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Review Article

Attention deficit hyperactivity disorder: a short review

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ABSTRACT

Attention deficit hyperactivity disorder (ADHD) is a common childhood psychiatric disorder with a prevalence of 4 to 8%. ADHD is characterized by hyperactivity, impulsiveness, and inappropriate inattentiveness. Though long considered a disease of childhood, studies have shown that a majority of cases persist in adulthood causing significant psychosocial impairment. Diagnosis is often based on clinical symptoms, and psychostimulants are mainstay in treatment of ADHD that are often complemented by psychotherapy and behavioural modifications.

Keywords: Hyperactivity, Impulsiveness, Stimulants, Inattention, Psychotherapy

INTRODUCTION

ADHD is one of the most common childhood psychiatric disorders. It is a neurodevelopmental disorder with a prevalence of 4-8% for ADHD in childhood.[1] It has long been considered a disorder of childhood that resolve during adolescence with little or no continued percussion in adult life.[2] However numerous studies of children with ADHD suggest that the disease persists during adulthood up to two-thirds of affected children.[3-11]

Longitudinal follow up studies estimate the prevalence of adult ADHD (aADHD) ranges between 2.5 to 4.9 percent.[12] Age and sex differences in prevalence rates of ADHD are routinely found in studies. Prevalence rates are higher in boys in the preschool group (8% in boys compared to 4% in girls). The prevalence decreases with age as adolescence sets in.[13] Though symptoms of ADHD may appear to diminish during adulthood, this may not always be the case. In a follow up study of 119 boys of nineteen years of age with childhood onset ADHD, the symptoms levels decreased as they entered adolescence but about 90% of the study subjects still did not function well.[14]

A study by World Health Organization (WHO) found several factors that predicted persistence of ADHD in adulthood. These predictors are severity of symptoms, other comorbidities, coexisting depression, social adversity and presence of ADHD in parents. ADHD also has a strong association with sleep disorders such as restless legs syndrome, circadian-rhythm sleep disorders, obstructive sleep apnea and peripheral limb movement disorder. A recent Australian study showed that 62% of children with ADHD had moderate or severe sleep problems and 22% took sleep medications during the 1-week observation period.[15]

In children with ADHD other psychiatric comorbidities are common; up to 87% have at least one comorbidity, and 20% have three or more comorbid conditions.[16-18] Other psychiatric disorders such as autism, bipolar disorder, obsessive compulsive disorder, and posttraumatic stress disorder occur concurrently with

ADHD and are associated with significant psychosocial impairment.

Increased rates of substance abuse, higher rates of anxiety & mood disorders, and high rates of traffic accidents have also been reported in patients with ADHD. Compared to controls, adults that suffer from ADHD have been reported to have more conflicts in their social and marital relationships. They also tend to underachieve in their careers, academics, and financial status despite adequate intellectual abilities.[19-23] Longitudinally derived data in ADHD youth lifespan connote that whereas symptoms of hyperactivity and impulsivity decay over time, the symptoms of inattention persist.[24,25]

In support of this, data derived from a large group of adults with ADHD indicate that whereas approximately 50% of adults display clinically significant levels of hyperactive/ impulsive symptomatology, 90% display prominent attentional symptomatology.[26,27]

More specifically, adults with ADHD evidence a variety of core attentional ADHD symptoms, including poor attention and concentration, easy distractibility, frequent shifting of activities, daydreaming and forgetfulness; followed more distantly by impulsivity, impatience, boredom, fidgeting, and intrusiveness.[28] ADHD adults are considered to experience executive function deficits, such as a reduced ability to attend, encode and manipulate information, and difficulties with organization and time management, as well as deficits in emotional regulation.[29]

Pathophysiology, clinical features and treatment options

Data shows ADHD has a significant genetic component indicated by high heritability from parents.[30-39] First-degree relatives of patients with ADHD have a high prevalence rate of 20-50%.[40] There have been reports of increased strong risk of developing ADHD among offspring of adults with ADHD.[41] In addition, strongly increased risks for ADHD (57%) among the offspring of adults with ADHD have been reported.[41]

Numerous twin studies indicate an average heritability of about 76% suggesting that the strong familial influences on ADHD are mainly genetic. However studies of twin studies of self-rated ADHD symptoms among adult population report lower estimates of heritability of around 30-40%.[42,43] There were no gender differences observed in the heritability estimates. Adoption studies show that ADHD is passed on only to biological relatives, which strongly suggests genetic factors playing a significant role causing high familial risk of the disease.[44]

There has been a lot of interest as to why the disorder persists in some people and remits in others that can possibly identify new targets that will help prevent progression of the disorder into adult life. Jeffrey Halperin according to his hypothesis proposed that ADHD is linked to an early appearing and enduring subcortical dysfunction (weak arousal mechanisms), while symptom remission is dependent on the extent of maturational changes in executive control.[45,46] He further suggested that the interaction between these two processes dictates the persistence or remission of symptoms of ADHD related to the emerging balance between subcortical and cortical function. This data was supported by a recent large study that obtained evidence that the same two processes account for eighty five percent and twelve percent respectively of the genetic influence of ADHD.[47]

There are several genes implicated in the pathogenesis of ADHD. Genetic variants among the dopamine receptor genes D4 (DRD4) and D5 (DRD5) provide the most consistent findings supported by a large meta-analysis.[48] Other genes implicated are dopamine transporter gene (DAT1), the serotonergic transporter (5-HTT), the synaptosomal associated protein, 25 kDa (SNAP-25), the dopamine beta-hydroxylase gene (DBH), and the serotonergic receptor (HTR1B).[49] All these together account for roughly 3.2% of the variance in ADHD symptoms in children.[50] Fronto-striatal circuitry in brain rich in dopaminergic activity has been strongly implicated in ADHD as supported by imaging studies using positron emission tomography (PET), and magnetic resonance imaging (MRI).

Environment also has a strong influence on ADHD. The disorder is best viewed as an interaction between genetic and environmental factors. Children with strong genetic predisposition are more likely to develop the disease if they are put in a correct environment often characterized by chaotic parenting.[51] Studies have demonstrated improvements of symptoms in children with ADHD when parents have been taught alternative parenting skills.[52,53] ADHD often affects the interactions of children with their parents.[54]

Those with ADHD are usually more talkative, defiant, less cooperative, and less compliant. They find difficulty in managing day-to-day activities and cannot play or work independently of their mothers.[55-58] In contrary to what is seen in normal mother-child interactions, the conflicts between them may get exacerbated when father gets involved in these interactions.[59]

Exposure to environmental toxins like organohalide pesticides, herbicides, lead, arsenic, aluminum, mercury, fumigants, and a wide range of aromatic and aliphatic solvents have been linked to abnormalities in behavior, perception, cognition, and motor ability that can be subtle during early childhood but disabling over the long term.[60] Diet is another environmental influence that can have adverse effects on symptoms of ADHD especially food additives, sugars and fatty acid deficiencies.[60]

ADHD is characterised by symptoms such as hyperactivity, impulsivity and inappropriate level of

inattention. These symptoms usually begin in childhood and leads to psychosocial impairment. Inattention is a key feature of the disorder causing inability to direct and maintain selective attention to motivationally relevant tasks.

Disorganization is frequently mentioned as one of the main indicators of inattention. Impulsivity refers to acting rashly without thinking about the consequences. Hyperactivity refers specifically to excessive/increased motor activity. As per the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) criteria there are three subtypes of ADHD namely inattentive type, hyperactive -impulsive type and the combined type.[61] A strong family history of ADHD was particularly present in persistent forms of ADHD.[62]

Early diagnosis based on assessment of symptoms and degree of impairment and commencing treatment is important, as it can significantly improve the social and functional status of the patient. Non treatment may deprive the patient with ADHD of the chance to resolve functional and psychosocial impairments. Severity of the disease and coexisting comorbidities should guide treatment. These group of patients often benefit from combined treatment. Concurrent substance abuse in patients with ADHD may pose a challenge since they can interfere with the stimulants used in treatment of ADHD. In such cases treatment with psychostimulants should not be withheld but postponed until the substance abuse problem resolves.[63]

Stimulants like methylphenidate and dexamphetamine are first choice medications used in treatment of ADHD in children as well as adults based on extensive literature.[64,65] Long lasting, extended release formulations are preferred because of compliance. Controlled studies have shown that they are effective in about 70% ADHD patients.[66] Treatment with stimulants also improves related problems like mood swings, cognitive problems, low self-esteem, and cognitive problems. An european study done recently showed the effectiveness of methylphenidate over six months in the longest double blind placebo trial to date.[67]

Stimulants are usually well tolerated and side effects are usually mild. Main side effects are fatigue, decreased appetite, palpitations, anxiety, difficulty sleeping, and dry mouth.[68-70] They occasionally cause increase in blood pressure and tachycardia therefore a thorough assessment of the patient prior to treatment and close monitoring & follow up are often necessary. They are contraindicated in pregnancy.

Other relative contraindications include hypertrophic cardiomyopathy, angina, hyperthyroidism, glaucoma, and cardiac arrhythmias. Atomoxetine which is a non-stimulant can be a second line treatment. Controlled studies have shown efficacy of other agents like bupropion, tricyclic antidepressants, modafinil, and guanfacine.[63] Pharmacotherapy alone is not sufficient in treatment of ADHD but should be combined with psychotherapy and behavioural modifications. Psychoeducation is often the initial step in the treatment plan, which involves educating the patient, their family members, and partners about the disease symptoms and impairment, frequent comorbidities, heritability and the treatment options. Coaching and cognitive behavioural therapy are often used in adjunct for treatment of ADHD.

CONCLUSION

ADHD is one of the most common childhood neurodevelopmental psychiatric disorders that causes significant psychosocial impairment and high comorbidity; if left untreated can lead to significant personal distress and high socioeconomic burden. Early diagnosis and treatment are imperative as it can significantly improve the quality of life of patients with ADHD as well as prevent further impairment. There are several pharmacotherapy agents available for the treatment of ADHD; mainly psychostimulants. Stimulants combined with psychotherapy and behavioural therapy provides an effective strategy for treatment of ADHD.

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