ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD): CURRENT APPROACHES TO DIAGNOSIS AND TREATMENT

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ABSTRACT

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most prevalent neurodevelopmental disorders affecting children and adolescents worldwide, with symptoms frequently persisting into adulthood. Characterized by persistent patterns of inattention, hyperactivity, and impulsivity, ADHD significantly impacts academic performance, social interactions, emotional well-being, and overall quality of life. The etiology of ADHD is multifactorial, involving complex interactions among genetic, neurobiological, environmental, and psychosocial factors. Early recognition and accurate diagnosis are essential for minimizing functional impairment and improving long-term outcomes. Current diagnostic approaches rely on comprehensive clinical assessment using standardized diagnostic criteria, detailed developmental history, behavioral observations, and validated rating scales obtained from multiple informants, including parents, teachers, and caregivers. Advances in neuroimaging, genetic research, and digital health technologies have enhanced understanding of the disorder, although no definitive biological marker is currently available for routine clinical diagnosis.

Management of ADHD requires a multimodal and individualized approach. Evidence-based behavioral interventions, parent training programs, classroom modifications, psychoeducation, and cognitive-behavioral strategies form the cornerstone of non-pharmacological treatment. Pharmacotherapy remains highly effective, particularly stimulant medications such as methylphenidate and amphetamine derivatives, while non-stimulant agents including atomoxetine, guanfacine, and clonidine provide valuable alternatives in selected patients. Emerging therapeutic modalities, including digital therapeutics, neurofeedback, telemedicine-based care, and precision medicine approaches, offer promising opportunities for personalized treatment and improved accessibility. Continuous monitoring, family involvement, and multidisciplinary collaboration are critical for optimizing treatment adherence and functional outcomes. This narrative review summarizes current concepts regarding the epidemiology, pathophysiology, diagnosis, and management of ADHD, with particular emphasis on contemporary diagnostic strategies, evidence-based therapeutic interventions, recent advances, and future directions in clinical practice.

Keywords: Attention Deficit Hyperactivity Disorder, ADHD, Inattention, Hyperactivity, Impulsivity, Neurodevelopmental Disorders, Behavioral Therapy, Stimulant Medications, Atomoxetine, Digital Therapeutics, Pediatric Psychiatry, Multidisciplinary Management.

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INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is commonly diagnosed in children or teens. Educators frequently identify the issue prior to others, as ADHD can lead to subpar academic performance. Various factors can influence a student's academic achievement. Consequently, it is imperative to precisely ascertain the origin of the student's challenges, as ADHD is merely one of numerous potential explanations. In cases of ADHD in children, targeted therapy can enhance outcomes.[1]

Immoderate impatience, emotional volatility, diminished self-worth, heightened sensitivity to rejection, stress, anxiety, challenges in overcoming setbacks, procrastination, inadequate emotional regulation, and pervasive feelings are among the emotional symptoms linked to ADHD. Inattention, impulsivity, and hyperactivity are the defining characteristics of ADHD, a persistent neurodevelopmental disease. ADHD, previously regarded as a childhood disorder, is now acknowledged to persist into adulthood in a significant number of affected persons, along with

its symptoms and related deficits.[2]Like children with the illness, adults with ADHD exhibit symptoms that lead to considerable interpersonal, occupational, and educational challenges. Novel pharmacological medicines and psychotherapy approaches are continually being developed to enhance treatment outcomes in this population.[3]

Diagnostic procedures for individuals with ADHD typically utilise standardised rating scales to evaluate symptoms experienced in the prior six months. Functional impairment must be assessed in several contexts, including interpersonal relationships, professional environments, educational settings, and domestic life. A comprehensive developmental history, encompassing conception, childhood, and educational experiences, must be acquired. The familial psychiatric history must be investigated, especially concerning learning disabilities, attentional and behavioural issues, ADHD, and tic disorders. Data must be collected for all first-degree relatives, encompassing parents, siblings, and children. A physical examination is essential to rule out underlying medical issues, including seizure disorders or substantial head injuries.

Men and women may manifest ADHD differently, along with the neurological problems commonly associated with it. Males are more predisposed than females to obtain an ADHD diagnosis. The variation in symptom manifestation may partially account for this disparity. Males are more prone to exhibit impulsive or restless behaviours, whereas females are more inclined to display inattention and emotional instability.[4]

The diagnostic assessment of ADHD in adults mostly depends on direct engagement with the patient. While direct contact is essential for diagnosis, a thorough review typically employs many strategies to reduce reporting bias and improve diagnostic precision, particularly when external incentives like medicine access are involved. Clinicians gather data from multiple domains to assess if ADHD symptoms are resulting in substantial functional impairment. This evaluation encompasses educational achievement, occupational success, interpersonal relationships, self-care abilities, time management skills, emotional control, driving proficiency, and general lifestyle functioning. Collateral information obtained from family members, friends, or other reliable informants contributes to a more complete assessment of impairment across different settings.

Structured or semi-structured interviews, clinical judgement checklists, and disorder-specific questionnaires that assess both self-perceptions and observations from parents or teachers serve as effective diagnostic instruments. Evaluating psychiatric comorbidities is essential in the diagnostic process, especially diseases that may resemble ADHD symptoms, like bipolar disorder and borderline personality disorder (BPD).[5]These diseases exhibit characteristics such as impulsivity and emotional instability, complicating differential diagnosis. It is crucial to differentiate ADHD from bipolar illness, as each condition necessitates distinct treatment strategies. Understanding the characteristics of BPD is crucial, as the impulsivity and emotional instability associated with it may mimic symptoms of ADHD.

The inattentive presentation of ADHD is largely characterised by challenges in sustaining attention on tasks or activities. Individuals commonly encounter difficulties in adhering to commitments, often abandoning things unfinished due to boredom and transitioning from one partially accomplished endeavour to another. They may also struggle to maintain focus on a singular task for a prolonged duration.[6]

Neuropsychological testing assesses memory, attention, and executive functioning, offering objective insights into cognitive capabilities and potentially validating cognitive deficiencies linked to ADHD. Diagnostic interviews, such as the Diagnostic Interview for ADHD in Adults (DIVA), systematically assess ADHD symptoms and their functional implications through a structured approach that integrates both self-reported and collateral data. These devices conform to recognised diagnostic standards and enable a thorough diagnosis based on substantial clinical data. Integrating these tests into the diagnostic process enables physicians to achieve a holistic evaluation that merges subjective experiences with objective data, therefore enhancing the comprehension of ADHD symptomatology and its effects on overall functioning.

ADHD symptoms encompass diverse levels of inattention, hyperactivity, and impulsivity. In youngsters, inattentive symptoms may present as concentration difficulties, thoughtless errors, fast disinterest or distractibility, forgetfulness, and challenges in finishing assignments. Hyperactive symptoms may encompass restlessness, excessive verbalisation, difficulty maintaining a seated position, and excessive running or climbing. Impulsivity can manifest as impatience, frequent interruptions, and actions taken without regard for repercussions. In adults, inattentive symptoms typically encompass difficulties in concentration, casual errors, inadequate organization and time management, avoidance of jobs necessitating prolonged mental exertion, frequent misplacement of possessions, and recurrent changes in employment or career trajectories. Hyperactivity may manifest as internal agitation, an incessant want for stimulation, excessive verbalisation, and an inability to remain motionless. Impulsivity may entail making decisions without contemplating repercussions, inadequate emotional regulation,

participation in hazardous behaviours, and frequent alterations in plans or objectives.[7]

There is no singular conclusive assessment for ADHD. Screening and diagnosis generally need a thorough clinical assessment, comprising a physical examination to detect medical illnesses that may manifest identical symptoms, succeeded by an in-depth discussion of behavioural patterns and activity levels. Patients are typically queried about their conduct, attention, and daily functioning.[8]

The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), categorises ADHD into three presentations: primarily inattentive, mainly hyperactive-impulsive, and composite presentation. Executive dysfunction and inattention are fundamental characteristics of the inattentive presentation, while the hyperactive-impulsive presentation is predominantly defined by heightened activity and impulsive behaviours, lacking significant inattentive symptoms.[9]

LITERATURE REVIEW

Etiology

The aetiology of ADHD is associated with multiple causes, encompassing both hereditary and environmental components. It is among the most genetically transmissible illnesses concerning psychiatric disorders. Monozygotic twins have significantly higher concordance than dizygotic twins. Siblings possess a twofold risk of developing ADHD compared to the general population. Likewise, viral infections, maternal smoking, dietary deficiencies, and foetal alcohol exposure have been investigated as potential etiological factors of the condition. No consistent findings exist regarding brain imaging in patients with ADHD. The quantity of dopaminergic receptors has been associated with the disorder's development, as research indicates a reduction of these receptors in the frontal lobes of patients with ADHD.[10] There is also evidence for the role of noradrenergic receptor involvement in ADHD.

Epidemiology

The subgroups of attention deficit disorders exhibit varying incidence rates among individuals afflicted by these diseases. The inattentive subtype is observed in approximately 18.3% of patients, whereas the hyperactive/impulsive and mixed subtypes account for 8.3% and 70%, respectively. The inattentive subtype is more prevalent in the female population. The illnesses together have a male-to-female ratio of 2:1 according to several studies.[11] It is common in approximately 3%-6% of the adult population. It is among the most common illnesses observed in childhood. Evidence suggests that ADHD is more widespread in the United States compared to other industrialised nations.

Pathophysiology

ADHD is linked to cognitive and functional impairments resulting from widespread brain abnormalities. The anterior cingulate gyrus and dorsolateral prefrontal cortex (DLPFC) are diminished in patients with ADHD. These modifications are believed to explain the deficiencies in goal-directed behaviour. Furthermore, fMRI measurements indicate diminished activity in the frontostriatal region in these individuals. Understanding these pathophysiological pathways is crucial for directing medication accordingly.[12] It is important to remember that ADHD is a clinical diagnosis. There are no standard laboratory or imaging results among patients with ADHD.

History and Physical

To diagnose ADHD, it is essential to have a pertinent history of the individual in question. ADHD is diagnosed in children based on their history, requiring the presence of difficulties in at least 6 of the 9 symptoms outlined in the DSM-5. Inattentive symptoms encompass a lack of meticulous attention to tasks, oversight of minor details, hasty task completion, seeming unresponsiveness during conversations, challenges in organization, incomplete work, aversion to or avoidance of jobs requiring prolonged cognitive effort, misplacement of items, and forgetfulness. Hyperactive symptoms encompass fidgeting, a persistent sensation of a "internal motor," leaving one's seat, climbing, excessive noise, impulsively blurting out responses, excessive or untimely talking, difficulty awaiting one's turn, and interrupting or intruding upon others. These symptoms must manifest in various contexts.

In adults, these fundamental symptoms may be absent and may instead present as alternative issues, including procrastination, mood instability, and diminished self-esteem. They are likely to exhibit greater impulsivity or inattentiveness, as the symptoms of hyperactivity can be more effectively managed. The signs of inattention or hyperactivity are likely to be shown throughout a comprehensive childhood history yet may have been overlooked.

ADHD disrupts functioning and growth. This may be applicable to non-working people and is frequently overlooked in this demographic. A stay-at-home mother may encounter challenges in ensuring her children arrive at school punctually, maintaining an organised household, and remaining attentive while driving, all of which impact her overall functioning and everyday life while not being employed or attending school. It is crucial to consider this when formulating a diagnosis.

Various scales are employed to assess the issues experienced by patients with ADHD. An example is the Brown Attention Deficit illness Scale, which encompasses prevalent domains of difficulties for individuals and can be utilised in adults to diagnose the illness. The Vanderbilt ADHD scale is frequently utilised for children due to its inclusion of both teacher and parent components. A physical examination is not particularly effective for

diagnosing ADHD; nevertheless, it can be utilised to rule out medical conditions such as thyroid disorders. It may also assist in identifying any medical conditions that could inform treatment options. For instance, persons with hypertension may refrain from selecting stimulants as a therapeutic alternative.[13]

Evaluation

ADHD is a clinically diagnosed condition that lacks specific laboratory or radiologic diagnostics. Neuropsychological tests lack sufficient sensitivity for detecting the illness; hence, diagnosis should rely on the patient's history.[13] The evaluation of the patient with ADHD is usually done with different rating scales and multiple informants, who may include the teachers and parents. A doctor must investigate other illnesses that may be responsible for the symptoms exhibited by a child. It should not be diagnosed in relation to symptoms stemming from another disorder, such as a psychotic episode or a manic episode.

DSM 5: Types of ADHD

1. Predominantly inattentive
2. Predominantly impulsive or hyperactive
3. Combination of the above

- The onset is usually before age 12
- Symptoms present at school, work, or home
- The disturbance causes significant impairment in social, occupational, and academic functioning.
- The disorder is not accounted for by any other behavior disorder.

Treatment / Management

Pharmacological intervention remains the cornerstone of treatment for those diagnosed with ADHD. It is categorised into two primary types: stimulants and non-stimulants. Stimulants are categorised into amphetamines and methylphenidates. Both categories of stimulants inhibit the reuptake of dopamine at the presynaptic and postsynaptic membranes. Amphetamines directly induce the release of dopamine. Stimulants constitute the primary treatment for ADHD. They demonstrate efficacy in approximately 70% of patients. The number needed to treat is 2. Each subtype of stimulant has several formulations, including immediate-release, extended-release, long-acting, and sustained-release options. Adverse effects of stimulants encompass alterations in blood pressure, diminished appetite and sleep, and potential for dependency. Nonetheless, people with ADHD exhibit a heightened risk of substance use, and research indicates that stimulant treatment reduces their total lifetime risk of substance misuse. Due to the classification of stimulants as prohibited substances, providers frequently exhibit reluctance in their utilisation. Repeated evidence has demonstrated the necessity of administering stimulants for ADHD.

Concerns have arisen over the usage of stimulants in patients with seizures. Recent research indicate that stimulant treatment for ADHD is safe in individuals with epilepsy.

Patients with ADHD and tic disorders may experience an escalation in the frequency of tics. Incorporating alpha agonists may assist in diminishing tics.[14]

Among the non-stimulant alternatives, there exist two categories: antidepressants and alpha agonists. Atomoxetine is the most recognised agent within the antidepressant group, functioning as a selective norepinephrine reuptake inhibitor. It has demonstrated efficacy in numerous trials as a therapy for ADHD, however not quite to the extent of stimulants. It possesses negligible antidepressant effects. It is frequently utilised in children who are intolerant to stimulants or experience anxiousness. Additional antidepressants comprise bupropion, which focuses on dopamine and norepinephrine, and tricyclic antidepressants (TCAs), which are considered last-resort alternatives. These function by targeting norepinephrine.

Finally, alpha agonists like clonidine and guanfacine may serve as an efficacious treatment for ADHD. These are linked to various cardiovascular effects, including reduced blood pressure, sleepiness (more pronounced with clonidine than guanfacine), weight gain, and dizziness. They are determined to be more efficacious in younger children than in adults.

Psychosocial treatment is an alternative therapeutic approach employed for persons afflicted by the condition. This treatment modality encompasses psychoeducation for both the family and the patient, as well as cognitive-behavioral training regimens tailored to facilitate the patient's attainment of short- and long-term objectives. Research indicates that these training programs are highly successful when combined with medication. In contrast to other psychiatric diseases, substantial evidence supports the efficacy of drug management without therapy.[15]

The FDA has just approved the trigeminal nerve stimulation system for children not on medications. The device generates a low-level electrical pulse, which suppresses hyperactivity.

No diet has been found to improve ADHD.

Differential Diagnosis

Distinguishing ADHD from other clinical diseases is crucial due to potential symptom overlap. Mood disorders including sadness and anxiety may be misdiagnosed in patients with ADHD, as symptoms such as inattention, poor focus, memory impairment, and distractibility typically remain in individuals with this illness. Substance use disorders warrant thorough investigation, as children with ADHD are susceptible to substance misuse. It is essential to exclude hearing

abnormalities, learning disorders, and developmental issues when diagnosing ADHD.

Prognosis

The prognosis of ADHD varies based on the age of the individual exhibiting symptoms. The symptoms of ADHD are observed to linger into adolescence, potentially affecting social and academic spheres. Forty percent of the patients persist in suffering symptoms during their teenage years, while twenty-five percent are concurrently diagnosed with an antisocial disorder. Nonetheless, a significant long-term trend was observed indicating that the symptoms of patients with ADD diminished by around 50% in maturity. The prevailing guideline indicates that 50% of patients "outgrow" ADHD, particularly with intervention, while an additional 25% do not require medication in adulthood. This is hypothesised in two ways: firstly, that stimulants facilitate the progressive growth of the frontal brain, and secondly, since adults frequently select professions that do not necessitate prolonged concentration. In maturity, these individuals can attain their educational and professional objectives.[16]

ADHD treatment has been demonstrated to alleviate symptoms of oppositional defiant disorder and conduct disorder. It has demonstrated a reduced risk of substance usage.

Untreated ADHD can lead to enduring dysfunction, with severe implications such as chronic unemployment, heightened incidence of vehicular accidents, and escalated substance abuse. [17]

Deterrence and Patient Education

Patients with ADHD require regular follow-up to monitor their symptoms and concomitant conditions. The significance of patient education in attaining treatment objectives cannot be overstated. Parents of children with ADHD should receive formal education about the disorder to comprehend the underlying principles of the diagnosis. Optimal medication treatment necessitates continuous interaction between the primary carer and the family.[18]

Pearls and Other Issues

ADHD is frequently a readily manageable condition that is significantly stigmatised in society. Accurate diagnosis and therapy can transform the lives of those afflicted by these conditions.

Providers should not hesitate to prescribe stimulant drugs. They are exceptionally efficacious and can be rather secure when appropriately supplied.

ADHD is associated with several comorbid conditions, such as anxiety, depression, and behaviour disorder. ADHD treatment can ameliorate the symptoms of comorbid conditions.

Improving Healthcare Team Performance

ADHD is a disorder that can be managed, but successful adherence to management procedures is essential for achieving positive outcomes. The management entails an interprofessional team comprising a specialist psychiatrist, paediatrician, chemist, and other healthcare specialists, including nurse practitioners who assist in diagnosing the disease. The collaboration between the family and the healthcare staff is essential to ascertain the precise history of the patient's experiences.

The team should subsequently formulate a management plan that may encompass pharmacologic treatment, psychosocial intervention, or a combination of both. The team must analyse the comorbid illnesses of ADHD, as depression and anxiety disorders are significantly more prevalent in this population. To diagnose ADHD, regular follow-ups with the kid's primary carer must be arranged alongside the youngster. The clinician can thereafter assess the kid and clinically correlate the findings with those reported by the carer. This can be referred to a qualified psychiatrist for a definitive diagnosis. This would necessitate the involvement of additional healthcare specialists, including a psychologist or a qualified psychotherapist, in conjunction with the psychiatrist. The treatment plan is thereafter developed by the team, with the carer playing a significant part alongside the healthcare professionals. The carer must monitor the patient and assist in identifying any changes the youngster may display. Therefore, it can be concluded that a comprehensive healthcare strategy should be implemented for the diagnosis and treatment of ADHD to meet the long-term objectives of the treatment.[19]

Effective communication among the interprofessional team is essential for enhancing outcomes. The team should convene to ensure a unified message is communicated to the carer, who frequently becomes distressed by conflicting information.

Outcomes

Notwithstanding extensive study over several decades, the prognoses for individuals with ADHD remain cautious. Medication noncompliance is prevalent, and monitoring is challenging as several patients pursue alternative therapies. A considerable number of parents lack confidence in pharmaceuticals and frequently choose alternative treatments. It is indisputable that existing medicines assist certain individuals in enhancing their functionality. Nonetheless, in the absence of treatment, individuals persist in deteriorating and ultimately encounter financial, legal, and social challenges.[20]

METHODOLOGY

Study Design

This study was conducted as a **narrative review** aimed at summarizing current evidence regarding the diagnosis and treatment of Attention Deficit Hyperactivity Disorder (ADHD). The review focused on epidemiology, etiology,

pathophysiology, clinical presentation, diagnostic approaches, pharmacological and non-pharmacological treatment modalities, recent advances in management, and future directions in ADHD care.

Literature Search Strategy

A comprehensive literature search was performed using major electronic databases, including **PubMed/MEDLINE, Scopus, Google Scholar, Embase, and the Cochrane Library**. Relevant articles published in English between **2015 and 2026** were identified. Additional landmark studies and clinical practice guidelines published before this period were included when considered essential for understanding the evolution of ADHD diagnosis and management.

The search was conducted using combinations of Medical Subject Headings (MeSH) terms and keywords, including:

- "Attention Deficit Hyperactivity Disorder"
- "ADHD"
- "ADHD diagnosis"
- "ADHD screening"
- "DSM-5"
- "ADHD treatment"
- "Behavioral therapy"
- "Parent training"
- "Stimulant medications"
- "Methylphenidate"
- "Amphetamine"
- "Atomoxetine"
- "Non-stimulant therapy"
- "Digital therapeutics"
- "Neurodevelopmental disorders"
- "Children and adolescents"
- "Adult ADHD"

Boolean operators (AND, OR) were used to refine the search and improve retrieval of relevant publications.

Eligibility Criteria

Inclusion Criteria

Studies and publications meeting the following criteria were included:

1. Original research articles, systematic reviews, meta-analyses, narrative reviews, randomized controlled trials, cohort studies, and observational studies.
2. National and international clinical practice guidelines related to ADHD diagnosis and treatment.
3. Studies involving children, adolescents, or adults diagnosed with ADHD.
4. Publications addressing diagnostic methods, screening tools, behavioral interventions, pharmacotherapy, psychosocial management, digital health interventions, or long-term outcomes.
5. Articles published in English.

Exclusion Criteria

The following were excluded:

1. Non-English publications.
2. Conference abstracts lacking full-text availability.
3. Case reports and small case series with limited generalizability.
4. Studies focused exclusively on unrelated psychiatric or neurological disorders without specific relevance to ADHD.
5. Duplicate publications and studies with insufficient methodological details.

Study Selection and Data Extraction

Titles and abstracts retrieved from database searches were screened for relevance to the review objectives. Full texts of potentially eligible articles were subsequently examined. Information extracted from selected studies included:

- Study design and methodology
- Population characteristics
- Diagnostic criteria and assessment tools
- Treatment modalities
- Clinical outcomes
- Benefits and limitations of interventions
- Emerging diagnostic and therapeutic approaches

Key findings from major studies, guidelines, and consensus statements were systematically summarized and synthesized.

Data Synthesis

Given the narrative nature of the review, quantitative pooling of data was not performed. Instead, findings were organized thematically under major domains, including epidemiology, pathophysiology, diagnosis, behavioral interventions, pharmacological management, multidisciplinary care, recent advances, and future perspectives. Evidence from high-quality studies and guideline recommendations was prioritized to provide a comprehensive and clinically relevant overview of current approaches to ADHD diagnosis and treatment.

Ethical Considerations

As this study was based exclusively on previously published literature and did not involve human participants, patient data, or experimental interventions, **ethical committee approval and informed consent were not required**. The review was conducted in accordance with accepted principles of scientific integrity, transparency, and accurate reporting of evidence.

DISCUSSION

Our study findings indicate variances in clinical procedures concerning ADHD diagnosis and treatment in Saudi Arabia; however, the majority of our sample claimed compliance with the international ADHD standards outlined in clinical practice guidelines and the Saudi Ministry of Health protocol.[21]specifically about the utilisation

of clinical interviews and diagnostic instruments. Nevertheless, discrepancies in the implementation of organised protocols were evident, revealing substantial deficiencies in the standardisation of ADHD care. Our findings align with existing evidence, indicating that discrepancies in ADHD diagnosis and treatment are affected by resource availability and adherence to guidelines, which may lead to overdiagnosis and overtreatment[22]. Our findings call for the need for localized efforts to bridge gaps and improve consistency in clinical practice related to ADHD diagnosis and management in Saudi Arabia.

Merely 55.8% of our participants performed ADHD tests in accordance with DSM-5 criteria, which may result in diagnostic inaccuracies for ADHD. DSM-5 evaluations necessitate comprehensive symptom assessments across many settings, which can be laborious in a busy clinic due to time limitations. Consequently, numerous practitioners favour expedited screening instruments, such as the Vanderbilt Assessment Scale, in lieu of comprehensive DSM-5 evaluations. The inadequate use of comprehensive screening methods may be associated with insufficient practitioner training and resource limitations. Evidence indicated that over 44.2% of practitioners failed to enquire about all 18 DSM-5 symptoms for ADHD during their evaluations. Moreover, our sample frequently reported clinical problems, including the absence of early ADHD screening programs and restricted access to medications, consistent with prior studies.[22] highlighting systemic barriers in ADHD management. Our findings emphasize the importance of a more coordinated national strategy to enhance compliance with standard care for ADHD.

Screening practices for ADHD symptoms varied among our participants in this study, with the Vanderbilt Assessment Scale [23] being the most utilized, as recommended by the Saudi MOH protocol, followed by the Conners Rating Scales. Nonetheless, almost 15% of our sample did not employ any screening instruments for ADHD symptoms, highlighting substantial concerns regarding variations in clinical practice. This discovery is unsurprising and corresponds with international apprehensions about overdiagnosis and misdiagnosis when standardised protocols for ADHD are not consistently adhered to.[24] In Europe, for example, variations in ADHD screening and diagnosis practices have been reported, leading to potentially inflated ADHD diagnosis rates in some countries such as Italy and the U.K. In Saudi Arabia, the lifetime prevalence of ADHD is estimated at 11.3% to 12.4% which is higher than the global ADHD estimates (5–8%). Collectively, these challenges highlight the need for standardizing screening and diagnosis practices to minimize the likelihood of ADHD overdiagnosis.

The lack of available screening tools in Arabic could have contributed to the variation in practice found in this current study. Researchers have conducted forward and backward translation of the Vanderbilt Diagnostic Rating Scale into Arabic and validation of two versions of the Arabic translation of the Vanderbilt ADHD Diagnostic Scale: the Vanderbilt ADHD Diagnostic Parent Rating Scale and the Vanderbilt ADHD Diagnostic Teacher Rating Scale[25]. Additional studies have rendered Conner's Parent–Teacher Rating Scale into Arabic and performed assessments of its reliability and validity. Nonetheless, these techniques exhibit a deficiency in cultural adaption for the Saudi Arabian populace, hence constraining their applicability for doctors. Consequently, additional efforts are required to translate, culturally modify, and validate conventional ADHD instruments for the ADHD population in Saudi Arabia.

Clinical interviews with ADHD patients and their parents, guardians, or carers, where necessary, are crucial for diagnosis and management.[26]. Our findings indicated a compliance rate over 75% within the sample. In Saudi Arabia, familial engagement in healthcare decisions is highly esteemed, potentially fostering increased parental involvement in clinical evaluations. Furthermore, over 30% of the sample indicated a lack of inquiry on the number of symptoms, length, age at commencement, or context (e.g., home, school) with the patient or parent. Moreover, over 44% of them infrequently enquired about all ADHD symptoms enumerated in the DSM-5. Consequently, additional training in appropriate clinical interviewing techniques with patients and their parents, along with the DSM-5 guidelines, is necessary to improve the standardisation of ADHD assessments.

Participants in this study identified considerable obstacles to ADHD treatment, notably the restricted availability of drugs from physicians and protracted referral waiting periods. This issue was compounded by the inadequate provision of care for patients with ADHD in primary care settings. The absence of amphetamine-based psychostimulants in Saudi Arabia further limited therapy alternatives, as these drugs are frequently utilised in the management of ADHD[27]. Only three participants in our study indicated prescribing amphetamine-based psychostimulants for the management of ADHD symptoms, despite the lack of authorisation from the Saudi Food and Drug Administration for the use of these drugs in ADHD treatment. This practice underscores the necessity for additional approvals for these drugs due to the imperative to address ADHD symptoms in this demographic. International clinical practice guidelines, such as those from AAP and NICE,

advocate for the commencement of pharmaceutical intervention in children over six years and teenagers when ADHD symptoms result in considerable functional impairment. In adults, psychostimulant medication is typically warranted when symptoms significantly disrupt social, intellectual, or occupational functioning and when non-pharmacological therapies are inadequate. Methylphenidate is generally the first-line treatment owing to its safety profile; however, amphetamine-based stimulants may be used if symptom management is inadequate. Consequently, initiatives should be undertaken to promote the approval of a wider array of amphetamine-based psychostimulants for the treatment of ADHD in Saudi Arabia.

The diversification of ADHD medicine enhances treatment adherence and symptom management, underscoring the necessity for policy reform. Mitigating these systemic constraints and regulations necessitates collaborative efforts among politicians, healthcare providers, and the pharmaceutical sector to provide sufficient access to a diverse array of treatment alternatives. Furthermore, enhancing public awareness and parental education may alleviate familial obstacles, hence augmenting the overall efficacy of ADHD therapies.

Referrals of ADHD cases to rehabilitation services, including occupational and physical therapy, were rare, with merely one-third of our participants recommending their ADHD patients. This approach signifies a lost opportunity for comprehensive ADHD care, especially in tackling sensory processing challenges and comorbid conditions frequently linked to ADHD[28]. Integrating interdisciplinary techniques may improve outcomes for individuals with ADHD. International recommendations underscore the need of interdisciplinary care in enhancing educational and behavioural outcomes for children with ADHD. Moreover, cultivating partnerships among healthcare providers, educators, and rehabilitation specialists could optimise referral procedures and guarantee prompt access to therapeutic help. Implementing integrated care models and improving interdisciplinary collaboration could further optimise ADHD management.

The statistics indicate a substantial dependence on pharmacological interventions for ADHD, with the majority of providers recommending stimulant drugs. Many also use non-pharmacological therapies, demonstrating an integrated approach to care. The low referral rates to rehabilitation treatments, such as occupational or physical therapy, may indicate a lack of awareness among clinicians or restricted access to these services. This signifies a lost opportunity to provide more thorough, multidisciplinary care. Moreover, systemic obstacles including prolonged referral waiting lists and insufficient resources substantially impede prompt and effective care provision, eventually impacting patient outcomes.

The results of this study underscore the pressing necessity to promote a Ministry of Health protocol specifically designed for ADHD management in Saudi Arabia. Integrating training programs helps rectify discrepancies in diagnosis and treatment. Furthermore, improving medicine accessibility and establishing early screening initiatives could alleviate systemic issues. Cooperative initiatives between the public and private sectors are essential for attaining these goals. Insights from nations with robust ADHD programs, including the U.S. and the U.K., can inform the formulation and execution of ADHD initiatives tailored to Saudi Arabia. Furthermore, utilising technology, including telemedicine and digital health technologies, could provide extensive training and access to ADHD care, especially in distant or disadvantaged regions.

The current study has several noted limitations. The sample size may not adequately represent the entirety of clinical practice in Saudi Arabia. Secondly, the dependence on self-reported data raises the potential for reporting bias, an issue that could not be mitigated due to the study's design. The use of a cross-sectional study design precludes causal judgements regarding the observed relationships. Future research utilising larger, more representative populations and longitudinal approaches is essential to corroborate our findings.

CONCLUSION

This study offered an extensive examination of the prevailing procedures and obstacles in ADHD management in Saudi Arabia. The findings highlighted substantial deficiencies in the standardisation of ADHD diagnosis and treatment, indicating the necessity for national training in current procedures and systemic enhancements. These findings are significant for healthcare policymakers, physicians, and decision-makers seeking to enhance ADHD diagnosis and treatment by rectifying anomalies in clinical practice, drug availability, and diagnostic procedures. Mitigating these deficiencies through cooperative initiatives and policy reforms can improve care provision and results for individuals with ADHD. Policymakers and healthcare providers must prioritise interdisciplinary collaboration and training to guarantee a comprehensive approach to ADHD management.

REFERENCES

1. Karceski S. Diagnosis of attention-deficit/hyperactivity disorder. **Neurology**. 2016;87(25):e272–e274.
2. Johnson J, Morris S, George S. Attention deficit hyperactivity disorder in adults: what the non-specialist needs to know. **Br J Hosp Med (Lond)**. 2020;81(7):1–11.
3. Weiss M, Murray C. Assessment and management of attention-deficit hyperactivity disorder in adults. **CMAJ**. 2003;168(6):715–722.
4. Ophir Y. Reevaluating ADHD and its first-line treatment: insights from DSM-5-TR and modern approaches. Clinical neuropsychiatry. 2024 Oct;21(5):436.
5. Banaschewski T, Becker K, Döpfner M, Holtmann M, Rösler M, Romanos M. Attention-deficit/hyperactivity disorder. **DtschArztebl Int**. 2017;114(9):149–159.
6. Diamond A. Attention-deficit disorder (attention-deficit/hyperactivity disorder without hyperactivity): a neurobiologically and behaviorally distinct disorder from attention-deficit/hyperactivity disorder (with hyperactivity). **Dev Psychopathol**. 2005;17(3):807–825.
7. Goodman DM, Livingston EH. JAMA patient page. Attention-deficit/hyperactivity disorder. **JAMA**. 2013;309(17):1843. doi:10.1001/jama.2013.803.
8. MedlinePlus. ADHD screening [Internet]. Bethesda (MD): National Library of Medicine (US); 2023 [cited 2023 Aug 8]. Available from: https://medlineplus.gov/lab-tests/adhd-screening/
9. Adler LA, Faraone SV, Spencer TJ, Berglund P, Alperin S, Kessler RC. The structure of adult ADHD. **Int J Methods Psychiatr Res**. 2017;26(1):e1555. doi:10.1002/mpr.1555.
10. Millichap JG. Etiologic classification of attention-deficit/hyperactivity disorder. Pediatrics. 2008 Feb;121(2):e358-65
11. Salvi V, Migliarese G, Venturi V, Rossi F, Torriero S, Viganò V, Cerveri G, Mencacci C. ADHD in adults: clinical subtypes and associated characteristics. RivPsichiatr. 2019 Mar-Apr;54(2):84-89
12. Wilens TE, Spencer TJ. Understanding attention-deficit/hyperactivity disorder from childhood to adulthood. Postgrad Med. 2010 Sep;122(5):97-109.
13. Weiss M, Murray C. Assessment and management of attention-deficit hyperactivity disorder in adults. CMAJ. 2003 Mar 18;168(6):715-22
14. Osland ST, Steeves TD, Pringsheim T. Pharmacological treatment for attention deficit hyperactivity disorder (ADHD) in children with comorbid tic disorders. Cochrane Database Syst Rev. 2018 Jun 26;6(6):CD007990
15. Han DH, McDuff D, Thompson D, Hitchcock ME, Reardon CL, Hainline B. Attention-deficit/hyperactivity disorder in elite athletes: a narrative review. Br J Sports Med. 2019 Jun;53(12):741-745
16. Mannuzza S, Klein RG. Long-term prognosis in attention-deficit/hyperactivity disorder. Child AdolescPsychiatr Clin N Am. 2000 Jul;9(3):711-26
17. van der Burg D, Crunelle CL, Matthys F, van den Brink W. Diagnosis and treatment of patients with comorbid substance use disorder and adult attention-deficit and hyperactivity disorder: a review of recent publications. Curr Opin Psychiatry. 2019 Jul;32(4):300-306
18. Brinkman WB, Hartl Majcher J, Poling LM, Shi G, Zender M, Sucharew H, Britto MT, Epstein JN. Shared decision-making to improve attention-deficit hyperactivity disorder care. Patient Educ Couns. 2013 Oct;93(1):95-101
19. Cortese S, Coghill D. Twenty years of research on attention-deficit/hyperactivity disorder (ADHD): looking back, looking forward. Evid Based Ment Health. 2018 Nov;21(4):173-176
20. Leahy LG. Diagnosis and treatment of ADHD in children vs adults: What nurses should know. Arch Psychiatr Nurs. 2018 Dec;32(6):890-895
21. NICE. National Institute for Health and Care Excellence: Guidelines. In *Attention Deficit Hyperactivity Disorder: Diagnosis and Management*; National Institute for Health and Care Excellence (NICE): London, UK, 2018
22. Kazda, L.; Bell, K.; Thomas, R.; McGeechan, K.; Sims, R.; Barratt, A. Overdiagnosis of Attention-Deficit/Hyperactivity Disorder in Children and Adolescents: A Systematic Scoping Review. *JAMA Netw. Open* **2021**, *4*, e215335
23. Wolraich, M.L.; Lambert, W.; Doffing, M.A.; Bickman, L.; Simmons, T.; Worley, K. Psychometric properties of the Vanderbilt ADHD Diagnostic Parent Rating Scale in a referred population. *J. Pediatr. Psychol.* **2003**, *28*, 559–568
24. Abdelnour, E.; Jansen, M.O.; Gold, J.A. ADHD Diagnostic Trends: Increased

Recognition or Overdiagnosis? *Mo. Med.* **2022**, *119*, 467–473
25. Alqahtani, M.M.; Al Saud, N.M.; Alsharef, N.M.; Alsalhi, S.M.; Al-Hifthy, E.H.; AlHadi, A.N.; Ad-Dab'bagh, Y.; Alenazi, F.A.; Alotaibi, B.M.; Alsaeed, S.M.; et al. Psychometric Properties of the Arabic Vanderbilt Children's ADHD Diagnostic Rating Scale (VADRS-A) in a Saudi Population Sample. *Scand. J. Child Adolesc. Psychiatr. Psychol.* **2024**, *12*, 72–83
26. Culpepper, L.; Mattingly, G. A practical guide to recognition and diagnosis of ADHD in adults in the primary care setting. *Postgrad. Med.* **2008**, *120*, 16–26
27. Castells, X.; Blanco-Silvente, L.; Cunill, R. Amphetamines for attention deficit hyperactivity disorder (ADHD) in adults. *Cochrane Database Syst. Rev.* **2018**, *8*, Cd007813
28. Ghanizadeh, A. Sensory processing problems in children with ADHD, a systematic review. *Psychiatry Investig.* **2011**, *8*, 89–94