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**R Kesavan**  
Professor, Department of Public Health Dentistry, Thai Moogambigai Dental College and Hospital, Dr. MGR Educational and Research Institute, Chennai, Tamil Nadu, India

**A Vinita Mary**  
Professor and HOD, Department of Public Health Dentistry, Thai Moogambigai Dental College and Hospital, Dr. MGR Educational and Research Institute, Chennai, Tamil Nadu, India

**D Ranjani**  
Lecturer, Department of Public Health Dentistry, Thai Moogambigai Dental College and Hospital, Dr. MGR Educational and Research Institute, Chennai, Tamil Nadu, India

**Uzra Khanam Y**  
Junior Resident, Department of Public Health Dentistry, Thai Moogambigai Dental College and Hospital, Dr. MGR Educational and Research Institute, Chennai, Tamil Nadu, India

**Vaishnavi S**  
Junior Resident, Department of Public Health Dentistry, Thai Moogambigai Dental College and Hospital, Dr. MGR Educational and Research Institute, Chennai, Tamil Nadu, India

**Vitharsana Mary S**  
Junior Resident, Department of Public Health Dentistry, Thai Moogambigai Dental College and Hospital, Dr. MGR Educational and Research Institute, Chennai, Tamil Nadu, India

**Corresponding Author:**  
**R Kesavan**  
Professor, Department of Public Health Dentistry, Thai Moogambigai Dental College and Hospital, Dr. MGR Educational and Research Institute, Chennai, Tamil Nadu, India

## Assessment of knowledge, attitude and practice about obstructive sleep apnea among dental health care providers and students: A cross sectional study

**R Kesavan, A Vinita Mary, D Ranjani, Uzra Khanam Y, Vaishnavi S and Vitharsana Mary S**

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### Abstract

**Background:** Obstructive sleep Apnea (OSA) is a prevalent sleep disorder with significant health implications. Dental healthcare providers and students, given their regular patient interactions, could play a crucial role in identifying and managing OSA. This study aims to assess the knowledge, attitudes, and practices regarding OSA among dental healthcare providers and students.

**Methodology:** A comprehensive cross-sectional study was conducted to evaluate the understanding, perspectives, and actions related to OSA among dental healthcare providers and students. Structured questionnaires were employed to collect data on knowledge about OSA causes, symptoms, and risk factors, as well as attitudes towards its significance and current practices in OSA screening and management. Data was analyzed using descriptive statistics

**Results:** 370 dental health care providers and students participated in the study. A significant majority of participants, comprising 76.8%, acknowledged poly somnography as the primary and most reliable method for diagnosing obstructive sleep apnea (OSA), and 80.5% expressed the belief that dental practitioners play a role in reaching the conclusive diagnosis.

**Conclusion:** This research underscores the need for targeted educational interventions and training programs for dental healthcare providers and students to enhance their practical knowledge and competencies in identifying and managing OSA. Improving the awareness and engagement of dental professionals in OSA care could contribute significantly to holistic patient well-being.

**Keywords:** Obstructive sleep apnea, dental healthcare providers, dental students, knowledge assessment, attitude evaluation, practice analysis

### Introduction

Obstructive sleep apnea (OSA) is a prevalent sleep disorder characterized by recurrent partial or complete cessation of breathing during sleep, often accompanied by loud snoring and fragmented sleep patterns [1]. It is a significant public health concern due to its association with various systemic conditions, including cardiovascular diseases, diabetes, and hypertension [2, 3]. Obstructive sleep apnea (OSA) is marked by the interruption of breathing for durations lasting 10 seconds or more. This interruption results from either full or partial blockage of the throat, leading to frequent awakenings throughout the sleep cycle and an increased propensity for daytime drowsiness [4]. While the role of medical professionals in identifying and managing OSA is well-established, the awareness and involvement of dental health care providers in this domain have gained increasing attention. Polysomnography (PSG) remains the established and definitive diagnostic method for confirming obstructive sleep apnea (OSA). This procedure entails recording sleep breathing patterns and oxygen saturation overnight. A diagnosis of OSA is typically made if the patient experiences at least five instances of apneas or hypopneas per hour, leading to sleep disruptions and a decrease in blood oxygen levels. A comprehensive clinical assessment, facilitated by a basic questionnaire, is instrumental in identifying the condition at its early stages, enabling effective patient management [5]. It wasn't until 2014 that guidelines for the diagnosis and management of OSA were established in India, following consistent discussions led by the Department of Health Research, Ministry of Health and

Family Welfare, Government of India, in collaboration with the Department of Medicine at All India Institute of Medical Sciences, New Delhi, and with the support of the Indian Council of Medical Research. Recently, there have been emerging courses in India designed to train dentists in the diagnosis and treatment of OSA [6]. Notably, the current undergraduate dental curriculum lacks specific learning objectives related to the screening and management of OSA. Dentists have a crucial role in recognizing, advising, referring, and treating individuals with OSA. Dental health care providers, including dentists and dental students, play a crucial role in recognizing signs and symptoms of OSA, as they often have regular interactions with patients and may observe oral manifestations associated with sleep-disordered breathing [7]. However, the extent of their knowledge, attitude, and practice regarding OSA remains an underexplored area. This study aims to assess and analyse the current landscape of awareness and engagement among dental health care providers and students in relation to obstructive sleep apnea. Understanding the knowledge base, attitudes, and practices of dental professionals and students towards OSA is essential for several reasons. First, early identification and referral of individuals with OSA can contribute to timely intervention and improved health outcomes. Second, dental professionals may have a unique vantage point to observe oral and craniofacial characteristics associated with sleep disorders. Third, integrating sleep health education into dental curricula can enhance the overall competency of future dental practitioners.

### Materials and Methods

This study adopted a cross-sectional approach to evaluate the knowledge, attitude, and practices concerning obstructive sleep apnea (OSA) among dental health care providers and students. The research spanned a five-month period, from July 2023 to October 2023, encompassing data collection, analysis, and report compilation. The investigation targeted dental students and oral health care providers in Chennai, with approval obtained from the Institutional Review Board of a private dental college in Chennai. A sample of 370 participants was selected through convenient sampling, and demographic details were recorded. The questionnaire, consisting of 25 questions assessing knowledge, attitude, and practice about OSA, was validated during the pilot study, demonstrating satisfactory consistency (Cronbach's alpha = 0.73). The first section of the questionnaire collected demographic information, while the second part focused on questions related to knowledge, practice and attitude of obstructive sleep apnea. Data collection utilized Google Forms distributed through social media platforms, particularly WhatsApp. Informed consent was obtained, assuring participants of the confidentiality and privacy of their information. Participants were encouraged to provide accurate responses. The collected data was encoded and analyzed using IBM SPSS Version 26 software. Cross tabulations were performed, and statistical significance was assessed using Pearson's Chi-square test.

### Results

The present study involved 370 participants, including dental students and healthcare providers. The average age of participants was 26.11 years, with 67% females and 37% males. Among them, 4.3% were BDS graduates, 10.5% were final year undergraduate students, 45.4% were house surgeons (CRR1), 20.3% were MDS graduates, and 19.5% were

postgraduate students. Work hours varied, with 48.9% working 3-6 hours a day [Table 1]. In terms of awareness, 76.5% knew the definition of obstructive sleep apnea (OSA), with a higher percentage of males (83.6%) compared to females (73%). Concerning the potential severity of OSA, 23.8% considered it life-threatening if untreated, while 61.6% believed it could cause systemic diseases. Most participants (76.8%) recognized polysomnography as the gold standard for OSA diagnosis, and 80.5% believed that dental practitioners contribute to the final diagnosis. Regarding treatment, 68.1% believed both sleep physicians and dentists can prescribe oral appliances for OSA patients. Seventy percent considered OSA common among both genders, and 83.2% identified snoring as a symptom of OSA. The majority (82.7%) acknowledged that OSA prevalence increases with age, and 86.2% recognized abnormal maxilla and mandibular development as a risk factor. Concerning opinions on continuous positive airway pressure (CPAP), 68.1% mentioned retroclination of maxillary incisors as a disadvantage. About treatment necessity, 64.9% believed mild OSA does not require treatment. Enlarged adenoids were identified as risk factors by 89.2% [Table 2]. Most participants (65.1%) agreed that dentists play a role in diagnosing and treating OSA, with 55.7% stating the importance of inquiring about patients' sleep patterns. Regarding education, 32.2% strongly agreed that dental curricula should include OSA information, and 50.5% agreed that OSA screening should be mandatory in clinical examinations. Over half (51.4%) agreed that dentists and sleep physicians should collaborate in dealing with OSA patients. Also, 52.4% agreed that dentists, upon encountering abnormal oral structures, should investigate and refer patients to sleep physicians [Table 3]. Observing tooth attrition, 82.2% asked about sleep history. Additionally, 59.7% screened patients for OSA with a history of snoring, and 48.4% referred patients with oral findings related to OSA to physicians. Only 20% fabricated oral appliances for OSA, while 21.9% attended courses on OSA management. Lastly, 88.6% expressed interest in attending courses on the dental management of sleep-related oral diseases [Table 4].

### Discussion

The study revealed that most participants, particularly males (83.6%), were familiar with the definition of obstructive sleep apnea (OSA). This contrasts with findings from other studies by Kale *et al.* [8] (60.71%), Bian *et al.* [9] (75%), and Manohar J *et al.* [10] (88%), where the awareness among dentists varied. In terms of recognizing polysomnography as the gold standard for OSA diagnosis, our study demonstrated a significant understanding (76.8%), while Kale *et al.* reported a lower awareness (40.18%). Regarding inquiring about sleep history after observing tooth attrition, our study showed a high percentage (82.2%), in contrast to Sawan *et al.*'s study where 58.89% of participants never asked about sleep history [11]. The perception of OSA prevalence among genders in our study was at 70%, without distinguishing a higher prevalence among males, which is a notable omission. Jokubauskas *et al.* [12] reported that 68.9% of dentists correctly identified the relationship between gender and OSA. In terms of the role of dentists in OSA diagnosis and treatment, our study found general agreement (65.1%), while Kale *et al.* [8] reported a higher percentage (96%) supporting a collaborative approach involving dentists and sleep physicians. The acknowledgment of the importance of inquiring about sleep patterns (55.7%) and investigating snoring and OSA in patients with bruxism (52.4%) aligns with findings from Zakaria *et al.* Concerning

education, our study highlighted a high interest (88.6%) in attending courses on the dental management of sleep-related oral diseases, emphasizing the importance of continuous learning [13]. In contrast, Kale *et al.* reported that only 10.71% of dentists attended extra courses on OSA management [8]. In 2012, Ivanoff *et al.* advocated for the readiness of dental graduates to identify individuals susceptible to obstructive sleep apnea (OSA) and to ensure they are adequately trained to educate the public on the factors contributing to OSA risk and preventive measures [14]. The study emphasized the role of qualified dentists in providing oral appliances for OSA, as per the guidelines from the American Academy of Dental Sleep Medicine. This underscores the perceived responsibility of dentists in contributing to the final diagnosis of OSA. In conclusion, the study underscores the need for enhanced education and awareness among dentists regarding OSA, as

well as the importance of their role in diagnosis and treatment. Addressing gaps in knowledge and promoting further education can contribute to better patient care and collaboration with other healthcare professionals in managing OSA.

**Conclusion**

In conclusion, the study provides valuable insights into the awareness, attitudes, and practices of dental students and healthcare providers regarding obstructive sleep apnea. The findings highlight both strengths and areas for improvement in the integration of sleep medicine into dental education and clinical practice. Further research and targeted educational interventions may help bridge the identified gaps and enhance the role of dentists in the comprehensive care of patients with sleep-related disorders.

**Table 1:** Distribution of Subjects Based on Demographic Details

		Mean	Standard deviation
Age	19-45	26.11	5.070
		Frequency (N)	Percentage (%)
Gender	Males	122	33.0
	Females	248	67.0
Qualification	BDS	16	4.3
	Final years	39	10.5
	Interns	168	45.4
	Post graduate students	75	20.3
	MDS students	72	19.5
Hours of Practice	3 – 6 hours	181	48.9
	Less than 3 hours	35	9.5
	More than 6 hours	79	21.4
	Not applicable	75	20.3
Total		370	100.0

**Table 2:** Awareness and Perspectives of Obstructive Sleep Apnea among Dental Professionals

Question	Options	Females N (%)	Males N (%)	P-Value
Are you aware of the definition of obstructive sleep apnea	<ul style="list-style-type: none"> <li>Cessation of airflow because of the increased collapsibility of upper airway only.</li> <li>Don't know</li> <li>Recurrent episodes of complete or partial obstruction of the upper airway during sleep.</li> <li>Respiratory sound generated in upper airway during sleep particularly deep sleep (slow wave) and REM sleep.</li> </ul>	42 (16.9) 19 (7.7) 181 (73.0) 6 (2.4)	15 (12.3) 0 (0.0) 102 (83.6) 5 (4.1)	.006*
What will happen if Obstructive sleep apnea is untreated?	<ul style="list-style-type: none"> <li>Cause systemic diseases.</li> <li>Don't know</li> <li>Life threatening</li> <li>Memory loss</li> <li>Psychological disorders</li> </ul>	145 (58.5) 11 (4.4) 59 (23.8) 14 (5.6) 19 (7.7)	83 (68.0) 2 (1.6) 29 (23.8) 6 (4.9) 2 (1.6)	.080
What do you think as the gold standard method for the diagnosis of OSA?	<ul style="list-style-type: none"> <li>Case history</li> <li>Don't know</li> <li>Polysomnography</li> <li>STOP questionnaire</li> </ul>	26 (10.5) 24 (9.7) 181 (73.0) 17 (6.9)	10 (8.2) 2 (1.6) 103 (84.4) 7 (5.7)	.023*
Do you think that dental practitioner contributes to final diagnosis of OSA?	<ul style="list-style-type: none"> <li>Don't know</li> <li>No</li> <li>Yes</li> </ul>	24 (9.7) 28 (11.3) 196 (79.0)	6 (4.9) 14 (11.5) 102 (83.6)	.287
Who can prescribe oral appliances for OSA patients?	<ul style="list-style-type: none"> <li>Both</li> <li>Dentist</li> <li>Don't know</li> <li>Sleep physician</li> </ul>	157 (63.3) 57 (23.0) 9 (3.6) 25 (10.1)	95 (77.9) 19 (15.6) 1 (0.8) 7 (5.7)	.031*
OSA is more common among?	<ul style="list-style-type: none"> <li>Don't know</li> <li>Equal prevalence in both the genders</li> <li>Females</li> </ul>	17 (6.9) 166 (66.9)	1 (0.8) 93 (76.2) 11 (9.0)	.037*

	<ul style="list-style-type: none"> <li>• Males</li> </ul>	33 (13.3) 32 (12.9)	17 (13.9)	
Is snoring a symptom seen amongst OSA patient?	<ul style="list-style-type: none"> <li>• Don't know</li> <li>• No</li> <li>• Yes</li> </ul>	21 (8.5) 25 (10.1) 202 (81.5)	3 (2.5) 13 (10.7) 106 (86.9)	.088
Does the prevalence of OSA increase with age?	<ul style="list-style-type: none"> <li>• Don't know</li> <li>• No</li> <li>• Yes</li> </ul>	29 (11.7) 23 (9.3) 196 (79.0)	4 (3.3) 8 (6.6) 110 (90.2)	.426
Abnormal maxilla and mandibular development can be a risk factor for OSA?	<ul style="list-style-type: none"> <li>• Don't know</li> <li>• No</li> <li>• Yes</li> </ul>	21 (8.5) 18 (7.3) 209 (84.3)	3 (2.5) 9 (7.4) 110 (90.2)	.087
Disadvantages of CPAP (continuous positive airway pressure) is that, it causes,	<ul style="list-style-type: none"> <li>• Don't know</li> <li>• Proclination of mandibular incisors</li> <li>• Proclination of maxillary incisors</li> <li>• Retroclination of maxillary incisors</li> </ul>	26 (10.5) 23 (9.3) 43 (17.3) 156 (62.9)	10 (8.2) 5 (4.1) 11 (9.0) 96 (78.7)	.017*
Which is not the correct choice of treatment For OSA?	<ul style="list-style-type: none"> <li>• Don't know</li> <li>• Mild OSA does not require treatment</li> <li>• Mild OSA treated with Oral appliance</li> <li>• Moderate to severe OSA treated with CPAP and Orthognathic surgeries</li> <li>• Severe OSA treated with oral Orthognathic surgeries</li> </ul>	24 (9.7) 145 (58.5) 30 (12.1) 37 (14.9) 12 (4.8)	5 (4.1) 95 (77.9) 3 (2.5) 9 (7.4) 10 (8.2)	.000*
Enlarged adenoids are the risk factors for OSA?	<ul style="list-style-type: none"> <li>• Don't know</li> <li>• No</li> <li>• Yes</li> </ul>	27 (10.9) 9 (3.6) 212 (85.5)	2 (1.6) 2 (1.6) 118 (96.7)	.004*

\* Statistically significant  
Pearson's Chi-square test

**Table 3:** Attitudes and Perspectives of Dental Professionals Regarding the Role of Dentistry in Obstructive Sleep Apnea (OSA) Diagnosis and Management

Question	Options	Females N (%)	Males N (%)	P-Value
Do you think that dentist plays a role in diagnosing and providing treatment for OSA?	Agree	158 (63.7)	83 (68.0)	.675
	Disagree	4 (1.6)	2 (1.6)	
	Neutral	38 (15.3)	13 (10.7)	
	Strongly agree	48 (19.4)	24 (19.7)	
Do you think it is important for the dentist to enquire about sleep pattern of his patients during history taking?	Agree	130 (52.4)	76 (62.3)	.297
	Disagree	9 (3.6)	6 (4.9)	
	Neutral	46 (18.5)	15 (12.3)	
	Strongly agree	62 (25.0)	25 (20.5)	
Do you think when dentist identifies bruxism habit in his patients, it is his role to enquire about snoring and OSA?	Agree	124 (50.0)	70 (57.4)	.189
	Disagree	6 (2.4)	1 (0.8)	
	Neutral	55 (22.2)	17 (13.9)	
	Strongly agree	61 (24.6)	34 (27.9)	
Do you think during under graduation the dental curriculum should include information about OSA and role of dentist in its management?	Agree	118 (47.6)	59 (48.4)	.925
	Disagree	5 (2.0)	2 (1.6)	
	Neutral	46 (18.5)	20 (16.4)	
	Strongly agree	78 (31.5)	41 (33.6)	
In your opinion, should OSA screening for a patient be a mandatory part of clinical examination for the dentists?	Agree	126 (50.8)	61 (50.0)	.262
	Disagree	6 (2.4)	3 (2.5)	
	Neutral	58 (23.4)	20 (16.4)	
	Strongly agree	56 (22.6)	38 (31.1)	
Do you think that Dentist and sleep physicians should deal together with OSA patients?	Agree	127 (51.2)	63 (51.6)	.704
	Disagree	6 (2.4)	2 (1.6)	
	Neutral	55 (22.2)	25 (20.5)	
	Strongly agree	57 (23.0)	32 (26.2)	
Do you think if the dentist encounters abnormal anatomical oral structures, then should he further investigate for OSA and refer the patient to sleep physician?	Agree	123 (49.6)	71 (58.2)	.471
	Disagree	8 (3.2)	2 (1.6)	
	Neutral	58 (23.4)	27 (22.1)	
	Strongly agree	58 (23.4)	22 (18.0)	

**Table 4:** Practices and Training of Dental Professionals in the Diagnosis and Management of Obstructive Sleep Apnea

Question	Options	Females N (%)	Males N (%)	P-Value
Have you ever asked your patient about sleep history after observing attrition of teeth in his mouth?	No	51 (20.6)	15 (12.3)	.051
	Yes	197 (79.4)	107 (87.7)	
Have you ever screened patient for OSA who has given history of snoring?	No	106 (42.7)	43 (35.2)	.167
	Yes	142 (57.3)	79 (64.8)	
Have you referred your patient to physician for sleep disordered diagnosis after noticing oral findings related to OSA?	No	127 (51.2)	64 (52.5)	.821
	Yes	121 (48.8)	58 (47.5)	
Have you ever fabricated any oral appliance for treating your patient with OSA?	No	196 (79.0)	100 (82.0)	.507
	Yes	52 (21.0)	22 (18.0)	
Have you ever attended any course on management of OSA patients?	No	191 (77.0)	98 (80.3)	.469
	Yes	57 (23.0)	24 (19.7)	
Would you be interested in attending course on dental management of sleep related oral diseases?	No	30 (12.1)	12 (9.8)	.519
	Yes	218 (87.9)	110 (90.2)	

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