



## A STUDY OF BRAINSTEM AUDITORY EVOKED POTENTIAL IN DIABETES MELLITUS.

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**Abstract :** Involvement of auditory pathway is one of the examples of central neuropathy in Diabetes mellitus which can be assessed electrophysiologically by brainstem auditory evoked potential. This study was aimed to determine the changes of brainstem auditory evoked potential in diabetes mellitus. This study was conducted in Department of Physiology. 40 cases of Type 2 diabetes of duration 5-15 years and 40 nondiabetic controls including both genders of age group 30-55years were included in this study. Individuals with history of ear disease, hearing loss, intake of ototoxic drugs and other drugs acting on central nervous system were excluded from the study. BAEP was recorded in all participants. Results were analysed using student t test. Absolute latencies of wave III, V and interpeak latency I-III, III-V, I-V were significantly prolonged in study group. The observed delay may be due to impairment in electroconductive properties of myelin sheath due to various metabolic changes that occurs in diabetes, like accumulation of sorbitol, hypoxia and deprivation of nerve growth factors. So, diabetes produces subclinical auditory alterations which can be detected earlier by brainstem auditory evoked potential even before the appearance of specific symptoms.

**Keyword :** 'Brainstem auditory evoked potential', 'Diabetes mellitus', 'Central neuropathy'

### INTRODUCTION

Diabetes mellitus comprises a group of common metabolic disorders that share the phenotype of hyperglycemia.(1) The prevalence of diabetes is rapidly rising all over the world. Over the past 30years, the status of diabetes has changed from being considered as a mild disorder of the elderly to one of the major causes of mortality & morbidity affecting the youth and middle aged people.(2) Neuropathy is the more precocious and frequent complication of diabetes mellitus.(1) Brainstem auditory evoked potentials have been used for electrophysiological assessment of central neuropathy in diabetes mellitus.(3,4) This test basically evaluates the absolute latency of waves, which is the time needed for the stimulation to initiate the auditory potential in a determined structure. Further, the test evaluates intervals, which are the time necessary for the electrical potential to pass from one structure to another.(4)

### AIM

To determine the changes of brainstem auditory evoked potential in diabetes mellitus.

### MATERIALS & METHODS

This study was conducted in Department of Physiology. 40 diabetic (Type 2) patients of age group 30-55years with duration of diabetes ranging from 5-15 years with fasting blood sugar <126mg/dl & postprandial blood sugar <200mg/dl were recruited from diabetic outpatient clinic for this study. Control group consists of 40 nondiabetic subjects of same age group. Patients with history of ear disease, hearing loss, prolonged intake of ototoxic drugs & other drugs which might interfere with central nervous system function (methylodopa, phenytoin, antipsychotic & antidepressant drugs) were excluded. Informed written consent was obtained from all participants. They were subjected to detail clinical history & clinical examination. Brainstem auditory evoked potential (BAEP) was recorded using 8 channel polygraph - Neuroperfect plus. The evoked potentials within 10ms of stimulation was recorded using two channels.

Channel 1 : Ai – Cz

Channel 2 : Ac – Cz

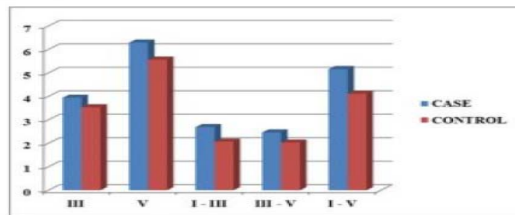
Ground : at Fz ( 10 – 20 international system of EEG electrode placement ) The test was carried out in a quiet room. Brief click stimulus of 30db intensity was given through ear phone. Contralateral ear was masked with continuous white noise. Absolute peak latencies & Interpeak latencies were recorded. Statistical analysis was done using student t test.

### RESULTS

Mean value of absolute latency of wave III, V & IPL I – III, III – V, I – V of study & control group with statistical significance is shown in Table 1 & Figure 1.

Table 1		
Parameter	Mean ± Standard deviation	p value
<b>Wave III</b>		
Study	3.948 ± 0.4515	<0.0001
Control	3.5337 ± 0.4033	Significant
<b>Wave V</b>		
Study	6.2985 ± 0.5906	<0.0001
Control	5.5692 ± 0.5399	Significant
<b>IPL I – III</b>		
Study	2.6972 ± 0.4988	<0.0001
Control	2.0745 ± 0.1976	Significant
<b>IPL III – V</b>		
Study	2.4657 ± 0.5779	0.0004
Control	2.0362 ± 0.4420	Significant
<b>IPL I – V</b>		
Study	5.1632 ± 0.6747	<0.0001
Control	4.1112 ± 0.5248	Significant

Figure 1



## DISCUSSION

The present study shows significant prolongation in absolute latencies of wave III, V, interpeak latency I – III, I – V ( $p < 0.0001$ ) & interpeak latency III – V ( $p < 0.001$ ) in study group when compared to control group. The result is similar to study done by Gupta Rahul et al(1), who showed significant difference in latencies of wave III, V, IPL I-III, III-V & I – V in diabetes due to neuropathy. Bijan Forogh et al(5) showed significant prolongation in wave I, III, V latencies and IPL I-III, III-V, I-V in diabetes. The result of the present study agreed with this result. M W Donald et al(6) reported significant prolongation in latencies of wave III, V & IPL I – III, I – V in diabetes. Similar result is found in the present study. The usefulness of BAEP in early diagnosis of neuropathy with diabetes mellitus was observed by Al-Azzawi LM, MirzakB.(7) They found significant increase in latencies of wave I, III, V & IPL I – III, III – V, I – V. Talebi M et al (8) showed significant association between latencies of wave III, IV, V & IPL I – III, III – V in diabetic group. Ren J et al (9) reported increased wave V latency & IPL I-V in diabetes mellitus. The observed delay in the neural conduction process may be related to impairment in the electroconductive properties of myelin sheath evoked by various metabolic changes (10) caused by diabetes like accumulation of sorbitol (increasing osmotic stress) and fructose (promoting glycation), hypoxia(11) & deprivation of nerve growth factors.(12)

## CONCLUSION

Brainstem auditory evoked potential is a simple, non-invasive procedure to detect early impairment in auditory pathway even in the absence of specific symptoms. If BAEP is carried out in all diabetic patients, subclinical auditory alterations can be detected earlier.

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