PRACTITIONERS' SECTION

ATTENTION DEFICIT HYPERACTIVITY DISORDER – A REVIEW FOR FAMILY PHYSICIANS

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ABSTRACT

Attention deficit hyperactivity disorder (ADHD) is a chronic behavioral disorder characterized by persistent hyperactivity, impulsivity, and inattention that impairs educational achievement and/or social functioning. Its diagnosis is made by ascertaining whether the child's specific behaviors meet the diagnostic and statistical manual of mental disorders-IV-revised criteria. Its etiology is still unclear but recent studies suggest that genetics plays a major role in conferring susceptibility. Comorbidity with psychiatric disorders such as anxiety disorder, depression, oppositional defiant disorder and conduct disorder; and with specific learning disability is not uncommon. Although medication works well in most cases of ADHD, optimal treatment requires integrated medical and behavioral treatment. Methylphenidate (MPH) and atomoxetine are the two drugs being currently prescribed and their efficacy in decreasing the symptoms of ADHD is well documented. Pyschoeducational interventions in school can help increase the successful functioning of affected children and improve their academic performance. Almost half of affected children continue to show significant symptoms of the disorder into adolescence and young adulthood. The family physician can play an important role in detecting this condition early, coordinating its assessment and treatment, counseling the parents and classroom teacher, and monitoring the child's academic and psychosocial progress on a long-term basis.

Key words: Attention deficit hyperactivity disorder, Family physicians, Primary care

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For over 100 years it has been documented that some children can have excessive and impairing hyperactivity, impulsivity, and inattention.[1] In 1902, the English pediatrician George Still presented a series of three lectures to the Royal Society of Medicine describing 43 children from his clinical practice that were often resistant to discipline, who showed little inhibitory volition, had serious problems with sustained attention and

could not learn from the consequences of their actions.[1] He proposed that these significant behavioral problems were due to an underlying neurological deficit and not caused by the environment.[1]

However, it was not till 1968 that the diagnostic and statistical manual of mental disorders (DSM) of the American Psychiatric Association first named this clinical disorder as hyperkinetic impulse disorder (DSM-II).[2] As newer clinical research emerged, the name changed to attention deficit disorder (DSM-III) in 1980, and eventually to attention deficit hyperactivity disorder (ADHD) (DSM-IV) in 1994.[3,4]

Diagnosis of ADHD

Family physicians should initiate an evaluation for ADHD when a child presents with symptoms that include academic underachievement and failure, disruptive classroom behavior, inattentiveness, poor self-esteem, or problems with establishing or maintaining social relationships.[5] The diagnosis of ADHD is based on clinical findings and is made by ascertaining whether the child's specific behaviors meet the DSM-IV-R criteria Table 1.[7] These criteria define three subtypes of ADHD: (1) ADHD primarily of the inattentive type (ADHD/I); (2) ADHD primarily of the hyperactive-impulsive type (ADHD/HI); and, (3) ADHD, combined type (ADHD/C).[6]

A child meets the diagnostic criteria for ADHD by documentation of: (1) presence of at least six of the nine behaviors described in the inattentive domain (ADHD/I), or, at least six of the nine behaviors described in the hyperactive/impulsive domain (ADHD/HI), or six of the nine behaviors described in both domains (ADHD/C), and these behaviors should be occurring "often" and to a degree that is maladaptive and inconsistent with the child's developmental level Table 1; (2) presence of these behaviors in two or more settings (for example, at home and at school) for at least past 6 months; (3) presence of some symptoms of ADHD before 7 years of age (history from parents); (4) clear evidence of clinically significant impairment in academic or social functioning, or in both; (5) these symptoms not occurring exclusively

Table 1: Criteria for the diagnosis of ADHD (derived from DSM-IV-R)[6]

Behavior domains	
Inattention *(*nine criteria*)*	Hyperactivity-impulsivity *(*nine criteria*)*
1. Careless with details	*Hyperactivity* (*six criteria*)
2. Fails to sustain attention in tasks	1. Fidgets with hands or feet or squirms in seat
3. Appears not to listen	2. Leaves seat in classroom or when should be seated
4. Does not finish instructed tasks	3. Runs about or climbs excessively and inappropriately
5. Poor in organizing tasks	4. Cannot play or engage in leisure activities quietly
6. Avoids tasks that require sustained mental effort	5. Always "on the go" or "driven by a motor"
7. Loses things	6. Talks excessively
8. Easily distracted by extraneous stimuli	
9. Forgetful in daily activities	*Impulsivity* (*three criteria*)
	1. Blurts out answer before questions are completed
	2. Has difficulty awaiting turn
	3. Interrupts or intrudes others' conversations or games

Criteria for subtypes is 6/9 on either list, or, for combined subtype, 6/9 on each of both lists — together with certain guidelines (see text)

during the course of a pervasive developmental disorder, schizophrenia, or another psychotic disorder, and not better accounted for by another mental disorder (for example, a mood disorder or an anxiety disorder).[6]

Family physicians should obtain the evidence regarding the core symptoms of ADHD directly from parents and the classroom teacher.[7] Cranial CT/MRI scan, electroencephalogram, and blood tests (e.g., thyroid hormone levels, lead levels) are not necessary for diagnosing ADHD.[7] However, audiometric and ophthalmic examinations should be done to rule out associated hearing and visual deficits, as they are common causes of poor school performance.

Prevalence of attention deficit hyperactivity disorder

Attention deficit hyperactivity disorder is one of the most common behavioral disorders of childhood. Data from Western countries indicate that 6.8% (range 8–12%) of school-going children have ADHD: 3.2% have ADHD-I, 0.6% have ADHD-HI, and 2.9% have ADHD-C.[7,8] Overall, boys are affected three times more often than girls, but girls are more likely than boys to have the ADHD-I subtype.[7,8]

There is no data available from India of prevalence rates of ADHD among elementary school-going children in the general population. However, recent studies from Chandigarh and Kolkata have reported that 8.1 and 15.5% of children referred to the child guidance clinic, respectively, were diagnosed as having ADHD.[9,10]

What causes ADHD?

There is no one single unified theory that explains the etiology of ADHD. Recent functional MRI brain studies indicate that the disorder may be caused by atypical functioning in the frontal lobes, basal ganglia, corpus callosum, and cerebellar vermis.[11],[12] Pharmacological studies have also implicated dysregulation of frontal-sub cortical-cerebellar catecholaminergic circuits (dopamine and norepinephrine neurotransmitter systems) in the pathophysiology of the disorder.[13] Family studies have provided strong evidence that genetics plays a major role in conferring susceptibility to ADHD.[14]–[16] Studies have indicated that low-birth weight and psychosocial adversity (for example, severe parental discord, low-social class, foster placement) are predisposing risk factors for ADHD.[17,18] Also, babies born to mothers who consume alcohol or smoke during pregnancy are at risk for ADHD.[19,20]

Comorbid conditions and their diagnosis

Family physicians should be aware that between 18% and 35% of children with ADHD have one or more associated psychiatric disorders such as anxiety disorder, depression, oppositional defiant disorder (ODD), and conduct disorder (CD).[21,22] Although the family physician may not always be in a position to make a precise diagnosis of these coexisting conditions, evidence for most of them can be easily detected.[5] For example, a family history of anxiety disorders coupled with a patient history characterized by frequent fears and difficulties with separation from caregivers may be suggestive of an anxiety disorder.[5] Frequent sadness and preference for isolated

activities should alert the physician to the presence of depressive symptoms.[5] ODD includes persistent symptoms of 'negativistic, defiant, disobedient, and hostile behaviors toward authority figures.'[6] The diagnostic features of CD, a more severe condition, include 'a repetitive and persistent pattern of behavior in which the basic rights of others or major age-appropriate social norms or rules are violated.'[6] Preliminary studies suggest that ODD and CD are more frequent in children with the ADHD-HI and ADHD-C subtypes, while depression and anxiety disorder are more frequent in children with the ADHD-I and ADHD-C subtypes.[7,8]

The Child Behavior Checklist (CBCL) is a useful screening tool for the identification of psychiatric comorbidity in children and adolescents with ADHD in the primary care setting.[23–25] It is an affordable pencil and paper test completed by the child's caregiver, requiring no administration by a physician. Use, scoring, and pricing information are accessible at: http://www.aseba.org/.[23–25] Referral to a child psychiatrist is necessary when screening suggests psychiatric comorbidity.

Also, up to 15–20% of children with ADHD have associated specific learning disability (SpLD) which is manifested by *significant* unexpected, specific and persistent difficulties in the acquisition and use of efficient reading (dyslexia), writing (dysgraphia) or mathematical (dyscalculia) abilities *despite* conventional instruction, intact senses, normal intelligence, proper motivation, and adequate socio-cultural opportunity.[26] Associated SpLD adds to the academic underachievement and failure.[22] Referral to a learning disability clinic is necessary when the academic difficulties are suggestive of SpLD.[26] Psychoeducational testing will be required to determine whether a discrepancy exists between the child's learning potential (intelligence quotient) and actual academic progress (achievement test scores). The clinical psychologist conducts the *standard* intelligence test viz. Wechsler intelligence scale for children test to determine that the child's intellectual functioning is normal. The special educator assesses the child's academic achievement by administering a standard educational test (for example, wide range achievement test or curriculum-based test) to assess the child's performance in areas such as reading, spelling, written language, and mathematics.[26] An academic achievement of 2 years below the child's actual school grade placement or chronological age is considered diagnostic of SpLD.[26]

Recent data also indicates that girls with ADHD are less likely to have any of this coexisting conditions.[27]

Importance of early diagnosis of ADHD

It is now well recognized that the presence of a child with ADHD results in increased likelihood of disturbances to family and marital functioning, disrupted parent–child relationships and increased levels of parent stress, particularly when ADHD is comorbid with ODD or CD.[28] Even parents of preschool children with ADHD may be under huge stress when their child does not respond to ordinary parental requests and behavioral advice.[29]

If ADHD remains undetected the child may experience academic failure, rejection by peers, and develop low-self-esteem.[30–33] Whereas it was previously thought that all children eventually outgrow ADHD, recent studies suggest that 30–60% of affected children continue to show significant symptoms of the disorder into adolescence and young adulthood.[30–33] Adolescence may bring about a reduction in the over activity but inattention, impulsiveness, and inner restlessness remain resulting in academic, behavioral, and social impairment.[30–33] Among individuals whose symptoms abate during adolescence, the outcome may be similar to that of normal subjects in terms of social functioning, and drug and alcohol use, although not academic achievement.[30],[31],[33] Adults with persistent symptoms complete less formal schooling, have lower-status jobs and have higher rates of antisocial personality.[30,31,33]

If ADHD with coexisting psychiatric conditions remains undetected the prognosis is poorer. Adolescents with ADHD and coexisting depression are at increased risk for suicide attempts.[34] Frequently, children and adolescents with ADHD with persisting ODD later develop symptoms of sufficient severity to qualify for a diagnosis of CD.[35] The frequency of substance-use disorder, mostly not involving alcoholism, is higher among adolescents and young adults with ADHD predominantly among those with coexisting CD.[30–32]

Thus, it is important to identify ADHD early during childhood, rather than when chronic poor school performance, or problems with strained parent–child relationship or social functioning and their attendant emotional sequelae ensue.

Management of ADHD

The three treatments that have been validated as being significantly effective for ADHD are: (1) medication management, (2) behavioral therapy, and (3) a combination of the two approaches.[36]

(1) *Medication management of ADHD*: To achieve amelioration of the core ADHD symptoms, medication management is superior to behavioral therapy.[36] MPH and atomoxetine are the two drugs which are being currently prescribed and their efficacy in decreasing the symptoms of ADHD is well documented.[36–40] Medications are not recommended for use in children who are below 6 years of age.[36–40]

Most children with ADHD improve on the stimulant MPH and maintain their improvement without intolerable adverse events.[36–38] MPH is believed to act on central dopamine and norepinephrine pathways.[36–38] Short-acting MPH is now available in our country. Its behavioral effects begin within 30 min of oral administration and last for 3–5 h. The daily dose should be individualized by titration and careful monitoring and it ranges from 5 to 20 mg twice daily to three times daily.[36–38] Side effects include anorexia, stomachache, headache, irritable mood, tics, and sleep difficulties. These side effects, however, are usually mild and responsive to dose adjustment and often abate with continuous use. Continuous use has been associated in

some children with slowing of physical growth (approximately 1 cm/year during the first 1–3 years of treatment), which is transient and of unclear cause.[36–38] In Western countries, long-acting MPH is now available and it permits once-daily administration (18–54 mg) and its behavioral effects last for 10–12 h.[38] Long-acting MPH is used to ensure compliance in children who feel embarrassed to take medication in school.[38]

Atomoxetine a nonstimulant highly selective noradrenaline reuptake inhibitor, is a new drug, which represents an important advance in the pharmacological management of ADHD.[38–40] Atomoxetine demonstrates efficacy comparable to methylphenidate in the treatment of ADHD.[38–40] Once-daily dosing of atomoxetine has been shown to be effective in providing continuous symptom relief. The starting dose is 0.5 mg/kg/day and increased after 4 days to 1.2–1.4 mg/kg/day. Its most commonly reported adverse effects are transient and include dyspepsia, nausea, vomiting, decreased appetite, and weight loss.[38–40]

In general, medication is best titrated against desirable effects such as behavioral control, improved educational achievement and peer group relations, and development of intolerable adverse effects.[38] Medication can be discontinued on Sundays and school holidays. Also, periodic (yearly) discontinuation for a brief period (for example, during summer vacations) is often used to reaffirm the need for continuing medication.[38]

Additional pharmacological options include the antidepressants: bupropion and desipramine; and the antihypertensives: clonidine and guanfacine.[38] But the scientific base supporting the efficacy of these drugs is limited.[38] Another stimulant drug, pemoline, although effective is no longer used because of its potential to cause serious hepatotoxicity.[38]

(2) *Behavioral therapy*: Parents are taught by psychologists or social workers to achieve consistent and positive interactions with their affected child. They are taught how to reinforce positive behaviors by praise or by using daily contingency charts (star or 'happy face' charts), how to extinguish negative behaviors by active ignoring, and how to effectively punish for intolerable behaviors.[41] Parent training is the sole treatment for children with ADHD who are below 6 years of age.[42]

Simple pyschoeducational interventions at school such as seating the child near the teacher to minimize classroom distractions, or assigning a specific teacher to review daily assignments with the child have been shown to be effective in improving the behavior and academic performance of affected children.[43]

(3) *Combined treatment*: Optimal treatment of ADHD requires integrated medical and behavioral (combined) treatment.[36] Although combined treatment does not yield significantly greater benefits than medication management for core ADHD symptoms, it helps reduce the total daily required medication dose and the associated non-ADHD symptoms viz. symptoms of anxiety and depression, and oppositional/aggressive behaviors; and helps achieve positive

functioning outcomes for peer interactions, parent–child relations, and reading achievement.[36] Recent research suggests that combined treatment may help prevent the development of future psychiatric disorders.[36]

Management of associated SpLD

The cornerstone of treatment of SpLD is remedial education. The child has to undergo remedial education sessions twice or thrice weekly for a few years to achieve academic competence.[26,44] The child should also avail the required provisions (accommodations) to help cope up in a regular mainstream school, e.g. exemption from spelling mistakes, availing extra 30 min for all written tests, dropping a second language and substituting it with work experience, dropping algebra and geometry and substituting them with lower grade of mathematics, and work experience.[26,44]

Important role of family physician

Every family physician can facilitate early detection of ADHD by enquiring during a consultation whether the child has problems in learning at school, and specifically asking the parents whether they are concerned about their child's behavior in school, or at home.[7] The family physician can play a crucial role in coordinating the assessment (obtaining information of child's behavior from parents and classroom teacher) and treatment (prescribing ongoing medication once the patient is stabilized, and ensuring compliance) of ADHD.[7] Those familiar with its management can even initiate the medication management, but will need to liaise with a child psychiatrist/developmental pediatrician regarding any complications in treatment (for example, intolerable side effects or treatment failure) or if comorbid conditions (ODD, CD, anxiety, depression, SpLD) are suspected.[7]

It is well known that favorable outcome of ADHD is dependent on a supportive home and school environment.[36] The family physician can play an important role in counseling the parents and classroom teacher of a child with ADHD about the need for medication, psychoeducational interventions, analyze their feedback about the child's specific target behaviors to titrate the medication dose, and monitor the child's academic progress on a long-term basis.

Parents of a child with ADHD may consult their family physician about the utility of unconventional therapies such as cognitive treatments, individual psychotherapy, play therapy, restrictive or supplemental diets, mineral or amino acid supplements, megavitamins, herbal medicines, homeopathy, allergy treatments, neurofeedback, and vestibular and sensorimotor integration to treat their child's disorder. None of these have proved to be effective when subjected to double-blind controlled clinical trials.[45–50] The family physician can help parents become better-informed consumers.

To conclude, every family physician can play a crucial role in ensuring that no child with ADHD loses out in life.

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