



BRAIN STEM AUDITORY EVOKED RESPONSE IN ALCOHOLICS

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ABSTRACT

Alcohol is the most commonly used abused drug in the world. Long term alcohol consumption affects all the organs including central nervous system. Brain stem auditory evoked response are the potential recorded from vertex and ear in response to brief auditory stimulus and reflect various diseases of auditory nerve and central auditory pathway. The study was designed to evaluate and compare the brain stem auditory evoked response in Right and left ear Latencies and inter peak latencies in chronic alcoholics and non alcoholic controls. it was case control study including 100 subjects - 50 non-alcoholic controls and 50 alcoholics consuming 21 units/week.

Mean latency of wave III and wave V was significantly higher in alcoholics. Inter peak latency of wave I-III, I-V was significantly increased in alcoholics as compared to non-alcoholics. long term alcohol consumption affects auditory pathway and delays auditory transmission time in alcoholics.

KEYWORDS : Brain stem auditory evoked response, Latency , inter peak latency.

INTRODUCTION

Alcohol is a substance that impacts social, psychological, health and economical spheres of our existence. Alcoholism is characterised by significant physiological, psychological and social dysfunction. There are wide ranging effects of long term consumption of alcohol on nervous system functioning either through changes in general metabolism, nutritional deprivation, hepatic malfunction and psychosomatic or psychological disturbances.

The evoked potential techniques provide unique and sensitive indices of brain function yielding data at the level of sensory, perceptual and cognitive processing (1). Brain stem auditory evoked responses (BAEPS) are the potential recorded from vertex and ear in response to brief auditory stimulus to assess the conduction through auditory Pathway upto midbrain .BAEPS are commonly used as non-invasive, objective test for clinical diagnosis of inner ear, cerebello pontine angle and central auditory pathway (2). Deviation from standard BAEPS latencies and amplitudes generally reflect various diseases affecting the auditory nerve and central auditory pathways (3).

Several studies have demonstrated that alcohol use significantly increases auditory brainstem transmission time in rats, cats and man however functional brain stem defects have not been reported in alcoholic patients (4)

OBJECTIVE:

So the present study was designed to evaluate the long term effect of alcohol on the auditory pathway with brain stem auditory evoked response.

MATERIAL AND METHODS:

It was cross sectional case control study. Study was approved by institutional ethics committee. 100 male subjects in age groups of 25-40 years were selected randomly from general population. The subjects were divided in two groups. Study group included 50 chronic alcoholics consuming alcohol 21 units / week (1unit = 10gm, 1 unit = 30ml.) for greater than 5 years without abstinence and not having clinical overt neuropathy. control group included 50 healthy men of same age socio-economic status and not consuming alcohol Subject with tuberculosis , diabetes , thyroid diseases ,neurological diseases ,acoustic handicap ,on long term medication known to cause neuroathy were Excluded .

Type, quantity, frequency and duration of alcohol consumption was recorded. Alcohol consumption in units was quantified. Alcohol dependence screening was done by using alcohol dependence data questionnaire (SADD). ENT examination including otoscopic examination, tuning fork hearing tests were done to rule out ear disease.

Brain stem evoked auditory response absolute latency in ms of waves I, III, V and interpeak latency in (ms) of wave I-III and I-V of both Right and left ear was measured with RMS BERA-32 Supersec Recorders and Medicare Private Ltd.

The subjects were advised to remain calm, relaxed and recording was done in quite comfortable room. The negative electrodes were placed on right and left mastoid process and positive electrode on the point slightly in front of vertex. The ground electrode is placed on the frontal area.(5) Stimulus intensity was kept between 70-90 db above the hearing threshold. potentials were recorded.

Table – comparison of Brain stem auditory evoked response in non-alcoholics and chronic alcoholics

Variables (ms)	Ear	Non alcoholics Mean ± SD	Chronic alcoholics Mean ± SD	P value
Latency wave I	Rt	1.505 ± 0.0165	1.504 ± 0.014	P > 0.05
	Lt	1.507 ± 0.0145	1.507 ± 0.013	P > 0.05
Latency wave III	Rt	3.670 ± 0.056	4.18 ± 0.090	P < 0.05
	Lt	3.570 ± 0.026	4.14 ± 0.020	P < 0.05
Latency wave V	Rt	5.691 ± 0.068	6.155 ± 0.095	P < 0.05
	Lt	5.66 ± 0.072	6.198 ± 0.085	P < 0.05
Inter peak latency wave I-III	Rt	2.125 ± 0.016	2.387 ± 0.015	P < 0.05
	Lt	2.135 ± 0.028	2.48 ± 0.037	P < 0.05
Inter peak latency wave I-V	Rt	4.045 ± 0.498	4.37 ± 0.018	P < 0.05
	Lt	4.089 ± 0.075	4.38 ± 0.019	P < 0.05

RESULT

No significant difference was there in latency of wave I of alcoholics and non-alcoholics. Significant difference was found in latency of wave III, V and inter peak latency of wave I-III, and wave I-V of alcoholics and non-alcoholics, it was significantly prolonged in alcoholics.

DISCUSSION

In the modern world, alcohol abuse is a most common social and economical problem. It is emerging as third leading cause of death in world. long term alcohol consumption affects various body organs - Cardio vascular system, gastro intestinal tract, respiratory system, central nervous system, peripheral nervous system. Electro physiological tests are considered as unique sensitive indices of brain function.

The latency of wave I was found to be equal in alcoholics and controls. This suggests the eighth nerve transmission till the level of cochlear nucleus was not altered in alcoholics. The latency of wave III and V was delayed in alcoholics and the delay was found to be highly

significant on statistical analysis.

The inter peak latency I-III, I-V was prolonged in alcoholics. This suggests delayed transmission of auditory impulse in the auditory pathway of alcoholics at the level of brain stem and mid brain. The delay in latency of wave III and V in alcoholics indicate neuropathy at brain stem and mid brain level in auditory pathway.

Y.W. Chan (1985) studied BERA in chronic alcoholics with Wernicke Korsakoff syndrome. Abnormality in all inter peak latency I-V and I-III intervals were observed.(6)

Elisabeth Stephanie Smith et al studied alcohol consumption of head and neck tumour patients. They found prolongation of latencies of I, III, V and prolongation of I-III and I-V inter peak latency.(4)

H Begleiter et al studied BERA in alcoholic patients who show no clinical signs of corticobulbar or corticospinal tract deficit. He found significant increase in inter peak latency of III-V (3).

Long history of alcohol consumption may cause central pontine myelinosis. The pathological changes usually involve central part of the base of mid to upper pons and are characterised by loss of myelin sheath and oligodendroglia. Where as nerve cell, axis cylinder, blood vessel remain intact. Demyelination of auditory tract and nuclei at the level of caudal and mid pons adjacent to basis pontis has been shown to result in significant increase in brain stem transmission time. The demyelination cannot be readily identified by clinical diagnosis and in most cases its presence is detected by neurophysiological tests. (3)

Alcohol may be ototoxic to outer hair cell. A disturbance in the end cochlear environment by alcohol and its metabolites may result in abnormal outer hair cell motility. Alcohol may influence neurotransmission in the inner ear. It is suggested that alcohol suppresses the central nervous system by inhibiting excitatory transmission via N-Methyl aspartate receptors and enhancing inhibitory transmission via γ - aminobutyric acid subtype A receptor. A number of studies demonstrated that alcohol may suppress the outer hair cells via efferent pathway in animals, middle ear impedance is also affected by alcohol.(7).

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