

# Knowledge of and attitude toward attention-deficit/hyperactivity disorder (ADHD) assessed among primary schoolteachers of Makkah City in Saudi Arabia

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## ABSTRACT

**Background:** One of the most prevalent pediatric medical conditions is attention-deficit/hyperactivity disorder (ADHD). It is characterized by symptoms of hyperactivity, impulsivity, and/or inattention. The first people to notice a child's ADHD symptoms are typically their teachers, who may then offer data that are typically helpful in its diagnosis. The purpose of this study was to assess teachers' knowledge of ADHD, its causes and etiology, as well as the key demographic factors that influence said knowledge. **Method:** The study was conducted among schoolteachers of primary schools located in different regions of Makkah City, Kingdom of Saudi Arabia. We used a stratified random sampling technique to collect our sample, with the inclusion criteria being teachers who were working in a primary school and who were directly involved in teaching students. Data analysis was performed using the IBM SPSS Statistics software version 21. **Results:** We received 335 responses to our questionnaire. The age of the participants ranged from 18 to 59 years, with the mean age being  $40.2 \pm 13.8$  years. About 66.9% of teachers were women. Most of the teachers in this sample had a bachelor's degree (73.4%), and only 21.8% had diplomas. Regarding the years of teaching experience, 34.6% had teaching experience exceeding 20 years, whereas 20.6% had less than five years of teaching experience. Regarding general knowledge of the teachers, (5.4%) of the teachers had a good level of knowledge. Only 63.6% of teachers were aware that ADHD students frequently struggled with task and activity organization, and only 7.5% of teachers had good knowledge of ADHD treatment, compared to 40.9% who had a good awareness of symptoms and diagnosis. Only the teachers' education level was significantly associated with their knowledge level of ADHD: 25% of teachers with a postgraduate degree had an overall good level of knowledge versus 2.7% of those with a diploma ( $P = 0.006$ ). **Conclusion:** The findings of this study lead to the conclusion that elementary school instructors have an inadequate understanding of ADHD. Some teachers misunderstand the signs and general facts associated with ADHD, thereby indicating the need for further training in this area.

**Keywords:** ADHD, attention deficit hyperactivity disorder, primary school teachers, teachers' knowledge

## Introduction

Attention-deficit/hyperactivity disorder (ADHD) is one of the most common childhood disorders, with an estimated prevalence of 8%–10% in school-age children. It is characterized by

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symptoms of hyperactivity, impulsivity, and/or inattention. The symptoms have an impact on the cognitive, intellectual, behavioral, emotional, and social functioning of the child. Although the exact cause of ADHD is unknown, a genetic imbalance in catecholamine metabolism in the cerebral cortex appears to be a major factor. ADHD development has been linked to perinatal tobacco smoking and prematurity. Prenatal alcohol exposure and brain trauma are two other factors that have been linked to the development of ADHD, but the evidence is mixed.<sup>[1]</sup> Teachers are typically the first to notice ADHD symptoms in children, which allow them to provide information that is usually useful in diagnosing ADHD and thus has an impact on students' academic performance and overall learning ability.<sup>[2]</sup> According to Bussing *et al.*,<sup>[3]</sup> parents frequently follow a teacher's advice regarding ADHD, but this can be misleading because teachers who are unfamiliar with the disorder may offer inappropriate advice.

Alanazi *et al.*<sup>[4]</sup> conducted a study in Riyadh, Saudi Arabia, to assess ADHD knowledge and attitudes among male primary schoolteachers. According to the findings of the study, schoolteachers had insufficient information about the disorder and some teachers misunderstood the symptoms and general information about ADHD, indicating the need for additional education on this disorder.

Al-Moghamsi *et al.*<sup>[5]</sup> conducted another study on elementary schoolteachers to assess their knowledge of ADHD in Al-Madina, Saudi Arabia, 2017. The study also revealed a lack of knowledge about ADHD, particularly when it came to its treatment. Teachers also held some common misconceptions about the causes, symptoms, diagnosis, and management of ADHD. In addition, a study conducted in Ethiopia by Dessie *et al.*<sup>[6]</sup> revealed that only a few primary schoolteachers had a comprehensive understanding of ADHD. Furthermore, Guerra *et al.*<sup>[7]</sup> conducted research in Texas and discovered that teachers lacked knowledge on the causes, nature, and outcomes of ADHD. While they did have some knowledge about the signs and diagnosis of ADHD, they may have had difficulty recognizing such signs in a specific child. Teachers are typically the ones who perform referrals during the initial stages of ADHD-related assessment, and these referrals have been identified as predictors of a child's symptoms.<sup>[8]</sup>

The diagnosis of ADHD, according to these collaborative guidelines, should be based on a synthesis of information obtained from parents, school reports, and any health-care professionals who may have been consulted, as well as an interview and examination of the child.<sup>[9]</sup> Moreover, primary care physicians should have sufficient knowledge to make a probable diagnosis of ADHD and other behavioral disorders. One of the first steps toward a correct diagnosis is to provide primary care physicians with adequate training.<sup>[10]</sup>

Previous Saudi studies highlighted the importance of integrating the ADHD knowledge improvement program into teachers educational and training programs. In addition to continuous assessment of their knowledge of ADHD. This approach can

lead to better understanding and management of ADHD in the school, ultimately improving academic outcomes for students with ADHD. It also helps to increase awareness about this condition among teachers and students.<sup>[4,5]</sup>

To our knowledge, no study has been conducted to assess primary schoolteachers' awareness about ADHD in Makkah City, Kingdom of Saudi Arabia. The purpose of this study is to assess schoolteachers in Makkah on their knowledge of ADHD and to thereby determine whether these teachers should be given more information about the disorder.

## Subjects and Methods

**Study setting:** The study was done at the Faculty of Medicine, Umm Al-Qura University, Kingdom of Saudi Arabia.

**Study duration:** The study was done in the time from October-2022 to January-2023.

**Study design:** This was a cross-sectional study.

**Study participants:** The inclusion criteria were male and female teachers working as administrators or student advisors in primary schools in Makkah. The exclusion criterion was any male or female teacher working in elementary or high school in Makkah.

**Sample size:** The minimum sample size required for this study was calculated using the Raosoft website. The population at which the study was aimed included around 2000 people, and for us to have a confidence level of 95% with a 5% error margin we would need around 323 people. We planned to maximize our sample size to reach 300 female and 300 male participants.

**Data collection:** For data collection, a semi-structured and self-administered online questionnaire was used. Participants provided informed consent. Three hundred thirty-five teachers were interviewed using the Knowledge of Attention Deficit Disorders Scale (KADDS) and a demographic questionnaire. Scutto *et al.*<sup>[11]</sup> developed the KADDS, a 36-item rating scale, to assess teachers' knowledge on and their misconceptions about ADHD. The KADDS questionnaire contains statements about ADHD with three response options: "true" (T), "false" (F), and "don't know" (DK). These items are divided into three categories: ADHD symptoms/diagnosis (9 items), ADHD treatment (12 items), and general knowledge about the nature, causes, and outcomes of ADHD (15 items). The KADDS format allows for the differentiation of what teachers do not know from their misconception of ADHD.

## Statistical analysis

Data were collected, reviewed, and then analyzed using the IBM SPSS Statistics version 21 (IBM, Armonk, NY). All statistical methods used were two-tailed with an alpha level of 0.05, and significance was determined if the *P* value was less than or equal to 0.05. Each correct answer received a 1-point score in terms of the

teacher's knowledge. The overall knowledge level of the various KADDS subscales regarding ADHD was determined by adding discrete scores for different correct knowledge items. The level of knowledge was considered good if the total score of each subscale and the overall score was 60% or higher than the total possible score, and less than 60% was considered poor. Descriptive analysis was done by prescribing frequency distribution and percentage for study variables including the teacher's sociodemographic data and different KADDS items. Awareness level was graphed; cross tabulation was done for showing the distribution of teachers' overall awareness level according to their data and other factors using the Pearson Chi-squared test for significance and exact probability test, if there were small frequency distributions.

### Ethical considerations

The study was conducted after receiving ethical approval from the ethical committee of the Faculty of Medicine, Umm Al-Qura University, Kingdom of Saudi Arabia.

### Results

A total of 335 teachers completed the study questionnaire. Their mean age was  $40.2 \pm 13.8$  years; 66.9% were women, 84.8% were married, 90.4% were of Saudi nationality, and 73.4% had a bachelor's degree in education. Regarding teaching experience, 34.6% had more than 20 years of teaching experience and 49.3% had a monthly income of 11,000–20,000 SAR [Table 1].

Table 2 shows that 71.3% of teachers correctly answered that children with ADHD are more distinguishable from children without ADHD in a classroom than in a free play situation, and 51% correctly answered that an adult can be diagnosed with ADHD. Of them, 46% correctly answered that symptoms of depression are found more frequently in ADHD children than in non-ADHD children.

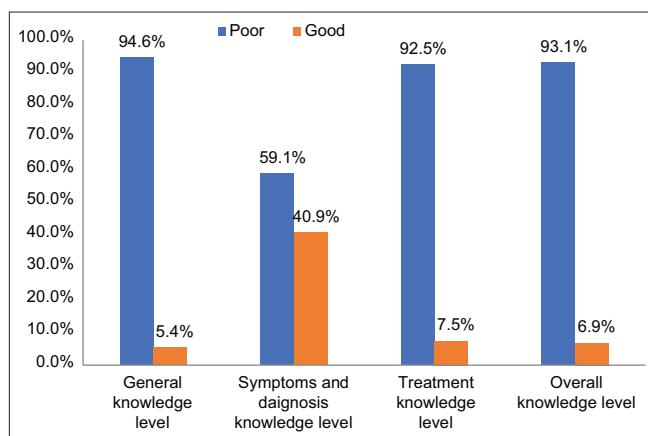
Table 3 shows that 80.9% of teachers correctly answered that ADHD children are frequently distracted by extraneous stimuli; 80.3% correctly answered that ADHD children often fidget or squirm in their seats; and 72.2% correctly answered that to be diagnosed as ADHD a child must exhibit relevant symptoms in two or more settings. Most of the teachers, (63.6%) knew that ADHD children often have difficulties organizing tasks and activities.

Table 4 shows that most of the teachers (77.6%) knew that training parents and teacher on how to manage ADHD is generally effective when combined with medication treatment. Of them, 49% knew that in severe cases of ADHD medication is often used before other behavioral modification techniques are implemented. About 44% correctly answered that ADHD is largely the result of ineffective parenting skills, and 39.4% knew that side effects of stimulant drugs used for the treatment of ADHD may include mild insomnia and reduced appetite.

Figure 1 shows that general knowledge was good among 5.4% of teachers. In detail, 7.5% had good knowledge of ADHD treatment, while 40.9% had good knowledge regarding its

**Table 1: Sociodemographic data of primary schoolteachers in Makkah City, Kingdom of Saudi Arabia**

Sociodemographic data	No.	%
Age in years		
18–29	45	13.4%
30–39	81	24.2%
40–49	125	37.3%
50+	84	25.1%
Gender		
Male	111	33.1%
Female	224	66.9%
Marital status		
Single	51	15.2%
Married	284	84.8%
Nationality		
Saudi	303	90.4%
Non-Saudi	32	9.6%
Educational level		
Diploma	73	21.8%
Bachelor	246	73.4%
Postgraduate	16	4.8%
Teaching experience in years		
<5	69	20.6%
6–10	53	15.8%
11–15	64	19.1%
16–20	33	9.9%
>20	116	34.6%
Monthly income in SAR		
<5000	80	23.9%
5000–10,000	67	20.0%
11,000–20,000	165	49.3%
>20,000	23	6.9%



**Figure 1: Knowledge of and attitudes toward attention-deficit/hyperactivity disorder (ADHD) measured among primary schoolteachers in Makkah City, Kingdom of Saudi Arabia**

symptoms and diagnosis. In total, 6.9% had overall good knowledge regarding ADHD.

Table 5 shows that a teacher's educational level was significantly associated with their knowledge level regarding ADHD. Twenty-five percent of teachers with a postgraduate degree had overall good knowledge level versus 2.7% of those with diploma ( $P = 0.006$ ).

**Table 2: Participants' responses to KADDS subscale on general knowledge about the nature, causes, and outcome of ADHD**

General knowledge	CA	Correct		Incorrect		I don't know	
		No.	%	No.	%	No.	%
Most estimates suggest that ADHD occurs in approximately 15% of school-age children	F	222	66.3%	49	14.6%	64	19.1%
ADHD children are typically more compliant with their fathers than with their mothers	T	126	37.6%	98	29.3%	111	33.1%
ADHD is more common in first-degree biological relatives (i.e., mother, father) of children with ADHD than in the general population	T	128	38.2%	93	27.8%	114	34.0%
It is possible for an adult to be diagnosed with ADHD	T	171	51.0%	55	16.4%	109	32.5%
Symptoms of depression are found more frequently in ADHD children than in non-ADHD children	T	154	46.0%	63	18.8%	118	35.2%
Most ADHD children "outgrow" their symptoms by the onset of puberty and subsequently function normally in adulthood	F	159	47.5%	63	18.8%	113	33.7%
If an ADHD child is able to demonstrate sustained attention to video games or TV for over an hour, that child is also able to sustain attention for at least an hour of class or homework	F	167	49.9%	83	24.8%	85	25.4%
A diagnosis of ADHD by itself makes a child eligible for placement in special education	F	220	65.7%	48	14.3%	67	20.0%
ADHD children generally experience more problems in novel situations than in familiar situations	F	207	61.8%	50	14.9%	78	23.3%
There are specific physical features which can be identified by medical doctors (e.g., pediatrician) in making a definitive diagnosis of ADHD	F	160	47.8%	57	17.0%	118	35.2%
In school-age children, the prevalence of ADHD in boys and girls is equivalent	F	129	38.5%	80	23.9%	126	37.6%
In very young children (less than 4 years old), the problem behaviors of ADHD children (e.g., hyperactivity, inattention) are distinctly different from age-appropriate behaviors of non-ADHD children	F	201	60.0%	53	15.8%	81	24.2%
Children with ADHD are more distinguishable from children without ADHD in a classroom setting than in a free play situation	T	239	71.3%	36	10.7%	60	17.9%
The majority of ADHD children evidence some degree of poor school performance in the elementary school years	T	183	54.6%	89	26.6%	63	18.8%
Symptoms of ADHD are often seen in non-ADHD children who come from inadequate and chaotic home environments	T	155	46.3%	81	24.2%	99	29.6%

CA: Correct answer, T: True, F: False

**Table 3: Participants' responses on the second subscale of KADDS which include nine items pertaining to symptoms and diagnosis of ADHD**

Knowledge of symptoms/diagnosis	CA	Correct		Incorrect		I don't know	
		No.	%	No.	%	No.	%
ADHD children are frequently distracted by extraneous stimuli	T	271	80.9%	36	10.7%	28	8.4%
In order to be diagnosed with ADHD, the child's symptoms must have been present before age 12	T	195	58.2%	56	16.7%	84	25.1%
One symptom of ADHD in children is that they have been physically cruel to other people	F	174	51.9%	93	27.8%	68	20.3%
ADHD children often fidget or squirm in their seats	T	269	80.3%	30	9.0%	36	10.7%
It is common for ADHD children to have an inflated sense of self-esteem or grandiosity	F	140	41.8%	70	20.9%	125	37.3%
ADHD children often have a history of stealing or destroying other people's things	F	119	35.5%	110	32.8%	106	31.6%
Current wisdom about ADHD suggests two clusters of symptoms: one of inattention and another of hyperactivity/impulsivity	T	215	64.2%	44	13.1%	76	22.7%
In order to be diagnosed with ADHD, a child must exhibit relevant symptoms in two or more settings (e.g., home, school)	T	242	72.2%	34	10.1%	59	17.6%
ADHD children often have difficulties organizing tasks and activities	T	213	63.6%	60	17.9%	62	18.5%

CA: Correct answer, T: True, F: False

## Discussion

Our study sought to assess primary schoolteachers in Makkah on their knowledge of and attitudes toward ADHD.

The current study found that teachers had a low level of knowledge about ADHD in general (nature of the condition) and its treatment, but a higher level of knowledge about its symptoms and diagnosis. The overall

**Table 4: Participants' responses to the third subscale of KADDS which include 12 items pertaining to the treatment of ADHD**

Treatment knowledge	CA	Correct		Incorrect		I don't know	
		No.	%	No.	%	No.	%
Current research suggests that ADHD is largely the result of ineffective parenting skills	F	113	33.7%	148	44.2%	74	22.1%
Antidepressant drugs have been effective in reducing symptoms for many ADHD children	T	103	30.7%	54	16.1%	178	53.1%
Parent and teacher training in managing an ADHD child are generally effective when combined with medication treatment	T	260	77.6%	25	7.5%	50	14.9%
When treatment of an ADHD child is terminated, it is rare for the child's symptoms to return	F	73	21.8%	103	30.7%	159	47.5%
Side effects of stimulant drugs used for treatment of ADHD may include mild insomnia and appetite reduction	T	132	39.4%	44	13.1%	159	47.5%
Individual psychotherapy is usually sufficient for the treatment of most ADHD children	F	125	37.3%	102	30.4%	108	32.2%
In severe cases of ADHD, medication is often used before other behavior modification techniques are attempted	T	164	49.0%	56	16.7%	115	34.3%
Reducing dietary intake of sugar or food additives is generally effective in reducing the symptoms of ADHD	F	229	68.4%	55	16.4%	51	15.2%
Stimulant drugs are the most common type of drugs used to treat children with ADHD	T	93	27.8%	86	25.7%	156	46.6%
Behavioral/Psychological interventions for children with ADHD focus primarily on the child's problems with inattention	F	194	57.9%	44	13.1%	97	29.0%
Electroconvulsive therapy (i.e., shock treatment) has been found to be an effective treatment for severe cases of ADHD	F	85	25.4%	75	22.4%	175	52.2%
Treatments for ADHD that focus primarily on punishment have been found to be the most effective in reducing the symptoms of ADHD	F	97	29.0%	161	48.1%	77	23.0%

CA: Correct answer, T: True, F: False

knowledge level of the study participants was very low (less than one-tenth).

Kleynhans *et al.*<sup>[12]</sup> estimated an average of 42.6% correct answers regarding ADHD among South African schoolteachers. Scututto *et al.*<sup>[11]</sup> discovered that 47.8% of primary schoolteachers in the United States correctly answered ADHD-related questions. In Australia, 60.7% of teachers answered the ADHD knowledge questionnaire correctly, indicating a higher level of knowledge.<sup>[13]</sup>

Alanazi *et al.*<sup>[4]</sup> discovered that only 8% of teachers in Riyadh had never heard of ADHD, while 78% had read about it at least once. Their average level of ADHD knowledge, on the other hand, was high (at least 90% of their answers were correct).<sup>[4]</sup> Other findings from similar studies conducted in Saudi Arabia<sup>[14,15]</sup> and around the world indicate that teachers are unaware of ADHD symptoms.

Another study in Makkah discovered that 58.9% of elementary and kindergarten teachers answered ADHD questions correctly.<sup>[16,17]</sup> Another study conducted in Riyadh discovered the percentage of overall correct answers to be 17.2%.<sup>[18]</sup>

In terms of symptoms and diagnosis, our study found that more than three-fourth of teachers correctly answered that ADHD children are frequently distracted by extraneous stimuli and that ADHD children frequently fidget or squirm in their seats. On the other hand, less than three-fourth correctly answered that a child must exhibit relevant symptoms in two or more settings to be diagnosed with ADHD. Furthermore, approximately two-third of the study teachers were aware that ADHD children frequently struggle with task and activity organization. In terms of treatment knowledge, approximately

three-fourth of teachers believed that training parents and teachers on how to manage ADHD is generally effective when combined with medication treatment. Half of the teachers believed that in severe cases of ADHD, medication is frequently used before other behavioral modification techniques are implemented. Less than half of the teachers believed that current research suggests that ADHD is largely the result of ineffective parenting. Furthermore, more than one-third were aware that stimulant drugs used to treat ADHD can cause mild insomnia and reduced appetite.

Teachers demonstrated a high level of knowledge about ADHD symptoms and diagnosis in the study by Alanazi *et al.*,<sup>[4]</sup> with the most common symptom, according to teachers, being that children with ADHD would leave their seats during class even if it was not permitted (89%). Furthermore, the majority of teachers (88.1%) were aware of additional symptoms such as frequent runs, jumps, and climbs. The majority of teachers (88%) were aware of additional symptoms such as the child's inability to play quietly and requiring constant movement. Some symptoms, on the other hand, were not recognised by a large percentage of teachers, such as the refusal of children with ADHD to complete a task that requires only 39.6% completion.

Alkahtani<sup>[16]</sup> discovered that nearly one-fifth of the teachers in their study responded correctly to general knowledge items, while roughly one-fourth responded incorrectly. Only a small percentage (18.1%) of teachers correctly answered symptoms and diagnosis, whereas more than one-fifth answered items incorrectly. Similar findings were reported for treatment items by the authors, all of which are consistent with the current study's low knowledge level.

**Table 5: Factors associated with overall knowledge among teachers regarding ADHD**

Factors	Overall knowledge level				P
	Poor		Good		
	No.	%	No.	%	
Age in years					0.726
18–29	43	95.6%	2	4.4%	
30–39	76	93.8%	5	6.2%	
40–49	114	91.2%	11	8.8%	
50+	79	94.0%	5	6.0%	
Gender					0.862
Male	103	92.8%	8	7.2%	
Female	209	93.3%	15	6.7%	
Marital status					0.764 <sup>s</sup>
Single	47	92.2%	4	7.8%	
Married	265	93.3%	19	6.7%	
Nationality					0.555 <sup>s</sup>
Saudi	283	93.4%	20	6.6%	
Non-Saudi	29	90.6%	3	9.4%	
Educational level					0.006*
Diploma	71	97.3%	2	2.7%	
Bachelor	229	93.1%	17	6.9%	
Postgraduate	12	75.0%	4	25.0%	
Teaching experience in years					0.537 <sup>s</sup>
<5	67	97.1%	2	2.9%	
6–10	48	90.6%	5	9.4%	
11–15	58	90.6%	6	9.4%	
16–20	31	93.9%	2	6.1%	
>20	108	93.1%	8	6.9%	
Monthly income in SAR					0.679
<5000	75	93.8%	5	6.3%	
5000–10,000	63	94.0%	4	6.0%	
11,000–20,000	154	93.3%	11	6.7%	
>20,000 SR	20	87.0%	3	13.0%	

P: Pearson  $\chi^2$  test<sup>s</sup>; Exact probability test. \*P<0.05 (significant)

As reflected in Table 5, only a high level of education was found to be significantly related to a higher level of knowledge. Less than three-fourth of the participants correctly identified that children with ADHD are more distinguishable from children without ADHD in a classroom than in a free play situation, and half of the participants correctly identified that an adult can be diagnosed with ADHD. Teachers in the current study also correctly answered that children with ADHD have higher rates of depression than their peers. Previous Saudi research found no link between teachers' ages and other demographics.<sup>[19]</sup>

The results of published studies on factors that promote better knowledge varied greatly. Muanprasart *et al.*,<sup>[20]</sup> for example, reported that younger teachers were more knowledgeable about ADHD. Furthermore, Youssef *et al.*<sup>[21]</sup> discovered that teachers with a postgraduate degree and ADHD training scored higher, both of which are consistent with our findings. Many other factors have been reported in the literature to promote ADHD knowledge, such as teacher efficacy, psychology training, teaching students with ADHD, and years of teaching experience. The actual relationship between a variety of factors and one's level

of ADHD knowledge, on the other hand, has never been well established.<sup>[22–24]</sup>

A combination of parental involvement, a knowledgeable school administration, and long-term assistance from a pediatrician or child psychiatrist has been shown to improve the disabled child's academic and social performance.<sup>[25]</sup> Parents, teachers, and primary pediatric care providers have been identified as key players in the identification and management of behavioral and learning issues. Syed *et al.* and Nishtar *et al.* studies showed emphasize the importance of detecting ADHD at the primary care level.<sup>[26,27]</sup>

## Limitations

A limitation of the present study was the use of a self-reporting questionnaire that could have a recall bias.

## Conclusion

The present study demonstrates a low level of knowledge among teachers regarding ADHD: only 5.4% had good knowledge. A positive association was found between knowledge level and the teachers' educational level, as a significantly higher percentage of teachers with postgraduate education had a good level of knowledge. Schools should organize structured courses and workshops on children with ADHD to prepare teachers on how to deal with the needs of said children. In addition, integration of the ADHD knowledge improvement program into teachers' educational and training programs should be considered. Future studies need to be conducted on larger samples and on teachers of all educational levels to assess the magnitude of their knowledge level for better management of ADHD in school children. Further research is also needed in various regions of Saudi Arabia, with a longer follow-up period required to assess the long-term impact of the aforementioned awareness program.

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## Conflicts of interest

There are no conflicts of interest.

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