Assessment of Knowledge, Attitude and Performance of Primary Healthcare Physicians in Tabuk City, Saudi Arabia regarding Attention Deficit Hyperactivity Disorder (ADHD) in children and adolescents

Majed Akram AlGhassab [1], Rasha Ali Abdelrahman [2], Ahmad Raja Albalawi [3], Asma Ali Alharbi [4], Nawaf Saeed Almaliki [2], Hamad Ibrahim Hamad Albalawi [3]

[1] Family medicine resident, Tabuk health cluster
[2] Egyptian board of family medicine, Tabuk health cluster
[3] Saudi board of family medicine and fellowship in diabetes management, Tabuk health cluster
[4] Saudi board of family medicine, Tabuk health cluster

Corresponding author
Dr. Majed AlGhassab
Family medicine resident
Mob: 0966551537733
Email: Majed4Ak@gmail.com

Received: June 2025. Accepted: July 2025; Published:July 20, 2025.
Citation: Majed Akram AlGhassab et al. Assessment of Knowledge, Attitude, and Performance of Primary Healthcare Physicians in Tabuk City, Saudi Arabia regarding Attention Deficit Hyperactivity Disorder (ADHD) in children and adolescents. World Family Medicine. July-August 2025; 23(5): 6 - 16. DOI: 10.5742/MEWFM.2025.805257860

Abstract

Background: Attention-Deficit/Hyperactivity Disorder (ADHD) is a prevalent neurodevelopmental disorder that affects children and adolescents, often persisting into adulthood. Primary healthcare (PHC) physicians play a crucial role in the early identification, referral, and management of ADHD, yet their knowledge, attitudes, and clinical practices may vary.

Aim: To assess the knowledge, attitudes, and performance of primary healthcare physicians in Tabuk City, Saudi Arabia, regarding ADHD in children and adolescents.

Methods: A cross-sectional study was conducted among 181 PHC physicians in Tabuk City from April to September 2024. Data were collected using a structured, self-administered questionnaire distributed via interviews and online forms. The questionnaire included sections on sociodemographic characteristics, knowledge (12 items), attitudes, and clinical practices related to ADHD. A pilot study confirmed the reliability of the questionnaire (Cronbach's alpha = 0.72).

Results: The majority of participants (82.3%) had good overall knowledge of ADHD. While most correctly identified core ADHD symptoms and its chronic nature, misconceptions persisted regarding gender differences and the need for private educational support. Attitudes were generally positive, with 80.1% supporting a role for PHC physicians in ADHD management, although 58.0% believed it is not their job. Only 33.7% reported diagnosing ADHD cases in the past year, and of those, 90.2% referred patients to specialists. Age and gender were significantly associated with knowledge levels ($p = 0.049$ and $p = 0.004$, respectively), whereas other factors showed no significant association.

Conclusion: PHC physicians in Tabuk show generally good knowledge and a positive attitude toward ADHD, yet gaps in practice and misconceptions remain. Strengthening ADHD-specific training and enhancing PHC involvement in early identification and management are recommended to improve care delivery for affected children and adolescents.

Keywords: ADHD, primary healthcare, knowledge, attitude, physicians, Tabuk, Saudi Arabia

Introduction

Attention deficit hyperactivity disorder (ADHD) is a neurobehavioral disorder characterized by hyperactivity, impulsivity, and inattention (1). It is one of the most common conditions affecting children worldwide (2), with prevalence rates varying based on location and diagnostic criteria, ranging from 1.7% to 6.7% (3). In Saudi Arabia, ADHD is particularly widespread among elementary school children, with higher rates in males (16.4%) compared to females (11.6%-13.5%) (4-8).

The condition originates from neurological dysfunction in the brain, though researchers continue to explore its physiological origins (1, 9). Genetic factors play a significant role, with a monozygotic twin concordance rate of 55%-90% (10-12). Children with ADHD parents face a 25% risk of inheriting the disorder, and males are at higher risk than females. Other contributing factors include prenatal and perinatal conditions (such as maternal stress, alcohol and tobacco use, low birth weight, and prematurity), lead exposure, and brain injuries (12, 13). Interestingly, higher parental education is associated with lower ADHD incidence (14).

Symptoms usually become evident in early childhood, particularly between ages 6 and 12, when school demands make them more noticeable (15, 16). The DSM-5 criteria remain the standard for diagnosis, classifying ADHD into four types: combined presentation, hyperactive-impulsive presentation (ADHD/HI), inattentive presentation (ADHD/I), and other specified or unspecified ADHD (17). While neuropsychological testing exists, it does not significantly enhance diagnostic accuracy.

ADHD affects daily functioning, increasing the risk of academic and professional struggles, car accidents, substance abuse, social difficulties, and legal issues (18-21). Although no cure has been reported, it can be managed through medication and behavioral therapy (22). Authoritative reports suggest stimulant medications like methylphenidate (Ritalin, Equasym) and dexamphetamine (Dexedrine) as primary treatments (23, 24).

Primary healthcare physicians play a crucial role in ADHD management but often struggle to recognize mental health conditions in children (25). Research suggests that only a third of children and adolescents with mental health issues receive specialized care (26). ADHD is one of the leading reasons for pediatric and adolescent psychiatry follow-ups (27). Compared to their peers, children with ADHD require significantly more medical visits, prescriptions, and mental health appointments, leading to more than double the yearly healthcare costs, which escalate when comorbid conditions are present (28-30).

Methodology

A cross-sectional study design was used to answer the research questions. The target population consisted of all primary healthcare physicians working in Tabuk City, with an estimated total of approximately 400 physicians. The study was conducted over a six-month period from April 1, 2024, to September 31, 2024. Data collection was carried out using a structured, self-administered questionnaire, made available in both online and interview formats to maximize response rates. The online version was distributed through WhatsApp groups via a Google Form, while additional data were gathered through face-to-face and telephone interviews. Participation was voluntary, and informed consent was obtained from all respondents. The inclusion criteria included all currently practicing primary healthcare physicians in Tabuk City. Physicians who were on leave or sabbatical during the study period or those who declined to participate were excluded. All available and accessible health care physicians were invited to participate in the study till no more new participants were included. The data collection tool was a structured questionnaire composed of three main sections. The first section captured sociodemographic and professional characteristics, including age, gender, and years of experience, nationality, and educational qualifications. The second section assessed knowledge of ADHD using 12 multiple-choice items. The third section evaluated the participants' attitudes and practices regarding the diagnosis and management of ADHD in children, including questions on their perceived roles, referral behaviors, and continuing medical education sources. Before the main data collection, a pilot study was conducted on 10 primary healthcare physicians to assess the clarity, validity, and reliability of the questionnaire. Feedback was used to refine the tool, and internal consistency was evaluated using Cronbach's alpha, which yielded a value of 0.72, indicating acceptable reliability.

Data Analysis

Data entry and statistical analysis were performed using the Statistical Package for the Social Sciences (SPSS) software, version 28 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize the personal and professional characteristics of the primary healthcare physicians, as well as their knowledge, attitudes, and experience related to Attention-Deficit/Hyperactivity Disorder (ADHD). Frequencies and proportions were calculated for categorical variables. The overall knowledge score was computed by assigning one point for each correct answer to the knowledge-related items. The total score was then converted to a percentage. Physicians who scored more than 60% were classified as having good knowledge, whereas those with scores of 60% or below were categorized as having poor knowledge. To examine associations between physicians' knowledge levels and various sociodemographic and professional variables (e.g., age, gender, nationality, qualifications, years of experience, and sources of ADHD knowledge), the Chi-square test (Pearson's χ^2 test) was used. When expected cell counts were small, the Exact Probability test was applied. A p-value of less than 0.05 was considered statistically significant. Additionally, physicians' attitudes toward ADHD diagnosis and management, and their practical experience with ADHD cases in the past year, were also analyzed using descriptive statistics.

Results

Table 1 describes the personal characteristics of the 181 primary healthcare physicians who participated in the study in Tabuk City, Saudi Arabia. The largest age group was physicians under 30 years old, accounting for 92 (50.8%), followed by 67 (37.0%) aged 30–40 years, and 22 (12.2%) over 40 years. In terms of gender, 109 (60.2%) were male and 72 (39.8%) were female. Regarding nationality, a majority were non-Saudi 137 (75.7%), while 44 (24.3%) were Saudi nationals. Most participants held an MBBS degree 147 (81.2%), whereas 28 (15.5%) had a doctorate and only 6 (3.3%) had a diploma or master's degree. Experience levels were nearly evenly split, with 88 (48.6%) having less than 5 years of experience and 93 (51.4%) having more than 5 years. Finally, when assessing perceived knowledge of ADHD, 145 (80.1%) of the physicians rated their knowledge as acceptable, while 36 (19.9%) reported poor knowledge.

Table 1: Personal Characteristics of the Study Primary Healthcare Physicians in Tabuk City, Saudi Arabia (N=181)

Personal data	No	%
Age in years		
< 30	92	50.8%
30-40	67	37.0%
> 40	22	12.2%
Gender		
Male	109	60.2%
Female	72	39.8%
Nationality		
Saudi	44	24.3%
Non-Saudi	137	75.7%
Qualification		
Diploma/master's	6	3.3%
Doctorate	28	15.5%
MBBS	147	81.2%
Experience years		
< 5 years	88	48.6%
> 5 years	93	51.4%
Perceived knowledge level of ADHD		
Poor	36	19.9%
Acceptable	145	80.1%

Table 2 illustrates the responses of primary healthcare physicians regarding key knowledge items related to ADHD. A high proportion of participants correctly identified that ADHD manifests in early childhood with symptoms of hyperactivity, impulsivity, and/or inattention (181; 100%), and that it is one of the most common neuropsychiatric disorders in childhood and adolescence (171; 94.5%). Most respondents also correctly recognized that ADHD may persist into adulthood (165; 91.2%) and potentially become a lifelong condition (159; 87.8%). Furthermore, awareness was strong regarding symptoms of inattention, such as difficulty organizing tasks and being easily distracted (175; 96.7%). However, distinguished misconceptions were observed as 77 (42.5%) of the participants incorrectly believed there are no gender differences in ADHD, and 87 (48.1%) wrongly stated that ADHD is associated with only one health condition. Additionally, 107 (59.1%) believed that children with ADHD do not need support from private education.

Table 2. Knowledge of ADHD among Primary Healthcare Physicians in Tabuk City, Saudi Arabia (N = 181)

Knowledge items	True		False	
	No	%	No	%
ADHD is a disorder that manifests in early childhood with symptoms of hyperactivity, impulsivity, and/or inattention	181	100.0%	0	0.0%
ADHD is one of the most common neuropsychiatric disorders of childhood and adolescence	171	94.5%	10	5.5%
There are no gender differences in ADHD	77	42.5%	104	57.5%
ADHD is associated with 1 health condition	87	48.1%	94	51.9%
Slow reading speed and learning difficulties are frequent in ADHD	149	82.3%	32	17.7%
Children with ADHD have a low level of arithmetic (mathematic) ability	119	65.7%	62	34.3%
Children with ADHD need not be supported by private education	107	59.1%	74	40.9%
Parents of ADHD children may have psychiatric disorders	127	70.2%	54	29.8%
ADHD may become a lifelong disease	159	87.8%	22	12.2%
ADHD may be seen during adulthood	165	91.2%	16	8.8%
Difficulty in remaining seated when sitting is required and difficulty waiting turns are symptoms of inattention	153	84.5%	28	15.5%
Difficulty organizing tasks, activities, and belongings, and easily distracted by irrelevant stimuli are symptoms of inattention	175	96.7%	6	3.3%

Figure 1 shows the overall knowledge levels of ADHD among primary healthcare physicians, along with their reported sources of information. The majority of physicians (149; 82.3%) had a good level of knowledge, while a smaller proportion (32; 17.7%) had poor knowledge. When exploring sources of knowledge (Figure 2), most participants (141; 77.9%) reported gaining information through personal reading about ADHD. In contrast, only 22 (12.2%) cited the internet, and a mere 18 (9.9%) had attended continuing medical education (CME) programs on ADHD.

Figure 1: The Overall Knowledge of ADHD among Primary Healthcare Physicians in Tabuk City, Saudi Arabia (N = 181

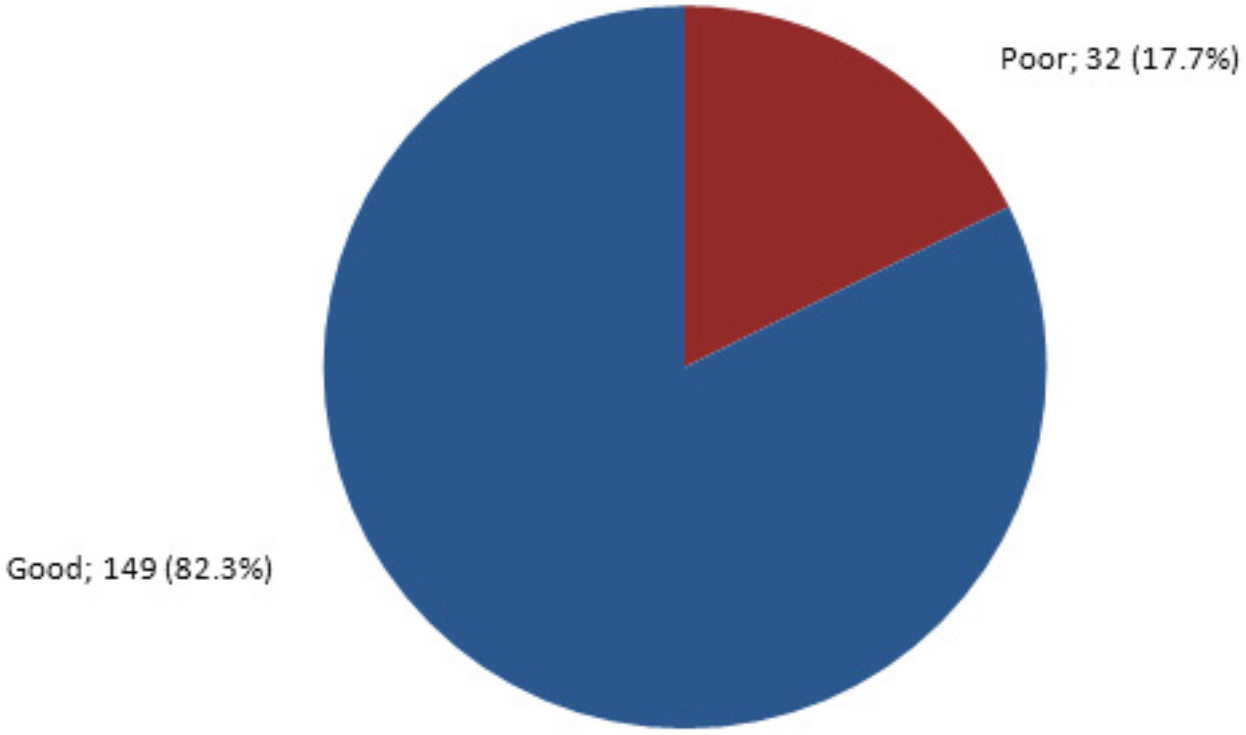

Figure 2: The source of Information about ADHD among Primary Healthcare Physicians in Tabuk City, Saudi Arabia

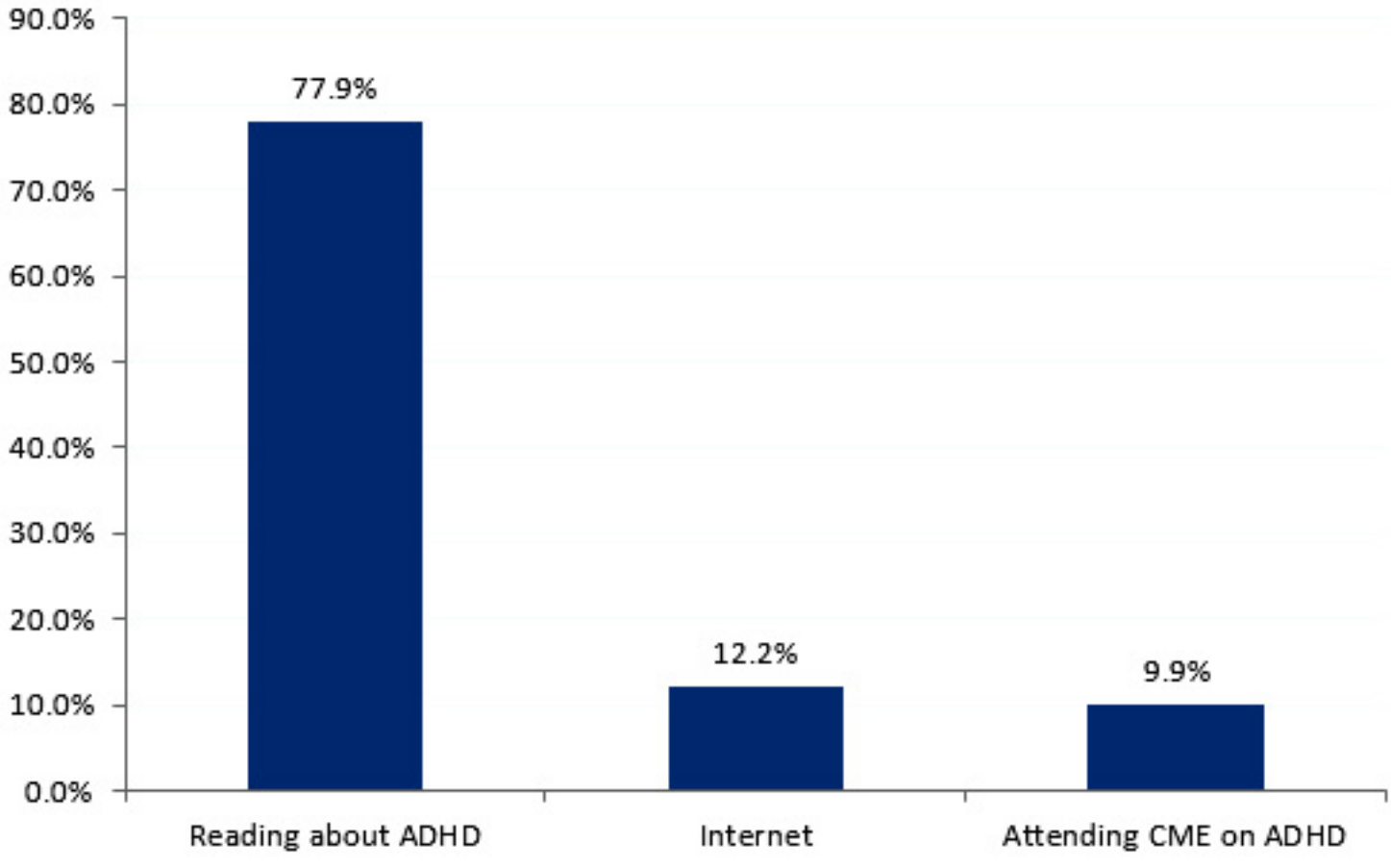

Table 3 presents the attitudes of primary healthcare (PHC) physicians toward ADHD diagnosis and management. A majority of physicians (119; 65.7%) agreed that ADHD is difficult to diagnose or manage within the PHC setting. Despite this, 145 (80.1%) believed that PHC physicians can play an active role in ADHD management, indicating a positive outlook toward their potential involvement. Interestingly, more than half of the respondents (105; 58.0%) agreed that managing ADHD is not within the job scope of PHC physicians. Consistently, 147 (81.2%) supported referring suspected ADHD cases to pediatricians.

Table 3: Attitudes of Primary Healthcare Physicians toward ADHD Diagnosis and Management in Tabuk City, Saudi Arabia (N = 181

Attitude	Agree		Disagree	
	No	%	No	%
ADHD is difficult to diagnose or manage by PHC physicians	119	65.7%	62	34.3%
PHC physicians can play an active role in the management of ADHD	145	80.1%	36	19.9%
Management of ADHD is not the job for PHC physicians	105	58.0%	76	42.0%
For the diagnosis of ADHD in children, PHC physicians should refer any suspected case to a pediatrician	147	81.2%	34	18.8%

Table 4 highlights the clinical experience of primary healthcare physicians in managing ADHD cases. Only 61 physicians (33.7%) reported diagnosing ADHD cases within the past year, while the majority (120; 66.3%) had not encountered or diagnosed any such cases. Among those who had diagnosed ADHD (n = 61), most (55; 90.2%) referred the patients to specialists, whereas only a small proportion (6; 9.8%) proceeded to prescribe treatment themselves.

Table 4. Experience of Primary Healthcare Physicians in Diagnosing and Managing ADHD Cases in the Past Year in Tabuk City, Saudi Arabia (N = 181)

	No	%
Diagnosed case(s) with ADHD in the last year		
Yes	61	33.7%
No	120	66.3%
If yes, what was done? (n=61)		
Prescribed treatment to ADHD patients	6	9.8%
Refer ADHD patients to a specialist	55	90.2%

Table 5 explores the association between various demographic and professional factors and the overall knowledge level of ADHD among primary healthcare physicians. Statistically significant associations were found with age and gender. Physicians aged over 40 years had the highest percentage of good knowledge (90.9%) compared to those under 30 (78.3%) and those aged 30–40 (85.1%) (p = 0.049). Gender differences were also significant (p = 0.004), with 89.0% of male physicians exhibiting good knowledge compared to 72.2% of female physicians. Other variables, such as nationality (p = 0.086), qualification (p = 0.459), years of experience (p = 0.863), and perceived knowledge level (p = 0.859), showed no statistically significant association with knowledge levels. Additionally, sources of knowledge, including attending CME (88.9%), internet (72.7%), and reading (83.0%), were not significantly linked to knowledge level (p = 0.374). Similarly, whether physicians had diagnosed ADHD cases in the past year did not significantly affect knowledge (p = 0.746).

Table 5: Factors Associated with PHCCs physicians Knowledge about ADHD in Tabuk

Factors	Overall knowledge level				p-value
	Poor		Good		
	No	%	No	%	
Age in years					
< 30	20	21.7%	72	78.3%	.049*
30-40	10	14.9%	57	85.1%	
> 40	2	9.1%	20	90.9%	
Gender					
Male	12	11.0%	97	89.0%	.004*
Female	20	27.8%	52	72.2%	
Nationality					
Saudi	4	9.1%	40	90.9%	.086
Non-Saudi	28	20.4%	109	79.6%	
Qualification					
Diploma/master's	0	0.0%	6	100.0%	.459^
Doctorate	6	21.4%	22	78.6%	
MBBS	26	17.7%	121	82.3%	
Experience years					
< 5 years	16	18.2%	72	81.8%	.863
> 5 years	16	17.2%	77	82.8%	
Perceived knowledge level of ADHD					
Poor	6	16.7%	30	83.3%	.859
Acceptable	26	17.9%	119	82.1%	
Sources of knowledge regarding ADHD					
Attending CME on ADHD	2	11.1%	16	88.9%	.374^
Internet	6	27.3%	16	72.7%	
Reading about ADHD	24	17.0%	117	83.0%	
Diagnosed case(s) with ADHD in the last year					.746
Yes	10	16.4%	51	83.6%	
No	22	18.3%	98	81.7%	

P: Pearson X2 test ^: Exact Probability test * P < 0.05 (significant)

Discussion

The study included 181 primary healthcare physicians, with the majority being under 30 years of age. A slightly higher proportion of participants were male, and most were non-Saudi nationals. In terms of qualifications, the vast majority held an MBBS degree, while a smaller percentage had a doctorate or higher qualifications. Years of experience were nearly evenly distributed between those with less than five years and those with more than five years. When self-assessing their knowledge of ADHD, most physicians perceived their understanding as acceptable, though a notable minority reported poor knowledge.

Regarding ADHD in children and adolescents, most physicians had a strong understanding of ADHD recognizing its early childhood onset, core symptoms (hyperactivity, impulsivity, inattention), and potential persistence into adulthood several misconceptions and knowledge deficiencies were identified, which may impact clinical practice. This high awareness of ADHD as a common neurodevelopmental disorder matches with global literature, which highlights its prevalence and long-term implications (31). The recognition of ADHD's persistence into adulthood is consistent with international studies showing that symptoms often continue beyond adolescence, affecting academic, occupational, and social functioning [32, 33]. However, the misconception that ADHD has no gender differences contradicts well-established evidence that boys are more frequently diagnosed due to differing symptom presentations, with girls often exhibiting more inattentive rather than hyperactive behaviors [34]. Additionally, the belief that ADHD is not associated with comorbid conditions is concerning, given that ADHD frequently coexists with learning disabilities, anxiety, and behavioral disorders [35]. This misconception may lead to under-diagnosis or mismanagement of associated conditions. Furthermore, the assumption that children with ADHD do not require private educational support directs the importance of individualized learning strategies, which are crucial for academic success in this population [36].

The dependence on personal reading as the primary source of ADHD knowledge, rather than structured medical education, underlines a critical gap in formal training. While self-directed learning is valuable, the low attendance in CME programs suggests that many physicians may lack exposure to updated, evidence-based ADHD guidelines. This finding is consistent with studies from other regions, where primary care providers often report insufficient ADHD training [37]. In Saudi Arabia, similar knowledge deficiencies have been observed in previous research, indicating the need for enhanced ADHD education in medical curricula and postgraduate training [38].

Compared to studies in other Saudi regions, such as Al-Khobar and Riyadh, where physicians also showed variable ADHD knowledge [39], our findings suggest that while awareness of core ADHD symptoms is strong, misconceptions about comorbidities and gender differences persist. Internationally, similar patterns have been reported, with primary care providers often lacking confidence in diagnosing and managing ADHD without specialist support [40]. The high proportion of physicians with good self-reported knowledge contrasts with some global studies where clinicians expressed uncertainty about ADHD management [41], possibly indicating cultural differences in self-assessment or varying exposure to ADHD cases.

In contrast to our study, Al-Ahmari et al (42) in Aseer Region reported that PHC physicians' knowledge about ADHD was suboptimal, but they had a positive attitude toward their role with regard to ADHD. Also, these findings have been reported in studies in several countries. In Pakistan, Jawaid et al. [34] reported that the knowledge of general practitioners on ADHD was deficient. They questioned the ability of physicians at the PHC level to screen children for ADHD. In the UK, Thapar and Thapar [44] stated that general practitioners did not have adequate knowledge to diagnose or manage ADHD. Ghanizadeh [45] also reported that general practitioners needed to be more informed about ADHD. In the USA, Goodman et al. [46] found that primary care physicians had limited knowledge and experience with ADHD.

Our study also reveals contradiction in primary healthcare (PHC) physicians' attitudes toward ADHD. While a majority acknowledged the challenges of diagnosing and managing ADHD in PHC settings, most also believed they could play an active role in its management. This suggests a willingness to engage in ADHD care despite perceived difficulties, possibly reflecting a sense of professional responsibility. However, over half of the respondents did not consider ADHD management within their job scope, and a strong preference for referral to pediatricians was evident. This discrepancy may be due to insufficient training, lack of confidence, or systemic barriers such as limited resources and unclear clinical guidelines for ADHD in primary care. The high referral tendency aligns with studies in Saudi Arabia and globally, where ADHD management remains heavily reliant on specialists.

Conclusion and Recommendations

In conclusion, this study demonstrates a good level of knowledge regarding ADHD among the study PHCC physicians in Tabuk City, especially in recognizing its core symptoms and chronic nature. However, knowledge gaps and misconceptions persist in specific areas, such as the role of gender differences and the association of ADHD with other conditions. Although most physicians expressed positive attitudes toward their role in ADHD management, a significant number still perceived it as outside their responsibilities, with limited direct involvement in diagnosis or treatment. The majority preferred referring cases to specialists rather than initiating management themselves. The findings also indicate that knowledge levels were significantly associated with age and gender, but not with other professional or educational factors. Notably,

continuing medical education (CME) on ADHD was underutilized, with most physicians relying on self-directed reading. Enhancing CME programs focusing on ADHD diagnosis and management tailored to PHC settings, with efforts to increase participation is recommended with clarification of the role of PHC physicians in ADHD care through guidelines and structured training to empower their involvement.

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