Original Research

Comparison between Two Kinds of Online Educational Interventions on Knowledge-Attitude and Practice of Prosthodontists about the Role of Intra-Oral Appliances in Management of Obstructive Sleep Apnea

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Abstract

Background and Objective: Obstructive sleep apnea (OSA) needs early detection and effective treatments to reduce the risk of its harmful consequences. The aim of this study was to assess the knowledge and practice of prosthodontists about OSA and oral appliances (OAs) after a period of training and comparative evaluation between two types of virtual education.

Materials and Methods: This study was a randomized clinical trial with two types of educational interventions (PowerPoint and podcast) performed among the members of the Association of Prosthodontists (dentists who are specialist in prosthodontics) in 2020. The participants answered to a questionnaire which assessed their knowledge and practical actions about OSA. Data were analyzed using SPSS software and independent-sample t-test.

Results: Group A (PowerPoint) obtained higher scores in all knowledge sections compared to group B (podcast). Totally, the mean scores of group A in knowledge and practical sections were 77.56 ± 9.09 and 81.75 ± 12.39, respectively. In addition, the mean scores of group B in knowledge and practical sections were 74.72 ± 10.79 and 80.69 ± 14.05, respectively. The difference between the mean scores of the two groups in knowledge and practical sections was not significant.

Conclusion: The virtual educational intervention had positive effects on the knowledge and practice of prosthodontists about OSA and OAs. Although the power Point was more effective than podcasts, there was not significant difference between them.

Keywords: Obstructive sleep apnea; Mandibular advancement; Knowledge; Distance learning; Online education

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Introduction

Obstructive sleep apnea (OSA) is defined by repeated symptoms of apnea and hypopnea during sleep (1). The good night sleep plays an important role in a person's general health and is essential for daily activities (2). The harmful consequences of OSA could be observed in central nervous system (CNS), cardiovascular system, and metabolic system, which cause inability of concentration, behavioral problems, cardiovascular diseases (CVDs), and poor growth and development in children (3). The OSA affects 2% of middle-aged women and 4% of middle-aged men. Sleep problems including snoring, OSA, and upper airway resistance syndrome (UARS) not only happen in adults, but also in children (4, 5). Decrease in the forces of the pharyngeal dilators, negative inspiratory pressure produced by the diaphragm, and inappropriate upper airway anatomy are the strong factors for the developmental OSA (6). Moreover, studies indicate that pharynx is the common site of obstruction in OSA (7). Most of the time, the airway failure happens during sleep when the base of the tongue connects to the posterior pharyngeal wall and soft palate. One of the common reasons of OSA are excessive tissue of the soft palate, a

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large tongue, swollen uvula, large tonsils, and redundant pharyngeal mucosa (6).

Intraoral devices were first used in in the late 1980s as an effective treatment option for mild to moderate OSA (8). Oral appliances (OAs) fall into three general categories: mandibular advancement, tongue retainer, and soft palatal lift appliances. The first group is more common with the mechanism of advancing the mandible, and it keeps the airway open and helps in the treatment of sleep apnea, albeit some side effects. Therefore, the construction and adjustment of these devices should be performed by prosthodontists who have enough experience about maxillary appliances as well as the ability to choose the right treatment after the examination (9, 10). On the other hand, dentists may be the first ones who recognize the signs and symptoms of OSA, including long soft palate, large tongue (macroglossia), or small mandible. Accordingly, they can play an important role in identifying and providing treatment by using OAs, and also referring patients with OSA (11). Many dental techniques are identified to improve the treatment of patients with OSA along with other medical treatments (10).

On the other hand, dentists should pay attention to two issues: At first, before accepting responsibility for OSA, they should have sufficient knowledge in the field of sleep medicine and knowledge of OAs usage. Secondly, they need to know that cooperation between dentists and sleep physicians is critical to patients' health and teamwork is the best approach to treat OSA (4, 11). It is clear that OSA is a medical problem and physicians play an important role in properly identifying and referring patients with OSA. Most previous studies have focused on physicians' knowledge and attitudes about sleep disorders. Some research has evaluated the sleep medicine knowledge provided in medical schools and resulted in a lack of education about sleep disorders in dental schools as well (5).

In the study by Davoodi et al., prosthodontists received lower scores in the areas of knowledge of diagnostic, anatomical and para-clinical parameters, therapeutic indications, and some other sections. Therefore, lack of knowledge and practice of prosthetics should be addressed by educational interventions (12). Web-based training is a cost-effective way to educate a large number of participants from different locations and provide them all with the same training. Podcast and PowerPoint are two common multimedia tools which are used in virtual education and rely more on auditory and visual powers respectively و but their effectiveness in training may vary depending on the audience. Given the circumstances of the present era, when education is directed to virtual education due to the spread of the coronavirus disease-2019 (COVID-19), it is important to compare the performance of virtual content (13, 14).

The aim of this study was to assess the knowledge and practice of prosthodontists about OSA and OAs after a period of training with two methods. So far, there has been no study conducted about the effect of educational intervention on knowledge, attitude, or practice of prosthodontists about intraoral appliances for treatment of OSAs.

Materials and Methods

This study was a randomized clinical trial that was approved by Iranian Registry of Clinical Trials (IRCT) with the registration code IRCT20200714048102N1 with two types of educational interventions power point and podcast) performed among the members of the Association of Prosthodontists in 2020.

They illustrated their consent to participate in this study by filling a consent form.

In case of participating in a previous sleep apnea training course, they were excluded from the study. The subjects were dichotomized randomly into two groups: A and B with 25 and 26 participants, respectively. This sample size had enough statistical power to test at least 15 unit differences (in a scale of 0 to 100) between study groups both for total knowledge and total practice scores; > 99.9 and 97.8%, respectively. The random allocation of participants in this study was simple randomization. In this way, we listed the people who were ready and satisfied to participate in the study and assigned a random number to each of them. By sorting people by this random number, we assigned the first half of the list to one group and the remaining half to another group. A third party randomized the list of people volunteering for the company and collected the answers. The names of the groups were also provided to the analyzer in the form of codes A and B. The educational content was forwarded in the form of PowerPoint files and podcasts in group A and group B, respectively, both through a virtual network. Reminder messages were sent on a scheduled basis. After six weeks, a questionnaire was sent to participants to assess their knowledge-attitude and practice about the role of intra-oral appliances in the management of OSA.

Educational content: Educational content was

produced based on the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) pattern. Analysis means collecting information about participants and learning needs. The best approach and educational media were chosen in the design step. In addition, the development includes choosing and providing the best media and educational materials which should be used during the implementation. Evaluation is a continuous process that is performed during the ADDIE. The power points and podcast files had the same educational content, including information about the OSA symptoms and OAs effectiveness, functions, and side effects.

Questionnaire: The questionnaire proposed in the study by Davoodi et al. was used to evaluate the prosthodontists knowledge-attitude and practice about OSA without any previous training, but in the present study different prosthodontists were evaluated after educational interventions (12). The questionnaire included demographic information, six areas of awareness, and two areas of practice. The six areas of awareness evaluated the prosthodontists knowledge of signs and symptoms, diagnosis and anatomical and preclinical parameters, points before prescribing appliances, therapeutic indications, contraindications of appliances, and complications of no treatment. The two areas of practice evaluate the prosthodontists practice about the risk reduction recommendations and diagnosis and treatment. Each item (except demographic items) consisted of five answers (completely agree, agree, no idea, disagree, and completely disagree). Depending on the scoring, each item had a score of 1 to 5, with the lowest and highest scores for each item being 1 and 5, respectively.

Statistical analysis: For analyzing the data, the Statistical Package for the Social Sciences (SPSS) software (version 21, IBM Corporation, Armonk, NY, USA) was used. The quantitative variables were explained as mean and standard deviation (SD), while the qualitative variables were justified as frequency and percent. The mean scores in the two groups were compared using the independent sample t-test.

Ethical consideration: The study was approved by Tehran University of Medical Sciences (TUMS), Tehran, Iran, and the Ethics Committee of TUMS (IR.TUMS.DENTISTRY.REC.1399.034). Prosthodontists had no obligation to complete the questionnaires and all of them participated in the study with their consent. The three retest combination codes were not requested from the participants for the sake of confidentiality of the name and were used only as the last number of the ID number plus the last three numbers of the mobile phone.

Results

The mean age of group A and B were 46.16 ± 11.13 and 47.42 ± 10.08 years, respectively. Group A included 52% male participants and 58% of group B were females. It is considerable that most of the participants worked in their private clinics (about 80%). The mean years of working in the prosthodontics field in groups A and B respectively were 18.60 ± 11.10 and 19.96 ± 10.19. Furthermore, the participants were graduated from eight different universities, but most of them graduated from Tehran University of Medical Sciences (60% of group A and 58% of group B) (Table 1).

Table 1. Characteristics of participants

Variable		Group A	Group B
Age (year)	Mean ± SD	46.16 ± 11.13	47.42 ± 10.08
Age group	< 50 year [n (%)]	15 (60.0)	14 (53.8)
	> 50 year [n (%)]	10 (40.0)	12 (46.2)
Sex	Male [n (%)]	13 (52.0)	11 (42.3)
	Female [n (%)]	12 (48.0)	15 (57.7)
Work experience (year)	Mean ± SD	18.60 ± 11.10	19.96 ± 10.19
Work experience categories	< 25 year [n (%)]	16 (64.0)	15 (57.7)
	> 25 year [n (%)]	9 (36.0)	11 (42.3)
University	Tehran, Iran [n (%)]	15 (60.0)	15 (57.7)
	Shiraz, Iran [n (%)]	2 (8.0)	2 (7.7)
	Mashhad, Iran [n (%)]	3 (12.0)	2 (7.7)
	Tabriz, Iran [n (%)]	1 (4.0)	1 (3.8)
	Isfahan, Iran [n (%)]	2 (8.0)	1 (3.8)
	SBMU [n (%)]	1 (4.0)	4 (15.4)
	USA [n (%)]	1 (4.0)	0 (0.0)
	Yazd, Iran [n (%)]	0 (0.0)	1 (3.8)
Clinic	Private clinics [n (%)]	19 (76.0)	21 (80.8)
	University clinics [n (%)]	6 (24.0)	5 (19.2)

SD: Standard deviation; SBMU: Shahid Beheshti University of Medical Sciences

Table 2. Description of Group A and Group B scores in each sections of the questionnaire form

	Group A Mean ± SD	Group B Mean ± SD	P-value
Knowledge: Sign and symptom	86.50 ± 10.47	85.82 ± 13.18	0.84
Knowledge: Diagnosis parameter and anatomical and preclinical	65.20 ± 7.43	64.42 ± 12.03	0.78
Knowledge: Points before prescribing appliances	90.00 ± 12.50	85.10 ± 13.24	0.18
Knowledge: Therapeutic indications	68.00 ± 16.96	62.98 ± 21.06	0.35
Knowledge: Contraindications of appliances	83.33 ± 17.01	77.88 ± 17.94	0.27
Knowledge: Complications of no treatments	72.33 ± 15.07	72.12 ± 15.36	0.96
Practice: Risk reduction recommendations	86.50 ± 13.46	86.54 ± 16.55	0.99
Practice: Diagnosis and treatments	79.38 ± 14.35	77.76 ± 15.34	0.70
Total knowledge	77.56 ± 9.09	74.72 ± 10.79	0.32
Total practice	81.75 ± 12.39	80.69 ± 14.05	0.78

SD: Standard deviation

The mean scores of each groups in different sections are shown in table 2. Totally, the mean scores of group A in knowledge and practice sections were 77.56 ± 9.09 and 81.75 ± 12.39, respectively. Besides, the mean scores of group B in knowledge and practice sections were 74.72 ± 10.79 and 80.69 ± 14.05, respectively.

Group A in comparison to group B obtained higher scores in all knowledge sections. However, group B, which had educational interventions with podcasts, obtained a higher score just in one part of the practical sections (the risk reduction recommendations). The differences between the mean scores of the two groups in knowledge sections (signs and symptoms, diagnosis and anatomical and preclinical parameters, points before prescribing appliances, therapeutic indications, contraindications of appliances, and complications of no treatments) and practical sections (the risk reduction recommendations, diagnosis, and treatment) were not significant (P > 0.05, Table 2).

Discussion

Dentists sometimes are the first individuals who detect the OSA and sleep disorders. They refer patients with OSA to the related specialists or treat them with OAs. Therefore, having knowledge about OSA and OAs and cooperation between physicians and dentists are necessary. Qualified dentists can have a major role in early detection of OSA (15, 16). In the study by Jauhar et al., 57% of dentists prescribed oral instruments to treat snoring and apnea (2). In the study by Bian et al., more than half of the dentists were unable to identify common signs and symptoms of OSA and had no knowledge of mandibular advancement appliances (4). A study among the North American Schools found that less than half of the responding schools had training in the treatment of sleep disorders in their curricula and the graduates suffered from the lack of knowledge and education about sleep disorders and related treatments (15). The establishment of the American Academy of Dental Sleep Medicine (AADSM) in 1991 and the establishment of an OSA department at the AADSM in 2000 tried to increase the knowledge of dentists in the treatment of OSA (8). The American Board of Dental Sleep Medicine (ABDSM) was established to improve groups of dental experts (17). Therefore, the importance of education and examining the knowledge about sleep disorders has been grown gradually (18, 19).

Up to the Jauhar study, 74% of prosthodontists expressed their interest in participating in a course for the treatment of patients with OSA in order to compensate for the lack of their knowledge (2). In the study by Davoodi et al., the mean ± SD of the knowledge scores of non-faculty and faculty prosthodontists were 61.52 ± 6.38 and 65.69 ± 8.78 and their practice scores were 58.89 ± 14.27 and 68.54 ± 13.01, respectively (12).

In the present study, the mean score of knowledge in group A and group B was 77.56 ± 9.09 and 74.72 ± 79.10, and it was 81.75 ± 12.39 and 80.69 ± 14.05 in practice, respectively. Given the higher scores acquired, it seems that education could improve their knowledge. It is considered that the diagnosis parameter and anatomical and preclinical knowledge has the lowest scores in both groups, which means that the content of the educational intervention is not sufficient or the participants were not feeling the need for improving the diagnosis parameter and anatomical and preclinical knowledge as a prosthodontist.

Although the participants graduated from different universities and had one to 40 years of experience of working in the field of prosthodontics,

interventional education has the same influence on them. The results showed there is no significant difference between the two groups in all sections, indicating that there is no considerable difference between PowerPoint and podcasts as interventional education (12).

There are various teaching methods for intervention such as face-to-face methods (including lectures, conferences, workshops, etc.) and virtual web-based methods (including podcasts, power point brochures, etc.). The advantages of a virtual educational intervention include the possibility of managing the training time by the learner, easier access to content, and the possibility of retrieving and reviewing information (20). In this study, the offline virtual method power point and podcast) was selected. A systematic review of the implications of educational intervention for physicians concluded that educational intervention for physicians had little response, unless they had financial gain or privilege as motivation (21).

In the present study, despite the fact that there were not any regards or points, the participants had good cooperation. However, the major limitation of this study was that the participants were repeatedly asked to complete the questionnaire and also self-reporting of the data.

In the educational intervention in dental students by Salama and Al-Balkhi, there was not a time interval between the educational intervention and the evaluation after it, so high scores were obtained (22). For this reason, in the present study, based on the study by Tornava et al., we considered a six-week interval between intervention and evaluation (23).

Due to the fact that the podcast does not need to be seen and can be listened to while doing other things, it seems that it can increase participation, therefore, according to the same results as the power point group, is a good tool for training health professionals.

Schreiber et al. reported that video podcast is more convenient than live lecture for subjects because of its capability of stop and review, however they preferred live lecture as a main teaching tool and podcast as a supplementary. Moreover, there is not any difference between knowledge in the two methods (24), and the use of random simple quizzes could help educators while using podcasts (25).

Conclusion

Iranian prosthodontists need more education about OSA than school curricula; virtual educational intervention had positive effects on the knowledge and practice of prosthodontists about OSA and OAs. Although the power point was more effective than podcasts, there was no significant difference between them.

Conflict of Interests

Authors have no conflict of interests.

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