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DOI:  
10.4103/jehp.jehp\_1436\_21

# Investigate the role of positive and negative memories from dentistry in the anxiety of dental patients in Kerman, Iran

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## Abstract:

**BACKGROUND AND AIM:** Several research works show that anxiety is more common in women, low-income classes, and middle-aged and elderly populations. The present study aimed to investigate the role of positive and negative memories in patients' anxiety referred to the dental clinics, offices, and schools of Kerman, Iran, in 2018–2019.

**MATERIALS AND METHODS:** In this cross-sectional, descriptive, analytical study, the participants were selected among individuals referred to the dental offices, schools, and clinics of Kerman, Iran. In this study, 500 questionnaires were distributed among the participants (based on census method), and of these, 482 of which were reviewed (response rate = 96.4%). The questionnaire used in this study contained four categories of questions, including demographic information, general questions about dentistry, Corah's Dental Anxiety Scale, and Autobiographical Memory Questionnaire. Analysis of variance, *t*-test, and Chi-square test were used to analyze.

**RESULTS:** Overall, 281 participants were female, and 201 were male. Based on the findings, dental visits were enjoyable and pleasant experiences for 154 participants, and 165 patients were anxious while the dentist prepared for a restorative treatment. This study showed that people with negative memories had more anxiety. Anxiety was also significantly associated with positive memories, higher education, and gender (female) ( $P < 0.05$ ). Also, the most negative memories of dental treatments were associated with increased anxiety about dental treatments in adults ( $P < 0.05$ ), while positive memories did not have a relationship any with decreased anxiety ( $P > 0.05$ ).

**CONCLUSION:** The most negative memories of dental treatments were associated with increased anxiety about dental treatments in adults, while positive memories did not have any expected inverse relationship with anxiety.

## Keywords:

Anxiety, dental, memory, negative, positive

## Introduction

Dental anxiety is clearly related to the feeling of pain during a dental treatment. About 4%–7% of people in the community with severe fear and anxiety about dental treatments require different methods of fear and anxiety management.<sup>[1-3]</sup> In general, the feeling of pain in dentistry is related to not only

damage to dental tissues (or periodontium) and pain transmission to the brain but also many other factors, such as a person's mental state, previous experience of dental treatments, and use of painkillers.<sup>[4,5]</sup> Overall, pain and anxiety occur together; in other words, pain can make the patient anxious, and an anxious person may feel more pain.<sup>[6-8]</sup> Other causes of anxiety include negative personal experiences and other people's painful and discomfoting descriptions of dental treatments.<sup>[9]</sup>

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**How to cite this article:** Hashemipour MA, Mohammadi F, Kamyabi H. Investigate the role of positive and negative memories from dentistry in the anxiety of dental patients in Kerman, Iran. *J Edu Health Promot* 2022;11:427.

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Received: 27-09-2021  
Accepted: 29-01-2022  
Published: 28-12-2022

Despite the importance of oral health, visiting a dental professional or spending time on a dental chair for examination is often not easy or relaxing. Sometimes, anxiety is accompanied by fear and panic; therefore, due to the patient's poor coping behaviors, the dentist cannot provide any kind of services for the patient.<sup>[10]</sup> The severity of anxiety in patients may become debilitating, leading to a feeling of imminent threat and deterring the patient from receiving proper diagnostic or therapeutic dental treatments.<sup>[11]</sup> On the other hand, anxiety in clients and its occurrence during examinations can affect the efficiency of treatment and reduce the dentist's self-confidence.<sup>[12]</sup>

Many people experience anxiety disorders due to dental treatments, ranging from helplessness or mild negative stress to fear and severe avoidance.<sup>[13-15]</sup> The onset of anxiety in dentistry has often been attributed to negative therapeutic experiences in childhood and adolescence. Negative dental experiences in these periods have important implications for future behavioral therapies.<sup>[16,17]</sup>

Yakar *et al.* showed that high and statistically significant dental anxiety scores have been detected for the patients who are women, housewives, who had uneasy and painful dental treatment stories, who have personal inclinations to the anxiety,<sup>[18]</sup> although Levin *et al.*<sup>[19]</sup> showed that the general level of dental anxiety among young Israeli males was normal. No relation was found between the level of dental anxiety and the professional education of the treating dentist in childhood. Also, regular dental care in childhood has more effect on preventing the development of high dental anxiety than the professional education of the early caregiver.

Studies have shown that negative memories can affect patients' visits to the dentist.<sup>[16,17]</sup> Also, studies have shown that anxious patients recall bad memories several weeks after painful dental procedures and report an even higher level of pain than that reported immediately after treatment. However, the opposite is true for nonanxious patients, as they recall less pain than they had experienced. While earlier studies of treatment experiences have focused on the content and emotional intensity of past events, they have not assessed memory characteristics, such as memory recall, emotional impact, or belief in the accuracy of memory.<sup>[20,21]</sup> Logistic regression analyses indicated that negative dental experiences were predictive of dental fear regardless of age of onset. A family history of dental anxiety was predictive of child onset only. Locker *et al.* showed that negative dental experiences were predictive of dental fear regardless of age of onset. A family history of dental anxiety was predictive of child onset only.<sup>[21]</sup>

Therefore, this study has been formed due to the fact that a number of studies show the impact of negative experiences on dental referrals, and some of them are deficient in this issue. Various studies on dental anxiety in different cultures and societies help the reduction of this issue. Also, in this study, two questionnaires have been used that have good validity and reliability.

## Materials and Methods

### Study design and setting

In this cross-sectional, descriptive, analytical study, the participants were selected among individuals referred to the dental office, dental school, and clinics of Kerman, Iran. Availability sampling was applied in this study.

### Study participants and sampling

The present work was a cross-sectional study in which samples were selected by convenience sampling method because of accessibility and closeness to researcher. At first, the city of Kerman was divided into 4 districts based on the municipal districts and 10 offices and 8 clinics were selected from each district. Then, a final year student was referred and a questionnaire was given to people in a quiet environment (before dental work) and from they obtained oral consent. The purpose of the research was explained to each individual and a questionnaire was provided to them if they were satisfied. Before providing the questionnaire, it was coordinated with the dentist or the person in charge of the clinic. It took about 15 min for each person to complete the questionnaire.

### Data collection tool and technique

The enrolled participants were over the age of 15 years. The study objectives were explained to each individual, and then, a questionnaire was completed by each participant. Meanwhile, all participants were assured that their information in the questionnaires would remain confidential and only examined from a statistical point of view.

The questionnaire used in this study contained four categories of questions, including the demographic information, general questions about dentistry, Corah's Dental Anxiety Scale (DAS),<sup>[22]</sup> and Autobiographical Memory Questionnaire (AMQ), which were validated by Kaviani *et al.* in 2005.<sup>[11]</sup>

This DAS questionnaire was developed in 1969 by Corah<sup>[23]</sup> and has been validated in Iran by Javadinejad *et al.*<sup>[24]</sup> in 2011 with an alpha coefficient of 0.85 and internal coordination of 0.82, and by Morvati Sharifabad *et al.*<sup>[25]</sup> which has been employed in 2012 on 400 patients to dental offices in Mashhad.

The DAS generally includes four questions. Each question has five possible answers (answer 1, score 1; answer 2, score 2; answer 3, score 3; answer 4, score 4; and answer 5, score 5) (minimum = 4; maximum = 20). To calculate the anxiety scores of individuals, the scores of four questions were summed and reported as follows: scores 1–8, without anxiety; scores 9–12, moderate anxiety; scores 13–14, high anxiety; and scores 15–20, serious anxiety (dental phobia).<sup>[23]</sup>

The AMQ measures various features of recalling events; revisiting memories that involve re-experiencing an event in a vivid way, including the memory of sights, sounds, smells, or tastes; a mental recall of an event, both voluntarily and spontaneously, which refers to thinking or talking about the event; the effect of memory on a person’s current mood or physical response; and a person’s belief or faith in the accuracy of memory. It also examined whether a person remembers a memory or goes back to previous lost memories; besides, it studied the next perspective from which the memory comes to mind as its emotional attraction. Answers are scored on a Likert scale. The average scores for each of the 21 AMQ items ranged from 31 to 155; the higher the patient’s score shows that, the more negative his/her memories. This AMQ questionnaire was developed in 1976 by Robinson<sup>[26]</sup> and has been validated in Iran by Kaviani *et al.*<sup>[11]</sup> in 2005 with an alpha coefficient of 0.81, internal coordination of 0.79 and the interrater correlation was significant ( $r = 0.83$ ).

Analysis of variance, *t*-test, and Chi-square test were used to analyze the data in SPSS version 21 (IBM Company, Chicago, IL, USA). The level of statistical significance was set at 0.05 in the analysis.

### Ethical consideration

Before starting work, this dissertation was approved by the Ethics Committee of Kerman University with the code of ethics IR.KMU.REC.1397.288.

## Results

In this study, 500 questionnaires were distributed among the participants, 482 of which were reviewed (response rate = 96.4%). Overall, 281 participants were female, and 201 were male. The mean age of the participants was  $34.22 \pm 13.19$  years. The present results showed that among 102 participants (20.4%), the last visit to a dental professional was about 4–6 months ago. Also, 115 participants (23%) had seen a dentist twice in the past year. Table 1 shows the demographic characteristics of the participants in this study.

Overall, 124 participants (25.7%) had a negative dental experience, whereas 358 (74.3%) did not have a bad

**Table 1: Demographic characteristics (age, sex, marital status, employed status, educational level, last visit to dentist, and visits in the past year) of the subjects based on sex**

Characteristic	Male, n (%)	Female, n (%)	Total, n (%)
<b>Age</b>			
Age range	18-75	19-62	18-75
Mean age	38.18±8.12	30.26±18.26	34.22±13.19
Sex	41.7 (201)	58.3 (281)	100 (482)
<b>Marital status</b>			
Married	23.8 (115)	41.1 (198)	64.4 (313)
Single	17.4 (84)	17.7 (85)	35.1 (169)
<b>Employed status</b>			
Employed	25.1 (121)	25.9 (125)	51 (246)
Unemployed	20.7 (100)	28.3 (136)	49 (236)
<b>Educational level</b>			
≥ Diploma	17.6 (85)	15 (72)	32.6 (157)
> Diploma	31.1 (150)	36.3 (175)	67.4 (325)
<b>Last visit to dentist</b>			
1-3 months	18.7 (90)	12.4 (61)	31.1 (151)
4-6 months	8.7 (42)	12.5 (60)	21.2 (102)
1 year	14.3 (69)	10.8 (52)	25.3 (121)
2 years	2.5 (12)	8 (39)	10.5 (51)
>2 years	7.5 (36)	4.3 (21)	11.8 (57)
<b>Visits in the past year</b>			
No referral	15.7 (76)	6.5 (32)	22.1 (108)
1 time	8.5 (41)	19.7 (95)	28.2 (136)
2 times	7 (34)	16.8 (81)	23.8 (115)
3 times	6 (29)	10.7 (52)	16.7 (81)
>3 times	4.1 (17)	5.1 (25)	9.2 (42)

experience. Besides, 31 patients (6.2%) were given painkillers during dental treatments. This study showed that there is a significant relationship between the gender (men more than women,  $P = 0.03$ ), education level (people with higher education than diploma, 0.04), and bad dental work experience. Table 2 shows patients’ answers to general questions.

Based on the findings, women, people with higher education, and married people had scored higher DAS questionnaire, and there is a significant relationship (respectively,  $P = 0.01$ ,  $P = 0.001$ ,  $P = 0.021$ ). Table 3 shows the relationship between DAS questionnaire scores and patients’ demographic characteristics.

The results showed that 197 (40.9%) participants had anxiety about dental treatments and people without anxiety and moderate anxiety have more positive memories than negative memories. Also, people had more negative memories with high and serious anxiety, and this relationship was significant. There is a significant relationship between the most negative experiences of dental treatment and increased dental anxiety in young adults ( $P = 0.001$ ), while positive experiences did not show the relationship with decreased dental anxiety. Table 4 shows the relationship between anxiety and

**Table 2: Participant’s answers to general questions based on sex**

Question	Male, n (%)	Female, n (%)	Total, n (%)	P
Have you ever had a bad dental experience?				
Yes	14.6 (73)	10.2 (51)	25.7 (124)	0.03
No	40 (200)	31.6 (158)	74.3 (358)	
Have you ever had a tooth extracted?				
Yes	11.4 (57)	9 (45)	21.2 (102)	0.02
No	40 (200)	36 (180)	78.8 (380)	
Have you been given painkillers during dental treatment?				
Yes	4 (20)	2.2 (11)	6.4 (31)	0.06
No	48 (240)	42.2 (211)	93.6 (451)	
Have you ever had your teeth filled?				
Yes	36.4 (182)	37.8 (189)	77 (371)	0.14
No	10 (50)	12.2 (61)	23 (111)	

\*P<0.05 is significant

**Table 3: The relationship between Dental Anxiety Scale Questionnaire scores and patient’s demographic characteristics**

Characteristic	Scores of DAS questionnaire (mean±SD)*	P
Age		
≤30	8.92±3.8	0.410
>30	8.02±2.4	
Sex		
Male	8.05±3.1	0.01**
Female	9.65±4.2	
Marital status		
Married	8.51±4.1	0.021**
Single	7.02±2.9	
Employed status		
Employed	8.25±3.2	0.324
Unemployed	8.34±3.3	
Educational level		
≥Diploma	7.84±3.1	0.001**
>Diploma	10.02±2.8	
Last visit to dentist (year)		
≥1	7.42±2.5	0.135
<1	7.55±2.4	
Visits in the past year		
No referral	8.56±3.2	0.08
Referral	8.64±3.1	

Scores 1-8=Without anxiety; scores 9-12=Moderate anxiety; scores 13-14=High anxiety; and scores 15-20=Serious anxiety. DAS: Dental Anxiety Scale, SD: Standard deviation. \*\*P<0.05 is significant

positive and negative memories based on questionnaires AMQ.

Based on the findings, there was a significant relationship between age, gender, education, married, visits in the past year, and positive memories and anxiety (respectively,  $P = 0.04$ ,  $P = 0.02$ ,  $P = 0.01$ ,  $P = 0.04$ , and  $P = 0.01$ ). Also, there is a significant relationship between last visit to the dentist, employed status, visits in the past year, and negative memories and anxiety (respectively,  $P = 0.001$ ,  $P = 0.04$ , and  $P = 0.001$ ), as seen in Table 5.

## Discussion

The results showed that 197 (40.9%) participants had anxiety about dental treatments. Vadiati Saberi *et al.* showed that 83 persons (41.5%) of samples had slight dental anxiety, 78 persons (39%) had average dental anxiety, and 39 persons (19.5%) were with severe dental anxiety.<sup>[26]</sup>

In a study by Ghasempoor and Haddadi, 13.3% of the clients were anxious.<sup>[27]</sup> Also, in a study by Peretz, 21.3% of the clients had dental anxiety.<sup>[28]</sup> Besides, in the investigation of young adults by Drachev *et al.* in 2001, 13.7% had dental anxiety.<sup>[29]</sup> Moreover, a study by Tarazona *et al.* showed that the prevalence of dental anxiety among patients was 36%.<sup>[30]</sup>

Anxiety and fear of dentistry are common around the world, although some subgroups have reported higher levels of anxiety than others. Epidemiological studies have shown that 3%–20% of people are anxious about dental treatments.<sup>[31]</sup> Overall, differences in anxiety rates in different studies can be due to variations in study populations, age, economic and social status, and data collection tools.

Based on the findings, women, people with higher education, and married people had scored higher DAS questionnaire which is compatible with other studies.<sup>[26-30]</sup>

In the study of Ghasempoor and Haddadi,<sup>[27]</sup> there was no difference between the two sexes in level of anxiety and the reason could be that people were younger than our study and the sample was very limited. Taló Yildirim *et al.*'s<sup>[32]</sup> study showed that gender has the strongest effect on raising dental anxiety scores. Also, Onwuka *et al.*<sup>[33]</sup> found more anxiety and fear in women comparing with men. Existence of more anxiety in women compared to men has been confirmed in many studies. This may be due to the fact that anxiety disorders are generally more common in women than men.<sup>[34]</sup>

**Table 4: The relationship between anxiety (score of questionnaire Corah’s Dental Anxiety Scale) and positive and negative memories based on questionnaires Autobiographical Memory Questionnaire**

Memory	Score 1-8 no anxiety, n (%)	Score between 9-12 moderate anxiety, n (%)	Score between 9-12 moderate anxiety, n (%)	Score between 15-20 serious anxiety, n (%)	Total, n (%)	P
Positive memory	71.9 (210)	12.3 (46)	8.5 (25)	7.3 (21)	62.6 (302)	0.001*
Negative memory	41.6 (75)	24.4 (44)	19.4 (35)	14.4 (26)	37.6 (180)	

\*P<0.05 is significant

**Table 5: The relationship between demographic variables and positive and negative memories and anxiety**

Characteristic	Positive memory		P	Negative memory		P
	Has anxiety, n (%)	No anxiety, n (%)		Has anxiety, n (%)	No anxiety, n (%)	
Age						
≥30	8.4 (42)	22.4 (112)	0.04*	12.4 (62)	8 (40)	0.08
>30	10 (50)	19.6 (98)		86 (43)	7 (25)	
Educational level						
≥Diploma	8.2 (41)	13 (65)	0.01*	6.2 (31)	4 (20)	0.06
>Diploma	10.2 (51)	29 (145)		14.8 (74)	11 (55)	
Last visit to dentist (year)						
≤1	6.2 (31)	39.6 (198)	0.06	20.8 (104)	8.2 (41)	0.001
<1	12.2 (61)	2.4 (12)		5 (25)	2 (10)	
Employed status						
Employed	9 (45)	20.4 (102)	0.21	12.2 (61)	7.6 (38)	0.04
Unemployed	18.4 (47)	21.6 (108)		8.8 (44)	7.4 (37)	
Sex						
Male	7.4 (37)	19.6 (98)	0.02*	6.2 (31)	7 (35)	0.12
Female	1.1 (55)	22.4 (112)		14.8 (74)	8 (40)	
Marital status						
Married	12.2 (61)	25 (125)	0.04*	15.4 (77)	10 (50)	0.07
Single	6.2 (31)	17 (85)		5.6 (28)	5 (25)	
Visits in the past year						
No referral	4.8 (24)	5.8 (29)	0.01*	10.2 (51)	1 (5)	0.001
Referral	13.6 (68)	36.2 (181)		10.8 (54)	14 (70)	

\*P<0.05 is significant

Another study from Australia showed that 1.16% of the clients had high levels of anxiety from their personal dental experiences; also, higher rates were reported in adults aged 40–64 years. Besides, women from all age groups and individuals with a low socioeconomic status had higher levels of anxiety.<sup>[35]</sup>

The general effect of anxiety and fear of dentistry is multifaceted. A person who avoids dental appointments tends to have a worse oral health, although the extent of this relationship has not been investigated yet.<sup>[36]</sup> Carter *et al.*<sup>[37]</sup> reported that children and adolescents experienced less fear and anxiety; these feelings were only a source of concern when they were disproportionate to the actual threat and disrupted the person’s daily functioning.

This study showed that people with no and moderate anxiety have more positive memories than negative memories. Also, people had more negative memories with high and serious anxiety and this relationship was significant. There is a significant association between the characteristics of the most negative experiences of dental treatment and increased dental anxiety in young adults,

while positive experiences did not show the inverse relationship with dental anxiety.

Van Houtem *et al.*<sup>[38]</sup> examined the relationship between memory characteristics and dental fear and anxiety and showed that patients with dental phobia had negative memories of dental treatments. While the mean age of the participants was 45–51 years, the negative memories they reported occurred about 25 years ago on average; this suggests that the reported events were rooted in youth rather than childhood or adolescence. Moreover, Mehrstedt *et al.*<sup>[39]</sup> found that fear of dentistry had a negative relationship with quality of life. This finding suggests that the relationship between fear of dentistry and negative perceived quality of life is multidimensional. The researchers concluded that patients may be anxious about their oral health and, therefore, avoid seeing a dentist for fear of reprimand.

There is a significant association between the characteristics of the most negative experiences of dental treatment and increased dental anxiety in young adults,

while positive experiences did not show the inverse relationship with dental anxiety.

Moreover, a study by Risløv Staugaard *et al.*<sup>[40]</sup> showed that negative memories of dental treatments were significantly associated with dental anxiety; this result replicates previous findings in middle-aged patients with dental anxiety. Overall, positive memories did not show a predicted inverse relationship with dental anxiety; they exclusively included memories of dental treatments during childhood and adolescence. Negative and positive therapeutic experiences in this period can be important regarding their impact on behavioral therapy for adults. Besides, Carter *et al.*<sup>[37]</sup> showed that the characteristics associated with memory recall and the emotional impacts of negative memories are associated with increased fear of dentistry. In particular, participants who had strong and distinctive negative memories, with physical reactions and changes in mood and behavior, were more likely to fear dental visits; this finding shows that clear negative memories make adults more fearful of dentistry.

Previous research by Khan *et al.*,<sup>[41]</sup> Gan *et al.*,<sup>[42]</sup> and Oliveira *et al.*<sup>[43]</sup> shows that negative experiences before dental treatments are perceived to be more distressing than subsequent experiences. The person's age during a therapeutic event was also negatively correlated with the emotional attraction of the event; in other words, older memories were more emotionally negative.

In this study, a link between positive memories and reduced anxiety of dentistry was hypothesized; however, this hypothesis was not accepted. Surprisingly, we found a link between some aspects of positive memory recall and increased anxiety of dentistry; this indicates a general trend in sensitive people to have clear memories of events, regardless of their attraction. Studies on emotional memory show that negative and positive memories increase the recall and review of memories in vulnerable populations.<sup>[40,44]</sup>

Studies have shown that the experience of a negative event is associated with fear and anxiety about dental work, especially teeth, the factors of re-experience, vision, sound, smell, and reminders of the physical environment.<sup>[40,45]</sup> In their study, Oosterink *et al.*<sup>[45]</sup> showed that anxiety about dental treatment is strongly associated with re-experiencing. The study done by Rajeev *et al.*<sup>[46]</sup> showed that negative memories of dentistry are significantly associated with fear and anxiety, which is consistent with the findings of Van Houtem *et al.*<sup>[47]</sup>

Positive experiences were expected to be significantly associated with reduced fear of teeth, but our study

failed to achieve the expected result that is consistent with the findings reported by Rajeev *et al.*<sup>[46]</sup> Like the results obtained by Risløv Staugaard *et al.*,<sup>[40]</sup> our study also showed that none of the positive experiences are significantly associated with dental anxiety.

In dental treatments, it should be noted that a normal young person may recall positive but insignificant memories by default, while negative events can be considered as exceptions. These findings seem to follow the principle that "bad is stronger than good;" in other words, although human experiences are predominantly positive, the few that are negative have a greater impact.<sup>[44]</sup> Overall, memories of a dentist's positive behaviors seem easily accessible to adults. On the other hand, patients may find the treatment very stressful despite the dentist's best intentions and behaviors, which can be due to the patient's vulnerability or reactivity to stress. For example, a child may think of a dentist as ruthless or impatient due to anxiety when the dentist is, in fact being precise and delicate.<sup>[40]</sup>

In a study by Khan *et al.*,<sup>[41]</sup> a number of adults stated that there is a link between their anxiety about dentistry and negative dental memories. Moreover, the results of a study by Apfelbaum *et al.*<sup>[48]</sup> showed that negative memories, especially pain in previous dental treatments, cause feelings of fear and anxiety. Therefore, one of the methods for the reduction of patients' anxiety is to reduce pain after dental treatments. Oliveira *et al.*<sup>[43]</sup> also showed a relationship between dental anxiety and pain memory, which is consistent with a study by Sakamoto and Yokoyama.<sup>[49]</sup>

### Limitation and recommendation

The main limitation in the present work is the lack of some patients and the head of the clinic or dentist cooperation. It is recommended that more patients should be considered in the study to remove some effects of the above limitation.

### Conclusion

There is a significant association between the characteristics of the most negative experiences of dental treatment and increased dental anxiety in young adults. In this regard, it is worth mentioning that positive experiences did not show the inverse relationship with dental anxiety. Since most negative memory has a significant association with dental anxiety, one of the factors which should be considered by the dentists to overcome the dental anxiety among patients is not to create a negative memory, even though positive experiences fail to reduce the dental anxiety.

### Acknowledgment

This research has been carried out as an approved research project with the support of the Vice Chancellor

for Research and Technology of Kerman University of Medical Sciences from the Research Center for Social Factors Affecting Oral Health (Code No: 96000641) (Ethics Code: IR.KMU.REC.1397.288).

### Financial support and sponsorship

Nil.

### Conflicts of interest

There are no conflicts of interest.

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