ATTENTION DEFICIT HYPERACTIVITY DISORDER: AN OVERLOOKED PROBLEM IN CHILDREN

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Background: This condition is one of the most prevalent disorders among school-aged children treated by child neurologists and pediatricians. It is characterized by inattention, hyperactivity-impulsivity or combination of these features. It is one of the most common causes of poor school performance. It remains under diagnosed and under recognized.

Objectives: To study the characteristics of Attention Deficit Hyperactivity Disorder in our children.

Methods: 42 children diagnosed as having ADHD (according to Statistical Manual of Mental Diseases edition IV) in the pediatric neurology clinic in Al-Kadhimiya Teaching Hospital. 40 non-ADHD children matching with age and sex were used as control. Chi square was used to find the significance of the characteristics of ADHD.

Results: Males were affected twice as the females. 59.5% of the patients were of the combined type. 42.9% had significant history of nocturnal enuresis (P= 0.01). 71.4% had significant history of daily injuries, (P= 0.004). 61.9% had significant history of poor school performance, (P= 0.0001). 80.9% had significant history of sleep problems, (P= 0.0003). 69% of all subtypes had onset of symptoms after 7 years of age and all cases of the hyperactive subtype before 7 years of age.

Conclusion: Boys with ADHD are more commonly affected. The most common type of ADHD is the combined type, and the hyperactive type is the least. The hyperactive type is more common in the younger age group. ADHD children are more likely to have nocturnal enuresis, daily injuries, poor school performance and sleep problems.

Key words: Attention deficit, hyperactivity, children

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Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most prevalent disorders (3-5% of school-age children) treated by physicians who manage children/adolescents, making up as much as half of child psychiatric clinical practice and also commonly managed by child neurologists and pediatricians[1].

The essential description disorder has a 75 year-long history under a variety of names- "incorrigibles," "brain damaged," "hyperkinetic," and "Minimal Brain Dysfunction"[2]. Since 1980, the term "attention" has been the initial and therefore most prominent word featured in the names given to the syndrome, either "inattention" alone or combined with "hyperactivity" and "impulsivity," comprising the other central features defining the clinical category of Attention deficit Hyperactivity Disorder[3].

The core symptoms of ADHD are: short attention span for mental age, impulsivity (acting without thinking of consequences), easy distractibility (inability to maintain focus on a needed task) and motor overactivity (which may range from fidgetiness to continuous movement). These core features have been organized into two major groups (inattentiveness and hyperactivity-impulsivity) in the Diagnostic and Statistical Manual of Mental Disorders 4th edition (DSM-IV) of the American Psychiatric Association 1994 under the criteria for attention deficit hyperactivity disorder[4].

The Attention Deficit Hyperactivity Disorder still remains under diagnosed and under recognized, although this illness affects at least one pupil in each classroom. Despite its prevalence, untreated ADHD can lead to school failure, relationship break-

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ups, drug abuse, and a tremendous sense of underachievement[5].

Recently, it has been verified that the presence of ADHD in early ages could be a vulnerability factor for developing different psychiatric disorders in adults, such as substance abuse and personality disorders and it has been demonstrated that it increases the risk of antisocial behavior development in adulthood[6,7].

ADHD is a descriptive diagnosis in which indices of the severity of behavior enable it to be distinguished from normal behavior. Both over-diagnosis and under-diagnosis occur[8]. Although the biological basis of ADHD is unknown, it has been shown to possess a considerable heritability. Current association studies have focused mainly on dopaminergic genes[9].

The etiology of ADHD encompasses genetic and environmental factors. Pre-, peri-, and postnatal stresses are environmental factors that may play a role in its etiology[10].

Anatomical imaging studies of individuals with attention deficit hyperactivity disorder consistently point to involvement of the frontal lobes, basal ganglia, corpus callosum and cerebellum. Imaging studies of brain physiology also support the involvement of the right frontal and basal ganglia, probably mediated by decreased brain dopaminergic functioning[11,12].

Several studies have shown an association between ADHD and the 7-repeat allele of the dopamine D (4) receptor gene (DRD4).

Recently, Faraone SV et al. and Todd RD et al. reported an association of the DSM-IV primarily inattentive ADHD subtype with a 5' 120 base pair repeat polymorphism in the DRD4 gene[13,14].

Diagnostic Criteria for ADHD according to DSM-IV (Diagnostic and Statistical Manual of Mental diseases edition 4)[3]

Either (1) or (2):

(1) Six (or more) of the following symptoms of **inattention** have persisted for at least 6 months to a degree that is maladaptive and inconsistent with the developmental level:

Inattention

i. Often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities.

ii. Often has difficulty sustaining attention in tasks or play activities.

iii. Often does not seem to listen when spoken to directly.

iv. Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions).

v. Often has difficulty organizing tasks and activities.

vi. Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework).

vii. Often loses things necessary for tasks or activities (e.g. toys, school assignments, pencils, books, or tools).

viii. Is often easily distracted by extraneous stimuli.

ix. Is often forgetful in daily activities.

(2) Six (or more) of the following symptoms of **hyperactivity-impulsivity** have persisted for at least 6 months to a degree that is maladaptive and inconsistent with the developmental level:

Hyperactivity

i. Often fidgets with hands or feet or squirms in seat.

ii. Often leaves seat in classroom or in other situations in which remaining seated is expected.

iii. Often runs about or climbs excessively in situations in which it is inappropriate (in adolescents or adults, may be limited to subjective feelings of restlessness).

iv. Often has difficulty playing or engaging in leisure activities quietly.

v. Is often "on the go" or often acts as if "driven by a motor".

vi. Often talks excessively.

Impulsivity

i. Often blurts out answers before questions have been completed.

ii. Often has difficulty awaiting turn.

iii. Often interrupts or intrudes on others (e.g. butts into conversations or games).

- **ADHD combined type:** if both criteria (1) and (2) are met for the past 6 months.
- **ADHD Predominantly Inattentive Type:** if criterion (1) is met but criterion (2) is not met for the past 6 months.
- **ADHD Predominantly Hyperactive-Impulsive Type:** if criterion (2) is met but criterion (1) is not met for the past 6 months.

It is essential that family physicians be knowledgeable about the presentation and diagnosis of ADHD. Stimulant medications continue to be the mainstay of treatment, such as methylphenidate, although many other medications (such as antidepressants and alpha blockers) are helpful adjuvant to therapy. Current recommendations for treatment include an individualized, multimodal approach involving parents, teachers, counselors and the school system. New clinical practice guidelines from the American Academy of Pediatrics specify diagnosis and treatment for childhood ADHD, including psychosocial interventions, psychopharmacology, educational modifications, skill training, and social support[15,16].

Aim of the study

To study the characteristics of Attention Deficit Hyperactivity Disorder in the children referred to the neuropediatric consultation clinic in Al-Kadhimiya Teaching Hospital.

Patients and Method

This study was conducted on the children who were referred to the consultation pediatric neurology clinic in Al-Kadhimiya Teaching Hospital, along the period from September 2003 to May 2004.

In the first stage the parents of those children who were suspected to have ADHD filled a standardized questionnaire of 18 ADHD symptoms defined at the Diagnostic and Statistical Manual of mental diseases edition IV (DSM-IV)[3].

After screening the children, a total of 42 were diagnosed to have ADHD according to the criteria mentioned in DSM-IV. The age range was from 7-14 years (26 boys and 16 girls).In the second stage the following procedures were done: DSM-IV symptoms questionnaire, oriented history, physical examination and neurological examination.

ADHD diagnosis was subdivided into three subtypes:

- Predominantly hyperactive – impulsive
- Predominantly inattentive
- Combined type

Additionally 40 healthy non-ADHD children had served as control; age range was 7-15 years (22 boys and 18 girls). Statistical analysis was done using chi square and any P value greater than 0.05 was regarded to be not significant.

Results

During the nine months period of the study 42 children with ADHD were collected, 28 of them were males (67%) and 14 were females (33%). Male: female ratio was 2:1.

The patients were distributed according to age groups and subtypes of ADHD. The most common subtype was the combined (59.5%), then the inattentive (33.3%), and the least was the hyperactive-impulsive (7.2%).

Table 1: Distribution of the ADHD patients according to age groups and subtypes.

Age group (years)	Combined No. %	Inattentive No. %	Hyperactive-impulsive No. %	Total No. %
6-7	9 (21.4%)	4 (9.5%)	2 (4.8%)	15 (35.7%)
8-9	7 (16.7%)	5 (11.9%)	1 (2.4%)	13 (31%)
10-11	5 (11.9%)	3 (7.1%)	0 (00%)	8 (19%)
12-13	3 (7.1%)	1 (2.4%)	0 (00%)	4 (9.5%)
> 14	1 (2.4%)	1 (2.4%)	0 (00%)	2 (4.8%)
Total	25 (59.5%)	14 (33.3%)	3 (7.2%)	42 (100%)

During taking the past history the parents were asked about nocturnal enuresis after age of 5 years. It has been found that 42.9% of the patients had history of nocturnal enuresis while 15% only of the control group had this problem. The difference was statistically significant with a p value of 0.01.

Table 2: ADHD patients with history of nocturnal enuresis after age of 5 years compared to the control group.

Nocturnal Enuresis	ADHD	Control
Positive	18 (42.9%)	6 (15%)
Negative	24 (57.1%)	34 (85%)
Total	42 (100%)	40 (100%)

P= 0.01

Regarding history of injuries of the children with ADHD, the parents were asked about daily continuous injuries of their children and it was found that 71.4% of the patients had daily injuries while only 20% of the control group had this problem. The difference was statistically significant with a p value 0.004.

Table3: ADHD cases with history of daily injuries compared to the control group.

Daily injuries	ADHD	Control
Positive	30 (71.4%)	15 (37.5%)
Negative	12 (28.6%)	25 (62.5%)
Total	42 (100%)	40 (100%)

P= 0.004

School performance of the patients was one of the important things to ask the parents about and it was found that 61.9% of the ADHD children had school repetition, suspension or expulsion, while only 17.5% of the control group had school repetition, suspension or expulsion. The difference was statistically significant with a p value 0.0001.

Table 4: School performance of the ADHD children.

School repetition, suspension, expulsion	ADHD	Control
Positive	26 (61.9%)	7 (17.5%)
Negative	16 (38.1%)	33 (82.5%)
Total	42 (100%)	40 (100%)

P= 0.0001

Regarding sleep problems of the children with ADHD 45.2% of their parents reported difficulty in settling and going to sleep compared to 20% in the control group, and 35.7% of them reported sleep disruptions compared to 17.5% in the control group, while 19.1% of the parents with ADHD children did not report any sleep problem compared to 62.5% in the control group. The differences were statistically significant with a p value 0.0003.

Table 5: Sleep problems in ADHD children.

Sleep problem	ADHD	Control
Difficulty in settling and going to sleep	19 (45.2%)	8 (20%)
Disruptions of sleep	15 (35.7%)	7 (17.5%)
No difficulty	8 (19.1%)	25 (62.5%)
Total	42 (100%)	40 (100%)

P= 0.0003

The parents were asked about the onset of impairment due to symptoms of ADHD, and it was divided either before 7 years of age or after it. It was found that all the children with the hyperactive-impulsive subtype started their symptom criteria before the age of 7 years, while the majority of the combined and the inattentive subtypes started their symptom criteria after the age of 7 years.

Table 6: Distribution of ADHD patients according to the onset of symptom criteria and the subtypes.

Onset of symptom criteria	Combined ADHD	Inattentive ADHD	Hyperactive-impulsive ADHD	Total
Before 7 years	4 (16%)	6 (42.9%)	3 (100%)	13 (31%)
After 7 years	21 (84%)	8 (57.1%)	0	29 (69%)
Total	25 (100%)	14 (100%)	3 (100%)	42 (100%)

Discussion

In the present study sex difference in children with ADHD was obvious, male to female ratio 2:1. Several studies in many countries worldwide support this finding. Hortnug et al in 2002 found male to female ratio in a mostly clinic-referred sample of children with ADHD to be 4.5:1[17]. Biederman et al in 2002 also in a clinic-referred sample mentioned male to female ratio in ADHD children to be 3:1[18].

Boys being affected more than girls by ADHD appear to be because boys are more likely to be disruptive, hyperactive, and impulsive and express the disorder more clearly. This sex difference is even more pronounced among those who are seen in psychiatric rather than pediatric settings. The lower likelihood for girls to manifest psychiatric, cognitive and functional impairment than boys could result in gender-based referral bias unfavorable to girls with ADHD.

The younger age group (6-7 years) was affected more (35.7%), and the percentage dropped to (4.8%) in the older age group (> 14 years). Barkley et al in 1990 in his study " an 8-year prospective follow-up study of ADHD" mentioned that the prevalence of ADHD was high in school-aged children and it dropped down in adolescence[19].

In this study the combined type of ADHD was the most common (59.5%) while the inattentive type presented as (33.3%) of cases and the hyperactive type presented as the least type (7.2%). Similar results were found by Pineda et al in

2003[20], by Montiel-Nava et al in 2002[21] and by Gaub and Carlson in 1997[22].

In childhood, the combined subtype of ADHD is most common, followed by the inattentive and hyperactive subtypes. Symptoms of ADHD may diminish over time; hyperactive or impulsive symptoms often decrease to a greater extent than the inattentive ones do. Overall, 50% to 75% of all ADHD patients have the combined subtype[23].

Children with ADHD in this study had significantly higher rates of nocturnal enuresis than those without ADHD, similar results found by Faraone in 2003[24] and by Robson in 1997[25].

Being a neurodevelopmental disorder, children with ADHD are more likely to present with nocturnal enuresis than the non-ADHD children.

Parents of ADHD children and adolescents reported statistically higher rates of body injuries and motor vehicle accidents compared to the control group. In a study by Barkley et al.[26] children and adolescents with ADHD showed increased incidence of motor vehicle accidents and body injuries. This is expected because children and adolescents with ADHD exhibit more problem behavior and are less socially skilled than their normal counterparts. Due to their inattention and hyperactivity they are more prone to daily injuries.

Because of the behavior characteristic of ADHD, many affected children have to struggle with school work and perform poorly academically. In this study (61.9%) of the children with ADHD had school repetition, suspension or expulsion.

Despite of their best efforts, these children often do poorly or fail in their academic and social environments.

Of the children with ADHD, 80.9% had more significant sleep problems, 45.2% of them had difficulty in settling and going to sleep and 35.7% of them had disruptions of sleep. That was also proved by Day in 1998[27].

Conclusion

1. Boys with ADHD are affected twice more than girls.
2. The most common type of ADHD is the combined type, and the hyperactive type is the least.
3. The hyperactive type is more common in the younger age groups.
4. ADHD children are more likely to have nocturnal enuresis, daily injuries, poor school performance and sleep problems.

Recommendations

1. Family physicians and pediatricians should be knowledgeable about the presentation and diagnosis of ADHD.
2. Diagnosis of ADHD should be according to the criteria mentioned in the Diagnostic and Statistical Manual of Mental diseases edition 4 (DSM-IV).
3. Treatment includes a multimodal approach involving parents, teachers, counselors and the school system.

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