A Comprehensive Review of Attention Deficit Hyperactive Disorder in Children: Diagnosis, Intervention and Future Directions

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***Abstract*—ADHD is the most common psychiatric disorder of children according to Diagnostic and Statistical Manual of Mental Disorders [DSM-V]. ADHD encompasses a range of behaviours that disrupt social standing. Typically, Attention Deficit Hyperactive Disorder is marked by impulsive actions, difficulty maintaining attention and hyperactive tendencies. Research indicates that the primary traits of ADHD evolve as individuals mature, suggesting that regardless of how it is classified, ADHD appears to diminish during adulthood. Across this lifespan hyperactivity-though still noticeable -becomes less pronounced. To diagnose specific symptoms, a thorough background or family history is essential. This paper provides an extensive overview of current knowledge surrounding ADHD in children, highlighting diagnostic criteria, assessment tools, and emerging research trends and treatment options. Additionally, it emphasizes future directions for addressing this increasingly common disorder in children. This paper also addresses the difficulties associated with early diagnosis and underscores the significance of inclusive education and collaborative approaches to support children affected by this condition.**

***Index Terms*—ADHD, Diagnosis, Intervention, Future Directions.**

I. INTRODUCTION

Attention Deficit Hyperactive Disorder is the most prevalent disorder if childhood which gets overlooked at the early stages due to the unawareness and lack of knowledge and as a result it often continues to adulthood unknowingly ruining one's overall behaviour and personality. At the childhood it affects the child's social life along with cognitive, academic and emotional development. Understanding the concept of ADHD, first we have to drop the rigidity and work with multidisciplinary lens including all psychology, psychiatry, education and neuroscience. First of all, we must know that not all those with ADHD have the problems in reading, spelling or arithmetic that are seen in learning disordered children, and not all those with learning disorders have behavioural problems. Second most important thing to know is that the treatment of ADHD behavioural problems and learning disorder problems are different.

DEFINITIONS AND CLASSIFICATIONS:

According to Diagnostic and Statistical Manual of Mental Disorders (DSM-V), the major symptoms of the disorder are seen before the age of 12 years but however persist for at least 6 months which is observed inappropriate for the child's developmental levels. It's characterized by the persistent patterns of hyperactivity, inattention and impulsivity.

DSM-V has classified ADHD in to three groups:

- Predominantly Inattentive Type (ADHD-PI)
- Predominantly Hyperactive Impulsive Type (ADHD-PHI)
- Combined Type (ADHD-C)

OBJECTIVES OF THE STUDY:

 To examine the current diagnostic criteria and practices for ADHD in children, including the application of DSM-5 guidelines, and to assess the impact of factors such as age, gender, socioeconomic status, and comorbid conditions on the accuracy and timeliness of diagnosis.

 To evaluate the effectiveness of existing intervention strategies for managing ADHD in children, encompassing pharmacological treatments, behavioural therapies, parent management training,

and emerging non-pharmacological approaches like neurofeedback and physical exercise.

 To identify and analyse the challenges and limitations associated with current ADHD interventions, including issues related to accessibility, adherence, and the need for individualized treatment plans.

 To explore future directions in ADHD diagnosis and treatment, focusing on advancements in technology such as EEG-based diagnostic tools and digital health platforms, and their potential to enhance early detection and personalized care.

 To synthesize findings from recent studies to provide a comprehensive overview that can inform clinical practice, policy-making, and future research aimed at improving outcomes for children with ADHD.

II. RESEARCH METHODOLOGY

In accordance with the availability of resources and feasibility of the present research paper, the research study is conducted on the bases of secondary sources of data which has been collected from different databases like PUBMED, MEDLINE, ERIC etc., journals, research papers and books. Additional searches may include ClinicalTrials.gov, WHO registries, grey literature, and relevant guideline repositories. Search terms combine ADHD-related keywords with terms related to diagnosis, assessment, pharmacological and non-pharmacological interventions, screening tools, and future/policy directions.

III. REVIEW OF LITERATURE

Longitudinal studies are needed to understand the developmental trajectory of ADHD into adolescence and adulthood, as discussed by Wender (2001), who explores ADHD across the lifespan. Efforts to improve early screening in preschool-aged children, especially in community and school settings, and the incorporation of strength-based interventions that build on children's capabilities rather than focusing solely on deficits are gaining momentum.

Attention Deficit Hyperactivity Disorder (ADHD) is among the most prevalent neurodevelopmental disorders in children, characterized by persistent inattention, hyperactivity, and impulsivity (American Psychiatric Association, 2013). Over the years, extensive research has focused on understanding its etiology, diagnostic criteria, and the effectiveness of various intervention strategies. This literature review synthesizes key studies related to the diagnosis and treatment of ADHD in children and highlights emerging directions in the field.

The DSM-5, published by the American Psychiatric Association (2013), remains the primary diagnostic framework for ADHD, delineating symptom clusters and functional impairments that must persist for at least six months across multiple settings.

Thapar et al. (2013) further extend the understanding of ADHD etiology by discussing genetic and environmental contributions. They underscore that ADHD is highly heritable and influenced by multiple genes, although environmental factors such as prenatal exposure to toxins and psychosocial adversity also play a significant role.

Felt et al. (2014) provide a detailed overview of the clinical diagnosis and management of ADHD in primary care, emphasizing early identification and the importance of developmental and behavioural history in diagnostic evaluation.

Behavioural parent training and teacher-mediated strategies are also widely supported in the literature for managing symptoms and enhancing functioning across home and school environments (Felt et al., 2014).

Polanczyk et al. (2015) conducted a meta-analysis on the global prevalence of mental disorders in children and adolescents, reporting that ADHD affects approximately 5% of children worldwide. This suggests a universal health concern requiring culturally adaptable diagnostic tools and intervention frameworks. However, disparities in awareness, diagnostic practices, and access to treatment persist between high- and low-income countries.

ADHD interventions have evolved from solely pharmacological approaches to encompass behavioural, educational, and psychosocial components. Barkley (2015) presents a comprehensive framework for managing ADHD through multimodal treatment involving medication, parent training, classroom interventions, and cognitive-behavioural therapy.

Neurobiological research by Faraone and Biederman (2016) explores the structural and functional brain differences in individuals with ADHD, particularly in

the prefrontal cortex and basal ganglia, lending support to the biological basis of the disorder.

Emerging research emphasizes the need for personalized medicine approaches, integrating genetic, neuroimaging, and behavioural data to tailor interventions (Faraone & Biederman, 2016). There is also growing interest in technology-based interventions, such as neurofeedback, digital behaviour tracking, and mobile health applications, which show promise in supplementing traditional treatment modalities.

On the other hand, non-pharmacological interventions are gaining prominence due to concerns about side effects and long-term dependency. Storebø et al. (2019) conducted a Cochrane systematic review on social skills training, indicating moderate success in improving interpersonal relationships and reducing disruptive behaviour.

Pharmacological treatments, particularly stimulant medications like methylphenidate and amphetamines, remain the most evidence-based interventions, as highlighted by Peterson et al. (2024) in their systematic review of treatment efficacy in children and adolescents.

IV. PREVELANCE AND RISK FACTORS

Globally, ADHD affects approximately 5-7 % of children (Polanczyk et al., 2015) based on different rates of diagnostic practices, awareness, and socio-cultural factors. Many risk factors are associated with this disorder of ADHD being a complex condition with no single known cause.

~ Genetic Predisposition: ADHD is highly heritable (76%)

~ Family History: close family members with ADHD or another mental health condition are a significant risk factor.

~Environmental Factors: exposure to lead, alcohol, or tobacco during pregnancy can be a cause.

~Prenatal and Perinatal Factors: infants with premature birth or low birth weight are more likely get affected with this disorder.

V. DIAGNOSIS AND DIAGNOSTIC PROCESS

No specific tests can diagnose ADHD and the DSM 5 requires the presence of a sufficient number of core symptoms and functional impairment to complete the diagnosis process of ADHD which is very complex.

Generally, ADHD is divided into three subtypes which are: Primarily Inattentive (eg; distracted, poor organization and follow through), Primarily Hyperactive (eg; fidgety, overly active, interrupts), and combined. A significant family history of ADHD is the most supportive element of an ADHD diagnosis. Its diagnostic procedure includes:

- ❖ Clinical Evaluation: It involves a multi-informant, multimethod approach that includes the conduction of proper clinical interviews with parents, teachers and children.
- ❖ Using rating scales example-Conner's Rating Scale, Vanderbilt ADHD diagnostic Rating Scale.
- ❖ The patient and developmental history are observed keenly.
- ❖ Differential Diagnosis: Other disorders or mental conditions should be ruled out like autism spectrum disorder (ASD), anxiety, learning disabilities and sleep disorders.
- ❖ Neuropsychological Assessment: It involves evaluating an individual's cognitive and behavioural functions to aid in diagnosis, treatment planning and understanding the impact of ADHD on daily life.

Some tests that are used are mentioned below:

- ✓ -Test Of Variables of Attention (TOVA)
- ✓ -Stroop Test
- ✓ -Wisconsin Card Sorting Test (WCST)
- ✓ -Trail Making Test
- ✓ -NEPSY-II
- ✓ -Wechsler Adult Intelligence Scale (WCST)
- ✓ -WISC- Wechsler Intelligence Scale for Children.
- ✓ -Continuous Performance Test.

VI. CURRENT TREATMENT APPROACHES

- Pharmacological Interventions- Stimulants and non-stimulants are there for clinical purposes. Some stimulants like Methylphenidate and Amphetamines are very effective treatments in 70% of cases. Non stimulants like Atomoxetine, Guanfacine, and Clonidine are alternatives with fewer abuse concerns.
- Behavioural Interventions- Parent training in behaviour management and classroom strategies

(eg; token systems, seating changes) are the first line approaches for behavioural improvement. For adolescents and older children Cognitive Behavioural Therapy.

- Educational Supports- There are some educational strategies which are used for the treatment of ADHD like Individualized Education Plans (IEPs), Accommodations under section 504 (US), Inclusive Classroom Strategy and Differential Instructions.

VII. CHALLENGES IN DIAGNOSIS AND MANAGEMENT AND FUTURE DIRECTIONS

There are few challenges that have been faced during the diagnosis of ADHD. Sometimes the diagnosis gets complicated due to the overlapping of the symptoms of other disorders. Cultural prejudices also affect the parent and teacher report. Early identification and intervention due to the disparities in healthcare and education system.

- Precision medicine in ADHD aims to personalize the treatment by considering an individual's genetic makeup and other unique characteristics to optimize medication, selection and dosage.
- Current ADHD treatment relies heavily on trial and error, research into the genetics of ADHD, including pharmacogenomics (how genes affect drug response), offers more hope for targeted and effective therapies.
- Emerging tools include apps and wearables for tracking behaviour and medication adherence.
- Diagnostics driven by AI utilize machine learning on extensive behavioral databases. Engaging neurocognitive training aims to enhance executive function skills.
- Several innovative practices in schools include:
  - Professional development programs for educators to foster inclusive settings.
  - Early universal screening during the initial school years.
  - The incorporation of social-emotional learning (SEL) to aid in self-regulation

VIII. CONCLUSION

ADHD in children poses significant challenges but also opportunities for early intervention and holistic support. Advances in neuroscience, digital technology and educational strategies promise a more nuanced understanding and improved outcomes. A collaborative approach involving families, educators, clinicians and policy makers is essential to support affected children and promote their well-being.

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