Neurophysiological Assessment of Cognitive Functions in Children with Comorbid Attention Deficit Hyperactive Disorder and Learning Disorders

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Date received: 15/9/2010
Date accepted: 10/2/2011

Background: This is a cross sectional case control study aimed at neurophysiologic assessment of the cognitive functions of a group of children with comrobid ADHD and LDs.

Subjects & Methods: The study included 25 children with comorbid LD/ADHD disorders, attending the child psychiatry outpatient clinic at Institute of psychiatry Ain Shams University hospitals with an age ranging from 7-12 years old. Controls were 25 child matched with patients for age, sex and socioeconomic class. Both patients and controls were subjected to full psychiatric/neurological history and examination, socioeconomic class questionnaire, Wechsler Intelligence Scale for children Revised version (WISC-R), Electroencephalogram (EEG), and long wave auditory evoked potential (Event Related Potential, ERP).

Results: Our comorbid ADHD/LD sample was predominantly males showed significantly lower values of verbal, performance and total subscales of intelligence compared to controls. About 60% of the study group had abnormal EEG with 60% having theta slow waves and 40% having focal changes. Focal changes were distributed as four with fronto-tempora focus and two with occipito-tempora focus with three of them had secondary generalization. In the control group, no one have abnormal EEG changes. There was a highly significant difference between ADHD/LD patients and controls in P300 latency and amplitude, N100 latency and amplitude, N200 latency, and P20 latency. Age and total IQ score were positively correlated with P300 amplitude and negatively correlated with P300 latency. EEG was positively correlated to P300 latency and negatively correlated to P300 amplitude. There was no correlation between P300 latency and amplitude with frequency of perinatal complications or family history of ADHD/LD disorder.

Conclusion: Children with comorbid ADHD and LDs are needed to best identify and treat their multiple academic needs. The neurophysiologic assessment by EEG and ERP can play an important role in the evaluation and treatment of those children.

Keywords: Neurophysiologic, Cognitive, LD, ADHD, Comorbid.

Abbreviations:
ADHD: Attention Deficit Hyperactive Disorder
LDs: Learning Disorders
IQ: Intelligence Quotient
EEG: Electroencephalogram
ERP: Event Related Potential
DSM-IV TR: Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision
WISC-R: Wechsler Intelligence Scale for Children Revised version
RD: Reading Disorder
DWE: Written Expression Disorder
ADHD/LD: Comorbid Attention Deficit Hyperactive Disorder with Learning Disorders
QTL: Quantitative Trait Locus
MD: Mathematical Disorders

Egypt. J. Psychiatry. May 2011; 32(2): 59-66

INTRODUCTION

Learning disability disorders (LDs) occur in 2-10% of the general population. As many as 30-50% of children with ADHD may have LDs. Written expression and reading disability are the most likely subtypes to co-occur with ADHD, with 65% of children with ADHD meeting criteria for written expression disability, with between 25 and 40% of children with ADHD meeting criteria for reading disability, 31% of children with ADHD meeting criteria for mathematical disability, and 70% of children with ADHD meeting criteria for one or more LDs (Pastor and Reuben, 2002 and Dietz and Montague, 2006).

ADHD and LD are highly comorbid and are both characterized by academic impairment although they have average or above average intelligence (Rabiner, 2003). The cognitive functions of those children with comorbid ADHD and LDs is still a matter of controversy. Some researchers found that, they do not have lower cognitive levels than children without