Faculty of Medicine - Ain Shams University

Event-Related Potential (P_{300}) In Normal Children
(4 - 6 Years)

Thesis

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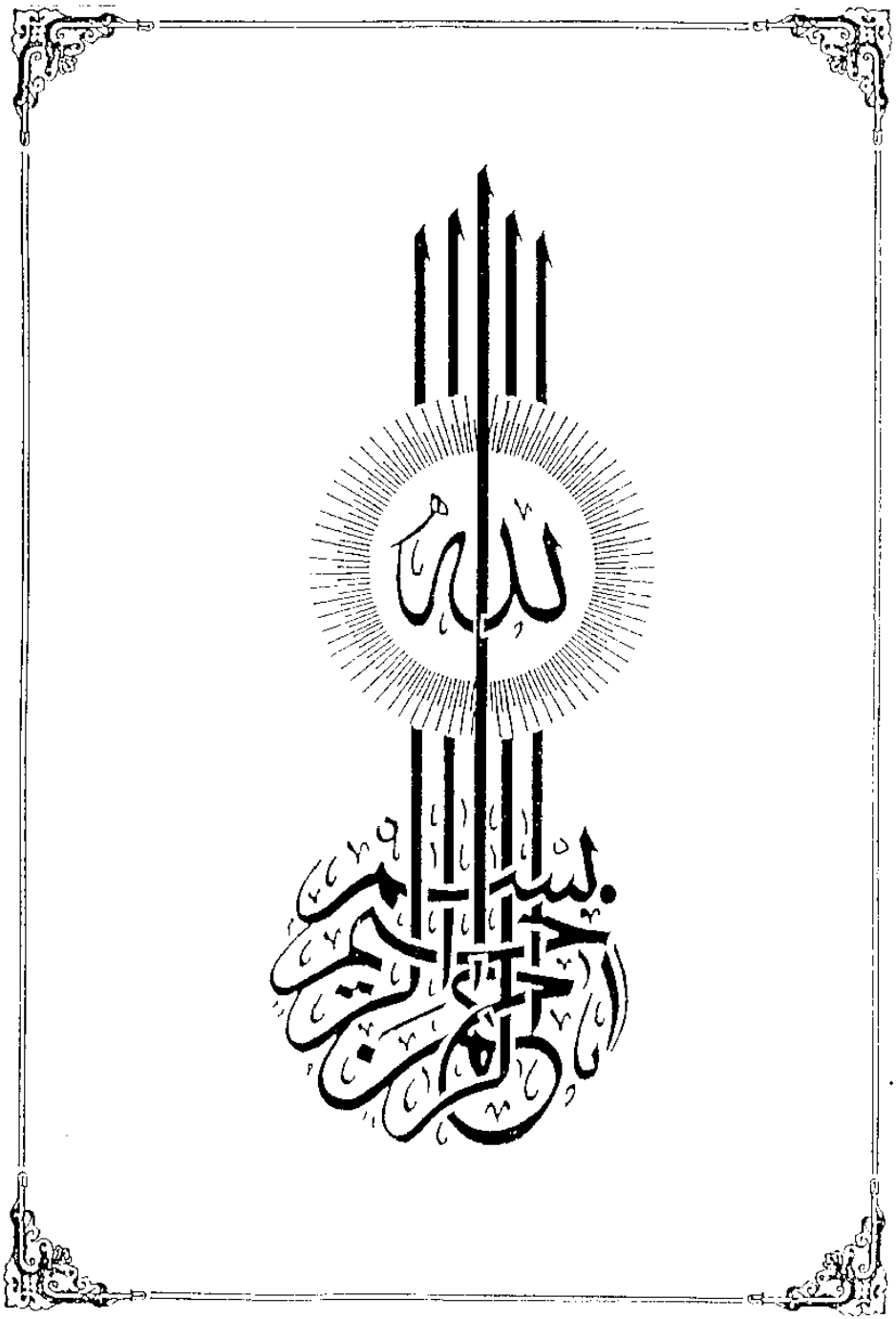

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P_{300} is a late positive endogenous component of event related potentials . It is characterized by a single, large, positive peak which occurs at latency of approximately 300 m.sec. post-stimulus onset after the N_1 - P_2 complex ***(Ferraro and Durrant, 1994) .***

P_{300} occurs when rare stimuli are presented in experimental paradigm involving the auditory, visual or somatosensory systems . P_{300} is generated when subjects attend and discriminate stimulus events that differ from one another on some dimensions by noting the occurrence of every target stimulus ***(Polich, 1986)*** . It is relatively unaffected by changes in stimulus parameters but it is sensitive to information-processing demands of the task ***(Rogers et al., 1991)*** . If P_{300} appears, it is an indication that the subject recognizes the difference between the target and non target stimuli .

Intracranial recordings of P_{300} have suggested that its generation involves multiple subcortical sites ***(Wood et al., 1980)***. Regions of limbic system particularly the hippocampus and amygdala have been postulated as generators, both on bases of surface electromagnetic recordings ***(Okada et al., 1983)*** and intracranial recordings ***(Squires et al., 1983)***. Thalamus ***(Wood et al., 1980)***, frontal cortex ***(Wood and McCarthy , 1985)*** and auditory cortex ***(Richer et al., 1983)*** also contribute to P_{300} generation.

P_{300} seems to be neural correlate of cognitive functions such as decision making, information processing, and short term memory ***(Donchin , 1981)*** . So, it could be used as a clinical tool for assessment of cognitive functions, and its latency is considered to be a measure of speed of cognition ***(Donchin et al., 1986)*** .

Introduction and Rationale

P_{300} is studied in normal adults as well as in patients with dementia ***(Goodin , 1990)***, Schizophrenia ***(Baribeau-Braun et al., 1983)***, Alzheimer's disease ***(Chayasirisobhon et al., 1984)***, head trauma and brain tumors ***(Ebner et al., 1986)***.

In children, changes in age and memory span both predicted significant changes in P_{300} latency and amplitude . In general, as children grow older, P_{300} latency decreases and its amplitude increases ***(Said et al., 1996)*** . This decrease in latency could be related to the maturation of cognitive process ***(Martin et al., 1993)***.

P_{300} abnormalities have linked to auditory processing disorders ***(Jirsa and Clontz, 1990)***, Down's syndrome ***(Lincoln et al., 1985)*** and psychiatric disorders ***(Diner et al., 1985)***. Low amplitude P_{300} in children is due to hyperactivity, schizophrenia, and reading disabilities ***(Ciesielki et al., 1990)***.

P_{300} in normal children (6 - 12 years old) was studied by **Said et al. (1996)** . They reported that larger amplitude and shorter latency were encountered in older age group (10 - 12 years) than younger age group (6 - 8 years).

However, none of the available literature discussed auditory P_{300} in children below 6 years .

Studying auditory processing using P_{300} in such children may help in early detection of cognitive disorders and learning disability and consequently helps in their early management . The central test battery, as a tool to diagnose learning disability, could be too lengthy and definitely difficult in such age group .

Accordingly, this study is undertaken to address the variables of P_{300} in normal young children (4 - 6 years) as an attempt in the diagnosis of cognitive disorders early in life .