

## ATTENTION-DEFICIT /HYPERACTIVE DISORDER

## ~ IS A "REAL" DISEASE?



V. D. N. SRINIVAS<sup>1\*</sup>, P.MADHUKIRAN<sup>2</sup>, E.VEERAAIAH<sup>2</sup>, M.CHANDRA RAO<sup>2</sup> and N.S.V. MUKHARJEE<sup>2</sup>

<sup>1\*</sup>Department of Pharmaceutical Sciences, Farleigh Dickinson University, Madison, NJ, USA

<sup>2</sup>. University college of pharmaceutical sciences, Andhra University, Vishakapatnam, (A.P), India.

## ABSTRACT:

Attention-deficit/hyperactivity disorder (AD/HD or ADHD) is neurobehavioral developmental disorder. It affects about 3 to 5% of children globally with symptoms starting before seven years of age. There is wide variability in estimates depending on research methodologies utilized in studies. It is characterized by a persistent pattern of impulsiveness and inattention, with or without a component of hyperactivity. ADHD is generally a chronic disorder with 30 to 50% of individuals diagnosed in childhood continuing to have symptoms into adulthood. As they mature, adolescents and adults with ADHD are likely to develop coping mechanisms to compensate for their impairment. Better methods are needed for monitoring the prevalence and understanding the public health implications of ADHD. Stimulant medication is the treatment of choice for treating ADHD but psychosocial interventions may also be warranted if comorbid disorders are present. Pharmacologic treatments and multiple types of psychotherapy are available for adults with ADHD.

**KEY WORDS:** ADHD, adults, Pharmacotherapy

## INTRODUCTION

## What is ADHD?

The definitions of ADHD and hyperkinetic disorder are based on maladaptively high levels of *impulsivity*, *hyperactivity* and *inattention*. They are all based on observations about how children behave: 'impulsivity' signifies premature and thoughtless actions; 'hyperactivity' a restless and shifting excess of movement; and 'inattention' is a disorganised style preventing sustained effort. All are shown by individual children to different extents, and are influenced by context as well as by the constitution of the person<sup>1-6</sup>.

SIGNS AND SYMPTOMS<sup>7,8</sup>:

The primary symptoms of ADHD are inattention, hyperactivity and impulsivity:

1. **Inattention:** Easily distracted, Day-dreaming, Not finishing work, Difficulty listening.
2. **Hyperactivity:** Restlessness, Often characterized by an inability to sit still, Fidgeting, Squirminess, Climbing on things, Restless sleep.

3. **Impulsiveness:** Acting before thinking of consequences, Jumping from one activity to another, Disorganization, Tendency to interrupt other peoples' conversations.

Many co-existing conditions require other courses of treatment and should be diagnosed separately instead of being grouped in the ADHD diagnosis. Some of the associated conditions are:

1. **Oppositional defiant disorder (35%) and conduct disorder (26%):** Which both are characterized by anti-social behaviors such as stubbornness, aggression, frequent temper tantrums, deceitfulness, lying, or stealing.
2. **Primary disorder of vigilance:** This is characterized by poor attention and concentration such as a reading disorder called dyslexia, as well as difficulties staying awake. These children tend to fidget, yawn and stretch, and appear to be hyperactive in order to remain alert and active.
3. **Mood disorders:** Boys diagnosed with the combined subtype have been shown more likely to suffer from a mood disorder.
4. **Bipolar disorder:** As many as 25% of children with ADHD have bipolar disorder. Children with this

combination may demonstrate more aggression and behavioral problems than those with ADHD alone.

**5. Anxiety disorder:** This has been found to be more common in girls diagnosed with the inattentive subtype of ADHD.

**6. Obsessive-compulsive disorder.** It is believed to share a genetic component with ADHD, and shares many of its characteristics.

**7. Tourette's disorder:** A small percentage of people with ADHD have a neurological disorder involving various nervous tics and mannerisms.

#### TYPES OF ADHD<sup>9</sup>:

**1. Predominantly Inattentive Type:** It is hard for the individual to organize or finish a task, to pay attention to details, or to follow instructions or conversations. The person is easily distracted or forgets details of daily routines.

**2. Predominantly Hyperactive-Impulsive Type:** The person fidgets and talks a lot. It is hard to sit still for long (e.g., for a meal or while doing homework). Smaller children may run, jump or climb constantly. The individual feels restless and has trouble with impulsivity. Someone who is impulsive may interrupt others a lot, grab things from people, or speak at inappropriate times. It is hard for the person to wait their turn or listen to directions. A person with impulsiveness may have more accidents and injuries than others.

**3. Combined Type:** Symptoms of the above two types are equally present in the person.

#### CAUSES OF ADHD:

A specific cause of ADHD is not known<sup>10</sup>. Scientists are studying cause(s) and risk factors in an effort to find better ways to manage and reduce the chances of a person having ADHD. The cause(s) and risk factors for ADHD are unknown, but current research shows that genetics plays an important role. In addition to genetics, scientists are studying other possible causes and risk factors including: Environmental exposures (e.g., lead), Diet and social and physical environments, Brain injury, Alcohol and tobacco use during pregnancy, Premature delivery and Low birth weight

**1. Genetic factors:** Twin studies indicate that the disorder is highly heritable and that genetics are a factor in about 75% of ADHD cases. Hyperactivity also seems to be primarily a genetic condition; however, other causes do have an effect<sup>11</sup>. Researchers believe that a large majority of ADHD cases arise from a combination of various genes, many of which affect dopamine transporters. Candidate genes include dopamine transporter, dopamine receptor D4, dopamine beta-hydroxylase, monoamine oxidase A, catecholamine-methyl transferase, serotonin transporter promoter (SLC6A4), 5-hydroxytryptamine 2A receptor (5-HT<sub>2A</sub>), 5-hydroxytryptamine 1B receptor (5-HT<sub>1B</sub>)<sup>12</sup>, and the dopamine beta hydroxylase gene (DBH TaqI)<sup>13</sup>.

**2. Environmental factors:** Twin studies to date have also suggested that approximately 9% to 20% of the variance in hyperactive-impulsive-inattentive behavior or ADHD symptoms can be attributed to nonshared environmental (nongenetic) factors<sup>14,15</sup>. Environmental factors implicated include alcohol and tobacco smoke exposure during pregnancy and environmental exposure to lead in very early life<sup>16</sup>. The relation of smoking to ADHD could be due to nicotine causing hypoxia (lack of oxygen) to the fetus in utero<sup>17</sup>. It could also be that women with ADHD are more likely to smoke<sup>18</sup> and therefore, due to the strong genetic component of ADHD, are more likely to have children with ADHD<sup>19</sup>. Complications during pregnancy and birth including premature birth might also play a role<sup>20</sup>.

#### 3. Diet:

**a. Additives:** A meta-analysis has found that dietary elimination of artificial food coloring and preservatives provides a statistically significant benefit in children with ADHD<sup>21</sup>.

**b. Sugar regulation:** A number of studies have found that sucrose (sugar) has no effect on behavior and in particular it does not exacerbate the symptoms of children diagnosed with ADHD<sup>22</sup>.

**c. Social factors:** There is no compelling evidence that social factors alone can cause ADHD. Many researchers believe that relationships with caregivers have a

profound effect on attentional and self-regulatory abilities.

#### d. Head injury:

ADHD patients have been observed to have higher than average rates of head injuries<sup>23</sup>; however, current evidence does not indicate that head injuries are the cause of ADHD in the patient's observed<sup>24</sup>.

#### DIAGNOSIS OF ADHD:

Deciding if a child has ADHD is a several step process. There is no single test to diagnose ADHD, and many other problems, like anxiety, depression, and certain types of learning disabilities, can have similar symptoms.

#### 1. DSM-IV Criteria and Recommended Adjustments

The most recent diagnostic criteria for ADHD as defined in DSM-IV, Text Version (DSM-IV, TX) by American Psychiatric Association is set forth in Table 1. These diagnostic criteria are some of the most rigorous and most empirically derived criteria ever available in the history of clinical diagnosis for this disorder.

#### 2. ICD-10

In the tenth edition of the *International Statistical Classification of Diseases and Related Health Problems* (ICD-10) the symptoms of ADHD are given the name "Hyperkinetic disorders". When a conduct disorder (as defined by ICD-10<sup>25</sup>) is present, the condition is referred to as "Hyperkinetic conduct disorder". Otherwise the disorder is classified as "Disturbance of Activity and Attention", "Other Hyperkinetic Disorders" or "Hyperkinetic Disorders, Unspecified". The latter is sometimes referred to as, "Hyperkinetic Syndrome".

#### 3. Differential diagnoses

To make the diagnosis of ADHD, a number of other possible medical and psychological conditions must be excluded.

##### a. Medical conditions

Medical conditions that must be excluded include: hypothyroidism, anemia, lead poisoning, chronic

illness, hearing or vision impairment, substance abuse, medication side effects, sleep impairment, and child abuse, among others<sup>27</sup>.

##### b. Sleep conditions

Among other psychological and neurological issues, the relationship between ADHD and sleep is complex. In addition to clinical observations, there is substantial empirical evidence from a neuroanatomic standpoint to suggest that there is considerable overlap in the central nervous system centers that regulate sleep and those that regulate attention/arousal<sup>28</sup>. Primary sleep disorders play a role in the clinical presentation of symptoms of inattention and behavioral dysregulation. There are multilevel and bidirectional relationships among sleep, neurobehavioral functioning, and the clinical syndrome of ADHD<sup>29</sup>.

#### TREATMENT:

Methods of treatment often involve some combination of behavior modification, medication, life-style changes, and counseling.

##### 1. Medication:

Medication can help a child with ADHD in their everyday life and may be a valuable part of a child's treatment. Several different types of medications may be used to treat ADHD:

##### 2. Stimulants

Stimulants are the best-known and most widely used treatments. Between 70-80 percent of children with ADHD respond positively to these medications.

Eg: Methylphenidate, Amphetamines and dextroamphetamine. Although scientists don't understand exactly why these drugs work, stimulants appear to boost and balance levels of the brain chemicals called neurotransmitters.

**Nonstimulants** were approved for treating ADHD in 2003. This medication seems to have fewer side effects than stimulants and can last up to 24 hour

**3. Dietary Supplements:** Dietary supplements and specialized diets are sometimes used by people with

ADHD with the intent to mitigate some or all of the symptoms. The effectiveness of these dietary supplements and specialized diets is debated because in many cases preliminary studies investigating their efficacy are small in scope or followup investigations have conflicting results. In the United States, no dietary supplement has been approved for the treatment for ADHD by the FDA.

#### **PROGNOSIS:**

The proportion of children meeting the diagnostic criteria for ADHD dropped by about 50% over three years after the diagnosis. This occurred regardless of the treatments used. It persists into adulthood in about 30-50% of cases. Those affected are likely to develop coping mechanisms as they mature thus compensating for their previous ADHD. People with ADHD tend to work better in less structured environments with fewer rules. Self-employment or jobs with greater autonomy are generally well suited for them. Hyperactive types are likely to change jobs often due to their constant need for new interests and stimulations to keep motivated.

#### **EPIDEMIOLOGY:**

ADHD's global prevalence is estimated at 3-5% in people under the age of 19. There is, however, both geographical and local variability among studies. Geographically, children in North America appear to have a higher rate of ADHD than children in Africa and the Middle East, well published studies have found rates of ADHD as low as 2% and as high as 14% among school aged children. The rates of diagnosis and treatment of ADHD are also much higher on the east coast of the USA than on the west coast. The frequency of the diagnosis differs between male children (10%) and female children (4%) in the United States.

#### **PREVENTION:**

There is no known way to prevent ADHD. Some studies indicate an association between mothers who smoke during pregnancy and a higher rate of ADHD in their children. Avoiding smoking, alcohol, and drugs during pregnancy may help prevent a

higher risk of developing ADHD or similar behaviour in offspring.

#### **FUTURE PROSPECTS:**

Important in future research will be efforts to understand the nature of the attentional problems in ADHD given that extant research seriously questions whether these problems are actually within the realm of attention at all and that the subtypes of ADHD may have qualitatively different attentional disturbances. The field of behavioral and especially molecular genetics offers exciting prospects for future research on ADHD goes without saying. To identify the very genes that give rise to ADHD. Such exciting prospects also exist within the domain of neurobiological and neuroimaging studies in view of present, albeit limited, evidence that diminished metabolic activity and even minute structural differences in brain morphology within highly specific regions of the prefrontal and midbrain systems may be associated with this disorder. The increasing availability, economy, safety, and sensitivity of modern neuroimaging devices should result in a plethora of new studies on ADHD given the promising starts to date

#### **CONCLUSION**

ADHD is finally understood to be a disorder that persists into adulthood in some persons and has global effects on their daily lives, affecting social, occupational, and relational functioning. Evidence-based pharmacologic, psychosocial, and psychotherapeutic interventions are available for effective treatment. This is an exciting time in ADHD research. The expansion of knowledge in genetics, brain imaging, and behavioral research is leading to a better understanding of the causes of the disorder, how to prevent it, and how to develop more effective treatments for all age groups.

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**ADDRESS FOR CORRESPONDENCE:**

**vdnsrinivas@gmail.com**