ORIGINAL ARTICLE

Knowledge of Obstructive Sleep Apnea (OSA) Among Dentists; A Cross-Sectional Study

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ABSTRACT

Objective: The objective of this study was to evaluate the knowledge of general and specialist dental practitioners working in teaching hospitals in Islamabad regarding the diagnostic criteria, referral practices, treatment options, and clinical management of patients with obstructive sleep apnea (OSA).

Study Design: Cross-Sectional Analytical Study.

Place and Duration of Study: Islamabad Dental Hospital, over six months from 7th September 2021 to 10th March 2022.

Materials and Methods: A questionnaire was prepared by merging the "Obstructive Sleep Apnea Knowledge and Attitude" (OSAKA) questionnaire with validated published questionnaires. Then validation was done by conducting a pilot study on 20 graduated dentists, giving Cronbach's alpha value of 0.759. It comprised 30 close-ended items on risk factors, signs and symptoms, consequences, diagnostic tools, and obstructive sleep apnea (OSA) management. The questionnaire was distributed to 215 dentists working in the teaching hospitals in Islamabad. The data was analyzed using IBM SPSS Statistics, version 25. The normality of data was checked using a box plot and the Shapiro-Wilk test. A one-way ANOVA/Kruskal-Walli's test was then used to assess the difference between the groups for designation, experience, and discipline. The post hoc Tukey's test was used for pair-wise comparison and *p* value ≤ 0.05 was considered significant.

Results: Almost 208 participants were familiar with the term sleep apnea. The overall knowledge scores were 12.82 ± 4.30. A statistically significant difference was noted between the knowledge scores with designation (*p* value 0.014) and clinical discipline (*p* value 0.028). Dunn's post hoc comparison showed a significant difference between the specialists and demonstrators (*p* value 0.001) and Bonferroni's post hoc test showed a significant difference between OMFS and periodontology (*p* value 0.047), and between oral medicine and periodontology (*p* value 0.030).

Conclusion: Although most dentists were familiar with sleep apnea, many participants lacked knowledge about its diagnosis and management.

Key Words: *Obstructive Sleep Apnea (OSA), Hypertension, Polysomnography, Periodontitis*.

Introduction

Obstructive sleep apnea (OSA) is a common sleep disorder characterized by cessation of breathing for 10 seconds or more, due to intermittent episodes of partial or complete collapse of upper airway obstruction.[1] It results in repeated awakening during sleep leading to daytime sleepiness.[1] Several factors contribute to the development of OSA, including high body mass index (BMI), male gender, advancing age, smoking, alcohol consumption and craniofacial irregularities like small and retrognathic mandible, hyperplastic palatine tonsils or uvula, high-arched palate, macroglossia, deviated nasal septum and inferiorly displaced hyoid bone.[2]

OSA is considered a clinically significant sleeping disordered breathing (SDB) as it can lead to the development of chronic diseases affecting the pulmonary, cardiovascular, and neurocognitive systems.[2] Benjafield *et. al*. [3], estimated that globally, about 1 billion people aged 30-65 years are affected

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by OSA and 425 million of those have moderate to severe OSA.

Polysomnography is considered a gold standard diagnostic tool for OSA.[4] However, it requires patients to sleep at the clinic overnight, making it unfeasible for patients especially when they are not familiar with the outcome of sleep disorders which restricts them from getting the polysomnography done. Additionally, it is not readily available and requires trained physicians to operate.[4] In this regard, dentists and general physicians are primary healthcare workers who can play an important role in the early diagnosis of OSA.

OSA has been linked to oral diseases like periodontitis, dental caries, and other oro-facial problems.[5] Dentists can help in the early diagnosis of the condition through intra-oral examination for the oral features of OSA, following a detailed history using validated OSA screening questionnaires such as Berlin, STOP-BANG, and Epworth sleepiness scale.[6] Dentists also play an integral role in educating patients regarding the importance of OSA management and can successfully manage mild to moderate cases of OSA by providing oral appliances to patients to reposition the jaws forward to prevent pharyngeal occlusion.[7] Additionally, they can work collaboratively with other healthcare professionals to ensure comprehensive management of OSA for their patients.

Studies evaluating the level of knowledge about OSA among medical students and physicians have been conducted in Pakistan, however, limited data is available on the knowledge among dental practitioners. Since patients often visit dentists regularly, even when they may not require a visit to a physician for many years, dentists can serve as the first healthcare workers to identify unidentified OSA. Evidence suggests that many dental practitioners may not be familiar with the diagnostic criteria, appropriate referral procedures, or treatment options available for patients with OSA. This knowledge gap can hinder the timely diagnosis and management of OSA, leaving patients at risk of severe complications. Therefore, the objective of this study was to assess the knowledge regarding diagnostic criteria, referral, treatment options, and clinical practice regarding OSA patients, among general and specialist dental practitioners working in teaching hospitals in Islamabad. The findings from this study can serve as a guideline to encourage dental practitioners to update their knowledge, ultimately helping to prevent life-threatening complications associated with the disease.

Materials and Methods

A cross-sectional study was conducted at Pakistan Medical and Dental Council (PMDC) approved public and private dental colleges in Islamabad including Islamabad Medical and Dental College, Shifa College of Dentistry, Rawal Institute of Health Sciences, HBS Medical and Dental College, School of Dentistry and Islamic International Dental College, Pakistan. The study was conducted over 6 months, from 7th September 2021 to 10th March 2022 after obtaining approval from the IRB of Islamabad Medical and Dental College (IMDC/DS/IRB/189).

The human resource departments of recognized dental colleges were then contacted to obtain a list of dental faculty and post-graduate residents (PGR) working in the clinical departments of these institutes. Approximately 481 graduated dentists (168 HOs, 83 PGR, 150 demonstrators and 80 specialists) were identified. Using the Rao soft calculator, an estimated sample size of 215 was calculated with a 95% confidence level, and a 5% margin of error, based on 54% 'proportion of good knowledge' found in recent medical graduates as reported in published data.[8]

After adjusting the sample size for each group, the questionnaires were distributed using convenient sampling among house officers, postgraduate residents, demonstrators, and specialists working in different clinical disciplines of dentistry. The questionnaire was formulated by combining the questions of “Obstructive Sleep Apnea Knowledge and Attitude” (OSAKA) with a validated published questionnaire.[19] A pilot study involving 20 graduated dentists was conducted to validate the newly developed questionnaire, giving Cronbach's alpha value of 0.759. The final questionnaire comprised 30 closed-ended items categorized into five sections including risk factors, signs and symptoms, consequences, diagnostic tools, and management of obstructive sleep apnea. The knowledge of participants was assessed regarding common risk factors associated with OSA including age, gender predisposition, weight, craniofacial variation and

sleep posture. Awareness of common signs and symptoms of OSA such as fatigue, insomnia, bruxism, and headaches were also evaluated. Knowledge of potential systemic health impacts of untreated OSA including diabetes, hypertension and cardiovascular diseases was also assessed. Familiarity of participants with commonly used diagnostic methods for OSA such as polysomnography (PSG), STOP-Bang questionnaire, Berlin questionnaire and the Epiworth sleepiness scale was recorded. Lastly, awareness of the effectiveness of various management strategies, such as continuous positive airway pressure (CPAP), uvulopalatopharyngoplasty, oral appliances and lifestyle changes was evaluated.

The data was analyzed using IBM SPSS Statistics, version 25 (IBM Corp., Armonk, NY, USA). Mean ± standard deviation was used to summarize the overall and group-wise knowledge scores. The normality of each group of designation, experience, and discipline was assessed using a box plot and the Shapiro-Wilk test. A one-way ANOVA/Kruskal-Walli's test was then used to assess any possible significant difference between the groups for designation, experience, and discipline. The post-hoc Tukey's test was further applied for the pair-wise comparison. The p value ≤ 0.05 was considered statistically significant.

Results

The 30-item questionnaire was then provided to 215 dentists including 36 (16.7%) specialists, 52 (24.2%) demonstrators, 40 (18.6%) postgraduate trainees, and 87 (40.5%) house officers. Each group of dentists was given a proportional representation in the sample. There were 88 (40.9%) participants with less than or equal to 1 year of experience. As far as clinical discipline is concerned, the majority (40%) were on rotation followed by operative dentistry 45 (20.9%) and oral medicine 25 (11.6%) as shown in Table I.

Table I: **Knowledge Score Comparison Within Demographic Variables (N=215)**

Demographics	f (%)	Knowledge Score (mean ± S.D)				*p* value
		Risk Factors	Signs and Symptoms	OSA Management	Mean ± S.D /Mean Rank	
Overall	215	6.80 ± 2.30	3.48 ± 1.56	1.42 ± 0.94	12.82 ± 4.30	
Designation [a]						
Specialist	36 (16.7%)	7.28 ± 2.5	4.06 ± 1.51	1.69 ± 0.98	134.78	0.014*
Demonstrator	52 (24.2%)	6.25 ± 2.21	3.21 ± 1.46	1.44 ± 0.96	91.89	
Postgraduate resident	40 (18.6%)	7.28 ± 2.11	3.18 ± 1.68	1.48 ± 0.88	110.48	
House officer	87 (40.5%)	6.70 ± 2.30	3.54 ± 1.53	1.26 ± 0.93	103.99	
Experience (years)						
≤ 1	88 (40.9%)	6.73 ± 2.30	3.56 ± 1.53	1.27 ± 0.93	102.02	0.112
2 - 5	53 (24.7%)	6.62 ± 2.11	3.11 ± 1.45	1.45 ± 0.89	96.10	
> 5	74 (34.4%)	7 ± 2.43	3.65 ± 1.64	1.57 ± 0.98	118.76	
Clinical discipline [c]						
On rotation	86 (40%)	6.70 ± 2.32	2.53 ± 1.54	1.27 ± 0.94	12.49 ± 4.40	0.028*
OMFS [b]	13 (6%)	7.08 ± 1.75	4.15 ± 1.73	2 ± 0.82	14.54 ± 3.97	
Operative dentistry	45 (20.9%)	7.02 ± 2.35	3.31 ± 1.54	1.31 ± 0.95	12.78 ± 4.11	
Orthodontics	8 (3.7%)	6.75 ± 1.28	3.75 ± 0.71	1.63 ± 0.74	13 ± 2.39	
Prosthodontics	22 (10.2%)	7.23 ± 2.47	3.68 ± 1.49	1.64 ± 0.95	13.68 ± 4.75	
Periodontology	15 (7%)	5.2 ± 2.65	2.13 ± 1.92	1.20 ± 1.01	9.6 ± 5.19	
Oral medicine	25 (11.6%)	7.04 ± 2.05	3.76 ± 1.27	1.68 ± 0.90	14.04 ± 2.89	

[a] Kruskal-Wallis test,
[b] Oral and Maxillofacial Surgery,
[c] One-way ANOVA,
* Statistically significant: p value ≤ 0.05

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Almost all participants 208 (96.7%) were aware of the term “sleep apnea” but only 29 (13.5%) and 27 (12.6%) had some idea of the Berlin Questionnaire and Epworth Sleepiness Scale respectively. These are the well-known and commonly practiced diagnostic tools for OSA. Among the first 21 items in the questionnaire (score range 0 - 21), 10 questions were about risk factors (score range 0 - 10), 6 questions were about signs and symptoms (score range 0 - 6), and 3 questions were about OSA management (score range 0 - 3).

The mean and standard deviation for overall knowledge and each sub-section is given in Table I. The overall knowledge scores (mean ± standard deviation) were reported as total = 12.82 ± 4.30, risk factors = 6.80 ± 2.30, signs and symptoms = 3.48 ± 1.56, and OSA management = 1.42 ± 0.94. The knowledge scores were further stratified concerning designation, experience, and clinical discipline. Since the group sizes were unequal so, first, the Shapiro-Wilk test of normality and Levene's test of homogeneity of variances were applied as shown in Table II. The groups were not statistically significant for clinical discipline suggesting that the normality assumption was fulfilled and leading to the one-way ANOVA. As for the designation and experience, most of the groups were statistically significant, suggesting that the normality assumption is violated and leading to the Kruskal-Wallis test. Levene's test was not statistically significant for all of the variables suggesting that the homogeneity of variances assumption is fulfilled and all groups in designation (*p* value 0.634), experience (*p* value 0.127), and clinical discipline (*p* value 0.09) have equal variances.

When compared for the knowledge score, there was a statistically significant difference between the designation (chi-square statistic 10.658, *p* value 0.014) and clinical discipline (F-statistic 2.419, *p* value 0.028). No statistically significant difference was observed between the experience groups (chi-square statistic 4.375, *p* value 0.112). Further, Dunn's post hoc comparison showed a significant difference between the specialists and demonstrators (*p* value 0.001) and Bonferroni's post hoc test showed a significant difference between OMFS and periodontology (mean difference 4.94, *p* value 0.047), and between oral medicine and periodontology (mean difference 4.44, *p* value 0.030).

To assess the level of knowledge among the dentists, Bloom's cut-off points were used as poor (less than 60% i.e., <12), moderate (60% - 79% i.e., 12 - 16), and good (80% - 100% i.e., >16). Based on this categorization, 75 (34.9%) dentists had poor, 91 (42.3%) moderate, and 49 (22.8%) had a good level of knowledge shown in Figure 1.

Table II: Normality Assessment for Each of the Groups of Designation, Experience, and Clinical Discipline

	Groups	Shapiro-Wilk test *p* value	Levene's test *p* value
Variables Designation	Specialist	0.011	0.634
	Demonstrator	0.153	
	Postgraduate resident	0.169	
	House officer	0.002	
Experience (Years)	≤ 1	0.002	0.127
	2 – 5	0.314	
	> 5	0.002	
Clinical Discipline	On rotation	0.002	0.09
	OMFS[1]	0.100	
	Operative dentistry	0.069	
	Orthodontics	0.050	
	Prosthodontics	0.256	
	Periodontology	0.825	
	Oral medicine	0.290	

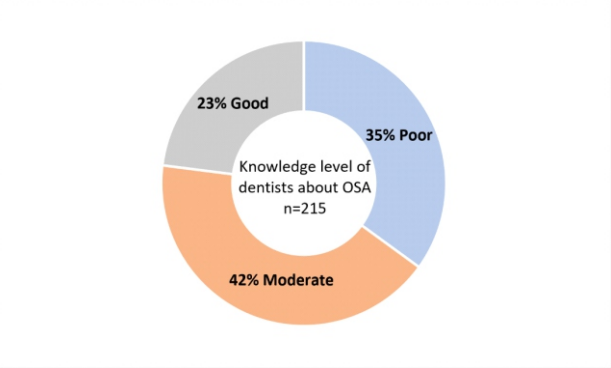

Figure 1: The Level of Knowledge Among the Dentists (n=215)

Discussion

Dentists are mostly the first contact healthcare providers frequently involved in discovering, referring, and even treating undiagnosed cases of OSA. Routine examination of the upper airway of dental patients facilitates screening them for OSA. However, a deficiency of information regarding OSA

in the dental curriculum can lead to an increased number of patients with undiagnosed OSA.[10]

Most respondents were aware of the term "OSA", yet the overall knowledge score was 12.82 indicating a low level of knowledge of the risk factors, signs, symptoms, and management of OSA. The overall knowledge level of OSA of most of the respondents was moderate (42%), followed by poor (35%) and good (23%). A similar study by Simmons *et al.,*[11] revealed an OSA knowledge score of 73.6% among dentists and 63.9% for all physicians. Another study conducted by Alzahrani *et al.,* [10] on 352 dentists assessing their knowledge and attitude towards sleep apnea found that although 80.6 % had previous knowledge of OSA, 65.58% scored below 12 in total knowledge score, whereas the mean total knowledge score was 9.86. They did not find any significant difference in mean total knowledge based on gender, professional title, or practice sector. Kale *et al.,* [12] concluded from a study involving 112 dentists that most of the dentists were aware of the definition, general findings and risk factors of OSA, however, they had a lack of information regarding screening, diagnosis, treatment planning and referral of OSA patients. Chauhan *et al.,* [13] concluded that 50% of dentists correctly answered questions related to symptoms and diagnosis of OSA but had poor knowledge about the pathophysiology, risk factors, complications and treatment.

A significant difference in the knowledge of OSA between specialists and demonstrators was noted. Swapna *et al.,* [14] discovered statistically significant differences in the responses related to awareness of OSA based on specialty and educational qualification. Their study concluded that there was a huge lack of knowledge among final-year students, interns, and general dentists. Additionally, in the current study, dentists working in pediatric dentistry had the highest knowledge score followed by dentists working in the department of oral medicine and oral & maxillofacial surgery, while dentists in periodontology obtained the lowest score. These results agreed with a previous study, where pediatric dentists had a mild-to-moderate level of knowledge and positive attitude toward OSA but these dentists lag in their training regarding the practical aspect.[15]

Conclusion

We concluded that the knowledge regarding diagnostic criteria, referral, treatment options, and clinical practice of OSA patients is deficient among general and specialist dental practitioners working in teaching hospitals in Islamabad.

Recommendation

This lack of knowledge could be attributed to the lack of training of dental practitioners at both undergraduate and postgraduate levels. So, the findings of the study emphasize the need to integrate comprehensive OSA education into the dental curriculum to train dental practitioners, so they can contribute to early diagnosis, referral or treatment of patients with sleep disorders.

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CONFLICT OF INTEREST

Authors declared no conflicts of Interest.

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DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.