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Knowledge and Practice of Present and Future Dentists about Nutrition Counseling in Yazd, Iran in 2022

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ABSTRACT

Background: Inadequate nutrition can affect oral health. Compromised oral health can also alter food choices and negatively lead to poor nutrition. This study aims to assess the knowledge and practice of dentists and dental students regarding nutrition counseling.

Methods: In this cross-sectional study, a valid and reliable four-part questionnaire was conducted among senior students and dentists in Yazd city in February 2022. All 40 senior students in the Faculty of Dentistry were selected by census method, and 98 dentists were selected randomly from all the names registered in the system of Medical Council. Data were analyzed by SPSS version 25 and t-test and Chi-square tests were used (P-value < 0.05)

Results: Out of a score 9, the mean score of knowledge was 7.12 ± 1.75 for dentists and 6.48 ± 1.2 for students. The mean score of dentists was higher than students (P = 0.03). Out of a score of 10, the mean score of dentists and students' practice were 3.26 ± 2.43 and 3.20 ± 1.82, respectively. There was no significant difference regarding the mean score practice in two groups (P = 0.879).

Conclusions: The knowledge level of both groups was not good but acceptable, and the quality of practice in both groups was poor. It seems that there is a need for corrective educational interventions to improve the practice of dentists and dental students.

Keywords: Dentists, Counseling, Cross-Sectional Studies, Students.

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Introduction

Nutrition counseling is an interactive process in which, a healthcare provider counsels the patients to assess their dietary intake and help them to adopt to healthy nutritional behaviors (1). Nutrition has a critical role in health promotion and disease prevention; thus, all healthcare practitioners need to have optimal counseling skills in order to be able to assist patients in this important task(2).

A balanced healthy nutrition plays a fundamental role in preserving the symbiotic relationship between oral microorganisms (3) and can prevent adverse effects of malnutrition and excessive consumption of sugar or alcohol on oral health (4, 5). Therefore, dentists should make their patients aware that inclusion of vitamins, calcium, zinc, and polyphenols in diet can prevent the progression of oral problems such as periodontal disease (3). Furthermore, patients seeking multiple teeth extraction should be informed about the adverse effects of impaired mastication on the quality of nutrition and its subsequent impact on general health, and encouraged to replace extracted teeth as soon as possible (6). Gradual tooth loss in the elderly also results in unfavorable changes in their diet (7). Pregnant women require nutrition counseling as well, as increased gag reflex and tendency to consume sugary foods during pregnancy may increase the risk of caries, and mother to child transmission of cariogenic bacteria may also occur (8). Moreover, some changeable risk factors such as obesity can predispose the patients to periodontitis, caries, and oral malignancies (6, 9-11). Improper nutrition is responsible for increased risk of hypertension, diabetes, and osteoporosis (6). All these contents should be included in the nutrition counseling process by a dentist with a comprehensive preventive approach. Guiding the patient to have a healthier diet can be more effective in controlling diabetes and improving periodontal health (9, 11) as higher consumption of fibers helps in better control of blood sugar (3). Vitamins and minerals are also required for bone formation and periodontal regeneration (12). Modifying the nutritional pattern can reduce the progression of gingivitis into periodontitis (12, 13). A healthy diet is also important in orthodontic patients to prevent the formation of caries (14). Higher consumption of grains, fruits, and unsweetened dairy products is associated with lower risk of caries; whereas consumption of foods containing added sugars, or hydrolyzed starchy products increases this risk (1). Sweet drinks are also associated with higher rate of caries, compared with solid foods (1, 15). Moreover, oral lesions are more common in patients with malnutrition (15).

Considering all the above mentioned, nutrition counseling can be considered a part of routine preventive dental care (1, 6). However, it appears that shortage of time and lack of dentists' knowledge regarding the significance of nutrition counseling are barriers against correct implementation of this task. Evidence shows that dentists can play an important role in motivating their patients to adopt a healthy diet.

However, the knowledge and attitude of dentists regarding nutrition counseling seems insufficient (2, 4). Thus, this study aims to assess the knowledge and practice of dentists and dental students regarding nutrition counseling.

Methods

This cross-sectional study was conducted on dentists practicing in Yazd and senior dental students of School of dentistry, in Shahid Sadoughi University of Medical Sciences in February 2022. Unfortunately, there was no study on the population of dentists or dental students. Based on a similar study by Bapat (4) on the evaluation of dental nutrition knowledge among nutrition students, assuming a standard deviation and the knowledge mean score of 1.72, an estimated error of 0.35 in the aforementioned study, and a 95% confidence level, in this study, 98 dentists were selected as a sample size from the list of dentists registered in the Medical Council file by a systematic random method. In addition, all the 40 senior students of school of dentistry were recruited by census sampling. Inclusion criteria were having a minimum of 6 months of work

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experience for dentists and passing the nutrition course for dental students. Incomplete questionnaires were excluded. The method of answering designed questions was compared in two groups of dentists and students.

Data collection

A researcher-designed, four-part questionnaire was used. The first part included demographic information including age, gender, and work experience; the second part included 9 questions regarding the knowledge of participants; the third part consisted of 6 questions regarding attitude, and the fourth part contained 10 questions about practice, all with respect to nutrition counseling.

Assessment of validity and reliability of the questionnaire:

Content validity was evaluated using the Lawshe's model. The opinions of 10 faculty members were quantified using the content validity index, which was calculated as 0.8. Thus, no item was finally rejected or revised. Regarding reliability, internal consistency of questions was assessed by calculating the cronbach's alpha, which was 0.7.

Knowledge and practice questions were scored as follows:

In knowledge part, each correct answer was scored 1, "I do not know" response was scored 0.5, and wrong answers were scored 0. In practice part, each 'Yes' answer was scored 1, and each 'No' answer scored 0. To report knowledge level qualitatively, the following classification system was used: Scores 8-9: were considered good, 6-8: acceptable, and scores < 6 were considered poor. To report the quality of practice, the following classification was used: Scores 8-10 were considered good, 5-8, acceptable, and < 5 were regarded as poor scores. Responses to attitude questions were reported as frequency values.

Statistical analysis

Data were analyzed by SPSS version 25. T-test and chi-square tests were used and the level of significance was 0.05.

Results

Of 138 questionnaires, 98 were filled out by general dentists with a mean age of 31.76 ± 6.16, and 40 were filled out by students with a mean age of 24.30 ± 0.75. Tables 1 and 2 present demographic information and frequency distribution of answers to knowledge questions respectively. The mean score of knowledge was 7.12 ± 1.75 in dentists and 6.48 ± 1.2 in students, both of which were considered acceptable. According to the t-test, the knowledge mean score of the dentists was higher than that of the students (P = 0.03).

Table 1. Demographic information of participants

Variable			Number (percent)
Group		Dental students	40 (29%)
		Dentists	98 (71%)
Gender	Dentists	Male	46 (46.9%)
		Female	52 (53.1%)
	Dental students	Male	18 (45%)
		Female	22 (55%)
Age group (yrs.)	Dentists	25-34	69 (70.4%)
		35-44	29 (29.6%)
	Dental students	24-23	23 (57.5%)
		26-25	17 (42.5%)
Work experience of dentists		≥ 5 years	45 (54.9%)
		< 5 years	53 (54.1%)

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Table 2. Frequency distribution of answers to knowledge questions

Question	Answer choice	Group	
		Dentists	Dental students
		Number (percentage)	Number (percentage)
1. Can antioxidant decrease the level of periodontal inflammation?	Yes*	(62.2%)61	(55.0%)22
	No	(12.2%)12	(2.5%)1
	I do not know	(25.5%)25	(42.5%)17
2. Is low intake of calcium and dairy products associated with higher severity of periodontitis?	Yes*	(45.9%)45	(37.5%)15
	No	(19.4%)19	(15.0%)6
	I do not know	(34.7%)34	(47.5%)19
3. Does consumption of sugary materials along with meals, compared to their use alone, decrease the risk of caries?	Yes*	(69.4%)68	(37.5%)15
	No	(12.2%)12	(25.0%)10
	I do not know	(18.4%)18	(37.5%)15
4.Does obesity increase the risk of periodontitis?	Yes*	(75.5%)74	(65.0%)26
	No	(10.2%)10	(7.5%)3
	I do not know	(14.3%)14	(27.5%)11
5. Does obesity increase the risk of caries?	Yes	(62.2%)61	(50.0%)20
	No	(14.3%)14	(25.0%)10
	I do not know	(23.5%)23	(25.0%)10
6. Does sweet drinks increase the risk of caries more than solid foods?	Yes*	(70.4%)69	(55.0%)22
	No	(14.3%)14	(27.5%)11
	I do not know	(15.3%)15	(17.5%)7
7. Does periodontitis increase the risk of hypertension?	Yes*	(73.5%)72	(62.5%)25
	No	(9.2%)9	(10.0%)4
	I do not know	(17.3%)17	(27.5%)11
8. Is consumption of fruit juice associated with higher risk of caries than fruits?	Yes*	(77.6%)76	(67.5%)27
	No	(11.2%)11	(12.5%)5
	I do not know	(11.2%)11	(20.5%)8
9. Is frequency of consumption of sugary substances more important than daily sum of consumption in development of caries?	Yes*	(93.9%)92	(92.5%)37
	No	(2.0%)2	(0.0%)0
	I do not know	(4.1%)4	(7.5%)3

*T-test

No significant correlation was observed between the dentists' mean score of knowledge dentists and their age, gender, or experience (Table 3). In addition, no significant correlation was found between the knowledge score of students and age or gender (Table 3).

Tables 4 and 5 present the frequency distribution of answers to attitude and practice questions, respectively.

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Table 3. Comparing the mean scores of knowledge regarding the two groups based on their demographics

Participants	Knowledge	Variable	Mean	Std. deviation	P-value*
Dentists	Gender	Male	7.17	1.62	0.80
		Female	7.08	1.87	
	Age group (yrs.)	25-34	7.20	1.59	0.51
		35-44	6.94	2.14	
	Work experience (years)	< 5 years	7.00	1.64	0.43
		≥ 5 years	7.24	1.88	
Dental students	Gender	Male	6.44	1.36	0.84
		Female	6.52	1.08	
	Age group (yrs.)	25-34	6.28	1.32	0.21
		35-44	6.76	0.97	

*T-test

Table 4. Frequency distribution of answers to attitude questions

Question	Answer	Group	
		Dentists	Dental students
		Number (percentage)	Number (percentage)
1. Which of the followings are the advantages of nutrition counseling in the first visit? (you can choose more than one answer)	Having an overall estimate of the oral health of patient	65 (66.3%)	23 (57.5%)
	Assessment of the success rate of treatment (tissue regeneration capacity, risk of infection, etc.)	41 (41.8%)	12 (30.0%)
	Finding unhealthy nutritional habits (fat overuse, insufficient fiber intake, soft regimen, high consumption of fast foods)	67(68.4%)	25 (62.5%)
2. Do you think that counseling regarding nutritional habits is should be included in preventive dental care?	Yes	78(79.6%)	29 (72.5%)
	No	7 (7.1%)	7 (17.5%)
	No opinion	13 (13.3%)	4 (10.0%)
3. What are the major obstacles against provision of nutrition counseling to your patients? (please choose up to two choices)	Not having adequate information in this regard	46 (46.9%)	23 (57.5%)
	Time-consuming nature of nutrition counseling	60 (61.2%)	14 (35.0%)
	Possibility of hurting the patients' feelings	13 (13.3%)	5 (12.5%)
	I do not see any reason to do so	19 (19.4%)	3 (7.5%)
	I do not have adequate confidence to do so	9 (9.2%)	7 (17.5%)
	I think it will not be effective	15 (15.3%)	13 (32.5%)
4. Do you think that you received adequate information about nutrition during your education?	Yes	22 (22.4%)	7 (17.5%)
	No	50 (51.0%)	25 (62.5%)
	No opinion	26 (26.5%)	8 (20.0%)
5. Do you think that if dentist cannot provide nutrition counseling, should refer the patient to a nutritionist?	Yes	39 (39.8%)	21 (52.5%)
	No	38 (38.8%)	11 (27.5%)
	No opinion	21 (21.4%)	8 (20.0%)
6. What is your main source for nutritional information?	Undergraduate dental curriculum	23 (23.5%)	10 (25.0%)
	Retraining courses	10 (10.2%)	4 (10.0%)
	Miscellaneous studies	37 (37.8%)	20 (0.50%)
	scientific congresses and seminars	1 (1.0%)	6 (15.0%)
	Social media	27 (27.6%)	0 (0.0%)

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Table 5. Comparison of the mean scores of practice based on demographics

Participants	Practice	Variable	Mean± Std. deviation	P-value*
Dentists	Gender	Male	2.97 ± 2.04	0.275
		Female	3.51 ± 2.73	
	Age group (yrs.)	25-34	3.37 ± 2.39	0.488
		35-44	2.85 ± 2.49	
	Work experience (years)	< 5 years	3.86 ± 2.31	0.008*
		≥ 5 years	2.55 ± 2.41	
Dental students	Gender	Male	3.50 ± 1.79	0.355
		Female	2.95 ± 1.86	
	Age group (yrs.)	23-24	3.21 ± 1.83	0.945
		25-26	3.17 ± 1.87	

The chi-square test showed no significant difference in responses to attitude and practice questions based on variables, except for the following items: a significantly higher percentage of dentists with an experience of over 5 years would refer their patients for counseling if they could not provide it to their patients (P = 0.01). Furthermore, a significantly higher percentage of dentists with over 5 years of experience selected undergraduate education as their main source of knowledge about nutrition (P = 0.01). A higher percentage of male students had a positive attitude towards nutrition counseling as a preventive dental care (P = 0.002).

The mean score of practice was 3.26 ± 2.43 in dentists and 3.20 ± 1.82 in students out of a score of 10, both of which were considered poor. According to t-test, there was no significant difference between dentists and students (P = 0.879). Moreover, the t-test showed no significant correlation between the dentists' mean score of practice and age and gender (Table 5). However, generally, the dentists with less experience had better practice (P = 0.008). No significant correlation was found between the students' mean practice score and age or gender (Table 5). A significantly high percentage of female students prescribed supplements (P = 0.03). A higher percentage of dentists with experience of over 5 years (P = 0.001) and younger dentists (P = 0.03) prescribed probiotics. Moreover, many dentists with an experience of over 5 years advised weight loss to overweight patients (P = 0.01). Frequency distribution of answers to practice questions in both groups is shown in Table 6.

Table 6. Frequency distribution of answers to practice questions

Question	Answer	Group	
		Dentists	Dental students
		Number (percentage)	Number (percentage)
1. Do you advise your patients to consume probiotics to promote oral health?	Yes	39 (39.8%)	15 (37.5%)
	No	59 (60.2%)	25 (62.5%)
2. If your patient is overweight, would you advise her/him to lose weight?	Yes	41 (41.8%)	23 (57.5%)
	No	57 (58.2%)	17 (42.5%)
3. Do you record the weight and BMI of patients prior to dental examination?	Yes	7 (7.1%)	0 (0.0%)
	No	91 (92.9%)	40 (100%)
4. Do you emphasize proper postoperative nutritional recommendations after tooth extraction or other surgical procedures?	Yes	60 (61.2%)	25 (62.5%)
	No	38 (38.8%)	15 (37.5%)
5. Have you ever recommended supplementation to improve periodontal health of your patients?	Yes	27 (27.6%)	9 (22.5%)
	No	71 (72.4%)	31 (77.5%)

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Question	Answer	Group	
		Dentists	Dental students
		Number (percentage)	Number (percentage)
6. Do you inform the patient about the consequences of tooth extraction such as nutritional impairments and their impact on systemic health?	Yes	56 (57.1%)	30 (75.0%)
	No	42 (42.9%)	10 (25.0%)
7. Do you advise assessment of the level of vitamin D in patients with periodontitis?	Yes	28 (28.6%)	17 (42.5%)
	No	70 (71.4%)	23 (57.5%)
8. Have you ever received nutrition counseling?	Yes	17 (17.3%)	5 (12.5%)
	No	81 (82.7%)	35 (87.5%)
9. Have you ever recommended the inclusion of vitamin D-rich foods such as fish or egg yok in daily diet to patients with recurrent aphthous or progressive bone loss?	Yes	21 (21.4%)	6 (15.0%)
	No	77 (78.6%)	34 (85.5%)
10. Have you ever participated in a workshop about nutrition?	Yes	13 (13.3%)	5 (12.5%)
	No	85 (86.7%)	35 (87.5%)

Discussion

The American Dental Association has encouraged dentists to update their knowledge about nutritional recommendations related to oral health (16). However, this topic has been largely ignored by dentists (17). This study evaluated the knowledge and practice of dentists and students regarding nutrition counseling. The mean score of knowledge for both groups was acceptable, which was in agreement with the results of Vaidya et al.'s research (16); they assessed the knowledge level of students majoring in nutrition. However, the results were different from those of Dolatkhah et al.'s study (18) which assessed the knowledge of medical students and Bapat et al.'s project (4) which discussed the knowledge of nutrition students. Moreover, dental students only had the knowledge about the basics of nutrition based on Abdullah et al.'s research (19), and there is a need for inclusion of further nutritional topics in dental curricula.

The participants' mean score of knowledge had no significant correlation with gender, which was consistent with several studies (1, 2, 4, 18, 20). The mean score of knowledge had no significant correlation with age, which was consistent with the results from Alamri (20) and Dolatkhah's studies (18).

In the current study, the dentists' mean score of knowledge was significantly higher than students. Similar results were shown by Abdullah et al. (19) who reported higher knowledge score in senior students compared with junior ones; Chalmuri et al (2), Vaidya et al. (16) demonstrated higher knowledge score in graduates compared with students; and Bapat et al. (4) reported higher score of third year students in comparison with first and second year students.

The score of dentists' mean score of knowledge had no significant correlation with their experience, which has not been evaluated in any other study.

In the present study, 62.2% of dentists and 55% of students believed that antioxidants can decrease inflammation in periodontitis due to their anti-inflammatory properties (21-23). Moreover, calcium supplementation can positively affect the management of periodontitis (24). Optimal calcium content can decelerate tooth loss and bone resorption (25-27). In the present study, 45.9% of the dentists and 37.5% of the students were aware of the correlation between low calcium intake and periodontitis.

Several studies reported the association of obesity with caries and periodontitis (6, 27, 28). In the present study, 75.5% of the dentists and 65% of the students were aware of the association of obesity with periodontitis, and 62.2% of the dentists and half of the students believed that obesity was associated with caries. Periodontitis

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can lead to hypertension (29-33). 73.5% of the dentists and 62.5% of the students in the present study considered hypertension a consequence of periodontitis.

In this study, 69.4% of the dentists and 37.5% of the dental students believed that consumption of sugary substances alone was more cariogenic than their consumption with meals; however, only 1.7% of nutrition students in the study by Bapat et al. (4) agreed with this statement. In the present study, 77.6% of the dentists and 76.5% of the students believed that fruit juices were more cariogenic than fruits, and 70.4% of the dentists and 55% of the students thought that sweet drinks were more cariogenic than sweet solid foods. In a study by Shah et al (34), 73% of the dental students linked the consumption of fruit juices to caries. In the present study, most of the participants in both groups correctly believed that the consumption frequency of sugar was more important in caries development than the total amount of consumption. However, in the study by Bapat et al, (4) most of the students had a different idea. This difference may be due to the fact that dental practitioners pay more attention to nutritional tips related to oral health compared with students of nutrition major.

Only 41.8% of dentists and 30% of students believed that nutrition counseling can improve the success of dental treatment; but, in a study by Ritchie et al. (35) most of the participants believed that it can increase the success of treatment.

In the present study, 79.6% of the dentists and 72.5% of the students agreed with that nutrition counseling should be included in preventive programs. In a study by Hseiki et al, (36) 94.8% of the physicians believed that proper nutrition was important in prevention of systemic diseases. In studies by Abdullah et al (19), Nidhi et al. (1) and Alamri et al. (20), the majority of dental students were of the idea that nutrition counseling was an inseparable part of oral care. In a study by Morge et al, (37) 71.7% of medical students considered nutrition counseling a part of routine care. Despite the positive attitude towards this topic, assessment of practice in the present study revealed that 61.2% of the dentists and 35% of the students considered that time-consuming nature of counseling, and 46.9% of the dentists and 57.5% of the students stated that not having adequate information were the main reasons for not providing patients with counseling. Furthermore, time-consuming nature of counseling was reported as the main obstacle by 36.3% of dental hygienists in a study by Cole et al (38), 36.3% of dental students in the study by Sivakumar et al (17) and 62.4% of physicians in the study by Hseiki et al (36). Regarding children, Sim et al. (39)reported that the main obstacle against nutrition counseling was lack of interest of parents, while Wright (40) reported that the main concern was parents' negative reaction. However, only 13.3% of dentists and 12.5% of the students were worried about the reaction of patients in the present study. Lack of self-confidence to provide counseling was reported by 9.2% of the dentists and 17.5% of the students, while this rate was 35.1% among dental students in Shah's study (34).

In this study, 39.8% of the dentists and half of the students reported referral of patients to a nutritionist. This rate was 39.1% in the study by Sivakumar et al, (17) and 53.7% in the study by Hseiki et al (36). 51% of the dentists and 62.5% of the students in the present study complained that they did not receive adequate nutritional information during education. This rate was 49.6% in the research by Hseiki et al.(36), 25.7% in the study by Abdullah et al. (19), 42% in the study by Sivakuamr et al. (17), and 64.9% in the study by Shah et al. (34). Such wide range of variation can be due to different educational curricula. In the present study, 37.8% of the dentists and 50% of the students claimed that they acquired their current information through non-academic studies, pointing to the insufficient education. This rate was 18% in the study by Cole et al. (38). Other studies did not address this topic (1, 2, 4, 16, 18-32, 34, 35). In the current study, 7.1% of the dentists and none of the students reported patients' weight and BMI recording. This rate was 61.2% in the study by Hseiki et al. (36), 72.6% in the study by Morge et al. (37), and 20% in the study by Bell et al. (41).

86.7% of the study's dentists reported no

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participation in related retraining courses. This rate was 72.9% in the study by Alamri et al. (20) and 73% in the study by Nidhi (1), which were consistent with the results of this study. Only one out of four in both groups reported supplements prescription. This rate was higher in Alamri (20) and Sivakuamr studies (17) ,which may be due to stronger belief in efficacy of supplements.

The efficacy of probiotics for risk reduction of caries and periodontitis has been well documented (42-44). Nonetheless, 60.2% of the dentists and 62.5% of the students did not recommend probiotics, and 58.2% of the dentists and 42.5% of the students did not advise their patients to lose weight. In the present study, about 60% of both groups instructed the patients regarding post-treatment diet, and 57.1% of the dentists and 75% of the students reported that they would inform about adverse consequences of tooth extraction. These items were not focused in previous studies.

Bone loss and recurrent aphthous ulcers have been linked to inadequate intake of vitamin D (45, 46). However, 71.4% of dentists and 57.5% of dental students reported that they would not measure the level of vitamin D in patients with bone loss. Also, 78.6% of the dentists and 85.5% of the students did not recommend vitamin D supplementation to patients with aphthous ulcers and progressive bone resorption. Moreover, most of the participants had never received nutrition counseling to possibly improve their attitude. A large number of less experienced dentists reported referral of patients to a nutritionist with prescribed probiotics, which may be due to their updated knowledge. Thus, retraining courses can be planned to update older dentists. The role modeling of dental professors in providing nutritional recommendations to patients can also help future dentists believe that they can be effective in improving the nutritional health of patients. It is suggested to re-evaluate the knowledge and practice of participants within one year after these corrective measures.

Conclusion

The mean score of knowledge in both groups were not good but were acceptable level, and the knowledge of dentists was higher than students. No significant difference was found in the mean score of practice in both groups, which were at poor level. Despite the acceptable level of knowledge among participants regarding nutrition counseling and their belief in its necessity, this positive knowledge did not lead to appropriate practice; this highlights the need for corrective educational interventions with emphasis on practice.

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Conflict of interest

Authors declare no conflict of interest.

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Authors declared no conflict of interests.

Ethical considerations

The study was approved by the ethics committee of Shahdi Sadoughi University of Medical Sciences (IR.SSU.DENTISTRY.REC.1400.032). Written informed consent was obtained from all the participants as the first page of questionnaire.

Code of Ethics

IR.SSU.DENTISTRY.REC.1400.032

Authors' contributions

F.R.M, suggested the main idea, supervised the conduction of the study, and prepared and translated the manuscript into English; Z.F.M, collected data; A.N and prepared the questionnaire. All authors reviewed the manuscript.

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