

## Attention Deficit Hyperactivity Disorder (ADHD) in Children: A Short Review and Literature

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### Abstract

Attention-deficit/hyperactivity disorder (ADHD) is a chronic condition that affects millions of children and often persists into adulthood. ADHD includes a combination of problems, such as difficulty sustaining attention, hyperactivity and impulsive behavior. ADHD is estimated to affect about 6 to 7 percent of people aged 18 and under when diagnosed via the DSM-IV criteria. Hyperkinetic disorder when diagnosed via the ICD-10 criteria give rates of between 1 to 2 percent in this age group. Children in North America appear to have a higher rate of ADHD than children in Africa and the Middle East; however, this may be due to differing methods of diagnosis used in different areas of the world. If the same diagnostic methods are used rates are more or less the same between countries. While treatment won't cure ADHD, it can help a great deal with symptoms. Treatment typically involves medications and behavioral interventions. Early diagnosis and treatment can make a big difference in outcome.

**Key words:** Attention-deficit/hyperactivity disorder; Children; Prevalence; World.

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## Introduction

Attention deficit hyperactivity disorder (ADHD) is a disorder of childhood and adolescence characterized by a pattern of extreme pervasive, persistent and debilitating inattention, overactivity and impulsivity. It is believed to be one of the most common reasons for mental health referrals to family physicians, aediatricians, paediatric neurologists and child and adolescent psychiatrists. Although originally thought to remit during childhood, the symptoms of ADHD have also been shown to persist in patients through adolescence and into adulthood. The disorder is often chronic, with one third to one half of those affected retaining the condition into adulthood. It interferes with many areas of normal development and functioning in a child's life. Children with ADHD are more likely than their peers to experience educational underachievement, social isolation and antisocial behaviour during the school years and to go on to have significant difficulties in the post-school years (1). Attention-deficit/hyperactivity disorder (ADHD) is one of the most common neurodevelopmental disorders of childhood. The worldwide prevalence in children  $\leq 18$  years has been estimated at 5.3% in a systematic review of 102 studies from all continents, with a majority from North America and Europe (2).

Attention deficit hyperactivity disorder (ADHD) is characterized by pervasive and impairing symptoms of inattention, hyperactivity, and impulsivity according to DSM-IV (3). The World Health Organization (WHO) (4) uses a different name—hyperkinetic disorder (HD)—but lists similar operational criteria for the disorder. Regardless of the name used, ADHD/HD is one of the most thoroughly researched disorders in medicine. It has been associated with a broad range of negative outcomes in affected subjects with a serious financial burden to

families and society, which characterizes it as a major public health problem.

An understanding of the epidemiological aspects of ADHD/HD may provide insight into its distribution and etiology as well as information for planning the allocation of funds for mental health services. In past decades, investigators from all regions of the world have made substantial efforts to define the prevalence of the disorder. Several literature reviews have reported highly variable rates worldwide, ranging from as low as 1% to as high as nearly 20% among school-age children. Several investigators have suggested that prevalence rates in Europe were significantly lower than rates found in North America (2).

### *Alternative Names*

Attention deficit disorder (ADD); ADHD; Childhood hyperkinesis.

### **Methods and Materials**

The current study was a review survey which was conducted to evaluate some informations of children's Attention deficit hyperactivity disorder that is mentioned in science website by studying articles and books science texts.

To evaluate the texts, the singular or combination forms of the following keywords were used: "ADHD", "Prevalence", "ADD", "Hyperkinesis" and "Children".

To evaluate the electronic Persian databases the following websites were searched: Google, Scientific information database (SID), Ministry of healthcare, Medical articles library of Iran (medlib.ir), Iranian research institute for information (Iran Doc), publication database (Magiran, Iran medex), and also search in other electronic databases such as Google Scholar, Scopus and PubMed. Also, library search was performed by referring to the

journal archives of libraries, and evaluating the available Persian and English references such as text books and also articles of research-scientific and educational journals, and articles of the annual seminar of medicine and psychology.

## Results

### *Symptoms*

Symptoms of ADHD fall into three groups:

- Not being able to focus (inattentiveness).
- Being extremely active (hyperactivity).
- Not being able to control behavior (impulsivity).

Some people with ADHD have mainly inattentive symptoms. Some have mainly hyperactive and impulsive symptoms. Others have a combination of different symptom types. Those with mostly inattentive symptoms are sometimes said to have attention deficit disorder (ADD). They tend to be less disruptive and are more likely not to be diagnosed with ADHD.

### *Inattentive Symptoms*

Fails to give close attention to details or makes careless mistakes in schoolwork

- Has difficulty keeping attention during tasks or play
- Does not seem to listen when spoken to directly
- Does not follow through on instructions and fails to finish schoolwork or chores and tasks
- Has problems organizing tasks and activities

- Avoids or dislikes tasks that require sustained mental effort (such as schoolwork)
- Often loses toys, assignments, pencils, books, or tools needed for tasks or activities
- Is easily distracted
- Is often forgetful in daily activities

### *Hyperactivity Symptoms*

- Fidgets with hands or feet or squirms in seat
- Leaves seat when remaining seated is expected
- Runs about or climbs in inappropriate situations
- Has problems playing or working quietly
- Is often "on the go," acts as if "driven by a motor"
- Talks excessively

### *Impulsivity Symptoms*

- Blurts out answers before questions have been completed
- Has difficulty awaiting turn

Interrupts or intrudes on others (butts into conversations or games).

### *Different Symptoms*

Boys and girls display very different ADHD symptoms, and boys are much more likely to be diagnosed with the attention disorder. Why? It's possible the nature of ADHD symptoms in boys makes their condition more noticeable than it is in girls. Boys tend to display externalized symptoms that most people think of when they think of ADHD behavior, for example: impulsivity or "acting out" hyperactivity, such as running and hitting lack of focus, including inattentiveness physical aggression ADHD in girls is often easy to overlook because it's not "typical" ADHD behavior. The symptoms aren't as obvious as they are in

boys. They can include: being withdrawn, low self-esteem and anxiety, intellectual impairment and difficulty with academic achievement, inattentiveness or a tendency to “daydream”, verbal aggression: teasing, taunting, or name-calling (Figur.1) (5-7).



**Fig.1:** Different ADHD symptoms in children

### Epidemiology

The mean worldwide prevalence of ADHD is between 5.29% and 7.1% in children and adolescents (<18 years) (2, 8). The prevalence of ADHD in Europe was estimated at just under 5%, however, there are still few global or European data on rates of incidence, prevalence or epidemiology of ADHD(2). Estimation of the prevalence of ADHD may be complicated by a range of factors such as

methodological and cultural differences, and variability in identification and medical classification systems used for diagnosis (2).

Prevalence factors ADHD prevalence rates may vary depending on several factors: Age – ADHD can affect children from pre-school age 2-4 and increasing recognition is now given to the fact that ADHD can extend beyond childhood and adolescence into adulthood (8, 9-12). Gender – a higher prevalence is often reported in males (8,13,14). Subtype ADHD – combined-type ADHD is generally considered most prevalent in all age-groups (15,16). ADHD is often present alongside comorbidities such as oppositional defiant disorder (ODD) and anxiety disorder (9,16-19) which may further complicate understanding of true prevalence rates.

### Africa

It is estimated that ADHD affects between 5.4-8.7% of children in Africa. Data quality however is not high(20).

### Germany

A 2008 evaluation of the “KiGGS” survey, monitoring 14,836 girls and boys (age between 3 to 17 years), showed that 4.8% of the participants had an ADHD diagnosis. While 7.9% of all boys had ADHD, only 1.8% girls had it, too. Another 4.9% of the participants (6.4% boys: 3.6% girls) were suspected ADHD cases, because they showed a rate  $\geq 7$  on the Strengths and difficulties questionnaire (SDQ) scale. The number of ADHD diagnoses was 1.5% (2.4%: 0.6%) among preschool children (3–6 years old), 5.3 % (8.7% : 1.9%) at age 7–10 years, and had its peak at 7.1% (11.3% : 3.0%) in the age group of 11–13 years. Among 14 to 17 years old adolescents the rate was 5.6% (9.4%: 1.8%) (21).

### Spain

Rates in Spain are estimated at 6.8% among people under 18 (22).

### *United States*

In the United States it is diagnosed in 2-16 percent of school children. The rates of diagnosis and treatment of ADHD are much higher on the east coast of the United States than on its west coast. The frequency of the diagnosis differs between male children (10%) and female children (4%) in the United States. This difference between genders may reflect either a difference in susceptibility or that females with ADHD are less likely to be diagnosed than males.

Boys outnumber girls across all three subtyping categories, but the exact magnitude of these differences seems to depend on both the informant (parent, teacher, etc.) and the subtype. In two community-based investigations, conducted by DuPaul and associates, boys outnumbered girls by only 2.2:1 in parent-generated samples and 2.3:1 in teacher-based input (23-29).

### *Exams and Tests*

If ADHD is suspected, the person should be evaluated by a health care professional. There is no test that can make or exclude a diagnosis of ADHD.

The diagnosis is based on a pattern of the symptoms listed above. When the person with suspected ADHD is a child, parents and teachers are usually involved during the evaluation process. Most children with ADHD have at least one other developmental or mental health problem. This problem may be a mood, anxiety or substance use disorder; a learning disability; or a tic disorder. A doctor can help determine whether these other conditions are present.

### *Treatment*



Treating ADHD is a partnership between the health care provider and the patient. If the patient is a child, parents and often teachers are involved. For treatment to work, it is important to:

- Set specific, appropriate goals.
- Start medicine and/or talk therapy.
- Follow-up regularly with the doctor to check on goals, results, and any side effects of medicines. During these visits, information should be gathered from the patient and if relevant, parents and teachers.

If treatment does not seem to work, the health care provider will likely:

- Confirm the person has ADHD.
- Check for medical conditions that can cause similar symptoms.
- Make sure the treatment plan is being followed.
- Medicines
- Medicine combined with behavioral treatment often works best. There are several different ADHD medicines that may be used alone or in combination. The health care provider will decide which medicine is right based on the person's symptoms and needs.
- Psychostimulants (also known as stimulants) are the most commonly used ADHD medicines. Although these drugs are called stimulants, they actually have a calming effect in people with ADHD.
- Follow the health care provider's instructions on how to take ADHD medicine.
- Some ADHD medicines have side effects. If the person has side

effects, contact the health care provider right away. The dosage or medicine itself may need to be changed (30-34).

*Risk factors for ADHD include:*

- Blood relatives (such as a parent or sibling) with ADHD or another mental health disorder
- Exposure to environmental toxins — such as lead, found mainly in paint and pipes in older buildings
- Maternal drug use, alcohol use or smoking during pregnancy
- Maternal exposure to environmental poisons — such as Polychlorinated biphenyls (PCBs) — during pregnancy
- Premature birth

Although sugar is a popular suspect in causing hyperactivity, there's no reliable proof of this. Many things in childhood can lead to difficulty sustaining attention, but that is not the same as ADHD (6, 35).

*Prevention*

To help reduce your child's risk of ADHD:

During pregnancy, avoid anything that could harm fetal development. Don't drink alcohol, smoke cigarettes or use drugs. Avoid exposure to environmental toxins, such as polychlorinated biphenyls (PCBs). Protect your child from exposure to pollutants and toxins, including cigarette smoke, agricultural or industrial chemicals, and lead paint (found in some old buildings).

Limit screen time. Although still unproved, it may be prudent for children to avoid excessive exposure to TV and video games in the first five years of life.

If your child has ADHD, to help reduce problems or complications:

Be consistent, set limits and have clear consequences for your child's behavior. Put together a daily routine for your child with clear expectations that include such

things as bedtime, morning time, mealtime, simple chores and TV.

Avoid multitasking yourself when talking with your child, make eye contact when giving instructions, and set aside a few minutes every day to praise your child.

Work with teachers and caregivers to identify problems early, to decrease the impact of the condition on your child's life (2-9).

**Conclusion**

Attention-deficit/hyperactivity disorder (ADHD) is a chronic condition that affects millions of children and often persists into adulthood. ADHD includes a combination of problems, such as difficulty sustaining attention, hyperactivity and impulsive behavior. Children with ADHD also may struggle with low self-esteem, troubled relationships and poor performance in school. Symptoms sometimes lessen with age. However, some people never completely outgrow their ADHD symptoms. But they can learn strategies to be successful. While treatment won't cure ADHD, it can help a great deal with symptoms. Treatment typically involves medications and behavioral interventions. Early diagnosis and treatment can make a big difference in outcome.

Children with ADHD have trouble functioning at home and in school and often have difficulty making and keeping friends. If left untreated, ADHD may interfere with school and work, as well as with social and emotional development. ADHD is more common in boys, whose impulsivity and hyperactivity may be evident. Inattentiveness is a hallmark of ADHD in girls, but because they aren't often disruptive in the classroom, they may not get diagnosed.

**Conflict of interest:** None

**References**



1. Thabet AM, Al Ghamdi H, Abdulla T, Elhelou MW, Ostanis P. Psychiatry, 2002; 159:1556–62. Attention deficit–hyperactivity symptoms among Palestinian children. *EMHJ* 2010; 16(5):505-10.
2. Polanczyk G, de Lima MS, Horta BL, Biederman J, Rohde LA. The worldwide prevalence of ADHD: a systematic review and meta-regression analysis. *Am. J. Psychiatry* 2007; 164 (6):942–8.
3. American Psychiatric Association: Diagnostic and Statistical Manual of Mental Diseases (DSM-IV), 4th ed. Washington, DC, American Psychiatric Publishing, 1994.
4. World Health Organization: The ICD-10 Classification of Mental and Behavioral Disorders: Diagnostic Criteria for Research. Geneva, Switzerland, World Health Organization, 1993.
5. Adler L. Epidemiology, Impairments, and Differential Diagnosis in Adult ADHD: Introduction. *CNS Spectrums: The International Journal of Neuropsychiatric Medicine* 2008; 13(8): 4-5. Retrieved from [http://www.cnsspectrums.com/asp/article\\_pf.asp?articleid=1703](http://www.cnsspectrums.com/asp/article_pf.asp?articleid=1703).
6. Attention-deficit/hyperactivity disorder (ADHD) in children. (2013, March 5). *Mayo Clinic*. Retrieved from <http://www.mayoclinic.org/diseases-conditions/adhd/basics/complications/con-20023647>.
7. Attention-deficit/hyperactivity among adults. (n.d.). National Institutes of Mental Health. Retrieved from [http://www.nimh.nih.gov/statistics/1ADHD\\_ADULT.shtml](http://www.nimh.nih.gov/statistics/1ADHD_ADULT.shtml) - See more at: <http://www.healthline.com/health/adhd/facts-statistics-infographic#6>
8. Willcutt EG. The prevalence of DSM-IV attention-deficit/hyperactivity disorder: a meta-analytic review. *Neurotherapeutics* 2012; 9(3):490-9.
9. Kessler RC, Adler L, Barkley R, Biederman J, Conners CK, Adler R, et al. The prevalence and correlates of adult ADHD in the United States: results from the National Comorbidity Survey Replication. *Am J Psychiatry* 2006; 163: 716-23.
10. Faraone SV, Biederman J, Mick E. The age-dependent decline of attention deficit hyperactivity disorder: a meta-analysis of follow-up studies. *Psychol Med* 2006; 36: 159-65.
11. Lara C, Fayyad J, de Graaf R, Kessler RC, Aguilar-Gaxiola S, Angermeyer M, et al. Childhood predictors of adult attention-deficit/hyperactivity disorder: results from the World Health Organization World Mental Health Survey Initiative. *Biol Psychiatry* 2009; 65(1): 46-54.
12. Barkley RA, Fischer M, Smallish L, Fletcher, K. The persistence of attention-deficit/hyperactivity disorder into young adulthood as a function of reporting source and definition of disorder. *J Abnorm Psychol* 2002; 111: 279-89.
13. Biederman J, Faraone SV, Monuteaux M, Plunkett E, Gifford J, Spencer T. Gender effects on attention-deficit/hyperactivity disorder in adults, revisited. *Biol Psychiatry* 2004; 55: 692-700.
14. Novik TS, Hervas A, Ralston SJ, Dalsgaard S, Pereira RR, Lorenzo MJ. Influence of gender on attention-deficit/hyperactivity disorder in Europe–ADORE. *Eur Child Adolesc Psychiatry* 2006; 15 Suppl 1: I15-I24.
15. Faraone SV, Biederman J, Weber W, Hatch M, Faraone SV. Psychiatric, neuropsychological, and psychosocial features of DSM-IV subtypes of attention-deficit/hyperactivity disorder: results from a clinically referred sample. *J Am Acad Child Adolesc Psychiatry* 1998; 37: 185-93.
16. Wilens TE, Biederman J, Faraone SV, Martelon MK, Westerberg D, Spencer TJ. Presenting ADHD symptoms, subtypes, and comorbid disorders in clinically referred adults with ADHD. *J Clin Psychiatry* 2009; 70: 1557-62.
17. Steinhausen HC, Novik TS. ADORE Study Group. Co-existing psychiatric problems in ADHD in the ADORE cohort. *Eur Child Adolesc Psychiatry* 2006; 15: i25-i29.
18. Yoshimasu K, Barbaresi WJ, Colligan RC, Killian JM, Voigt RG, Weaver AL, et al. Childhood ADHD is strongly associated with a broad range of psychiatric disorders during adolescence: a population-based birth cohort study. *J Child Psychol Psychiatry* 2012; 53: 1036-43.

19. Jensen PS, Hinshaw SP, Kraemer HC, Lenora N, Newcorn JH, Abikoff HB, et al. ADHD comorbidity findings from the MTA study: comparing comorbid subgroups. *J Am Acad Child Adolesc Psychiatry* 2001; 40: 147-58.
20. Bakare MO. Attention deficit hyperactivity symptoms and disorder (ADHD) among African children: a review of epidemiology and co-morbidities. *African journal of psychiatry* 2012; 15 (5): 358–61.
21. Erkennen B, Bewerten – Handeln, Zur Gesundheit von Kindern und Jugendlichen in Deutschland (PDF; 3,27 MB) (in German). Robert Koch Institute. 27 November 2008. Archived from the original on 11 December 2013. Retrieved 24 February 2014. Kapitel 2.8 Aufmerksamkeitsdefizit-/Hyperaktivitätsstörung (ADHS), S. 57.
22. Catalá-López F, Peiró S, Rido M, Sanfélix-Gimeno G, Gènova-Maleras R, Catalá MA. Prevalence of attention deficit hyperactivity disorder among children and adolescents in Spain: a systematic review and meta-analysis of epidemiological studies. *BMC Psychiatry* 2012; 12: 168.
23. Rader R, McCauley L, Callen EC. Current strategies in the diagnosis and treatment of childhood attention-deficit/hyperactivity disorder. *American family physician* 2009; 79(8):657–65.
24. Centers for Disease Control and Prevention . "ADHD Home". United States: CDC.gov, Oct 2013.
25. CDC (March 2004). "Summary Health Statistics for U.S. Children: National Health Interview Survey, 2002" (PDF). Vital and Health Statistics (United States: CDC) 10 (221).
26. Staller J, Faraone SV. "Attention-deficit hyperactivity disorder in girls: epidemiology and management". *CNS Drugs* 2006; 20(2):107–23.
27. Anastopoulos AD, Shelton, TL. Assessing attention-deficit/hyperactivity disorder. New York, NY: Kluwer Academic/Plenum Publishers, 2009.
28. The worldwide-pooled prevalence of ADHD for persons age 18 and under was 5.29%, based on a review of 102 studies comprising 171,756 subjects from all world regions. [Source: Polanczyk et al. (2007 June), The worldwide prevalence of ADHD: a systematic review and metaregression analysis, *American Journal of Psychiatry* 2007;164(6): 942-8].
29. Global ADHD prevalence for males aged 5-19 is 2.2% and for females 0.7%, based on a review of 44 studies covering 21 world regions.[Source: Erskine et al. (2013 December), Research Review: Epidemiological modelling of attention-deficit/hyperactivity disorder and conduct disorder for the Global Burden of Disease Study 2010, *Journal of Child Psychology and Psychiatry* 2013;54(12): 1263-74.
30. American Academy of Pediatrics, Subcommittee on Attention-Deficit/Hyperactivity Disorder, Steering Committee on Quality Improvement and Management. ADHD: Clinical practice guideline for the diagnosis, evaluation, and treatment of attention-deficit/hyperactivity disorder in children and adolescents. *Pediatrics* 2011; 128:1007-22.
31. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 5th ed. Arlington, Va: American Psychiatric Publishing, 2013.
32. Bostic JQ, Prince JB. Child and adolescent psychiatric disorders. In: Stern TA, Rosenbaum JF, Fava M, et al., eds. *Massachusetts General Hospital Comprehensive Clinical Psychiatry*. 1st ed. Philadelphia, Pa: Elsevier Mosby; 2008: chap 69.
33. Knouse LE, Safren SA. Current status of cognitive behavioral therapy for adult attention-deficit hyperactivity disorder. *Psychiatr Clin N Am* 2010; 33: 497–509.
34. Prince JB, Spencer TJ, Wilens TE, Biederman J. Pharmacotherapy of attention-deficit/hyperactivity disorder across the lifespan. In: Stern TA, Rosenbaum JF, Fava M, et al., eds. *Massachusetts General Hospital Comprehensive Clinical Psychiatry*. 1st ed. Philadelphia, Pa: Elsevier Mosby; 2008:chap 49.
35. Visser SN, Blumberg SJ, Danielson ML, Bitsko RH, Kogan MD. State-Based and Demographic Variation in Parent-Reported Medication Rates for Attention-Deficit/Hyperactivity Disorder, 2007-2008. *Prev Chronic Dis* 2013; 10: E09.