

Dentists' Attitudes and Practices regarding Diagnosis and Treatment of Obstructive Sleep Apnea

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Abstract

Background: Obstructive sleep apnea (OSA) is a breathing disorder that affects almost 20% of the adult population worldwide. Undiagnosed or untreated OSA has a high mortality. Dentists can be the first healthcare workers to diagnose this condition.

Objective: This study explored the attitudes of dentists regarding OSA, and their management, referral, and treatment practices for OSA patients.

Methods: A cross-sectional survey was conducted among dentists working in different dental teaching hospitals in Islamabad, Pakistan, from September 2021 to March 2022. A pre-designed questionnaire was used to collect data, consisting of information including demography, and dentists' knowledge and practices regarding diagnosis, management and referral of OSA patients. The chi-square test was applied to check the association between dentists' participation in OSA management courses and their self-reported ability to identify OSA patients. The association between practitioners' designation and experience with attitude was also evaluated using chi square test.

Results: While 96.7% of participants knew about OSA, only 34% had confidence in their ability to identify high-risk OSA patients. Recognition of high-risk OSA patients was significantly associated with topic inclusion in the dental curriculum and attending additional courses on OSA management ($p < 0.05$). Around 9.3% of participants frequently encountered OSA patients, and 35.3% regularly inquired about sleep history. Most participants preferred referring patients to physicians for management.

Conclusion: Dentists in teaching hospitals of Islamabad have a positive attitude towards managing and referring OSA patients, however there is a need for enhanced education and training in sleep medicine.

Key words: Obstructive sleep apnea, sleep medicine, dental curriculum, sleep apnea.

Introduction

Sleep is fundamental in maintaining good health, as it profoundly impacts thinking,

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Authors Contribution

AS conceptualized the project. MS & SK did the data collection. AU performed the statistical analysis. RF did the literature search. Drafting, revision & writing of manuscript were done by SAK & SH.

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problem-solving skills, memory, and emotional regulation. Sleep quality can be compromised by obstructive sleep apnea (OSA), which may lead to poor judgment, excessive daytime sleepiness, fatigue, nocturia, headache, irritability and memory loss.¹

OSA is a breathing disorder characterized by repetitive partial or complete obstruction of the upper airway for more than 10 seconds, resulting in transient hypoxia and sleep disturbances.² Worldwide, around 10-20% of the adult population suffers with OSA while in Pakistan, its prevalence ranges from 10 to 12.4%.³ It has been associated with a higher risk of developing systemic diseases such as diabetes mellitus and cardiovascular disorders while also being responsible for metabolic disorders, depression, and roadside accidents.⁴

Therefore, it is considered “an unmet public health problem” as many OSA cases are undiagnosed.⁵ Polysomnography (PSG) is the gold standard for diagnosing OSA. It records overnight sleeping patterns and oxygen saturation.⁶ However, it is not readily available and requires trained physicians to operate. In this regard, primary healthcare workers, including dentists and general physicians, play a key role in the early diagnosis of OSA.⁷ According to LA Swapana *et al*, dentists are the primary resource for identifying patients at risk for sleep apnea, and they play a pivotal role in the management of OSA through early diagnosis, suggesting lifestyle modification, making referrals to sleep physicians, and, if required, treating patients with oral appliances.⁸ Similarly, Kale *et. al* observed that dentists had a positive attitude towards OSA, yet they lacked information on areas related to OSA screening, diagnosis, and treatment modalities.⁹

Most previous studies conducted on OSA have been performed among medical students and physicians, but limited studies have assessed the same among dental practitioners. The Behavioural Risk Factor Surveillance System (BRFSS) survey conducted in 2016 indicated that 69.6% of the US adult population reported visiting a dentist in the past year for routine dental care.⁵ Bruxism, TMJ pain and worn out occlusal surface of teeth are frequently present in patients with OSA, therefore, the dentist can be the first healthcare worker to diagnose unidentified OSA. Additionally, they play a vital role in preventing OSA by manipulating the growth and development of the growing children's facial and upper airway structure through orthodontic intervention. Hence, training a greater number of dentists to identify patients at risk for OSA is important for identifying and managing OSA at its various levels of complexity and helping mitigate treatment costs.⁵

This study aims to explore the attitudes of dentists regarding the management, referral and treatment of patients with obstructive sleep apnea presenting to teaching hospitals in Islamabad. It is hypothesized that while dental practitioners have basic knowledge about OSA, they may lack training to identify and manage such patients, due to limited education on sleep medicine during their predoctoral training. This study will serve as a guideline to encourage dental practitioners to update their knowledge and acquire the skills needed to identify and treat patients with OSA at an early stage, thus preventing life-threatening complications.

Methods

A cross-sectional survey using self-administered questionnaire was conducted among

house officers (HOs), postgraduate residents (PGRs), demonstrators, and specialists working in clinical disciplines of dentistry in Pakistan Medical and Dental Council (PMDC) approved dental colleges in Islamabad from September 2021 to March 2022. The “Human Resource Departments” of recognized dental colleges were contacted to obtain a list of their clinical dental faculty and PGRs. A total of 481 graduated dentists (168 house officers, 83 postgraduate residents, 150 demonstrators, and 80 specialists) were working in PMDC approved colleges of Islamabad during 2021. The estimated sample size of 215 was calculated using a Rao-soft calculator with a 95% confidence level, and a 5% margin of error based on ‘proportion of good knowledge found in 54% of recent medical graduates, obtained from published data.¹⁰ Probability proportion was used to adjust the sample size in each group.

The questionnaire was formulated by constructing a conceptual framework based on the literature review. It included 3 sections that queried the respondent's demographic information, attitudes, and practices regarding OSA. The attitude section consisted of seven questions, two related to awareness of OSA and the dentist's desire to update their knowledge of OSA, and the other five were scored on a 5-point Likert scale, ranging from strongly disagree to strongly agree. It recorded the dentist's perception regarding the role of the dentist in the diagnosis of OSA, the importance of recording patients' sleep patterns, OSA screening as part of the clinical examination, collaboration with other physicians for the management of the disease, and ordering investigations for patients with abnormal oral anatomical structures. The practice component of the questionnaire focused on dentists' ability to recognise patients with OSA, whether they took courses to improve their diagnosis and management skills, the frequency of patients encountered, and management techniques for suspected patients with OSA. The questionnaire was validated through a pilot study with 20 graduated dentists and the calculation of Cronbach's Alpha. The Cronbach's alpha value for the attitude section was 0.78.

The questionnaire was distributed among house officers (HOs), postgraduate residents (PGD), demonstrators, and specialists in the clinical departments of the respective institutes. It was assured that participants' confidentiality would be maintained by removing any unique identifier such as name or employee ID. Incompletely filled forms or incorrectly filled forms (more than one item has been selected to answer the question) were excluded. The data was analysed using IBM SPSS

Statistics. Chi-square test was used to determine the association between the ability of dentists to recognise high-risk OSA patients and whether they have covered the topic of sleep apnea in the dental curriculum or attended any course on the management of OSA patients. Similarly, the association of designation and experience of dental practitioners with attitude was evaluated, and a *p*-value of ≤ 0.05 was considered significant.

Results

The questionnaire was distributed among 215 dentists, including 36 specialists, 52 demonstrators, 40 postgraduate trainees, and 87 house officers (Table-1). Each group of dentists was given a proportional representation in the sample. Most of the participants had 1 year or less of experience, while 34.4% had more than 5 years.

Almost all participants (208, 96.7%) were aware of the term "sleep apnea". However, only 73 (34%) reported that they can identify high-risk OSA patients. Most of the participants (61%) had covered the management of sleep apnea in their dental curriculum (undergraduate/postgraduate), while 16 (7.4%) had attended courses on the management of patients with OSA. There was a statistically significant association between "recognition of high-risk OSA patient and sleep apnea management topic in dental curriculum *p*-value = 0.012" and "recognition of high-risk OSA patient and course on management of OSA patients *p*-value = 0.002" (Table-2). 20 (9.3%) participants reported seeing OSA patients frequently, 70 (32.6%) occasionally, and 125 (58.1%) never encountered a patient with OSA.

Upon observing attrition of teeth in the mouth of patients, 76 (35.3%) dentists reported following up on patients' sleep history at least 3-5 times a week, 100 (46.5%) participants reported asking occasionally (once a week), while 39 (18.1%) never asked for such information from the patients. The dentists were also asked about their preferred treatments for OSA patients (Figure). The most preferred practice for patients with sleep apnea was "refer to a physician".

Question-wise analysis was conducted for the attitude section, with responses recorded on a 5-point Likert scale from strongly disagree to strongly agree. The participants were more inclined to strongly agree, agree, or neutral, with fewer than 20% disagreeing with any of the attitude questions (Table-3). Therefore, for the analysis purpose, the responses "Strongly disagree" and "Disagree" were merged into one category "Disagree" and similarly, "Strongly agree" and "Agree" were merged into "Agree". Then each attitude question was analysed for any association with "Designation" and "Experience". A statistically significant association was found between the "Designation" and "Dentists play an important role in the final diagnosis of OSA", "OSA screening of patients must be a mandatory part of clinical examination for the dentists", and "Dentists and sleep physicians should deal together with OSA patients" (Table-4). No significant association was found between any of the attitudes and "Experience". 174 (80.9%) dentists expressed interest in updating their knowledge of sleep medicine by enrolling in a continuing dental education program.

Table 1: Demographic description of the participants. (n=215)

<i>Designation</i>	<i>f (%)</i>	<i>Clinical discipline</i>	<i>f (%)</i>
Specialist	36 (16.7)	On Rotation	86 (40)
Demonstrator	52 (24.2)	Oral and Maxillofacial surgery	13 (6)
Postgraduate Resident	40 (18.6)	Operative dentistry	45 (20.9)
House officer	87 (40.5)	Orthodontics	8 (3.7)
Experience (years)		Prosthodontics	22 (10.2)
≤ 1	88 (40.9)	Periodontology	15 (7)
2 – 5	53 (24.7)	Paedodontics	1 (0.5)
> 5	74 (34.4)	Oral medicine	25 (11.6)

Table 2: Recognition of high risk OSA patient.

<i>Practices</i>	<i>Responses</i>	<i>Recognition of high risk OSA patient</i>			<i>X² p-value</i>
		<i>Yes</i>	<i>No</i>	<i>Total</i>	
The topic of sleep apnea management in the dental curriculum	Yes	53 (40.5%)	78 (59.5%)	131 (61%)	0.012
	No	20 (23.8%)	64 (76.2%)	84 (39%)	
Attended any course on the management of OSA patients	Yes	11 (68.8%)	5 (31.3%)	16 (7.4%)	0.002
	No	62 (31.2%)	137 (68.8%)	199 (92.6%)	

Table 3: Responses for the attitude. (n=215)

Attitude	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Q1. Dentists play an important role in the final diagnosis of OSA.	12 (5.6%)	13 (6%)	75 (34.9%)	70 (32.6%)	45 (20.9%)
Q2. During history taking, the dentist needs to enquire about the sleep patterns of patients.	13 (6%)	23 (10.7%)	39 (18.1%)	85 (39.5%)	55 (25.6%)
Q3. OSA screening of patients must be a mandatory part of clinical examination for dentists.	14 (6.5%)	24 (11.2%)	87 (40.5%)	61 (28.4%)	29 (13.5%)
Q4. Dentists and sleep physicians should deal together with OSA patients.	18 (8.4%)	8 (3.7%)	52 (24.2%)	84 (39.1%)	53 (24.7%)
Q5. If a dentist encounters abnormal anatomical oral structures, he/she should further investigate for OSA and refer the	20 (9.3%)	10 (4.7%)	26 (12.1%)	76 (35.3%)	83 (38.6%)

Table 4: Association of designation and experience of dental practitioners with attitude. (n = 215)

Attitude	Response	Designation				X ² p-value	Experience (years)			X ² p-value
		Specialist (36)	Demonstrator (52)	PG resident (40)	House officer (87)		≤ 1	2-5	> 5	
Q1.	Disagree	4 (11.1%)	4 (7.7%)	10 (25%)	7 (8%)	0.001 [*]	8 (9.1%)	8 (15.1%)	9 (12.2%)	0.201
	Neutral	6 (16.7%)	28 (53.8%)	14 (35%)	27 (31%)		27 (30.7%)	24 (45.3%)	24 (32.4%)	
	Agree	26 (72.2%)	20 (38.5%)	16 (40%)	53 (60.9%)		53 (60.2%)	21 (39.6%)	41 (55.4%)	
Q2.	Disagree	6 (16.7%)	6 (11.5%)	9 (22.5%)	15 (17.2%)	0.206	16 (18.2%)	6 (11.3%)	14 (18.9%)	0.565
	Neutral	2 (5.6%)	14 (26.9%)	8 (20%)	15 (17.2%)		15 (17%)	13 (24.5%)	11 (14.9%)	
	Agree	28 (77.8%)	32 (61.5%)	23 (57.5%)	57 (65.5%)		57 (64.8%)	34 (64.2%)	49 (66.2%)	
Q3.	Disagree	10 (27.8%)	6 (11.5%)	8 (20%)	14 (16.1%)	0.047 ¹	15 (17%)	6 (11.3%)	17 (23%)	0.075
	Neutral	6 (16.7%)	26 (50%)	19 (47.5%)	36 (41.4%)		36 (40.9%)	29 (54.7%)	22 (29.7%)	
	Agree	20 (55.6%)	20 (38.5%)	13 (32.5%)	37 (42.5%)		37 (42%)	18 (34%)	35 (47.3%)	
Q4.	Disagree	7 (19.4%)	5 (9.6%)	10 (25%)	4 (4.6%)	0.001 ¹	5 (5.7%)	6 (11.3%)	15 (20.3%)	0.049 ¹
	Neutral	2 (5.6%)	14 (26.9%)	14 (35%)	22 (25.3%)		22 (25%)	16 (30.2%)	14 (18.9%)	
	Agree	27 (75%)	33 (63.5%)	16 (40%)	61 (70.1%)		61 (69.3%)	31 (58.5%)	45 (60.8%)	
Q5.	Disagree	7 (19.4%)	7 (13.5%)	9 (22.5%)	7 (8%)	0.066	8 (9.1%)	6 (11.3%)	16 (21.6%)	0.059
	Neutral	0	6 (11.5%)	6 (15%)	14 (16.1%)		14 (15.9%)	8 (15.1%)	4 (5.4%)	
	Agree	29 (80.6%)	39 (75%)	25 (62.5%)	66 (75.9%)		66 (75%)	39 (73.6%)	54 (73%)	

*Statistically significant: p-value < 0.05

Discussion

Pursuit of improved quality of life among general population has led researchers to focus on disorders that were previously overlooked. Sleep disorders specifically Obstructive sleep apnea is one such disorder.¹¹ Dentists are often the first

healthcare providers who detect, refer, and manage cases of OSA.⁹ The cross-sectional self-administered questionnaire was emailed to 215 dentists as per the sample size calculated via the Rao-Soft Calculator. In this study, most participants were aware of the term 'Sleep Apnea', and a significant relation was also found between

specialists and the belief that a dentist plays an integral role in the final diagnosis of OSA. However, only 34% of participants were able to recognize their self-ability to discern signs and symptoms of high-risk OSA patients. High-risk OSA patients show persistent symptoms such as daytime tiredness, fatigue and snoring in addition to obesity and hypertension.¹² This lack of familiarity with the symptoms of high-risk OSA patients aligns with findings from previous studies, underscoring dentists' limited clinical exposure to the breathing disorder.¹³

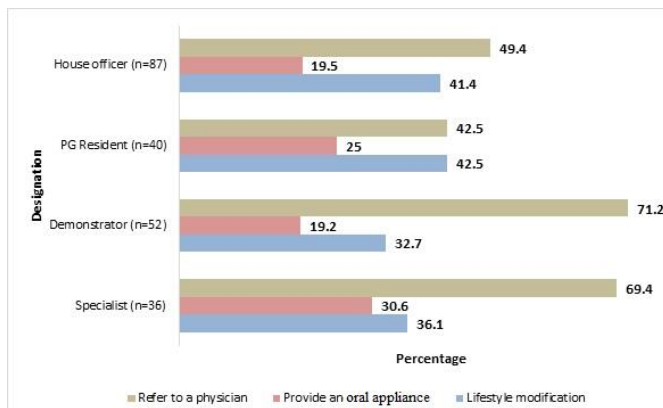


Figure: The preferred treatments offered by the dentists to the patients with OSA.

Only 9.3% of dentists reported having encountered patients with OSA, while 51% never encountered such patients. This huge gap may be due to the inability of dentists to identify high-risk OSA patients. Many cases of OSA remain undiagnosed as a result of a dentist unable to recognize the plethora of oral symptoms associated with the disorder.² Although more than half of the participants had some information regarding the management of OSA, as they covered this topic in their undergraduate years, the dental curricula of Pakistan touch upon the basics of sleep disorders, but the depth of coverage varies between institutions.¹⁴ A study conducted in Saudi Arabia reported that the average number of hours dedicated to sleep disorders in a dental curriculum amounted to about 1.95 hours.¹⁵ This leads to the limited knowledge of dentists to enable them to recognize high-risk patients with OSA, contributing to an increased number of undiagnosed cases and associated morbidity.¹²

Research has shown that it is imperative to include questions regarding sleep health in history particularly when taken in a dental setting.¹⁶ In this study, majority of dentists recognized the importance of including questions regarding sleep habits during history taking. Moreover, a statistically

significant association was also found between the specialists and the belief that OSA screening should be mandatory during clinical examination.

Most participants in this study were aware of their role in OSA referral. However, the role of dentists is not only confined to referral but also includes actual treatment implementation. Oral appliance therapy (OAT) now forms a major entity in the treatment of OSA.¹⁷ The recommended protocol by the American Academy of Sleep Medicine is that a dentist refer suspected OSA patients to a sleep specialist for final diagnosis and to determine if surgical intervention is needed with oral appliance therapy. If only OAT is required, the sleep physician refers the patient to the dentist for fabrication of the required appliance.⁹ In the current study, 30% of specialists and 25% of PG residents chose the application of Oral appliance therapy to manage OSA. The higher percentages of specialists and PG residents in this regard can be attributed to their longer clinical experience.¹⁸

In the current study, a statistically significant relation was found between the designation of dentists and the opinion that a collaborative approach between dentists and sleep physicians is needed to treat the disorder. Novice dentists, as a result of having less experience, are not as aware of dental treatment options available for OSA⁸. The majority of dentists in the current study show eagerness to increase the level of their knowledge regarding OSA. This finding corroborates previous research as more dentists are recognizing their pivotal role in sleep medicine.¹³ Training dentists to not just refer but actively take part in treating OSA patients will be beneficial to the public.

Conclusion

Most dentists recognize their vital role in the diagnosis, referral, and management of OSA. However, the lack of knowledge about the disorder often prevents dentists from detecting risk factors, signs and symptoms. Many dentists are willing to expand their knowledge regarding sleep medicine highlighting the need to include sleep medicine in dental curriculum.

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Availability of Data: The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethical Approval: The Institutional Review Board of Islamabad Medical & Dental College, Islamabad approved the study via letter no. IMDC/DS/IRB/189 dated 03/08/2021.

Conflict of Interest: None declared.

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