Knowledge and attitude toward obstructive sleep apnea among senior dental students, general dental practitioners, and dental specialists in Palestinian Authority: A cross-sectional...

Article *in* Cranio: the Journal of Craniomandibular Practice · August 2025

DOI: 10.1080/08869634.2025.2535922

CITATIONS
0

READS
8

2 authors:

Rola Shadid
Arab American University, Janin, Palestinian Territory
21 PUBLICATIONS **477** CITATIONS
SEE PROFILE

Mohammed Jaradat
Arab American University
13 PUBLICATIONS **53** CITATIONS
SEE PROFILE

CRANIO®: THE JOURNAL OF CRANIOMANDIBULAR & SLEEP PRACTICE
https://doi.org/10.1080/08869634.2025.2535922

Taylor & Francis
Taylor & Francis Group

RESEARCH ARTICLE

Knowledge and attitude toward obstructive sleep apnea among senior dental students, general dental practitioners, and dental specialists in Palestinian Authority: A cross-sectional study

Rola Shadid BDS, MSc, DABOI/ID, FAAID[a,b] and Mohammed Jaradat BDS, MSc[b,c]

[a]Department of Prosthodontics, Faculty of Dentistry, Arab American University, Palestinian Authority, Jenin, Palestine; [b]Private practice, Palestinian Authority, Palestine; [c]Department of Orthodontics and Pedodontics, Faculty of Dentistry, Arab American University, Palestinian Authority, Jenin, Palestine

ABSTRACT

Objective: This study aimed to evaluate the level of knowledge and attitude toward obstructive sleep apnea (OSA) in Palestinian Authority.

Methods: An online cross-sectional questionnaire was conducted from January 2025 to March 2025 and targeted senior dental students at Arab American University and Palestinian dental practitioners. A 37-item questionnaire including demographics, knowledge, and attitude categories was created using Google Drive.

Results: A total of 585 senior dental students and dental practitioners responded to the survey, with a mean total knowledge score of 17.9 ±4.72 out of 23, and attitude score of 21.49 ±3.41 out of 28. Senior dental students revealed the highest knowledge level while the general dental practitioners showed the lowest.

Conclusions: Dental practitioners had insufficient knowledge about OSA and a neutral attitude regarding OSA patients' management and referrals. Thus, revision of curricula in dental schools and organizing more educational programs about OSA are needed.

KEYWORDS
Obstructive sleep apnea; dental practitioners; students; knowledge; attitude

Introduction

Obstructive sleep apnea (OSA) represents a prevalent and critical sleep disorder impacting millions globally [1]. This condition is characterized by recurrent obstructive events in the upper airway during sleep, resulting in either complete cessation of breathing (apnea) or diminished airflow (hypopnea) that endures for 10 seconds or longer [2]. These interruptions disrupt standard sleep architecture, significantly decreasing blood oxygen levels, which adversely influences sleep quality and poses considerable health risks [3]. OSA patients commonly experience a range of distressing symptoms, which encompass loud snoring, prominent pauses in breathing throughout sleep, abrupt awakenings accompanied by gasping or choking sensations, and excessive daytime sleepiness [4]. Beyond the disturbances in sleep, the ramifications of OSA extend to a myriad of severe health complications, including coronary artery disease, myocardial infarctions, heart failure, hypertension, and cerebrovascular accidents (strokes). Moreover, OSA can detrimentally affect cognitive functioning, leading to difficulties in concentration, memory retention, and overall mental clarity [5].

Globally, the prevalence of OSA in adults ranges from 9% to 38% based on an apnea-hypopnea index (AHI) of ≥5 events per hour [6], and it varies from 1–4% among children [7]. However, this prevalence differs significantly by region, with China reporting the highest number of cases, followed by the United States, Brazil, and India [8]. In the Palestinian population, the prevalence of excessive daytime sleepiness surpasses that reported in Western demographics, aligning more closely with populations that exhibit similar lifestyle habits [9].

Various demographic and physiological factors contribute to the increased prevalence of OSA, with higher body mass index (BMI), male sex (male-to-female ratio of approximately 2:1 to 3:1), and advancing age all are identified as prominent risk factors [5].

For the diagnosis of OSA, a thorough medical history, clinical examination, lateral cephalogram, and/or cone beam computed tomography (CBCT) are necessary [10]. Although polysomnography (PSG) is widely

CONTACT Rola Shadid rola.shadid@aaup.edu Department of Prosthodontics, Faculty of Dentistry, Arab American University, Palestinian Authority, P.O Box: 240, Jenin, Palestine

regarded as the gold standard for diagnosing OSA [11], a comprehensive approach, combining clinical evaluations with objective testing methods like PSG leads to better identification and treatment outcomes for individuals with OSA [5].

Management of OSA should be personalized based on the severity of the condition, patient's preferences, and anatomical factors [12]. A multidisciplinary approach is often necessary, incorporating strategies like lifestyle changes (weight loss, smoking cessation, avoiding alcohol and sedatives), medical devices, adjunct therapies, and surgical interventions [12]. Whereas Continuous Positive Airway Pressure (CPAP) therapy remains the first-line treatment for patients with moderate to severe OSA [13], a mandibular advancement device (MAD) is recommended for patients with mild to moderate OSA or primary snoring, and it is also effective for severe OSA patients who do not respond to or could not tolerate CPAP therapy [14].

General dentists, orthodontists, pediatric dentists, radiologists, periodontists, oral and maxillofacial surgeons, prosthodontists and other specialists, each have important roles in the detection and even management of some OSA cases [15]. Since general dentists see patients on regular basis, they can recognize symptoms such as excessive sleepiness, morning headache, and jaw discomfort, which can prompt timely referrals for further assessment [16]. Orthodontists and pediatric dentists also play an important role by evaluating craniofacial development [17], as children who have micrognathia or midface hypoplasia are more likely to develop OSA [18]. Oral and maxillofacial radiologists could support diagnosis by detecting signs such as carotid artery calcification, a marker commonly seen in OSA patients [19], and by evaluating upper airway through cone-beam CT modality [20]. Additionally, periodontists are involved since a strong correlation has been demonstrated between periodontal disease and OSA [21]. This is because systemic inflammation and oxidative stress are observed in both entities [21,22]. Prosthodontists by providing complete dentures could lessen the severity of some selected OSA cases if they are worn while sleeping [15,23]. Lastly, oral and maxillofacial surgeons by performing surgical maxilla- mandibular advancement could also offer one of the best treatments in selected OSA cases [24].

According to the American Dental Association (ADA), the American Academy of Dental Sleep Medicine (AADSM), and the American Academy of Sleep Medicine (AASM), the dentist's responsibilities include identification of suspected OSA patients by carrying out an appropriate screening routine for new instances of OSA, referring patients who are at risk to medical specialists for sleep testing and therapy, and providing oral appliances such as mandibular advancement devices [25,26].

Numerous studies worldwide have surveyed the knowledge and attitude toward OSA management among dental practitioners [5,27–35] and dental students [29,30,33,36,37]; however, most of them revealed relatively insufficient knowledge and awareness regarding OSA [27,29–33,35–37].

Considering the substantial worldwide impact and the rising incidence of OSA, the vital role played by the dental practitioners in the screening as well as treating OSA by oral appliances, the current dearth of dental education in predoctoral dentistry institutions [37], and the scant information on the extent of dental professionals' OSA's knowledge in Palestinian Authority, this study aimed to evaluate OSA-related knowledge and attitude among senior dental students, general dental practitioners, and specialists in Palestinian Authority, and recognize factors associated with their level of knowledge and attitude toward OSA. Additionally, this study aimed to assess the relationship between their level of knowledge and attitude toward OSA.

Methods

This cross-sectional study was conducted in compliance with CHERRIES criteria [38] from January 2025 to March 2025, and focused on senior dental students in Arab American University's Faculty of Dentistry and on Palestinian dental practitioners. According to Raosoft sample size calculator [39], the minimum recommended sample size was 216 for senior students and 345 for dental practitioners, based on a population size of 492 senior dental students for the two academic years 2023–2024 and 2024–2025, and nearly 3000–3300 Palestinian licensed dental practitioners, with an accepted margin of error of 5% and a confidence interval of 95%.

Regarding inclusion criteria, participants had to (1) be senior trainee dental students for the academic year 2023–2024 (who graduated in September 2024 but are still in training period and not licensed), or senior dental students for the academic year 2024–2025 (who are expected to graduate in September 2025) at the Arab American University's Faculty of Dentistry; (2) be licensed dental practitioners in Palestinian Authority, whether general dental practitioners or specialists, regardless of the university they graduated from; (3) have access to the internet; and (4) sign an informed consent form.

Ethical approval was granted from the Arab American University Institutional Review Board (J-2025/A/1/N), and the study was carried out in compliance with the Declaration of Helsinki criteria.

The research authors, who are faculty members (one orthodontist and one prosthodontist) implicated in teaching OSA, developed the 37-item questionnaire used in this study in English (Appendix 1). Eight knowledge-based questions were derived from the Obstructive Sleep Apnea Knowledge and Attitude (OSAKA) questionnaire [40], a commonly used, validated, and trustworthy tool, and the other questions were adapted from earlier researches that were also pre-validated [31,33,34].

The questionnaire was pilot tested on 15 individuals involving three specialists, seven general dentists, and five students to verify its simplicity and clarity. They offered just minor recommendations for clarifying the questions, leading to finalizing the questionnaire as outlined in Appendix 1.

Regarding the internal consistency of the questionnaire's items for the 585 participants, the "Cronbach's α" was measured and revealed a satisfactory internal consistency with a coefficient of 0.842 for knowledge items and 0.711 for attitude items [41].

The 37-closed-ended mandatory items were divided into three main categories: demographics, knowledge, and attitude. Demographic characteristics included age, sex, professional title, workplace sector, clinical work experience, and the number of consultations or referrals for suspected OSA patients during their practice (Table 1). There were 23 questions in the knowledge category on OSA-related symptoms, risk factors, diagnosis, treatment, and the role of dentists (Table 2). The third category inspected attitude toward OSA and consisted of seven questions. They addressed the significance of understanding OSA in dentistry and the dentist's role of screening all patients. They also evaluated participants' confidence and the likelihood of fabricating oral appliances and using screening instruments to recognize at-risk patients (Table 3).

The convenience sampling method (snowball approach) was used to recruit participants. The online open survey was created using Google Drive and accessed with a web-link provided in the email and/or trusted closed digital platforms that can only be reached by senior dental students and/or licensed Palestinian dental practitioners (including WhatsApp groups, private Facebook groups, and alumni networks). A cover letter outlining the study's goals and procedures was enclosed with the questionnaire. Individual participation was anonymous since research data did not contain any identifiers, voluntary with no offered incentives, and all collected data were stored in a secure database with encrypted connection. The survey was expected to take eight to ten minutes, and all respondents were asked to give their informed consent and provided a singular submission.

Table 1. Demographic information of the participants ($N = 585$).

Variable	N	%
Age		
≤30 years	422	72.1
>30 years	163	27.9
Sex		
Female	325	55.6
Male	260	44.4
Professional title		
Dental students	237	40.5
General dentists	289	49.4
Specialists	59	10.1
Orthodontists	24	4.1
Pediatric dentists	2	0.3
Prosthodontists	15	2.6
Endodontists/Restorative dentists	6	1
Surgeons	8	1.4
Periodontists	4	0.7
Oral medicine/Oral pathology specialists	0	0
Workplace sector		
Public clinic/university	178	30.4
Private clinic	251	42.9
Both	65	11.1
Don't work	91	15.6
Years of practice		
≤5 years	314	53.7
5–10 years	82	14
11–20 years	78	13.3
>20 years	29	5
Don't work	82	14
Consultation/referral for OSA patients		
0	415	70.9
1–5	142	24.3
6–10	14	2.4
11–20	4	0.7
>20	10	1.7

Data are presented as n (%).

Scoring of knowledge and attitude

For the knowledge section, three possible answers were addressed for each question: true, false, and do not know. The "do not know" response was considered as incorrect. Since each correct response was considered to receive a score of 1, the highest possible knowledge score was 23. According to Bloom's cutoff, the total knowledge scores were divided into three levels: high, moderate, and low [31,42] (Table 4). A mean knowledge score was calculated as the sum of all correct answers (from 0 to 23). Higher mean value was deemed as a greater knowledge of the participant. The mean of the total knowledge scores was also computed.

Attitude items were responded via 5-point Likert scale: 0 = strongly disagree, 1 = disagree, 2 = neither agree nor disagree, 3 = agree, 4 = strongly agree [35]. The attitude score could range from 0 to 28. According to Bloom's cutoff, each respondent's total attitude score was computed and divided into three levels: positive, neutral, and negative (Table 4). Additionally, the mean of the total attitude scores was calculated.

Table 2. Participants' responses to questions about OSA knowledge and total knowledge score ($N = 585$).

Question	True*	False	Don't know
1. Obstructive sleep apnea (OSA) is described as frequent episodes of partial or complete obstruction of the upper airway for more than 10 seconds with accompanied respiratory efforts. (true)	528 (90.3)	23 (3.9)	34 (5.8)
2. Children can also suffer from OSA. (true) – adapted from OSAKA	525 (89.7)	25 (4.3)	35 (6)
3. The gold standard of OSA diagnosing is polysomnography. (true) – OSAKA	468 (80)	27 (4.6)	90 (15.4)
4. The loss of upper airway muscle tone during the sleep cycle contributes to the pathogenesis of OSA. (true) – OSAKA	477 (81.5)	41 (7)	67 (11.5)
5. OSA is more common in adults with high body mass index (BMI). (true)	528 (90.3)	27 (4.6)	30 (5.1)
6. OSA is more common in women than in men among adults. (false) – OSAKA	123 (21)	338 (57.8)	124 (21.2)
7. OSA is seen more in people younger than 40 years. (false)	117 (20)	336 (57.4)	132 (22.6)
8. OSA is common in people with short and wide neck. (true) – adapted from OSAKA	406 (69.4)	62 (10.6)	117 (20)
9. Tongue size is relevant regarding OSA. (true)	502 (85.8)	47 (8)	36 (6.2)
10. The most common cause of OSA in children is the presence of large tonsils and adenoids. (true) – OSAKA	499 (85.3)	29 (5)	57 (9.7)
11. OSA leads to sleep fragmentation and hypoxia. (true)	555 (94.9)	14 (2.4)	16 (2.7)
12. OSA patients usually complain of loud snoring and/or breathing interruption during sleep (observed apnea). (true)	565 (96.6)	11(1.9)	9 (1.5)
13. Some OSA patients complain of fatigue, daytime sleepiness, or morning headaches. (true)	530 (90.6)	24 (4.1)	31 (5.3)
14. Some orofacial pain and bruxism are linked to OSA. (true)	424 (72.5)	78 (13.3)	83 (14.2)
15. Patients with OSA may have symptoms of mouth breathing. (true)	532 (90.9)	21 (3.6)	32 (5.5)
16. Untreated OSA is associated with an increased risk of systemic hypertension, mortality (heart attack or stroke), or automobile accidents. (true) – OSAKA	469 (80.2)	31 (5.3)	85 (14.5)
17. Growth retardation is a common complication of OSA in children. (true)	387 (66.2)	71 (12.1)	127 (21.7)
18. Type 2 diabetes mellitus may be linked to OSA. (true)	314 (53.7)	84 (14.3)	187 (32)
19. Continuous positive airway pressure (CPAP) is the gold-standard treatment for mild, moderate, and severe obstructive sleep apnea in adults. (true) – OSAKA	441 (75.4)	43 (7.3)	101 (17.3)
20. Oral appliances can be used to treat mild and moderate OSA patients in adults. (true)	503 (86)	34 (5.8)	48 (8.2)
21. Dentists are responsible for OSA cases diagnosis. (false)	262 (44.8)	270 (46.2)	53 (9.1)
22. The dentist's role is to refer potential patients who are at high risk of OSA to a sleep physician. (true)	533 (91.1)	31 (5.3)	21 (3.6)
23. Dentists could prescribe oral appliances to treat mild and moderate OSA patients without referral to sleep physicians. (false)	197 (33.7)	343 (58.6)	45 (7.7)

Highlighted areas indicate the correct answers. *Displayed as N (%). OSA, obstructive sleep apnea.

Table 3. Participants' attitude towards OSA and total attitude score ($N = 585$).

Question	Agree/strongly agree*	Disagree/strongly disagree	Neither agree nor disagree
1. It is important for dentists to have knowledge of OSA as a clinical disorder.	573 (97.9%)	7 (1.2%)	5 (0.9%)
2. Dentists should screen all patients for possible OSA.	442 (75.6%)	88 (15.0%)	55 (9.4%)
3. I am confident to use any of the OSA screening tools to identify patients at risk.	305 (52.1%)	118 (20.2%)	162 (27.7%)
4. Dentists should refer potential patients with high OSA risk to sleep or related disciplines clinician.	562 (96.1%)	11 (1.9%)	12 (2.0%)
5. If a sleep physician referred a mild or moderate OSA case to my clinic, I am confident to fabricate an oral appliance.	282 (48.2%)	150 (25.6%)	153 (26.2%)
6. For children potentially with OSA, I would recommend them to ask otolaryngologists for further examination and treatment.	557 (95.2%)	9 (1.5%)	19 (3.3%)
7. I need further education about OSA.	564 (96.4%)	11 (1.9%)	10 (1.7%)

*Displayed as N (%). OSA, obstructive sleep apnea.

Table 4. Knowledge and attitude scores of participants towards OSA ($N = 585$).

Variable	N	%	Mean (SD)
Knowledge			17.90 (4.72)
High 18.4–23 (80%-100%)	293	50.1	
Moderate 13.8–18.17 (60%-79%)	189	32.3	
Low <13.8 (<60%)	103	17.6	
Attitude			21.49 (3.41)
Positive 22.4–28 (80%-100%)	235	40.2	
Neutral 16.8–22.12 (60%-79%)	312	53.3	
Negative <16.8 (<60%)	38	6.5	

SD standard deviation.

Statistical analysis

A Google Drive Excel document was used to collect responses, and the Statistical Package for Social Sciences (SPSS), version 22.0, was used to statistically analyze the data. For continuous variables, means and standard deviations were calculated, and counts and percentages were calculated for categorical variables. A generalized estimation equation (GEE) regression analysis was used to assess the factors correlated with the overall knowledge and attitude scores.

All the respondents' characteristics presented in Table 1 were regarded as independent variables that might be related to the scores. As well, the total knowledge score was evaluated as a predictor of attitude level toward OSA. Univariate analysis of all the independent variables was executed, and significant variables were incorporated into multivariate analysis. For all analyses, a P-value of less than 0.05 was considered significant.

Results

A total of 585 participants completed the questionnaire, with 237 senior dental students and 348 dental practitioners. The response rate was 48% for dental students; however, it cannot be calculated for dental practitioners because it is unknown how many invited dental practitioners opened the email or the social media platforms. Of all the respondents, 44.4% were males, 55.6% were females, 40.5% were senior dental students, 49.4% were general dentists, and 10.1% were dental specialists. Fewer than 5 years of clinical experience were reported by 53.7% of the respondents, and 70.9 % did not refer any patient with suspected OSA during the period of their clinical practice. The demographic information of the respondents is shown in Table 1.

The mean total knowledge score of all participants was 17.9 ± 4.72, revealing a moderate inadequate level of knowledge (Table 4).

As shown in Table 5, multivariate GEE regression analysis showed that the total knowledge score was significantly associated with the professional title, with senior dental students having the highest knowledge level and the general dental practitioners having the lowest (B = 2.978, 95% CI: 1.426 to 4.53, $p = .000$; B = −1.492, 95% CI: −2.682 to −0.302, $p = .014$, respectively). Figure 1 shows the percentage distribution of the knowledge scores among senior dental students, general dentists, and specialists. Additionally, multivariate analysis revealed the total knowledge score was significantly correlated with the workplace sector ($p < .001$), with those who worked in public clinic/university having the highest knowledge level (B = 3.892, 95% CI: 2.665 to 5.12, $p = .000$). In contrast, the total knowledge score had no significant correlation with the age ($p = .834$), sex ($p = .081$), years of practice ($p = .236$), or the average number of OSA patient referrals ($p = .251$).

The reported sources of information about OSA were medical lectures (26.2%), medical literature and journals (20.3%), internet (19.8%), classrooms and textbooks (14.4%), and others (11.1%) (Table 6).

Regarding attitude, the mean total attitude score of all participants was 21.49 ± 3.41, revealing a neutral

Table 5. Findings of univariable and multivariable GEE regression analyses for total knowledge score ($N = 585$).

	Univariable analysis			Multivariable analysis		
Variable	B	95% CI	P-value*	B	95% CI	P-value*
Age						
≤30 years	2.297	(1.465, 3.13)	**0.000**	0.174	(−1.461, 1.809)	0.834
> 30 years	Reference			Reference		
Sex						
Female	0.912	(0.145, 1.678)	**0.02**	0.598	(−0.073, 1.27)	0.081
Male	Reference			Reference		
Professional title			**0.000**			**0.000**
Dental students	3.011	(1.794, 4.229)	**0.000**	2.978	(1.426, 4.53)	**0.000**
General dentists	−1.226	(−2.421, −0.03)	**0.044**	−1.492	(−2.682, −0.302)	0.014
Specialists	Reference			Reference		
Workplace sector			**0.000**			**0.000**
Public clinic/university	4.462	(3.413, 5.512)	**0.000**	3.892	(2.665, 5.12)	**0.000**
Private clinic	−0.518	(−1.515, 0.478)	0.308	2.462	(0.916, 4.007)	**0.002**
Both	0.413	(−1.736, 0.909)	0.54	1.784	(0.11, 3.457)	**0.037**
Don't work	Reference			Reference		
Years of practice			**0.000**			0.236
≤5 years	1.349	(0.242, 2.457)	**0.017**	1.501	(0.224, 2.777)	0.021
5–10 years	−1.146	(−2.541, 0.248)	0.107	1.551	(−0.375, 3.477)	0.114
11–20 years	−1.481	(−2.893, −0.069)	**0.04**	1.318	(−0.985, 3.621)	0.262
> 20 years	−1.725	(−3.654, 0.204)	0.08	1.131	(−1.453, 3.715)	0.391
Don't work	Reference			Reference		
Consultation/referral for OSA patients			0.251			
0	Reference					
1–5	1.047	(0.152, 1.942)	**0.022**			
6–10	0.450	(−2.052, 2.952)	0.725			
11–20	0.628	(−3.998, 5.254)	0.790			
> 20	0.678	(−2.268, 3.625)	0.652			

GEE. generalized estimating equations. *P-value in bold is statistically significant (< 0.05).

attitude toward OSA (Table 4). Most of the respondents agreed that dentists should have knowledge of OSA as a clinical disorder (97.9%) and would refer patients at risk of OSA to sleep or related disciplines' clinicians (96.1%). Furthermore, a high percentage of the respondents believed that they should screen all patients for possible OSA (75.6%) (Table 3). On the other hand, only nearly half of the respondents (52.1%) expressed their confidence to use any of the OSA screening tools to identify patients at risk or to fabricate an oral appliance (48.2%) if a sleep physician referred a mild or moderate OSA case to their practice. Thus, most of the respondents (96.4%) reported that they would be interested in learning more about OSA (Table 3).

Multivariate analysis demonstrated that the total attitude score was significantly associated with the average number of OSA patient referrals and the total knowledge score. Those with higher total scores of OSA-related knowledge had a more positive attitude toward OSA (B = 0.264, 95% CI: 0.201 to 0.326, $p = .000$). In addition, those who referred more than 20 suspected OSA patients during the period of their clinical practice had the most positive attitude (B = 2.288, 95% CI: 0.296 to 4.279, $p = .024$) (Table 7).

Although multivariate analysis demonstrated that attitude score had no significant correlation with professional title ($p = .720$), univariable analysis showed a significant correlation, with dental students having a more positive attitude toward OSA than specialists and general dentists, respectively ($p = .000$). Figure 2 presents the percentage distribution of the attitude scores among senior dental students, general dentists, and specialists toward OSA.

In addition, multivariate analysis showed that attitude score had no significant correlation with age ($p = .938$), sex (0.075), years of practice ($p = .532$), or workplace sector ($p = .096$) (Table 7).

Discussion

The prevalence of OSA is frequently underestimated, and it is an underdiagnosed problem [43,44]. Serious health problems may arise if OSA is not diagnosed and treated.

As dentists are frequently the first line of detection and treatment for the general population, they are more likely to become the first point of contact, identify possible OSA or other sleep problems, refer patients to the right physicians, or manage these patients with oral appliances [45]. This study aimed to evaluate the level, and the factors associated with OSA-related knowledge and attitude among senior dental students, general dental practitioners, and specialists in Palestinian Authority; and to the authors' knowledge, this is the first study in Palestinian Authority assessing those

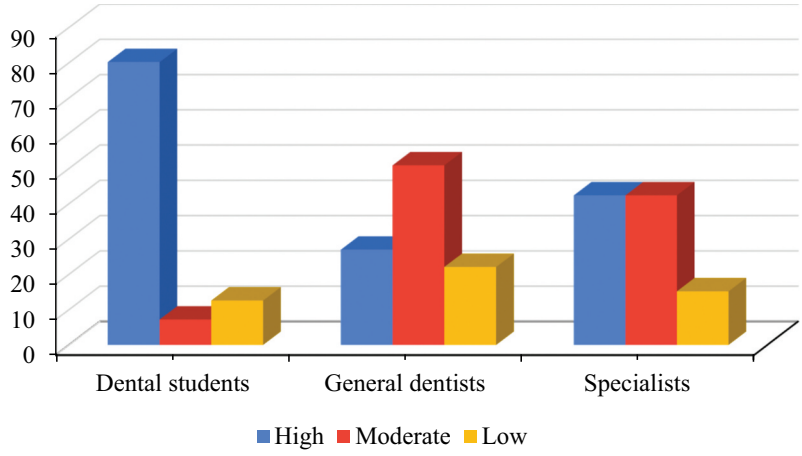

Figure 1. Percentage distribution of the knowledge scores among senior dental students, general dentists, and specialists about OSA. About 80% of senior dental students, 42% of specialists, and 27% of general dentists had a high level of knowledge about OSA.

Table 6. Sources of knowledge about OSA among participants ($N = 585$).

Source	N (%)
Medical lectures	153 (26.2)
Classrooms and textbooks	84 (14.4)
Academic conference	27 (4.6)
Medical literature and journals	119 (20.3)
University training programs	20 (3.4)
Internet	116 (19.8)
Television	1 (0.2)
Others	65 (11.1)

Table 7. Findings of univariable and multivariable GEE regression analyses for total attitude score ($N = 585$).

	Univariable analysis			Multivariable analysis		
Variable	B	95% CI	P-value*	B	95% CI	P-value*
Age						
≤30 years	0.86	(0.248, 1.472)	**0.006**	−0.049	(−1.291, 1.193)	0.938
> 30 years	Reference			Reference		
Sex						
Female	0.763	(0.211, 1.316)	**0.007**	0.464	(−0.047, 0.975)	0.075
Male	Reference			Reference		
Professional title			**0.000**			0.720
Dental students	0.546	(−0.407, 1.499)	0.262	−0.487	(−1.708, 0.734)	0.434
General dentists	−0.871	(−1.807, 0.064)	0.068	−0.153	(−1.089, 0.783)	0.102
Specialists	Reference			Reference		
Workplace sector			**0.000**			0.096
Public clinic/university	1.87	(1.042, 2.698)	**0.000**	0.494	(−0.466, 1.454)	0.313
Private clinic	−0.294	(−1.08, 0.492)	0.464	−0.600	(−1.780, 0.579)	0.318
Both	0.679	(−0.364, 1.722)	0.202	0.100	(−1.176, 1.377)	0.878
Don't work	Reference			Reference		
Years of practice			**0.001**			0.532
≤5 years	0.831	(0.015, 1.648)	0.046	0.309	(−0.663, 1.281)	0.389
5–10 years	−0.402	(−1.431, 0.626)	0.443	−0.126	(−1.588, 1.336)	**0.029**
11–20 years	0.033	(−1.008, 1.074)	0.95	0.222	(−1.541, 1.986)	0.061
> 20 years	−1.112	(−2.534, 0.31)	0.125	−0.753	(−2.732, 1.226)	0.556
Don't work	Reference			Reference		
Consultation/referral for OSA patients			**0.003**			**0.010**
0	Reference			Reference		
1–5	1.109	(0.468, 1.750)	**0.001**	0.895	(0.296, 1.494)	**0.003**
6–10	0.855	(−0.936, 2.647)	0.349	0.940	(−0.715, 2.596)	0.266
11–20	2.105	(−1.206, 5.417)	0.213	−0.2.232	(−0.883, 5.348)	0.160
> 20	2.155	(0.046, 4.265)	**0.045**	2.288	(0.296, 4.279)	**0.024**
Total knowledge score	0.132	(0.259, 0.364)	**0.000**	0.264	(0.201, 0.326)	**0.000**

GEE. generalized estimating equations. *P-value in bold is statistically significant (< 0.05).

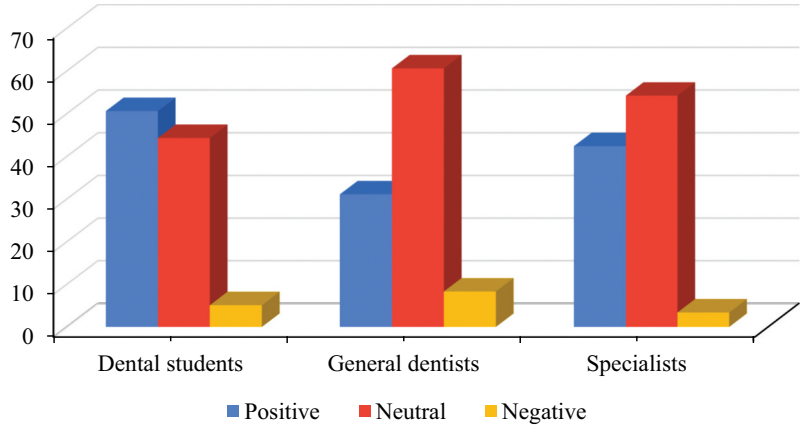

Figure 2. Percentage distribution of the attitude scores among senior dental students, general dentists, and specialists toward OSA. About 51% of senior dental students, 42% of specialists, and 31% of general dentists had a positive attitude toward OSA.

parameters. The findings revealed that the participants had a moderate inadequate level of knowledge about OSA with a mean score of 17.9 out of a total of 23, and a neutral attitude regarding OSA patients' referrals and confidence in their management with a mean score of 21.49 out of 28.

Due to the disparate questionnaire designs utilized in the previous worldwide studies, and due to the lack of comparable studies on OSA-related knowledge and attitude among dental students, general dentists, and specialists in Palestinian Authority, it was not feasible to directly compare the current findings with those of earlier studies. However, the findings of the current study could be comparable to those of recent research [33] that assessed OSA-related knowledge and attitude among dental students, general dentists, and orthodontic residents in Iran. It demonstrated that the participants had a moderate inadequate level of knowledge about OSA with an overall knowledge score of 15.99 out of 23, and general dentists and dental students revealed a neutral attitude toward OSA [33]. Other studies conducted on Saudi general dental practitioners and specialists [31], Malaysian dental practitioners [35], US pre-doctoral dental students of one university [37], and US oral and maxillofacial surgeons' residents [32], also revealed an inadequate level of OSA-related knowledge with an average score of 9.86 out of 20, 9 out of 18, 10.6 out of 18, and 10.38 out of 18, respectively. The above findings imply that there are considerable gaps in the knowledge levels about OSA among dental practitioners worldwide. This highlights the critical need to improve education and awareness about this important medical condition in the dental community in a way that ensures timely detection, diagnosis, referral and management of OSA.

In this study, only nearly half of the respondents (52.1%) expressed their confidence to use any of the OSA screening tools to identify patients at risk or to fabricate an oral appliance (48.2%) for a mild or moderate OSA case in their practice. These results agree with research findings involving dental and dental hygiene students that revealed there was little classroom-based education about sleep disorders and a possible lack of dental graduates' knowledge regarding the usage of oral appliance therapy for OSA patients [28,46]. This is a regrettable situation because it has been shown that oral appliance therapy is effective for patients with mild to moderate OSA and for severe OSA patients who do not respond to or could not tolerate CPAP therapy [14]. Recently, a toolkit known as STAB (Standardized Tool for the Assessment of Bruxism) has been launched and become available to dental professionals. This tool, which is the first multidimensional system for the evaluation of bruxism, also contains screening for sleep disorders like OSA [47].

Regarding the factors that were associated with knowledge and attitude level, senior dental students revealed a higher knowledge level and a more positive attitude in comparison with specialists and general dentists, respectively. This is in contrary to the findings of other studies where Shekarian et al. [33] indicated that there was no significant difference in knowledge scores between Iranian senior dental students and general dentists, and Shafiee et al. [30] who revealed that specialists generally had a higher level of knowledge than students. The authors reported that OSA is not included in the undergraduate dental programs in Iran [33]; however, OSA is recently introduced in the undergraduate dental educational curriculum to be 2.5 contact hours in our institution. This factor besides the issue that there are no postgraduate continuous educational programs on OSA in

Palestinian Authority could justify the higher level of knowledge and attitude of senior dental students compared with general dentists and specialists in our study. Though we did not assess the effect of university from which the dental practitioners graduated on the knowledge level, the inadequate level of OSA-related knowledge among Palestinian dental practitioners who graduated from a diversity of national and international universities, points to the inadequacy of dental educational curricula concerning dental sleep medicine worldwide and to the deficiency in continuous educational programs for dental practitioners.

In addition, our findings demonstrated that participants working in public clinics and/or universities exhibited a higher knowledge level about OSA than those working in private clinics, in contrast with the results of a previous study conducted in Iran [33]. This result could be explained by the issue that Palestinian practitioners working in universities or public sectors are usually more exposed to continuous educational lectures concerning different topics including sleep- related disorders, in contrast to those working in private sectors.

Furthermore, this investigation showed that respondents who were more knowledgeable about OSA and who referred more suspected OSA patients during their clinical practice (> 20), had a more positive attitude regarding OSA patients' referrals and more confidence in their management. This implies that dental practitioners' willingness to refer OSA patients and their confidence in managing those patients are reliant on their level of OSA-related knowledge, consistent with the findings of prior studies [31,34].

Nonetheless, the current study did not find a significant correlation between knowledge or attitude level and participants' age or years of clinical practice. Similar findings were reported by Sawan et al. [48], who found no significant difference in knowledge score based on age or years of clinical practice. In contrast, Shekarian et al. [33] reported a negative correlation since dentists with one to three years of clinical experience revealed a higher knowledge level compared to those with more than five years of clinical experience.

Concerning the relation between participants' sex and knowledge or attitude level, this study also found no significant correlation, in agreement with results of prior studies [31,33,37].

The majority of the dental practitioners and senior students in this study concurred that they require additional education regarding OSA issues. This can be achieved by adding more training courses and including more OSA-related material in universities' curricula, as suggested by several earlier studies [28,31,34].

Examining the knowledge and attitude of dental practitioners toward OSA is crucial as they must take the lead in timely detection and referral of patients at risk of OSA. To prevent more severe OSA complications and lessen the future concern on the patient's physical, mental, and financial well-being as well as the healthcare system, dental practitioners' understanding about OSA is essential. On the other hand, the insufficient OSA-related knowledge could lead to unjustified and even harmful overtreatment of the patients. Since OSA arises from intricate interaction between anatomical and non-anatomical elements, dental specialists – primarily orthodontists – should not assume that specific craniofacial features alone are sufficient to cause this critical disorder. Further, there is currently insufficient scientific evidence to support that early orthodontic interventions in young children (aged 2–3 years), such as myofunctional therapy, maxillary expansion and/or growth modification of the maxilla and/or mandible, could alleviate OSA signs or symptoms or prevent OSA from occurrence in the future. Employing unproven management approaches at all costs raises serious ethical issues, as it can mislead families and infringe upon appropriate professional boundaries. The responsibility of orthodontists is to make the timely referral of their patients to the proper medical professional once an issue is detected [49].

In the same context, orofacial pain and TMD management should rely on conservative protocols involving a combination of pain control, self-management, and psychosocial support [50]; rather than utilizing the "third pathway" of irreversible dental and surgical procedures that rely on outdated ideas regarding occlusal imbalances and jaw misalignments, as Greene and Manfredini have stated [50]. Therefore, OSA, bruxism, and TMD/orofacial pain patients must be protected from mis- and over-treatment by filling the gap between research findings and clinical practice [47,49].

While this study is pioneering in assessment of OSA-related knowledge and attitude among dental students and dental practitioners in Palestinian Authority where such data are scarce, caution should be exercised when considering the results due to some noteworthy limitations. First, the study's cross-sectional design and the use of self-reported questionnaire-methods are frequently criticized for their vulnerability to recall bias and subjective responses. Second, the use of snowball sampling could lead to biased samples and to the challenge in determining the statistical significance of the obtained findings. Third, the distribution of the survey online, coupled with the unsupervised nature of administration, introduced the possibility that participants could

have consulted external resources, such as the internet including artificial intelligence, to formulate their responses. This behavior could lead to an inflation of the perceived knowledge levels among the participants rather than an accurate assessment. Fourth, even though the sample number was higher than what the priori sample size calculation called for, we would have had more power to evaluate differences across subgroups if we had had more respondents. Lastly, the findings related to senior dental students are inherently specific to our institution and are influenced by the current curricular content, thereby limiting their applicability to other educational contexts.

Conclusion

The current investigation revealed that dental practitioners in Palestinian Authority had insufficient knowledge about OSA and a neutral attitude regarding OSA patients' management and referrals. However, they are willing to learn more about OSA. The participants' willingness to manage and refer OSA patients and their confidence in treating such patients were associated with their level of OSA-related knowledge. These findings point to the need for revision of predoctoral and postdoctoral curricula in Palestinian dental schools to include more uniform education about sleep medicine. Moreover, continuous education and training programs for dental practitioners to properly recognize and refer such patients are needed.

Acknowledgments

The authors would like to thank Dr Maryam Fasfous (Lecturer, Department of Data and Statistics, Polytechnic University, Hebron, Palestinian Authority) who did the statistical analysis.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

The author(s) reported there is no funding associated with the work featured in this article.

References

[1] Ali D, Qureshi S, Siddiqui H, et al. Rising cardiovascular mortality among obstructive sleep apnea patients: United States epidemiological trends (1999–2019). Heart Lung. 2025 Mar-Apr;70:271–277. doi: 10.1016/j.hrtlng.2025.01.005

[2] Yeghiazarians Y, Jneid H, Tietjens JR, et al. Obstructive sleep apnea and cardiovascular disease: a scientific statement from the American heart association. Circulation. 2021 Jul 20;144(3):e56–e67. doi: 10.1161/CIR.0000000000000988

[3] DiCaro MV, Lei K, Yee B, et al. The effects of obstructive sleep apnea on the cardiovascular system: a comprehensive review. J Clin Med. 2024 May 30;13(11):3223. doi: 10.3390/jcm13113223

[4] Aljawadi MH, Khoja AT, BaHammam AS, et al. Determining the prevalence of symptoms and risk of obstructive sleep apnoea among old Saudis. J Taibah Univ Med Sci. 2021;16(3):402–412. doi: 10.1016/j.jtumed.2020.10.024

[5] Jokubauskas L, Pileičikienė G, Žekonis G, et al. Lithuanian dentists' knowledge, attitudes, and clinical practices regarding obstructive sleep apnea: a nationwide cross-sectional study. Cranio. 2019 Jul;37(4):238–245. doi: 10.1080/08869634.2018.1437006

[6] Senaratna CV, Perret JL, Lodge CJ, et al. Prevalence of obstructive sleep apnea in the general population: a systematic review. Sleep Med Rev. 2017;34:70–81. doi: 10.1016/j.smrv.2016.07.002

[7] Behrents RG, Shelgikar AV, Conley RS, et al. Obstructive sleep apnea and orthodontics: an American Association of orthodontists white paper. Am J Orthod Dentofacial Orthop. 2019;156(1):13–28.e1. doi: 10.1016/j.ajodo.2019.04.009

[8] Benjafield AV, Ayas NT, Eastwood PR, et al. Estimation of the global prevalence and burden of obstructive sleep apnoea: a literature-based analysis. Lancet Respir Med. 2019;7(8):687–698. doi: 10.1016/S2213-2600(19)30198-5

[9] Kharoubi A. Sleep disorders and excessive daytime sleepiness in the Palestinian population. Neurosciences (Riyadh). 2004;9(1):46–48.

[10] Khasawneh L, Al Mortadi N, Abu-Ishqair E, et al. Cone beam computed tomography changes upon oral appliance therapy for adult patients with obstructive sleep apnea: a non-randomized clinical trial. Medicine (Baltimore). 2024 Oct 4;103(40):e39923. doi: 10.1097/MD.0000000000039923

[11] Portier F, Portmann A, Czernichow P, et al. Evaluation of home versus laboratory polysomnography in the diagnosis of sleep apnea syndrome. Am J Respir Crit Care Med. 2000;162(3 Pt 1):814–818. doi: 10.1164/ajrccm.162.3.9908002

[12] Kaleelullah RA, Nagarajan PP. Cultivating lifestyle transformations in obstructive sleep apnea. Cureus. 2021 Jan 26;13(1):e12927. doi: 10.7759/cureus.12927

[13] Li H, Pan Y, Lou Y, et al. The effects of continuous positive airway pressure therapy for secondary cardiovascular prevention in patients with obstructive sleep apnea: a systematic review and meta-analysis. Rev Cardiovasc Med. 2022 May 27;23(6):195. doi: 10.31083/j.rcm2306195

[14] Mogell K, Blumenstock N, Mason E, et al. Definition of an effective oral appliance for the treatment of obstructive sleep apnea and snoring: an update for 2019. J Dent Sleep Med. 2019;6(3):6. doi: 10.15331/jdsm.7090

[15] Lobbezoo F, Lavigne GJ, Kato T, et al. The face of dental sleep medicine in the 21st century. J Oral Rehabil. 2020 Dec;47(12):1579–1589. doi: 10.1111/joor.13075
[16] Ramar K, Dort LC, Katz SG, et al. Clinical practice guideline for the treatment of obstructive sleep apnea and snoring with oral appliance therapy: an update for 2015. J Clin Sleep Med. 2015 Jul 15;11(7):773–827. doi: 10.5664/jcsm.4858
[17] Bixler EO, Vgontzas AN, Lin HM, et al. Sleep disordered breathing in children in a general population sample: prevalence and risk factors. Sleep. 2009 Jun;32(6):731–736. doi: 10.1093/sleep/32.6.731
[18] Huynh NT, Desplats E, Almeida FR. Orthodontics treatments for managing obstructive sleep apnea syndrome in children: a systematic review and meta-analysis. Sleep Med Rev. 2016;25:84–94. doi: 10.1016/j.smrv.2015.02.002
[19] Tsuda H, Almeida FR, Tsuda T, et al. Cephalometric calcified carotid artery atheromas in patients with obstructive sleep apnea. Sleep Breath. 2010;14(4):365–370. doi: 10.1007/s11325-009-0324-9
[20] Chen H, Aarab G, de Ruiter MH, et al. Three-dimensional imaging of the upper airway anatomy in obstructive sleep apnea: a systematic review. Sleep Med. 2016;21:19–27. doi: 10.1016/j.sleep.2016.01.022
[21] Al-Jewair TS, Al-Jasser R, Almas K. Periodontitis and obstructive sleep apnea's bidirectional relationship: a systematic review and meta-analysis. Sleep Breath. 2015;19(4):1111–1120. doi: 10.1007/s11325-015-1160-8
[22] Bozic J, Galic T, Supe-Domic D, et al. Morning cortisol levels and glucose metabolism parameters in moderate and severe obstructive sleep apnea patients. Endocrine. 2016 Sep;53(3):730–739. doi: 10.1007/s12020-016-0925-6
[23] Heidsieck DS, de Ruiter MH, de Lange J. Management of obstructive sleep apnea in edentulous patients: an overview of the literature. Sleep Breath. 2016;20(1):395–404. doi: 10.1007/s11325-015-1285-9
[24] Camacho M, Liu SY, Certal V, et al. Large maxillomandibular advancements for obstructive sleep apnea: an operative technique evolved over 30 years. J Craniomaxillofac Surg. 2015;43(7):1113–1118. doi: 10.1016/j.jcms.2015.05.015
[25] American Dental Association. Proposed policy statement on the role of dentistry in the treatment of sleep-related breathing disorders. 2017. p. 5–6.
[26] Addy N, Bennett K, Blanton A, et al. Policy statement on a dentist's role in treating sleep-related breathing disorders. J Dent Sleep Med. 2018;5(1):25–26. doi: 10.15331/jdsm.6920
[27] Bian H. Knowledge, opinions, and clinical experience of general practice dentists toward obstructive sleep apnea and oral appliances. Sleep Breath. 2004;8(2):85–90. doi: 10.1055/s-2004-829633
[28] Vuorjoki-Ranta TR, Lobbezoo F, Vehkalahti M, et al. Treatment of obstructive sleep apnoea patients in community dental care: knowledge and attitudes among general dental practitioners and specialist dentists. J Oral Rehabil. 2016;43(12):937–942. doi: 10.1111/joor.12441
[29] Swapna LA, Alotaibi NF, Falatah SA, et al. Knowledge of obstructive sleep apnea among dental fraternity in Riyadh. Open Access Maced J Med Sci. 2019;7(15):2508–2512. doi: 10.3889/oamjms.2019.654
[30] Shafiee S, Sofi-Mahmudi A, Behnaz M, et al. Knowledge and attitude of Iranian dental students and specialists about obstructive sleep apnea. J Dent Sch. 2021;38(1):25–30. doi: 10.22037/jds.v38i1.26015
[31] Alzahrani MM, Alghamdi AA, Alghamdi SA, et al. Knowledge and attitude of dentists towards obstructive sleep apnea. Int Dent J. 2022;72(3):315–321. doi: 10.1016/j.identj.2021.05.004
[32] Chadha S, Inglehart MR, Shelgikar A, et al. OMS residents' obstructive sleep apnea-related education, knowledge, and professional behavior: a national survey. J Dent Educ. 2023;87(4):441–453. doi: 10.1002/jdd.13146
[33] Shekarian M, Feizbakhsh M, Rafie M. Knowledge and attitude of general dentists, senior dental students, and orthodontic residents toward obstructive sleep apnea. Clin Exp Dent Res. 2024;10(5):e931. doi: 10.1002/cre2.931
[34] Lin L, Zhao T, Ngan P, et al. Obstructive sleep apnea-related knowledge, attitude, experience, and behaviors among orthodontic professionals: a survey. Sleep Breath. 2023;27(6):2361–2369. doi: 10.1007/s11325-023-02852-x
[35] Eusufzai SZ, Then BYK, Jamayet NB, et al. Knowledge and attitude regarding obstructive sleep apnoea among medical and dental practitioners working in North-Eastern Peninsular Malaysia: a comparative cross-sectional study. Work. 2024;79(3):1465–1475. doi: 10.3233/WOR-220174
[36] Talaat W, AlRozzi B, Kawas SA. Sleep medicine education and knowledge among undergraduate dental students in Middle East universities. CRANIO®. 2016;34(3):163–168. doi: 10.1179/2151090315Y.0000000019
[37] Hsu M, Alessandri-Bonetti A, Alabsy M, et al. Knowledge and awareness of obstructive sleep apnea among dental students. J Dent Sleep Med. 2025;12(1). doi: 10.15331/jdsm.7368
[38] Eysenbach G. Improving the quality of web surveys: the checklist for reporting results of internet E-Surveys (CHERRIES). J Med Internet Res. 2004;6(3):e34. doi: 10.2196/jmir.6.3.e34
[39] Raosoft [Internet]. Sample size calculator. Seattle (WA): Raosoft; 2004 [cited 2025 Jan 25]. p. c1996–2011. Available from: http://www.raosoft.com/samplesize.html
[40] Schotland HM, Jeffe DB. Erratum to "development of the obstructive sleep apnea knowledge and attitudes (OSAKA) questionnaire" [sleep medicine 4 (2003) 443–450]. Sleep Med. 2008 Aug;9(6):705. Sleep Med. 2003;4(5):443–450. doi:10.1016/j.sleep.2008.02.004
[41] Tavakol M, Dennick R. Making sense of Cronbach's alpha. Int J Med Educ. 2011;2:53–55. Published 2011 Jun 27. doi:10.5116/ijme.4dfb.8dfd
[42] Bloom BS. Learning for mastery. Instruction and curriculum. Regional education laboratory for the Carolinas and Virginia, topical papers and reprints, number 1. Eval Comment. 1968;1(2):12.
[43] Fuhrman C, Fleury B, Nguyên XL, et al. Symptoms of sleep apnea syndrome: high prevalence and underdiagnosis in the French population. Sleep Med. 2012;13(7):852–858. doi: 10.1016/j.sleep.2012.04.005
[44] Lorenzi-Filho G, Genta PR, Drager LF. Are we missing obstructive sleep apnea diagnosis? Rev Port Pneumol. 2017;23(2):55–56. doi: 10.1016/j.rppnen.2017.01.003

[45] Smith HA, Smith ML. The role of dentists and primary care physicians in the care of patients with sleep-related breathing disorders. Front Public Health. 2017 Jun 15;5:137. doi: 10.3389/fpubh.2017.00137

[46] Reibel YG, Pusalavidyasagar S, Flynn PM. Obstructive sleep apnea knowledge: attitudes and screening practices of Minnesota dental hygienists. J Dent Hyg. 2019;93(3):29–36.

[47] Manfredini D, Ahlberg J, Aarab G, et al. Standardised tool for the assessment of bruxism. J Oral Rehabil. 2024;51(1):29–58. doi: 10.1111/joor.13411

[48] Sawan N, Bakhsh H, Aldossary M, et al. Obstructive sleep apnea awareness among dentists in Saudi Arabia: a cross-sectional study. Cureus. 2023;15(3):e36463. doi: 10.7759/cureus.36463

[49] Kandasamy S. Obstructive sleep apnea and early orthodontic intervention: how early is early? Am J Orthod Dentofacial Orthop. 2024 May;165(5):500–502. doi: 10.1016/j.ajodo.2023.12.005

[50] Greene CS. "The emperor's new clothes" - reflections on the ethics of second opinions in the TMD field. Cranio. 2025;43(2):173–174. doi: 10.1080/08869634.2024.2397326

Appendix 1: Questionnaire

Section A: Demographics

- Age *

  Mark only one oval.
  ○ 20 – 30
  ○ 31 – 40
  ○ 41 – 50
  ○ > 50

- Sex *

  Mark only one oval.
  ○ Male
  ○ Female

- . Professional clinical work experience: *

  Mark only one oval.
  ○ ≤ 5 years
  ○ 5-10 years
  ○ 11-20 years
  ○ >20 years
  ○ Don't work

- Workplace sector: *

  Mark only one oval.
  ○ Public clinic/ university
  ○ Private clinic
  ○ Both
  ○ Don't work

- Professional title: *

  Mark only one oval.
  ○ Senior dental student
  ○ General dentist
  ○ Orthodontist
  ○ Pediatric Dentist
  ○ Endodontist/Restorative Dentist
  ○ Prosthodontist
  ○ Surgeon
  ○ Periodontist
  ○ Oral medicine/ oral pathology specialist

- How many times have you referred/ consulted with physicians for a suspected patient with obstructive sleep apnea (OSA) in your practice? *

  Mark only one oval.
  ○ 0
  ○ 1-5
  ○ 6-10
  ○ 11-20
  ○ > 20

Section B: Knowledge of obstructive sleep apnea (OSA)

- Obstructive sleep apnea (OSA) is described as frequent episodes of partial or complete obstruction of the upper

  airway during sleep for more than 10 seconds with accompanied respiratory efforts. *

Mark only one oval.
○ True
○ False
○ Don't know

- Children can also suffer from OSA. *

Mark only one oval.
○ True
○ False
○ Don't know

- The gold standard of OSA diagnosing is polysomnography. *

Mark only one oval.
○ True
○ False
○ Don't know

- The loss of upper airway muscle tone during the sleep cycle contributes to the pathogenesis of OSA. *

Mark only one oval.
○ True
○ False
○ Don't know

- OSA is more common in adults with high body mass index (BMI). *

Mark only one oval.
True
False
Don't know

- OSA is more common in women than in men among adults. *

Mark only one oval.
○ True
○ False
○ Don't know

- OSA is seen more in people younger than 40 years. *

Mark only one oval.
○ True
○ False
○ Don't know

- OSA is common in people with short and wide neck. *

Mark only one oval.
○ True
○ False
○ Don't know

- Tongue size is relevant regarding OSA. *

Mark only one oval.
○ True
○ False
○ Don't know

- The most common cause of OSA in children is the presence of large tonsils and adenoids. *

Mark only one oval.
○ True
○ False
○ Don't know

- OSA leads to sleep fragmentation and hypoxia. *

Mark only one oval.
○ True
○ False
○ Don't know

- OSA patients usually complain of loud snoring and/or breathing interruption during sleep (observed apnea). *

Mark only one oval.
○ True
○ False
○ Don't know

- Some OSA patients complain of fatigue, daytime sleepiness, or morning headaches. *

Mark only one oval.
○ True
○ False
○ Don't know

- Some orofacial pain and bruxism are linked to OSA. *

Mark only one oval.
○ True
○ False
○ Don't know

- Patients with OSA may have symptoms of mouth breathing. *

Mark only one oval.
○ True
○ False
○ Don't know

- Untreated OSA is associated with an increased risk of systemic hypertension, mortality (heart attack or stroke),

or automobile accidents. *
Mark only one oval.
○ True
○ False
○ Don't know

- Growth retardation is a common complication of OSA in children. *

Mark only one oval.
○ True
○ False
○ Don't know

- Type 2 diabetes mellitus may be linked to OSA. *

Mark only one oval.
○ True
○ False
○ Don't know

- Continuous positive airway pressure (CPAP) is the gold-standard treatment for mild, moderate, and severe

obstructive sleep apnea in adults. *
Mark only one oval.
○ True
○ False
○ Don't know

- Oral appliances can be used to treat mild and moderate OSA patients in adults. *

Mark only one oval.
○ True
○ False
○ Don't know

- Dentists are responsible for OSA cases diagnosis. *

Mark only one oval.
○ True
○ False
○ Don't know

- The dentist's role is to refer potential patients who are at high risk of OSA to a sleep physician. *

Mark only one oval.
○ True
○ False
○ Don't know

Dentists could prescribe oral appliances to treat mild and moderate OSA patients without referral to sleep

physicians. *
Mark only one oval.
○ True
○ False
○ Don't know

- What are the sources of your obstructive sleep apnea -related knowledge? *

Mark only one oval.
○ Medical lectures
○ Classrooms and textbooks
○ Academic conference
○ Medical literature and journals
○ University training programs
○ Internet
○ Television
○ Others
Section C: Participant's attitude toward obstructive sleep apnea (OSA)

- It is important for dentists to have knowledge of OSA as a clinical disorder. *

Mark only one oval.
○ Strongly agree
○ Agree
○ Neither agree nor disagree
○ Disagree
Strongly disagree

- Dentists should screen all patients for possible OSA. *

Mark only one oval.

○ Strongly agree
○ Agree
○ Neither agree nor disagree
○ Disagree
○ Strongly disagree

- I am confident to use any of the OSA screening tools to identify patients at risk. *

Mark only one oval.
○ Strongly agree
○ Agree
○ Neither agree nor disagree
○ Disagree
○ Strongly disagree

- Dentists should refer potential patients with high OSA risk to sleep or related disciplines clinician. *

Mark only one oval.
○ Strongly agree
○ Agree
○ Neither agree nor disagree
○ Disagree
○ Strongly disagree

- If a sleep physician referred a mild or moderate OSA case to my clinic, I am confident to fabricate an oral

appliance. *
Mark only one oval.
○ Strongly agree
○ Agree
○ Neither agree nor disagree
○ Disagree
○ Strongly disagree

- For children potentially with OSA, I would recommend them to ask otolaryngologist for further examination and treatment. *

Mark only one oval.
○ Strongly agree
○ Agree
○ Neither agree nor disagree
○ Disagree
○ Strongly disagree

- I need further education about OSA. *

Mark only one oval.
○ Strongly agree
○ Agree
○ Neither agree nor disagree
○ Disagree
○ Strongly disagree