

Impact of Habitual Snoring on Subjective Dental Esthetics in University Population

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ABSTRACT

Objective: The aims of this study were to assess the prevalence of snoring in the University population and to test the null hypothesis that there is no impact of habitual snoring on the self-perceived of dental esthetics.

Materials and Methods: Berlin Questionnaire and esthetic component of the index of orthodontic treatment need was given to 700 students and employees aged 17–59 years (22 ± 4.5). Both snorers and nonsnorers were assessed for orthodontic treatment need. Chi-square and Student *t*-test were used to compare the difference between both groups using SPSS Statistics for Windows, Version 23.0. (IBM Corp, Armonk, NY).

Results: The prevalence of snoring was 19.2% (male 11.8% and female 7.4%). Nodded off or fall asleep during driving a car or while waiting at least twice a month were reported in 46%. The prevalence of tiredness and fatigue after sleep from 3 to 4 times a week was 36.9% and during the working time was 33.6%. Based on the Berlin Questionnaire stratification for risk of obstructive sleep apnea (OSA), 8.2% were considered as a high-risk patient for OSA, (males: 3.8% and females: 4.4%). About 38.3% of the participants with habitual snoring have gone through orthodontic treatment, while only 28.5% of nonsnoring participant have done that. About 12.3% of snoring participant consider themselves in need of orthodontic treatment compared to 6.6% of a nonsnoring participant ($P < 0.04$).

Conclusion: The null hypothesis is rejected; snoring has an impact on the self-perceived of dental esthetics. Snoring participant seeks orthodontic treatment more than the nonsnoring participant in our University population.

KEYWORDS: Esthetics, index of orthodontic treatment need, self-perceived, snoring, university population

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INTRODUCTION

A complete or partial collapse of the upper airway during sleep has different effects on the human body ranging from noisy breathing (snoring) to significant cardiovascular squeals as seen in obstructive sleep apnea (OSA).^[1] Snoring is defined as a sound produced during sleep due to the turbulence of air passing through the partially obstructed airway.^[2] Although the prevalence of snoring varies between studies due to its extremely subjective nature, previous studies reported the prevalence in the range of 5%–78% in males and 2%–59% in females.^[3,4] Over the years, recurrent episodes of apneas, intermittent hypoxia, and sleep fragmentation affect the function of different organs and systems,

mainly the brain and the cardiovascular system and alter the body metabolic balance. This leads to a variety of clinical squeal accepted as the OSA syndrome (OSAS). As the disorder progresses, the sleepiness becomes increasingly dangerous, causing impaired performance at work and major work-related and road accidents.^[5] In observational studies, the individuals with OSA have 2 to 10 times increased the risk of motor vehicle accidents

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than those without OSA.^[6] Moreover, many patients can develop cognitive and neurobehavioral dysfunction, inability to concentrate, memory impairment, and mood changes such as irritability and depression. This further impairs performance at work with a remarkable effect on the quality of life.^[5] Heavy and habitual snoring may represent a risk factor for some major medical conditions, such as diabetes mellitus and cardiovascular disturbance.^[7,8] Not only can snoring lead to impaired health, but it may also be a cause of social embarrassment and can disturb the sleep of a bed partner.^[9] In addition, the effect of snoring can also extend to craniofacial. Many craniofacial features and malocclusions were reported to be associated with snoring, for example, narrow airway at the level of the soft palate and oropharynx, neck circumference >40 cm, large tongue, more inferiorly positioned hyoid bone, more protruding maxilla, anterior-posterior discrepancy of maxilla and mandible, Class II malocclusion, increase in overjet, reduced overbite, narrower upper, and shorter lower dental arch, and crowding in the mandibular arch.^[10-13] However, the different characteristics of dental occlusion have no relationship to the severity of OSA among nonobese adult.^[14] In addition, OSA showed association with periodontal disease in individuals who suffer from hypertension or hypertensive cardiomyopathy disease.^[15] Several imaging modalities (lateral and frontal cephalogram, cone-beam computed tomography, and magnetic resonance imaging) can assist snoring. The gold standard screening tool used to diagnose the snoring is the polysomnography, however, it is not widely available and expensive to be used as screen tool, it is mostly available only in specialized sleep clinics. Therefore, the use of questionnaires such as Epworth, STOP-Bang, and Berlin questionnaires to screen for sleep-related breathing disorders (OSA and snoring) were recommended.^[5,6] On the other hand, snoring and OSA has well-defined effects on health-related quality of life (HRQOL) with significant impact on most of the domain of human life.^[16] Facial and dental attractiveness represents important elements of QOL for patients seeking orthodontic treatment.^[17] Most of these patients are often more concerned with improving their appearance and social acceptance than they are with improving their oral function or health. Enhancing these aspects of QOL is an important motive for undergoing orthodontic treatment.^[17] However, there are considerable differences between a clinician's and a patient's perceptions of dental appearance and needs for orthodontic treatment.^[18] Traditional methods of measuring dental health are unable to create a living picture of how people's lives are daily affected by oral health issues. They only give a

superficial overview of actual need.^[19] Therefore, the use of an index such as Aesthetic Component of the Index of Orthodontic Treatment Need (AC-IOTN) to measure the self-perceived dental esthetics was a necessity.^[20] However, among different studies which have made comparisons between snoring and malocclusion, there is little data on the effect of habitual snoring on patient's self-perceived of dental esthetics and alignment of teeth. Therefore, our aims of this study were to assess the prevalence of snoring and its symptoms in university population and to test the null hypothesis that there is no impact of habitual snoring on the self-perceived of dental esthetics and alignment of teeth.

MATERIALS AND METHODS

After the study approved at the institutional level with Ethics Committee number (EA/201/2017) and informed consent was obtained, a cross-sectional study was carried out among male and female students and employees, between November 2016 and April 2017. For the prevalence study, the sample size was calculated using Power and Sample Size Software (5.2 MB version 2.1.31.) which indicated 700 participants is required for this study. When the participants (700 individuals) agreed to participate in the study a consent form was given along with a set of the Arabic version of Berlin Questionnaire^[21-23] and AC-IOTN.^[20] The details of both questionnaires and AC-IOTN were explained to all participants. The inclusion criteria were Saudi adult female and male student or employee between the age of 18 and 60 years. Student younger than 18 years old and had craniofacial anomalies such as cleft lip and palate or psychological diseases were all excluded. The AC-IOTN records consist of series of 10 black and white photographic scale with progressive degrees of esthetic problems and displaying different degrees of malocclusion, ranging from 1 to 10, from most attractive to the least attractive. Each participant was asked to select the photograph scale that represented the attractiveness of his or her dental appearance the best. Assessment using black and white photographs has the advantage that the assessment is focused on the malocclusion and alignment of the teeth and not influenced by periodontal status or any tooth discoloration.^[20] Chi-square was used to compare the difference between both groups.

RESULTS

Out of 700 questionnaires distributed, 608 complete both the Berlin Questionnaire and AC-IOTN index, the response rate was 86%. Five hundred and fifty-three students and 56 employees (317 males and 291 female) aged 17–59 years [22 ± 4.6 ; Table 1]. The prevalence

of snoring was 19.2% (male 22.7%; female 15.4%). About 2.9% of the sample reported breathing pauses more than 3 times per week. Hypertension was present in 6% of the surveyed sample. 46% have report nodded off or fall asleep during driving a car or while waiting at least twice a month. The prevalence of tiredness and fatigue after sleep from 3 to 4 times a week was 36.9% and during the working time was 33.6%. Based on the Berlin Questionnaire stratification for risk of OSA, 8.2% were considered as a high-risk patient for OSA, [males: 7.2%; females: 9.2%; Figure 1]. Regarding the need for orthodontic treatment, 12.3% of snoring participant consider them self in need of orthodontic treatment compared to 6.3% of nonsnoring [$P < 0.04$; Table 2].

Consequently, 38.3% of participants with habitual snoring have gone through orthodontic treatment, while only 28.5% of nonsnoring participants have done orthodontic treatment [Table 3].

DISCUSSION

This study is the first large dataset on both male and female Saudi university population which collected by a standardized protocol on snoring, OSA symptom, and its association with self-perceived of dental esthetics. The present study was undertaken to determine the prevalence of snoring among both male and female and to test the null hypothesis that there is no impact of habitual snoring on the self-perceived of dental esthetics. The key findings of our study included first, snoring prevalence was 19.2% of our student’s population and 8.2% were considered as high-risk for OSA. Second, 12.3% of our snoring participant thought they need orthodontic treatment compared to 6.3% of a nonsnoring ($P < 0.04$). Third, 38.3% of the participants with habitual snoring seek orthodontic treatment compared to 28.5% of the nonsnoring.

Our data revealed a generally lower snoring prevalence in the female population compared to the male population (22.7% in males and 15.4% in females). The gender drift could be attributed to a hormonal influence

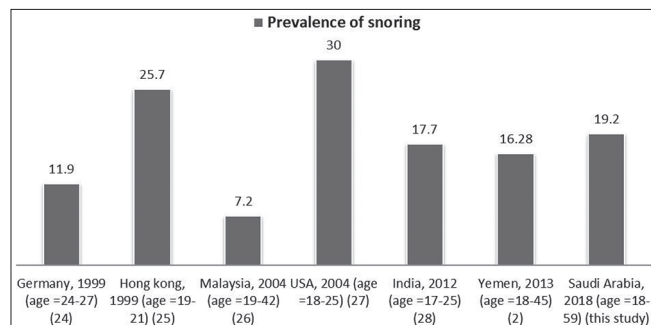


Figure 1: Summary of snoring among universities population

on respiratory control and fat distribution.^[5] Similar results were found in other studies which summarized in Figure 2.^[2,24-28] The prevalence of snoring in middle age men and women in Saudi in primary care was 40.8% in women and 52.3% in men.^[29,30] Netzer *et al.* reported that

Table 1: Distribution of studied cases according to demographic data

Variables	n (%)
Gender	
Male	317 (52.1)
Female	291 (47.9)
Role in the university	
Student	553 (90.8)
Employee	56 (9.2)
Current age	
Mean	22.45
SD	4.58
Range (years old)	17-59

SD=Standard deviation

Table 2: Comparison between snoring and nonsnoring participant regarding Aesthetic Component of the Index of Orthodontic Treatment Need

AC-IOTN	Snoring participant (%)	Nonsnoring participant (%)	P
No need for treatment	71 (87.7)	494 (93.7)	0.060
Need for treatment	10 (12.3)	33 (6.3)	0.045
Percentage within habitual snoring	81 (100)	527 (100)	

AC-IOTN=Aesthetic Component of the Index of Orthodontic Treatment Need

Table 3: Comparison between snoring and nonsnoring participant regarding orthodontic treatment

	Did the participant ever had an orthodontic treatment		
	Yes (%)	No (%)	Percentage within habitual snoring
Snoring participant	31 (38.3)	50 (61.7)	81 (100)
Nonsnoring participant	150 (28.5)	377 (71.5)	527 (100)

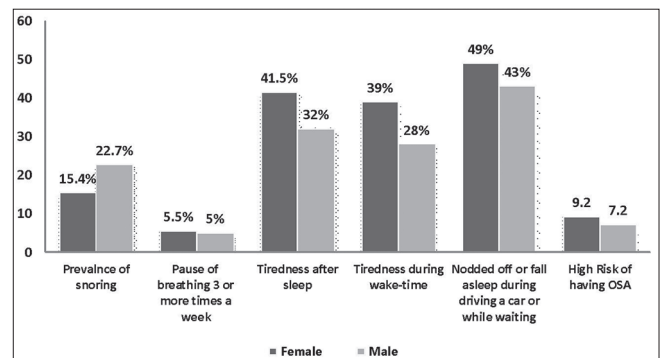


Figure 2: Prevalence of obstructive sleep apnea symptoms between male and female in this study

52.2% has habitual snoring and 37% were considered as a high-risk patient for OSA.^[22] Male gender and high BMI have also been proved as risk factors for snoring by another study.^[31]

A patient is at high risk of OSA if he or she scores “positive” in two or more categories of the three categories of Berlin Questionnaire. In our study, 8.2% were considered as high risk for OSA (7.2% in males and 9.2% in female’s, respectively). The prevalence of OSA symptoms was reported as 39% in Saudi women and 33.3% in men consequently.^[29,30] Natzer also reported similar results in the United States and Europe with 37.9% of males and 27.8%.^[32] In the United Arab Emirates, 22.9% of the male respondents were at high risk for OSAS, while 19.5% of the females were at high risk for OSAS.^[33] The differences between our result and above result may relate to the age of our patients as most of our patients were students with mean age 23.05, and it has been fairly well established that the prevalence of sleep apnea increases with age in both sexes. The prevalence of sleep apnea peaks in clinical populations around 55 years for men and 65 years for women.^[34]

Excessive daytime sleepiness (EDS) is an important feature in the diagnosis of obstructive sleep apnea. Surprisingly almost half of our study population have report nodded off or fall asleep during driving a car or while waiting at least twice a month (49% female and 43% male) which considered very high compared to other population (USA: 22.9% and Europe: 12%).^[32] Sleepiness due to OSAS has also been shown to be associated with poor performance in the workplace.^[35]

There have been several reports showing a high risk of road traffic accidents in individuals with untreated OSAS, and epidemiological studies suggest a particularly high rate of OSAS in truck drivers.^[36] In many countries, when OSA patient is being treated effectively an evidence is requiring by the licensing authorities to allow them to go back to their normal car driving, although practice varies appreciably between countries. The tiredness of fatigue after sleeping at least 3–4 times a week in our study was 41.5% in female and 32% in the male. Similar results were reported in the United States population (females 42%; males 30.5%), and those population results were higher than the European results (females: 17.7%; male: 13.8%).^[32] The most commonly encountered cause of EDS and tiredness of fatigue after sleeping in a clinical setting is OSA and snoring.^[4] Both lead to total or partial occlusion of the upper airway during sleep, causing apneas and hypopneas that lead to intermittent hypoxia, arousal from sleep with resulting sleep fragmentation, and disturbed sleep architecture.^[21] Therefore, lower oxygenation and increased sympathetic

cardiac tone during sleep are key factors contributing to EDS in patients with sleep-disordered breathing.^[37] On the other hand, tiredness during the working time in our result (39% in female and 28% in males) also resemble the United States result (44.4% in female and 34.4% in males), but those result are higher than European result (17.4% in females and 13.2% in males).^[32]

Comparison between snoring and nonsnoring participants regarding AC-IOTN showed that 12.3% of our snoring participant thought they need orthodontic treatment compared to 6.3% of a nonsnoring [$P < 0.04$; Table 2]. This result showed that snoring participants have less confidence in their dental esthetics compared to the nonsnoring participants [Table 3]. This important finding of our research indicated that snoring has an impact on the self-perceived of dental esthetics. Therefore, the impact of snoring and subsequently OSA is not only limited to EDS and tiredness or fatigue after sleep but also extend to include patient’s QOL which remain unexplored in the sleep laboratory. The review of available literature suggests that there is considerable impairment of HRQoL in OSA.^[38]

However, the impairment in QoL is not proportional to the disease severity measured by Apnea–Hypopnea Index and has not been consistently found to be associated with any other polysomnographic variable.^[16] Comparison between snoring and nonsnoring regarding seeking orthodontic treatment showed that 38.3% of the participants with habitual snoring seek orthodontic treatment compared to 28.5% of the nonsnoring [Table 3]. One of the reasons why snoring patients seek orthodontic treatment more than nonsnoring in our sample could be related to the orthodontic treatment itself as it may cause a significant increase in patients’ self-esteem. In adolescents and young adults, self-esteem appears to be more important than the normative level of malocclusion and craniofacial typology.^[16]

In view of the results of this study, these findings will hopefully assist in the orthodontic planning, as it is important that HRQoL should be considered in the treatment of snoring and OSA patients to improve HRQoL and self-esteem.

However, the current study could not overcome some methodological limitations. First, the generalization of the results to a larger population is limited because the sample subjects were university population. This source of study participants could introduce a potential selection bias into the investigation, making our results more applicable to university population than to the general public. Second, our study uses a self-reported questionnaire, which is likely to have underestimated

the prevalence. However, this study included a large sample of 608 university population, so it is meaningful in the assessment of the prevalence of symptoms of obstructive sleep apnea. Third, there is a possibility of underdiagnosis of snoring when a standard full-night polysomnography test is not administered. However, the Berlin Questionnaire can still be considered as an effective and inexpensive way for screening snoring. Fourth, although there is an impact of snoring on the self-perceived of dental esthetics and alignment of teeth, it does not necessarily reflect causality. Hence, a further clinical investigation is essential to explore this topic. Fifth, even though snoring participant seeks orthodontic treatment more than the nonsnoring participant, this result needs to be interpreted with more caution as going through orthodontic treatment did not necessarily imply the participants' own esthetic demands. Sometimes, it was by other's opinion or for other reason. Further studies are needed to address this topic using regression model analysis to isolate any confounding factors. Future research can also be carried out to explore the short- and long-term impact of treatment modalities such as surgery, dental appliances, and lifestyle modification on the snoring self-perceived of dental esthetics.

CONCLUSION

The null hypothesis is rejected, snoring has an impact on the self-perceived of dental esthetics and alignment of teeth and also snoring participant seek orthodontic treatment more than the nonsnoring participant.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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