

# Knowledge and Attitude Regarding Sleep Medicine among Medical Students at Qassim University, Saudi Arabia

Yazeed Mohammad Alrebdi<sup>1</sup>, Abdulrahman Khalid Ibn Awadh<sup>1\*</sup>, Mohammad Saleh Alfehaid<sup>1</sup>, Abdullah Abdulaziz Alsindi<sup>1</sup>, Ali Alaraj<sup>2</sup>

<sup>1</sup>Qassim College of Medicine, Qassim University, Qassim - Almulyda, Saudi Arabia; <sup>2</sup>Pulmonary Medicine, Dr Suliman Alhabib Medical Group, Riyadh, Saudi Arabia

## Abstract

**Citation:** Alrebdi YM, Awadh AKI, Alfehaid MS, Alsindi AA, Alaraj A. Knowledge and Attitude Regarding Sleep Medicine among Medical Students at Qassim University, Saudi Arabia. Open Access Maced J Med Sci. <https://doi.org/10.3889/oamjms.2019.833>

**Keywords:** knowledge; attitude; sleep medicine; medical students; sleep disorder

**\*Correspondence:** Abdulrahman Khalid Ibn Awadh, MBBS, Medical Intern, Qassim College of Medicine, Qassim University, Qassim - Almulyda, Saudi Arabia. E-mail: a.ibnawadh@gmail.com

**Received:** 10-Jun-2019; **Revised:** 28-Jul-2019; **Accepted:** 29-Jul-2019; **Online first:** 14-Sep-2019

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**Funding:** This research did not receive any financial support

**Competing Interests:** The authors have declared that no competing interests exist

**BACKGROUNDS:** Sleep disorders and sleep medicine are underrecognized by both the general public and health care workers. Lack of education and training in sleep medicine has resulted in a culture of physicians who have very limited knowledge about sleep disorders and, as a result, are likely to underdiagnose and under-treat patients.

**AIM:** This study aimed to assess the knowledge of and attitude regarding sleep medicine among medical students at Qassim University.

**METHODS:** This was a cross-sectional study of 4<sup>th</sup> and 5<sup>th</sup>-year medical students, conducted at Qassim University (Central and Unaizah branches), Saudi Arabia. We used a self-administered data collection tool to collect personal information (age, name, sex, medical school), and assessed general attitude toward sleep medicine and the students' current knowledge about sleep medicine using the Assessment of Sleep Knowledge in Medical Education (ASKME) survey.

**RESULTS:** The prevalence of medical students who had a special interest in sleep medicine was 23.3%. Poor knowledge about sleep medicine was detected in 94.8% of students, while good knowledge was observed in only 5.2%. The attitude of the students toward sleep medicine was negative among 40.5% and positive among 59.5%. University branches, gender, and preferred speciality were all significantly associated with attitude score, whereas interest in sleep medicine and knowledge of sleep disorders were associated with both knowledge and attitude scores.

**CONCLUSION:** This study found that medical students' knowledge of sleep medicine was very low, despite the majority of them having a positive attitude toward it.

## Introduction

Sleep is known to influence the physical and emotional wellbeing of adolescents by exerting substantial control over biological and psychosocial processes [1]. Sleep not only impacts physical growth and emotional development but also influences cognitive function and learning [2], [3]. Despite the magnitude and clinical importance of sleep issues, several studies have documented poor recognition of sleep disorders [3], [4].

In Saudi Arabia, the first certification exam for sleep medicine as an independent speciality was approved in 2009 [5], and sleep medicine was recognised as an independent speciality in 2012 [6],

though studies investigating the prevalence of sleep disorders in the Kingdom of Saudi Arabia (KSA) are limited. Based on available data and waitlists for participation in sleep studies [7], however, it appears that sleep disorders are prevalent among Saudis. Using the Berlin questionnaire to assess the prevalence of obstructive sleep apnea (OSA) risk and symptoms among middle-aged Saudi men and women in their primary care setting, it was revealed that 3 out of 10 Saudi men and 4 out of 10 Saudi women are at a high risk of OSA [8], [9]. A recent national survey quantitatively assessed sleep medicine service in the KSA [7], revealing that the field is nascent compared to developed countries. The survey identified nine sleep disorder facilities; seven were defined as sleep disorder centres that provide clinical diagnostics and therapeutic services for

patients with different sleep disorders, and two were defined as sleep laboratories that provide diagnostic and therapeutic services limited to sleep-related breathing disorders such as OSA [7], [10].

Sleep disorders and sleep medicine as a speciality are underrecognized by both the general public and health care workers. Members of the public in the KSA accept information on sleep disorders from any source without criticism, even if the information is not validated; therefore, they have developed their ideas and myths about sleep. Some of the public believe that sleep problems are natural and do not think of them as legitimate medical issues that can be treated [11]. Most patients seen in the clinic have gone to many doctors before visiting the sleep disorders clinic, thinking that all sleep problems are handled by mental health therapists, particularly psychiatrists. Due to the under-recognition of the seriousness of disorders like OSA, patient compliance with Continuous Positive Airway Pressure (CPAP) in the KSA is low compared to developed countries [12].

Similarly, the knowledge of practising physicians, particularly primary care physicians, about sleep disorders is limited [13]. Salem et al. reported that only 33.6% of the primary care physicians assessed knew sleep medicine [14]. A survey of primary health care (PHC) physicians in all primary care centres in Riyadh revealed that PHC physicians do not completely recognise the importance and impact of OSA and other sleep disorders [13]. Forty-three per cent of the participants did not realise the existence of sleep medicine as a speciality; 40% felt that sleep disorders are not common, and 38% did not know to whom they should refer their patients [13]. In general, medical students in the KSA rarely have a chance to learn sleep medicine in medical schools.

Similarly, postgraduate teaching of sleep disorders during residency training seems to be limited as well [12]. This lack of education and training in sleep medicine has resulted in a culture of physicians who have very limited knowledge about sleep disorders and, as a result, are likely to underdiagnose and under-treat patients [12]. A study published in Riyadh, KSA documented that only 27.7% of the medical students evaluated using the Assessment of Sleep Knowledge in Medical Education (ASKME) survey displayed awareness of sleep medicine [15].

The health system in the KSA relies on a referral system, where the patient's first exposure is usually to a PHC physician, who assesses and decides the patient's management plan. Thus, early detection and treatment of patients with sleep disorders depend, considerably, on the knowledge and awareness of PHC physicians. PHC physicians have limited knowledge about sleep disorders, sleep disorders among their patients are likely under-recognised, and patients with these disorders may be inaccurately diagnosed and may receive inappropriate treatment [16]. Studies in the KSA and Western

countries have shown that OSA is common among patients attending PHC clinics [8], [9], [17]. With the limited number of sleep medicine specialists in the KSA, it is impractical to expect that they will be able to be the primary caregivers for all patients with sleep disorders. Therefore, an alliance of sleep medicine specialists, PHC physicians, and general physicians (including those in internal medicine and paediatrics) becomes essential. Educational interventions are effective in increasing the rates of recognition of OSA among PHC physicians [18], though the level of knowledge and attitude regarding sleep medicine among medical students of the Qassim region is still unknown.

Hence, the present study aimed to determine the knowledge of and attitude towards sleep medicine among medical students at Qassim University, KSA.

## Methods

### **Selection and description of participants**

This was a cross-sectional study based on a survey conducted at two medical branches of Qassim University in Saudi Arabia. The study population consisted of 4<sup>th</sup> and 5<sup>th</sup>-year medical students in the two medical colleges of Qassim University (main campus and Unaizah campus). Random number generator software was used to randomly select participants from a list of all upper-year medical students to reach the required sample size to ensure adequate statistical power. Inclusion criteria were 4<sup>th</sup> and 5<sup>th</sup>-year medical students. Exclusion criteria were 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup>-year medical students as well as those whose data was incomplete.

### **Sample size calculation**

Based on the article published by Almohaya et al. [15], the prevalence of medical students who were aware of sleep medicine was 27.7%. This prevalence was used to determine the required sample size using the categorical formula:  $n = z^2(pq)/e^2$ , where

- $n$  = sample size
- $z$  = score from  $z$  distribution associated with confidence level (1.96 for 95% confidence)
- $p$  = estimated proportion of the event in the population
- $q = 100 - p$
- $e$  = margin of error (0.05)

The sample size required to detect a statistically significant result with 95% confidence and a narrow margin of error of 0.05, should be 158. Since

Qassim's main campus has a bigger population, about 70% of the calculated sample size was recruited from the main campus; 30% were recruited from Unaizah campus.

### **Ethical review and confidentiality**

The study was approved by the Regional Research Ethics Committee, registered at the XXX (Registration No. XXX). All information is kept strictly confidential and used only for research purposes.

### **Data collection**

A self-administered questionnaire collected demographic data of the participants (age, name, sex, medical school) and their attitude toward sleep medicine [19], [20]; knowledge about sleep medicine was assessed using the Assessment of Sleep Knowledge in Medical Education (ASKME) survey [19]. The ASKME survey is a 30-item questionnaire regarding the knowledge of sleep medicine. The questionnaire was previously tested in a pilot study of 10 medical students to identify the optimal time for questionnaire completion by participants. The ASKME survey has face validity, and the statistical analysis for internal consistency revealed a Cronbach's alpha value of 76%, which indicates a moderately good internal consistency.

Items were presented in a "true," "false" or "I don't know" format. For the ease of analysis, the knowledge questionnaire was re-coded into two categories where the correct answer for each question was identified and coded with 1, whereas the wrong answer was coded with 0. The total knowledge score was obtained by summing up the 30 questions. The minimum score was 0 and the maximum score was 30; a higher score signifies greater knowledge, and by using the cutoff points of 18/30 (60% of the total score), participants were classified as having poor knowledge if the score range was from 0-17 points, whereas good knowledge was determined if the score range was from 18-30 points.

Attitude toward sleep medicine was assessed using the 10-question attitude questionnaire adapted from ASKME [19], [20]. This questionnaire is scored on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The lowest possible score was 10, and the highest score was 50 points. Attitude scores were obtained by taking the sum of the scores of the ten questions. We then categorised participants who scored 30 (60% of the total score) or more as having a positive attitude and those whose score was less than 30 were categorized as having a negative attitude.

### **Statistics**

Statistical Package for Social Sciences

(SPSS) version 21 (Armonk, NY: IBM Corp.) was used for all data analyses. Descriptive statistics are presented as numbers and percentages for all qualitative variables, while the mean  $\pm$  standard deviation is presented for all quantitative variables. Knowledge and attitude scores among sociodemographic characteristics of participants were compared using independent t-tests (two-tailed). A p-value cut off point of 0.05 at 95% CI was deemed statistically significant. The normality of the distribution of data was assessed using Shapiro Wilk and Kolmogorov-Smirnov tests. Data violating assumptions of normality were instead compared using non-parametric tests.

## **Results**

A total of 158 questionnaires were distributed randomly among the students (4<sup>th</sup> and 5<sup>th</sup> years); 116 were returned (response rate of 73.4%). Table 1 presents the sociodemographic characteristics of students who were involved in this study. Students' ages ranged from 22 to 27 years; a majority was of a younger age (22 - 23 years age group). The majority of the students were recruited from the Qassim main campus (62.1%), and the rest were from the Unaizah branch (37.9%); most respondents were male (56.9% vs 43.1% female).

**Table 1: Sociodemographic characteristics of respondents (n=116)**

Study Variables	N (%)
University branch	
• Unaizah branch	44 (37.9%)
• Main campus branch	72 (62.1%)
Age group	
• 22 – 23 years	76 (65.5%)
• 24 – 27 years	40 (34.5%)
Year of study	
• 4 <sup>th</sup> year	65 (56.0%)
• 5 <sup>th</sup> year	51 (44.0%)
Gender	
• Male	66 (56.9%)
• Female	50 (43.1%)
GPA	
• 2.4 – 4.0	64 (55.2%)
• 4.1 – 5.0	52 (44.8%)
Preferred speciality	
• Medicine	42 (36.2%)
• Surgery	47 (40.5%)
• Others	27 (23.3%)
Specific interest in sleep medicine	
• Yes	27 (23.3%)
• No	89 (76.7%)
Importance of sleep medicine	
• Absolutely not important	03 (02.6%)
• Not important	13 (11.2%)
• Average	48 (41.4%)
• Important	41 (35.3%)
• Very important	11 (09.5%)

A high proportion of students were in their 4<sup>th</sup>-year level (56%), and most had a 4.0 or lower grade point average (GPA) (55.2%) (the highest GPA in our

institution was 5.0). Based on the preferred area of specialisation, 40.5% of students preferred surgery, 36.2% preferred medicine, and the rest expressed mixed speciality interests. Most of them had no interest in sleep medicine (76.7%), with 41.4% having an average knowledge of sleep disorders.

**Table 2: General knowledge toward sleep medicine (n=116)**

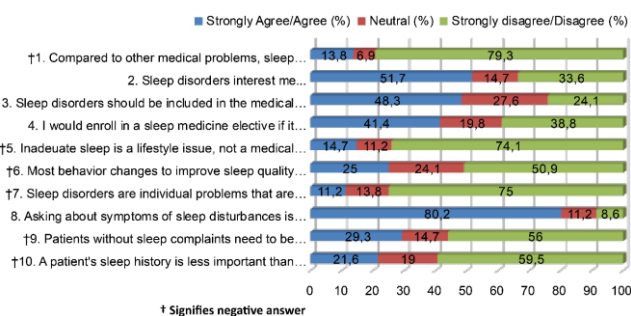
Knowledge statement	Correct answer N (%)
K1. The need for sleep decreases in persons above 50 years of age.	54 (46.6%)
K2. Melatonin is a natural body hormone that typically increases during nighttime hours.	87 (75.0%)
K3. Dream sleep (REM) occurs more in the second half of the night.	41 (35.3%)
K4. Sleeping longer on weekends is recommended as a regular practice to make up for the loss of sleep during the workweek.	34 (29.3%)
K5. Newborn infants spend about 16-18 hours per 24-hour period sleeping.	94 (81.0%)
K6. Incidence of insomnia is twice as common in older men as in older women.	20 (17.2%)
K7. A young (pre-adolescent) child who regularly has trouble getting to sleep at night should be allowed to sleep later in the morning.	45 (38.8%)
K8. The typical age of symptom onset for narcolepsy is 40 years or older.	25 (21.6%)
K9. The ability to sleep increases in persons above 50 years of age.	39 (33.6%)
K10. Slow-wave sleep is more prominent in the second half of the night.	17 (14.7%)
K11. The amount of slow-wave sleep increases in persons above 50 years of age.	13 (11.2%)
K12. Episodes of sleepwalking tend to occur in the last third of the night.	13 (11.2%)
K13. Episodes of REM sleep tend to lengthen throughout the night.	28 (24.1%)
K14. Periodic limb movements during sleep are typically decreased in REM sleep.	29 (25.0%)
K15. Hyperactivity in children can be exacerbated by inadequate sleep.	49 (42.2%)
K16. In alcoholics in recovery, sleep normalises within one month of alcohol abstinence.	12 (10.3%)
K17. Daytime napping is recommended for patients with difficulty initiating sleep.	31 (26.7%)
K18. Weight loss is often indicated in the treatment of primary snoring or mild OSA.	70 (60.3%)
K19. Slow-wave sleep is enhanced following daytime exercise.	30 (25.9%)
K20. Chronic bedwetting in children responds to treatment with anticholinergic drugs.	11 (9.5%)
K21. Nightmares are more common within the first two hours of sleep.	22 (19.0%)
K22. Heart rate, respiration, and blood pressure are more variable during REM sleep compared to non-REM sleep.	53 (45.7%)
K23. Antihypertensive drugs may cause sleeping difficulties as a side effect.	27 (23.3%)
K24. Early morning awakenings in the elderly are often associated with changes in the timing of their biological rhythms.	39 (33.6%)
K25. Alcohol can be beneficial in reducing the effects of jet lag.	24 (20.7%)
K26. Night shift workers are more likely to fall asleep on the job compared to employees with regular, daytime hours.	56 (48.3%)
K27. Episodes of sleepwalking commonly occur during REM sleep.	12 (10.3%)
K28. Menopausal women are at higher risk for developing symptoms of sleep apnea compared to pre-menopausal women.	29 (25.0%)
K29. Irregular sleep scheduling can increase the incidence of sleepwalking in children.	43 (37.1%)
K30. Symptoms of narcolepsy are related to seizure activity in the brain.	15 (12.9%)

Results of the ASKME questionnaires are shown in Table 2, which also indicates the correct

answer for each question asked. Based on students' responses, the most commonly agreed with statements were: "newborn infants spend about 16-18 hours per 24-hour period sleeping", "melatonin is a natural body hormone that typically increases during nighttime hours", and "weight loss is often indicated in the treatment of primary snoring or mild OSA". Students exhibited the least knowledge concerning the statement, "chronic bedwetting in children responds to treatment with anticholinergic drugs."

Details of the general attitude of medical students toward sleep medicine are shown in Figure 1; nearly all students strongly agreed/agreed with the statement, "asking about symptoms of sleep disturbances is an essential component of a comprehensive medical evaluation", whereas most strongly disagreed/disagreed with the statement, "compared to other medical problems, sleep disturbances are usually less important for a patient's health"

Details of the general attitude of medical students toward sleep medicine are displayed in Figure 1. The results showed that nearly all respondents either agreed or strongly agreed with the statement, "Asking about symptoms of sleep disturbances is an essential component of a comprehensive medical evaluation", whereas most students correctly disagreed with the following statements: "Compared to other medical problems, sleep disturbances are usually less important for a patient's health?", "Sleep disorders are individual problems that are not important for a wide population", and "Inadequate sleep is a lifestyle issue, not a medical problem".



**Figure 1: General attitude of the students toward sleep medicine**

Table 3 shows the characteristics of the students' knowledge and attitude toward sleep medicine. The mean knowledge score was 9.2 ( $\pm$  4.9). The prevalence of poor knowledge in this study was high (94.8%) as opposed to good knowledge (5.2%). The mean attitude score was 37.9 ( $\pm$  7.2) out of a possible total score of 50. Of these students, 40.5% viewed it with a negative attitude, while 59.5% viewed it with a positive attitude.

**Table 3: Knowledge and attitude toward sleep medicine (n = 116)**

Predictor variable	N (%)
Level of knowledge	
• Poor	110 (94.8%)
• Good	6 (5.2%)
Attitude	
• Negative	47 (40.5%)
• Positive	69 (59.5%)
Knowledge score (mean ± SD)	Mean ± SD 9.2 ± 4.9
Attitude total score (mean ± SD)	37.9 ± 7.2

When comparing the knowledge and attitude scores among sociodemographic characteristics of participants, we found that the attitude of the students in Unaizah branch was significantly higher compared to the main campus branch ( $T = 2.622$ ,  $p = 0.010$ ), where female students had a better attitude compared to males ( $T = -2.867$ ,  $p = 0.005$ ). The attitude of those students expressing interest in a non-internal medicine speciality was higher compared to those students with internal medicine speciality ( $T = -2.491$ ,  $p = 0.014$ ). Additionally, those students with interest in sleep medicine had better knowledge ( $T = 2.098$ ,  $p = 0.038$ ) and better attitude ( $T = 2.585$ ,  $p = 0.011$ ), and those who responded that knowledge of sleep disorders was important had significantly higher levels of current knowledge ( $T = -2.800$ ,  $p = 0.006$ ) and more positive attitudes ( $T = -3.209$ ,  $p = 0.002$ ) (Table 4).

**Table 4: Comparison between knowledge and attitude scores among sociodemographic characteristics of students (n=116)**

Factor	Knowledge Score Total Score (/30)		Attitude Score Total Score (/50)	
	Mean ± SD	T test; P-value <sup>§</sup>	Mean ± SD	T test; P-value <sup>§</sup>
<b>University branches</b>				
Unaizah branch	08.6 ± 04.0	-1.015; 0.312	40.1 ± 06.9	-2.622; 0.010 **
Main campus branch	09.5 ± 05.3		36.6 ± 07.0	
<b>Age group</b>				
22 – 23 years	08.9 ± 04.9	-0.512; 0.610	38.1 ± 06.9	-0.450; 0.654
24 – 27 years	09.5 ± 04.9		37.5 ± 07.8	
<b>Year of study</b>				
4 <sup>th</sup> Year	08.5 ± 04.2	-1.589; 0.115	37.9 ± 06.7	-0.062; 0.950
5 <sup>th</sup> Year	09.9 ± 05.5		37.9 ± 07.8	
<b>Gender</b>				
Male	09.3 ± 04.8	-0.259; 0.796	36.3 ± 07.1	-2.867; 0.005 **
Female	09.0 ± 05.0		40.0 ± 06.8	
<b>Grade point average (GPA)</b>				
2.4 – 4.0	08.8 ± 04.5	-0.879; 0.381	38.2 ± 06.7	-0.403; 0.688
4.1 – 5.0	09.6 ± 05.3		37.6 ± 07.8	
<b>Preferred speciality</b>				
Medicine	08.6 ± 05.1	-0.933; 0.353	35.8 ± 08.0	-2.491; 0.014 **
Non-Medicine	09.5 ± 04.8		39.1 ± 06.4	
<b>Interest in sleep medicine</b>				
Yes	10.9 ± 04.8	2.098; 0.038 **	40.9 ± 07.8	2.585; 0.011 **
No	08.6 ± 04.8		36.9 ± 06.8	
<b>Importance of sleep disorders</b>				
Not important	08.0 ± 04.4	-2.800; 0.006 **	36.1 ± 06.8	-3.209; 0.002 **
Important	10.5 ± 05.1		40.2 ± 07.0	

\*\* Significant at  $p \leq 0.05$ .

## Discussion

The purpose of the present study was to assess the knowledge and attitude regarding sleep medicine among medical students at Qassim University. This study revealed that the medical students' knowledge toward sleep medicine was relatively poor (94.8%), highlighting the need for sleep medicine to be added to the medical school's curriculum, which could be beneficial and will improve their knowledge of the subject. Our finding is consistent with a previous study conducted by Almohaya and colleagues [15]. Using the ASKME questionnaire, respondents were identified as having poor (score of < 60%) or good (score of  $\geq 60\%$ ) knowledge of sleep issues. Among 348 recruited students in their study, the mean score was 10.4 ( $\pm 4.4$ ), with more than 80 per cent of them being classified as having poor knowledge. In Croatia [21], among 112 respondents surveyed, poor knowledge of sleep issues was identified in most of the medical students, postgraduate physicians and specialists, which corroborates our results. In another study published locally (in the KSA), Saleem et al. [14] surveyed 88 primary care centres comprising 223 primary care physicians (PCP). They reported that the mean knowledge of PCP based on the ASKME questionnaire was 14.4 ( $\pm 4$ ). The majority of PCPs obtained a score between 11 and 20. These scores were higher than we observed, though we only investigated medical students, not physicians. In Egypt, Zaki et al. assessed the knowledge of final year medical students and house-officers about normal sleep and sleep disorders [22], also using the ASKME questionnaire. They reported that 91 per cent of the participants exhibited a low level of knowledge, which was also in agreement with our results. However, in China, Luo and associates reported poor knowledge about sleep in more than 60 per cent of students, and the majority of them were not aware of any medical school offering sleep medicine-related courses [23].

In this study, less than half of the students expressed a negative attitude; more than 60% viewed sleep science in a positive light. The mean score was 37.9 out of 50 points. In Singapore, Mahendran et al. reported the mean attitude of the medical students was 35 ( $\pm 4.3$ ) [24]. This result was comparable to our study outcome. However, they measured the attitude of the students by Medical Education (MED) sleep survey. Also, Kovaèiæ et al. reported that the majority of respondents exhibited positive attitudes toward sleep medicine, which was consistent with our study results [21]. We also discovered that even though Unaizah branch has fewer students, they demonstrated a significantly better attitude compared to students from the main campus branch. Females exhibited a better attitude than males, and those who preferred non-medicine specialities also had a more positive attitude toward sleep medicine. We also

found out that those with interest in and those who believed knowledge of sleep medicine was important had significantly greater levels of knowledge and more positive attitudes toward the subject. Various studies have reported negative associations between knowledge and attitude based on sociodemographic factors [14], [15], [21], [22], [24]. Salem et al. [14] observed that participants who attended lectures about medicine scored significantly better for the level of knowledge, but that knowledge had no relation to gender or the number of years of practice, whereas Almohaya and colleagues reported that the knowledge score did not differ by sex, GPA, level of academic achievement, or university attended [15]. A study from Egypt [22] reported that the knowledge score did significantly differ based on faculty location and gender, but no significant difference was observed based on years of study. In Singapore [24], researchers found no significant effect of age, gender, or medical qualifications on knowledge of basic sleep medicine, whereas, in Croatia, significant differences were found between the level of knowledge, but the attitude toward sleep medicine did not differ [21].

Our study demonstrates that one out of four students was interested in sleep medicine. This finding is by papers published locally [14], [15] Saleem et al. [14] reported more than 30 percent of the PCPs were interested in the subject, as did Almohaya et al. [15]. However, in China, more than 80 percent of medical students have demonstrated a strong interest in coursework related to sleep medicine, though most of them were not aware of any medical schools teaching the subject [23].

It is recommended that replication of this study be carried out with larger sample size, involving multiple institutions to better assess the knowledge and attitude of medical students toward sleep medicine in a broader, more generalizable context.

In summary, medical student knowledge regarding sleep medicine was very low, even though a majority of students expressed a positive attitude toward it. In this regard, faculty members such as lecturers, professors, and other related teaching staff should provide better sleep medicine education to increase their awareness. Although this subject might not be popular in the Saudi medical school, it is expected that better education on this subject will be part of the curriculum within the foreseeable future.

## Acknowledgements

The authors would like to thank the students who participated in data collection: Ghadah Abdulaziz Aloyaidi, Raghad Taha Fouly, Fai Mohammed Almarshud, Malek Abdulrahman Alburayh, Muath Abdullah Alhasson.

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