Original article

Knowledge and Attitude of Obstructive Sleep Apnea among Dental Students in North East Penisular Malaysia

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Abstract

Background: Obstructive sleep apnea (OSA) is sleep-disordered breathing that can cause morbidity and mortality.Dental students' knowledge of sleep apnea will help them identify patients with the condition in the future. ***Objective****:* This study was conducted to determine the knowledge and attitude of OSA among undergraduate dental students in Universiti Sains Malaysia (USM). ***Methodology:*** A total of 97 undergraduate dental students participated in this study. This cross-sectional study used a self-administered and validated Obstructive Sleep Apnea Knowledge and Attitude (OSAKA) questionnaire. The questionnaire consists of 18 questions of knowledge and five questions of attitude towards OSA. ***Results****:* The mean total score of knowledge is 7.5 (SD 3.77). Meanwhile, the mean total score of attitude is 12.0 (SD 2.22). Most of the students (74.2%) knew that majority of patients with OSA snored. However, only 14.4% knew uvulopalatopharyngoplasty is the curative treatment for OSA. Regarding attitudes, 88.7% of the students agreed that OSA as an important clinical disease. Only 7.2% were confident in identifying OSA patients, while 15.5% were confident in managing OSA. ***Conclusion****:* The level of OSA knowledge and awareness among dental students in USM was relatively low. Early education and training on OSA in dental schools are crucial to improve this state of affairs.

Keywords: Obstructive sleep apnea; dental student; knowledge; attitude

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Introduction

Apnea is defined as cessation of breathing for at least 10 seconds due to complete oronasal airflow obstruction. Sleep apnea is a condition in which a person stops breathing periodically during sleep. Sleep apnea can be classified into three types, of which the most common type is obstructive sleep apnea (OSA). OSA is characterized by recurrent episodes of partial or complete collapse of the upper airway during sleep which lead to impaired gas exchange and sleep disturbances.[1-3] Symptoms of OSA include witnessed apnea, snoring, gasping or

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choking during sleep, non-refreshing sleep, morning headache, decreased concentrations and irritability.[4]

The American Academy of Sleep Medicine has classified OSA according to apnea-hypopnea index (AHI) and degree of sleepiness during the day.The AHI isthe amount ofapneas and hypopneas per hour of sleep. The severity of apnea is classified according to AHI score, mild apnea has AHI of 5 to 15, mild apnea 16 to 30 and severe apnea>30.[1-3]The degree of daytime sleepiness is defined as unwanted sleepiness or involuntary sleep episodes occurring during activities. It is classified as mild if itoccurred during activities that require little attention, such aswatching television or reading. Activities that require focus, such as attending meeting, is an example of mild apnea. Extreme apnea also affects behaviours that require more active attention, such as driving or having conversation.[5]

OSA affects 3 to 7% of adult men and 2 to 5% of adult women worldwide, with prevalence rates varying from 3 to 5% across the globe.[1,3,6] In Malaysia,Kamil et al. found that the prevalence of habitual snoring, sleep-disordered breathing and excessive daytime sleepiness was 47.3%, 15.25% and 14.8%, respectively.[7] Of the respondents, 7% were clinically suspected of having OSA.In another study of sleep apnea conducted on express bus drivers, mild OSA was diagnosed in 28.7% of all participants, with the diagnosis of moderate OSA and mild OSA were 9.0% and 6.6%, respectively.[8]

OSA is more common in males than infemales.[1,3,9] People who are obese (BMI ≥30 kg/m2),[10] older in age (>65 years of age),[11] smoking[12] and drinking alcohol are at higher risk of getting OSA.[1,3] Several craniofacial features may suggest the presence of OSA such as increased neck circumference (>43cm in males, >41cm in females), mandibularretrognathism, lateral peritonsillar narrowing, macroglossia, tonsillar hypertrophy, elongated/ enlarged uvula, high arched/ narrow hard palate, nasal abnormalities (polyps, deviation, valve abnormalities, turbinate hypertrophy) and/ or increased turbination.[7,11]It is crucial for the dental students to identify these craniofacial features during dental visits to makeearly referral for appropriate management of OSA.

The gold standard diagnostic test tothe diagnosis of OSA is an overnight in-laboratory polysomnography test (PSG).[1,3,13]Home sleep monitoring device is another option to diagnose OSA, especially in cases of moderate and severe OSA.[1,3,13]Screening tools such as Berlin Questionnaire[14]and Epworth Sleepiness Scale (ESS)[15]have been developed as an adjunct to detect individual at high risk of developing OSA.[16]

The preferred treatment for mild to moderate OSA is continuous positive airway pressure (CPAP).[1,2,6,8,17]Mandibular advancement devices (MAD) has also been introduced as an alternative treatment for OSA for patients who have difficulties adapting to CPAP.[6,8,12]Clinical studies conducted by Aarab et al.,found that CPAP and MAD showed equal efficacy between in ambulatory blood pressure, quality of life and also daytime sleepiness.[18,19]

Untreated or unrecognised OSA has been shown to contributeto cardiovascular diseases,[5] stroke,[21,22] diabetes mellitus[21] and depression[23]. Since OSA may cause excessive during the day, cognitive dysfunction, impaired work performance and increased risk of mobile accidents,[24]this may result in negative economic consequences,[22]reduced quality of life, as well asa higher risk of morbsidity and mortality.[22]

Early detection and management of OSA patients aredependent on a wealth of knowledge and awareness of the future dental professionals on OSA. Indeed, OSA is a clinically significant condition and highly prevalent. However, to date, little is known about dental students' awareness and ability to recognize OSA patients.The aim of this study is therefore to determine the knowledge and attitudes of dental students in the USM towards OSA. The level of awareness and knowledge of dental students prior to graduation can provide insight into their future practice and may also help in the assessment of the training received.

Materials and methods

A cross-sectional study was conducted among undergraduate dental students at the School of Dental Sciences, Universiti Sains Malaysia. The inclusion criteria for the respondents of this study were year 4 and year 5dental students of USM.

The sample size was calculated using a single proportion formula.[13]In the calculation, the proportion was set at 0.336, based on the percentage of correctly answered questions regarding alcohol as a risk factor of oral cancer as stated in the Clinical Guidelines of Obstructive Sleep Apnea in adults by

Epstein et al.[13]The precision was set at 0.07, giving the calculated sample of 175. Including the 20% non-response rate, a final sample size of 210 was decided.

A validated Obstructive Sleep Apnea Knowledge and Attitudes (OSAKA) questionnaire adaptedfromSchotland et al.,was used to collect data variables in this study.[25] The OSAKA questionnaire consists of three sections inthe English language to assess the knowledge and attitude of OSA and to collect demographic data.

The knowledge sectionconsists of 18 true-false statements regarding epidemiology, pathophysiology, symptoms, diagnosis, and treatment of OSA. The response categories are "true", "false",or "do not know". Correct responses were counted as 1 point, while incorrect responses or "do not know" were counted as 0 points. Therefore, the total score obtained ranged from 0 to 18.

In the attitude section, participants were asked to rate their level of agreement with four statements regarding the importance of OSA and the ability to identify and manage OSA patients using a 5-point Likert Scale. The responses were scored from 1 (strongly disagree) to 5 (strongly agree). Thus, the total attitude score obtained ranged from 4 to 20.Demographic data such as gender, age, and race were also collected in this study.

The questionnaire was self-administered, and informed consent was obtained from all respondents. Ethical approval by the Human Research and Ethics Committee, Universiti Sains Malaysia, was obtained (Ethics No: USM/ JEPeM/ 16030112) for this study.

The data was analysed using IBM SPSS, Version 22.0. The data was entered, checked, explored and cleaned. Descriptive statistics wereused to analyse the demographic data and items in the knowledge and attitude sections. Categorical data was expressed as frequencies and percentage, and numerical data were expressed as mean and standard deviation (SD). Correlation analysis was used to determine the correlation between total knowledge score and total attitude score regarding OSA among dental students.

Ethical Clearance: Ethical approval by the Human Research and Ethics Committee, Universiti Sains Malaysia, was obtained (Ethics No: USM/ JEPeM/ 16030112)

Results

A total of 112 questionnaires were distributed among the year 4 and 5 dental students in USM. However, only 97 respondents returned and completed the questionnaire, givinga response rate of 87%. The mean age of participants was 24 (SD 0.79) and ranged from 22 to 27 years of age. On the basis of gender, 82.5% were female. The majority of the participants were Malay (70.1%), followed by Chinese (26.8%), Indian (2.1%) and Siamese (1.0%).

Table 1: Distribution of respondent socio-demographic profile (n=97)

Socio-demographic profile	n (%)
Age [a]	24 (0.79)
Gender	
Male	17 (17.5%)
Female	80 (82.5%)
Race	
Malay	68 (70.1%)
Chinese	26 (26.8%)
Indian	2 (2.1%)
Others	1 (1.0%)
Lecture regarding OSA during undergraduate years	
Yes	64 (66%)
No	33 (34%)
Heard about OSA	
Conference	14 (14.4%)
Reading	40 (41.2%)
Mass media	7 (7.2%)
Others	21 (21.7%)
No	15 (15.5%)

[a]Mean (SD).

Knowledge of OSA

Based on the questionnaires, 64 (66%) students havealready received a lectureregarding OSA. The majority of dental students have heardaboutOSA (84.5%) from reading (41.2%), while others heard it from colleagues or during a seminar (37.1%), conference (14.4%), and mass media (7.2%).

The correct response of all 18-itemsin knowledge sections is shown in Table 2. Majority of dental students (≥ 60%) knew that patients with OSA had snored. Approximately 63.9% of students responded correctly to the cause of OSA in children,which is enlarged tonsils and adenoids. However, most of the students werenot aware thatuvulopalatopharyngoplastyis the curative treatment of OSA and the normal AHI for an adult is less than 5.The mean (SD) total knowledge scores for dental students was 7.46 (3.77) out of 18. The highest total score of knowledge obtained by dental students is 15.

Table 2: Knowledge of obstructive sleep apnea among dental students (n=97)

Knowledge questions	Correct responses n (%)
1. Women with obstructive sleep apnea may present with fatigue alone.	35 (36.1%)
2. Uvulopalatopharyngoplasty is curative for the majority of patients with obstructive sleep apnea.	14 (14.4%)
3. The estimated prevalence of obstructive sleep apnea among adults is between 2 and 10%.	29 (29.9%)
4. The majority of patients with obstructive sleep apnea snoring.	72 (74.2%)
5. Obstructive sleep apnea is associated with hypertension.	50 (51.5%)
6. An overnight sleep study is the gold standard for diagnosing obstructive sleep apnea.	55 (56.7%)
7. Continuous positive airway pressure (CPAP) therapy may cause nasal congestion.	34 (35.1%)
8. Laser-assisted uvuloplasty is an appropriate treatment for severe obstructive sleep apnea.	30 (30.9%)
9. The loss of upper airway muscle tone during sleep contributes to obstructive sleep apnea.	55 (56.7%)
10. The most common cause of obstructive sleep apnea in children is the presence of large tonsils and adenoids.	62 (63.9%)
11. A craniofacial and oropharyngeal examination is useful in the assessment of patients with suspected obstructive sleep apnea.	48 (49.5%)
12. Alcohol at bedtime improves obstructive sleep apnea.	42 (43.3%)
13. Untreated obstructive sleep apnea is associated with a higher incidence of automobile crashes.	39 (40.2%)
14. In men, collar size 43 cm or greater is associated with obstructive sleep apnea.	32 (33%)
15. Obstructive sleep apnea is more common in women than in men.	29 (29.9%)
16. Continuous positive airway pressure (CPAP) is the first line therapy for severe obstructive sleep apnea.	35 (36.1%)
17. Less than five apnea or hypopneas per hour is normal in adults.	16 (16.5%)
18. Cardiac arrhythmias may be associated with untreated obstructive sleep apnea.	41 (42.3%)

Attitude of OSA

The attitude of participants regarding OSA is summarised in Table 3.With regard tothe attitude, 88.7% of the students believed that OSA was an important clinical disorder. The majority of them (89.7%) agreedthat it was important to identify OSA patients. However, only 7.22% of the students were confident in identifying patients with OSA. Similarly, only 15.5% of them agreed that they had confidence in their ability to manage OSA patients,as shown in Table 3. The mean (SD) total attitude score of dental students was 12 (2.22) out of 20.

Table 3: Attitude of obstructive sleep apnea among dental students (n=97).

Attitude questions	Mean (SD)
1. Importance of obstructive sleep apnea as a clinical disorder	3.16 (0.86)
2. Importance of identifying patients with possible obstructive sleep apnea	3.27 (0.84)
3. Confident in identifying patients at risk for obstructive sleep apnea	2.61 (0.8)
4. Confident in ability to refer patients with obstructive sleep apnea for further management	2.81 (0.82)

Correlation between Total Knowledge Score and Total Attitude Score

Table 4 shows the correlation between Total Knowledge Score and Total Attitude Score. It was found that the total knowledge score and total attitude score regarding OSA among dental students in USM were found to be significantly positively correlated (r=0.272) with p-value=0.007.

Table 4: Correlation of total knowledge and attitude score regarding obstructive sleep apnea among dental students (n=97).

Variable	Total attitude score regarding OSA n=97	
	r	*p*-value
Total knowledge score regarding OSA	0.272	0.007

Discussion

OSA is a multi-system disease that is higly associated with cause morbidity and mortality, yet most OSA patients remain undiagnosed and untreated. With an increasing number of obese populations,[26] the prevalence of OSA may increase in the future, particularly in Malaysia. Dentists are more likelyto encounterOSA patients,[27]and therefore need to have adequate knowledge regarding OSA, includingits clinical features, risk factors, and complications. Dental practitioners should be able to identify OSA at an early stage with a positive attitude and adequate

expertise, allowing for timely referral and care.

To the best of our knowledge, our study is the first surveyconducted in Malaysia to assess dental students' knowledge and attitude regarding OSA. From this study, we found that more than 50% of the students did not respond correctly to two-thirds of the knowledge items, particularly on epidemiology, diagnosis, and treatment of OSA. For epidemiology questions,30% of students incorrectly answered that women are more commonly-diagnosed with OSA than men. In addition, only 31% of respondents were aware of the estimated prevalence of OSA in adults. These results were consistent with a study by Ozoh et al.[27]

Previous studies done in South America have shown that amongphysicians, less than 30% of respondents knew that the normal AHI for adultswas less than 5. In the present study, however, only 16% of students answered this questioncorrectly.Approximately48% of respondents in this study agreed that craniofacial and oropharyngeal examination are useful for assessing suspected OSA patients.This finding indicates that there is a high risk of misdiagnosed or undiagnosed OSA patients in our population. Nonetheless, poor knowledge was supported by the low confidence among students (7.22%) in identifying patients with OSA.

In addition, 50% of students did not know that motor vehicle accident and cardiac arrhythmias were complications of untreated OSA. Similarly, a study by Ojeda et al.,[28] also found that most Latin American primary care physicians did not know the association of untreated OSA with cardiac arrhythmias.[28] Moreover, only 51.5% of students recognised the association of OSA and hypertension. This finding is consistent with the OSA study conducted among medical students graduates in Lagos (44.8%)[27] and newly graduated physiciansin Ecuador (33.8%).[28]

As far as OSA treatment is concerned, only (14%) of respondents considered uvulopalatopharyngoplasty to be the curative treatment of OSA. Similar surveys of medical graduates in Lagos[27]and newly graduated physicians in Ecuador[28] also showed similar findings. In fact, only one third of respondents knew that CPAP or laser-assisted uvuloplasty was the correct treatment for severe OSA. This could explain why some students (15.5%) were not confident that OSA patients could be referred for further management.

This study found that the level of knowledge regarding OSA among dental students was relatively low. In comparisontoprevious OSA studies, the level of knowledge regarding OSA among dental students in USM is at the same level as that ofgraduate medical students in Lagos.[27]Studies by Ozoh et al.,Ojeda et al.,and Fernandez et al.,concluded that their respondents' knowledge regarding OSA was also not optimal.[27,28,29]Despite OSA being recognised as an important clinical disorder,the level of confidence in diagnosing and managing OSA was inadequate, with only 16% of respondents were confident in the management of OSA patients.Our findings suggest that most of these students may not be able to recognise the high risk OSA patientssoon after graduation andtherefore,may not be able to manage the case properly. We believe that the most likely contributing factor for this result is due to limited exposure to sleep disorder in the current teaching module. This study found that only 66% of dental studentsreceiveda lecture regarding OSA during their undergraduate years. This finding indicates that 34% of the students claimed that they did not have any classrelated to OSA during their undergraduate years. The class isa one-hour presentation by the students who visited the sleep laboratory of Hospital USM.

Overallfindingsindicate that undergraduate education module and clinical experiences should be developed and improved to help the identification and management of patients with OSA. In order to improve OSA knowledge and its awareness, it has been suggested that sleep disorder,particularly OSA, should be incorporated into the new dental academic curriculum.Not only theoretically, dental students should also be exposed and experienced themselves on how to recognise clinical features, assess the risk factor, genetic predisposition[30] ,andmanagementof OSA patients with correct oral appliances as well as referral to specialists.

The major limitation of this study is the fact that it was a cross-sectional study administered only among dental students in USM. Consequently, the results of this study do not represent the general population of dental students in Malaysia. A larger

scale multicenterpopulation study involving not only hospital but also other government or private hospitals and other universities in Malaysia is deemlynecessary in order to enhance and improve data on the knowledge and awareness of dental students on OSA.

Conclusion

In conclusion, the level of knowledge and attitude regarding OSA among dental students in USM were relatively low. Thus, there is a need for enhanced OSA education and training programme in dental schools.Effective educational strategies for common sleep disorders, especially OSA should begin at the undergraduate level in order to strengthen the knowledge and attitude on OSA among dental students.As a result, dental students would be able to make early referrals of OSA patients appropriately, decreasing the OSA prevalence and its associated complications.

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Authors' contribution:

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