Prevalence and Risk Factors of Attention Deficit- Hyperactivity Disorder In School Children

Thesis

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Prevalence and risk factors of Attention Deficit Hyperactivity Disorder in school children

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Abstract

BACKGROUND*:* Attention deficit hyperactivity disorder (ADHD) is among the most common childhood psychiatric disorders which interfere with social and educational development. Findings showed a number of diverse risk factors concerning their pre, peri and postnatal history, neuropsychomotor development, and family environment that may be related with the disorder. **OBJECTIVES**: determine the prevalence of ADHD, comorbid disorders and risk factors in school children and comparing results of this study with previous one done by Ghanem et al., (1997). **METHODS**: Total sample included 3197 students (1780 M and 1417 F) from KG1 up to the 6th grade, 4 to 13 years of age in two primary schools in Cairo. The study was performed in two stages. First stage: was a cross-sectional descriptive study where teachers detected children possibly having ADHD using the DuPaul ADHD rating scale (a teacher questionnaire). Further evaluation using DSM-IV was done to confirm ADHD symptoms and comorbid psychiatric disorders. Second stage: was a case-control study where ADHD risk factors were evaluated by comparing ADHD cases (251) with (330) controls matched by age and sex using a pre-designed parents' questionnaire. **RESULTS***:* A total of 251 (7.9%) of schoolchildren had ADHD diagnosis which is significantly more than that of Ghanem et al., study (6.1%). Prevalence was 3.2 times more common in boys than girls (11.2%, 3.7%) respectively $p<0.01$. Hyperactivity and combined types of ADHD were significantly higher among boys $p<0.05$, while inattention was significantly higher among girls. Comorbid disorders revealed were ODD in 34.7%, CD in 16.3%, enuresis 30.3%, anxiety 15.1%, depression in 5.6% and low academic achievement in 45.8%. More cases had positive family history of ADHD than controls (14.9%, 5% OR 3.34), were living apart from one or both parents (12.9%, 5% OR 0.35), of working mothers (52.1%, 35%OR 2.02), being a middle-born children (28%, 18.9%), of fathers and mothers with low educational levels (28%, 18.2% for fathers and 31.1%, 22.6% for mothers), received O2 therapy in neonatal period (3.7%, 0.5%), consume soda drinks/canned juices daily (50.3%, 38.9% OR 1.59), eat chocolate daily (47.7%, 36.9% OR 1.56) and/or suffering from visual disturbances (15.5%, 7.9%). No significant difference was found for maternal or paternal age at child birth, exposure to passive smoking, pregnancy or labor hazards, breast feeding or artificial feeding, TV watching, frequency of internet use or computer/video game playing, consumption of packed snacks/chips, sweets/lollypops. **CONCLUSIONS**: ADHD prevalence in school children is similar to other studies. M: F ratio is 3.2: 1. Some factors as family history, living apart from one or both parents, being a middle-born child, receiving O2 therapy in neonatal period, having a working mothers or parents with low educational level, consuming soda drinks/canned juices or eat chocolate daily and/or suffering from visual disturbances were identified that increase the risk for the disorder that should receive attention.

Key words: ADHD, ODD, CD, academic achievement, school children, risk factors, internet, videogame.

TABLE OF CONTENTS

LIST OF ABBREVIATIONS

ADD	Attention-Deficit Disorder
ADHD	Attention-Deficit/Hyperactivity Disorder
AAP	American Academy of Pediatrics
APA	American Psychiatric Association
BASC	Behavior Assessment System for Children
CAM	Complementary and Alternative Medicine
CBCL	Child Behavior Checklist
CBT	Cognitive Behavior Therapy
CD	Conduct Disorder
CHI	Closed Head Injury
CI	Confidence Interval
CNS	Central Nervous System
CT	Computed Tomography
DAT	Dopamine Transporter Gene
DSM	The American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders
DSM-II	The second edition of the Diagnostic and Statistical Manual of Mental Disorders
DSM–III	The third edition of Diagnostic and Statistical Manual of Mental Disorders
DSM-III-R	The third edition of Diagnostic and Statistical Manual of Mental Disorders-Revised
DSM-IV	The fourth edition of Diagnostic and Statistical Manual of Mental Disorders
DSM-IV-TR	The fourth edition of Diagnostic and Statistical Manual of Mental Disorders-Text Revision
DRD2	Dopamine D2 Receptors
DRD4	Dopamine D2 Receptors
EEG	Electroencephalogram
Erc-Mg	Intraerythrocyte magnesium
ETS	Exposure To Tobacco-Smoke
fMRI	functional Magnetic Resonance Images
Freq	Frequency
GAD	Generalized Anxiety Disorder
HTR2A	Serotonin Receptor 2a Genes
ICD	International Statistical Classification of Diseases and Related Health Problems

IQ	Intelligence Quotient
ICD-9	International Classification of Diseases 9th Revision
ICD-10	International Classification of Diseases 10th Revision
LBW	Low birth weight
LC-PUFA	Long-chain Polyunsaturated Fatty Acids
LD	Learning Disorders
MAO	Monoamine Oxidase
MDD	Major Depressive Disorder
Mg-B6	Magnesium-vitamin B6
MRI	Magnetic Resonance Image
MTA	Multimodal treatment study of children with ADHD
O2	Oxygen
OCD	Obsessive Compulsive Disorder
ODD	Oppositional Defiant Disorder
OR	Odds Ratio
PET	Positron Emission Tomography
PSC	Pediatric Symptoms Checklist
QEEG	Quantitative EEG
SD	Standard Deviation
SGA	Small for Gestational Age
SNAP	Synaptosomal-Associated Protein
SPECT	Single-Photon Emission Computed Tomography
SSRI	Selective Serotonergic Reuptake Inhibitors
T3	Tri-iodothyronine
TBI	Traumatic Brain Injury
TPH	Tryptophan Hydroxylase
TV	Television
VARETA	Variable Resolution Electromagnetic Tomography
WHO	World Health Organization
WM	Working Memory
χ^2	Chi square

LIST OF TABLES

LIST OF CHARTS AND FIGURES

Introduction

Child psychiatric disorders result in suffering for children and those around them, interfere with social and educational development, and can lead to life-long social and psychiatric problems (Rutter, 1996). Attention deficit hyperactivity disorder (ADHD) is among the most common childhood psychiatric disorders which presents with inattention, hyperactivity, impulsivity, academic underachievement, or behavior problems *(American Academy of Pediatrics, 2000).* Comorbid conditions often accompany the disorder and some of them are potentially life-threatening conditions.

Prevalence estimates ranges from 4% to 8% across cultures *(Visser et al., 2007)*, and 3%-5% of prepubertal elementary school children *(Havey et al., 2005).* Previously, a prevalence of 6.1% was found among a sample of Egyptian school children *(Ghanem et al., 1997).* Throughout the world its prevalence varies widely and it reached up to 20% of grade school children in Colombia *(Cornejo et al., 2005)*, and 17.1% in Brazil *(Vasconcelos et al., 2003).* It is most frequently identified during elementary school years; however the onset of ADHD frequently occurs earlier, with presentation as young as 3 years of age (*Greenhill et al., 2008).* Teachers are often the primary source of information regarding ADHD diagnoses in school children however; they are likely to identify children at rates higher than the expected prevalence rates specified in DSM-IV *(Havey et al., 2005).* It is diagnosed much more often in boys than in girls *(St Sauver et al., 2004; Stubbe et al., 2005).*

According to the literature, ADHD is a syndrome produced by multiple causes that depend on genetic factors and environmental and social adversities. Nutritional factors play major roles as well. The issue on the role of food preservatives and artificial colorings in ADHD remains controversial *(Boris & Mandel 1994; Cruz & Bahna, 2006).* Exposure to tobacco smoke in utero is suspected to be associated with ADHD symptoms in children *(Linnet et al., 2003).* Findings showed a

number of diverse risk factors concerning their pre, peri and postnatal history, neuropsychomotor development, and family environment that may be related with the disorder *(Poeta & Rosa Neto 2006; Hurtig et al., 2007).*

The internet, video games and other media types are reported to have important social and mental health effects in children and adolescents. However they showed inconsistent findings between their use and ADHD *(Yoo et al., 2004; Chan & Rabinowitz, 2006; Bioulac et al., 2008).*

Hypothesis

This study hypothesized that: Many factors could contribute to the development of ADHD as perinatal complications, family and social factors as large family size, family distortion, and first borne child, excessive use of non-nutritional food additives as well as the change of the Egyptian life style as a result of excessive use of internet and video games.

Aim of the study

To determine:

1. The prevalence of ADHD and comorbid disorders accompanying it in elementary school-aged children in Cairo.

2. Possible risk factors which may have role in the etiology of ADHD.

3. The effect of life style changes; as excessive use of TV, computer, internet and video games on the prevalence of ADHD in recent years by comparing results of this study with previous one done by Ghanem et al., (1997) where ADHD prevalence was 6.1%.

Attention-Deficit/Hyperactivity Disorder

(ADHD)

REVIEW OF LITERATURE

HISTORY AND TERMINOLOGY

It has been argued that ADHD is a typical result of the adverse conditions of modern society; in such a situation it can be useful to go back in the history of medicine. There is considerable evidence to suggest that ADHD is not a recent phenomenon; *2500 years ago, the great physician-scientist, Hippocrates* described a condition that seems to be compatible with what we now know as ADHD. He described patients who had.... "Quickened responses to sensory experience, but also less tenaciousness because the soul moves on quickly to the next impression". Hippocrates attributed this condition to an "overbalance of fire over water". His remedy for this "overbalance" was "barley rather than wheat bread, fish rather than meat, water drinks, and many natural and diverse physical activities"*(ADHD.org.nz, 2005).*

The typical symptoms of ADHD were, however, described as early as *1846 by Heinrich Hoffmann*, a physician who later founded the first mental hospital in Frankfurt. Interestingly, his description was published in a children's book entitled "Struwwelpeter" which he had designed for his 3-year-old son Carl Philip. The symptomatology is impressively depicted in the colorfully illustrated story of "Zappel-Philipp" ("Fidgety Philip"), probably the first written mention of ADHD by a medical professional.

It is astonishing how clearly the typical symptoms of ADHD are depicted in Hoffmann's book. Many of the international classification of diseases, 10th revision (ICD-10) criteria for ADHD are fulfilled: Philip fails to