Original article:

A comparison study of P300 in alcohol dependence persons and age matched controls

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Abstract

P300 is the most frequently investigated Event Related Potential (ERP) appearing at about 300 msec following task-related stimuli. P300 is a symmetrical wave maximum over the midline, central and parietal regions with a latency varying between 250 msec and 600 msec depending on the stimulus and the subject parameters. P300 can be elicited by any stimulus, the most common being an unexpected or infrequent stimulus (oddball paradigm). Two factors, (i) stimulus infrequency or unexpectedness and (ii) attention to task relevance operate independently. Defining abnormality on the basis of latency and amplitude has not been possible because of wide-variations.

Introduction:

P300 is the most frequently investigated Event Related Potential (ERP) appearing at about 300 msec following task-related stimuli. P300 is a symmetrical wave maximum over the midline, central and parietal regions with a latency varying between 250 msec and 600 msec depending on the stimulus and the subject parameters. P300 can be elicited by any stimulus, the most common being an unexpected or infrequent stimulus (oddball paradigm). Two factors, (i) stimulus infrequency or unexpectedness and (ii) attention to task relevance operate independently. Defining abnormality on the basis of latency and amplitude has not been possible because of wide-variations. P300 may be useful for showing group differences and sequential studies. Alcoholics manifested significantly delayed P300 latencies and some found have smaller P300 amplitudes. These findings are similar to P300 patterns found in Alzheimer's disease, other dementias and normal aging.

Aim: To identify subclinical cognitive impairment in newly diagnosed patients with alcohol dependence.

Material and methods:

In this study, 31 alcohol dependence patients diagnosed according to DSM IV criteria (mean age – 33.9 years) and 30 age matched controls (mean age – 34.4 years) were enrolled. Inclusion criteria: Alcohol dependence patients aged < 45 years, without significant past/present medical/neurological illness.

Cognitive functions were evaluated with Mini Mental State Examination (MMSE) and detailed lobar examination.

• Auditory ERPs were recorded by using the oddball paradigm.
• The patient is asked to count raise the finger in response to target stimuli.
• Computed Tomography Brain to rule out cerebral atrophy

Study period: January 2018 to June 2018 at Neurology department at chengalpattu medical college

Electrode placement: surface electrodes placed at Fz,Cz,Pz and are referred to link mastoid reference.

• Low pass filters-30Hz

• High pass filters-1000Hz

• Sweep time of 1sec and amplified to 10000 times.

• ERP waveforms are computed separately for all rare and frequent stimuli.

• Latency and amplitude of N1, P2, N2 and P3 were obtained.

Results:

Parameter	Alcohol dependence group (± SD)	Control group (±SD)	P value (Independent Samples Test - Levene's Test for Equality of Variances)
N1 latency	97.7 (±8.9) msec	94.9(±7.9) msec	Insignificant
P2 Latency	177.5(±13.6) msec	174.9(±14.5) msec	Insignificant
N2 Latency	232.6(±23.6) msec	223.8(±15.9) msec	Insignificant
P3 Latency	361.1(±23.7) msec	318.8(±10.0) msec	p<0.001 (Significant P Value)
P3 Amplitude	7.1(±3.1) microV	8.2(±3.7) microV	Insignificant

Discussion:

The mean P300 latency of alcoholic patients peaked at 361.1 ± 23.7 msec and this result is significantly different from those of the controls which peaked at 318.8±10.0 (p<0.001) (Independent Samples Test - Levene's Test for Equality of Variances). When the mean latencies of N1, P2, N2 were compared, there was no difference between the groups (Insignificant P value). The mean amplitudes of N1, P2, N2, & P3 between two groups were also insignificant P.

Conclusion:

 We conclude that our finding of delay in P300 latency may indicate a neuronal structural impairment due to chronic alcoholic exposure to alcoholic dependence patients despite the fact that obvious cognitive dysfunction

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is not observed.

 These patients should be aggressively treated for alcoholism to prevent development of cognitive impairment later.

References:

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