

Faculty of Medicine - Ain Shams University

Event-Related Potential (P₃₀₀) In Normal Children (4-6 Years)

Thesis

Submitted In Partial Fulfilment For The Master Degree In Audiology

Presented By

Maged Kamal Abdel-Fattah Sidky

617 89 4 K

Supervised By

60086

Prof. Dr.

Salah M. Soliman

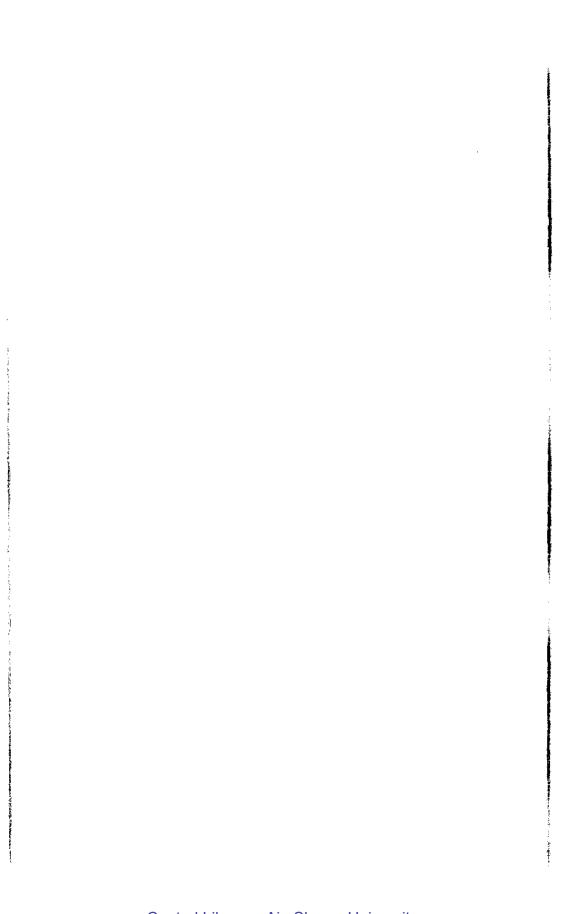
Professor of Audiology, E.N.T. Department Ain Shams University

Dr

Iman M.S. El-Danasoury

Asst. Professor of Audiology, E.N.T. Department Ain Shams University

1998





Acknowledgment

I am greatly indebted to *Prof. Dr.* **Salah Soliman**, Professor of Audiology, Ain Shams University, for his helpful supervision, encouragement and extremely useful advice.

I would like to express my deepest thanks to *Dr.* **Iman M.S El-Dansoury** Asst. Professor of Audiology, Ain Shams

University for her continuous support and sincere contribution to this wok.

My special thanks are due to all members of the Audiology Unit, Ain Shams University, For their continuous support and cooperation.

Magd Kamal



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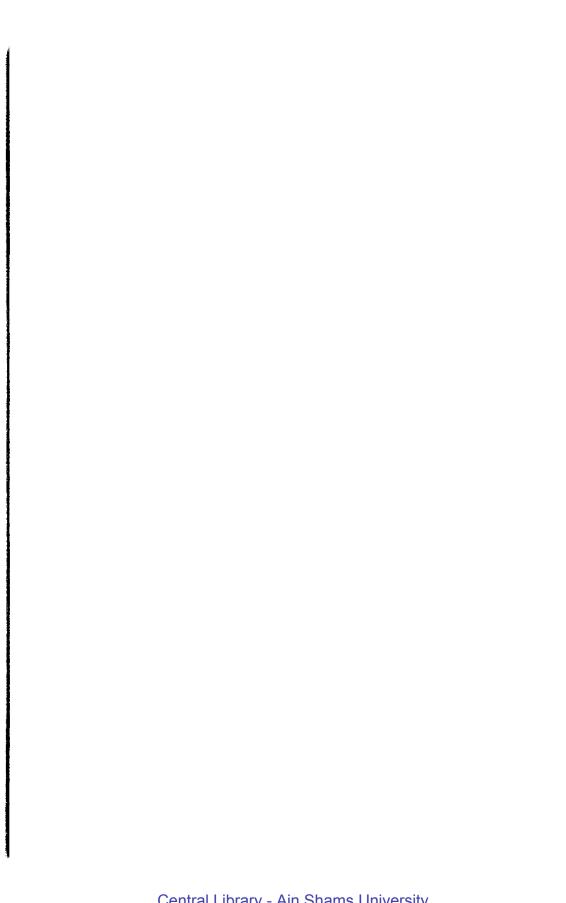
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ntroduction and Rationale



Introduction and Rationale

 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).

P₃₀₀ occurs when rare stimuli are presented in experimental paradigm involving the auditory, visual or somatosensory systems . P₃₀₀ 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 P₃₀₀ appears, it is an indication that the subject recognizes the difference between the target and non target stimuli.

Intracranial recordings of P₃₀₀ 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 P₃₀₀ generation.

P₃₀₀ 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).

P₃₀₀ 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).

P₃₀₀ 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 P₃₀₀ 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.