=2.1542) and left eye (1.8022) was significantly higheras compared to proliferative phase in right eye(mean = 1.4017) and left eye (1.3388).P Value <0.05 (table No. 2).

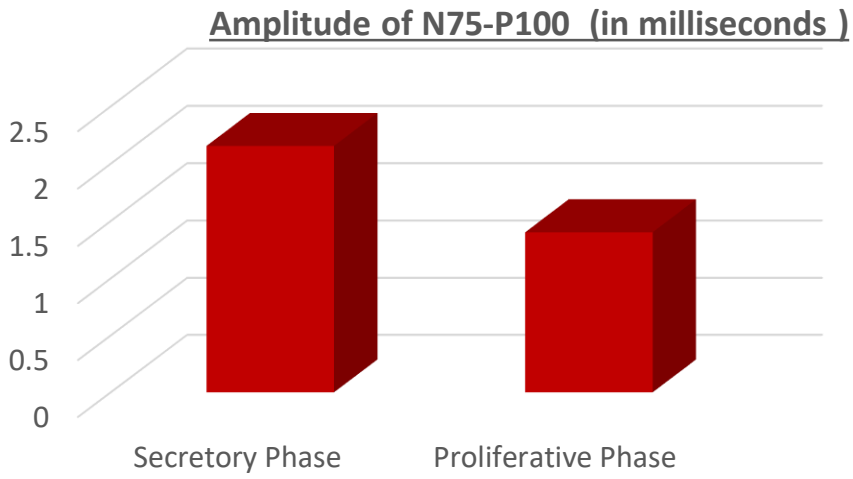
Left Eye



Right Eye



Right Eye



DOI: 10.69605/ijlbpr_13.8.2024.24

V.E.P is an evoked electrophysiological potential which can be extracted using signal averaging from electroencephalographic activity recorded at the scalp. Increased latency on V.E.P waves is the hallmarkof many visual pathway diseases.[11,14,15]

From study it is clear that V.E.P latency increases as we go from proliferative phase tomenstrual phase. Estrogen shortens V.E.P latency and its effect on CNS seems to be antagonised by progesterone and its metabolites.[11,12]

In our study menstruation was associated with increased pattern and flash V.E.P latencies in 40 healthy girls aged 18-25 years.

Various reasons for increased latency may be:-

[1]Decreased blood levels of estrogen and diminution of neuroprotective effect of estrogen.[13,14]

[2] Associated biochemical changes causing stress and anxiety.

[3] Vascular congestion around optic nerve reducing conduction velocity.[15]

CONCLUSION

The clinical implication of these findings is application of V.E.P for confirming demyelinating disease and optic neuritis. In such cases one should take into account the prolongation of V.E.P latency during menstruation, may errorneously verify demylinating disease.

REFERENCES

1. Finkelstein Lo. On sensory disorders in diseases and on changes of the fields of vision in menstruation. Opthalmic Rev 1887; 6: 323-326.
2. Harding GFA. The visual evoked potentials in neuro-opthalmic disorders. In: Desmet JE,ed.Visual Evoked Potentials:Amsterdam :Elsevier;1990: 146-167.
3. Maurer K, Bruner M, Hopf HC, Lowitzsch K. Visual pattern evoked responses (VER), acoustically evoked responses (AER),electrically evoked blink reflexes in assessment of neurofibromatosis. Electroencephalogr Clin Neurophysiol.1997;143:524.
4. Sklar FH, Ehle AL, Clark WK. Visual evoked potential: a noninvasive technique to monitor patients with shunted hydrocele. Neuro-surgery.1979;4:529-534.
5. Kaneda Y, Ikuta T, Nakayama H,Kagawa K, Furuta N. Visual evoked potential and electroencephalogram of healthy females during the menstrual cycles. J Med Invest. 1997;44:41-46.
6. Shushtarian SM,Yahyavi SH.Study of visual evoked potentials during normal monthly cycle in normal female subjects. Biomed Sc Instrum 1999;35:165-167.
7. Kluck N, O'Connor S, Hesselbrock V, Tasman D, Maier A, Bauer L. Variation in evoked potential measures over the menstrual cycle; a pilot study. Prog Neuropsychopharmacol Biol Psychiatry,1992;16:901-911.
8. Resende LA, Silva MD, Impeba F,Achoa NB,Behl C,Widmann M, Trapp T, Holsboer F. 17- beta estradiol protects neurons from oxidative stress induced cell death in vitro. Biochem Biophys Res Commun 1995;216:473-482.
9. Tasman A, Hahn T, Maiste A. Menstrual cycle synchronized changes in brain stem auditory evoked potentials and visual evoked potentials. Biol Psychiatry.1999;45:1516-1519.
10. Yilmaz H, Erkin EF, Mavioglu H, Sungurtekin U. Changes in pattern reversal evoked potentials during menstrual cycle. Int Ophthalmol.1998;22:27-30.
11. Behl C,Widmann M, Trapp T, Holsboer F. 17-beta estradiol protects neurons from oxidative stress induced cell death in vitro. Biochem Biophys Res Commun 1995;216:473-482.
12. Parducz A, Perez J, Garcia-Segura LM. Estradiol induces plasticity of gabaergic synapses in thehypothalamus.Neuroscience1993;53:395-401.
13. Case AM, Reid RL. Effects of menstrual cycle on medical disorders. Arch Intern Med 1998;158:1405-1412.
14. Chung SC, Goldfarb AH, Jamurtas AZ, Hegde SS, Lee j. Effect of exercise during follicular and luteal phases on indices of oxidative stress in healthy women. Med Sci Sports Exerc 1999;31:409-413.
15. Atta HR, Brown IA. Intracocular haemorage in menstruation. J R coll Surg Edinb 1987;32:34-36.