



# Comparative Opinion of Dental Clinicians and Patients Regarding Dental Appearance and the Need for Cosmetic Dental Procedures

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## Abstract

**Background:** This study compared the opinion of dental clinicians and patients regarding dental appearance and the need for cosmetic dental procedures. This information can serve as a basis for efficient treatment planning.

**Methods:** This cross-sectional study was conducted on 200 dental patients, 5 general dentists, and 5 restorative dentists. A standardized questionnaire with 17 questions was used to collect information regarding the opinion of patients about the appearance of their anterior teeth and the need for cosmetic dental procedures. Tooth shade, overjet, and overbite were also recorded, and three photographs were obtained from their teeth and assessed by dental clinicians. Data were analyzed by the Spearman, independent t, Mann-Whitney, and Bonferroni tests and ANOVA ( $\alpha=0.05$ ).

**Results:** Of 100 male and 100 female patients participating in this study, 73% were satisfied with the appearance of their teeth, which was higher than the satisfaction rate reported by general dentists (65%) and restorative dentists (48%). The difference in opinion was not significant between the patients and general dentists ( $p=0.325$ ). The satisfaction level of the restorative dentists was significantly lower than the patients ( $p<0.001$ ) and general dentists ( $p<0.001$ ). The patients were mostly dissatisfied with the color of their teeth (60%), and 88.5% were interested in cosmetic procedures (mostly bleaching). The opinion of the three groups was not significantly different regarding the need for cosmetic procedures ( $p=0.414$ ).

**Conclusion:** Restorative dentists had a significantly lower satisfaction with dental appearance of the patients, compared with general dentists and patients themselves. However, the opinion of the three groups was not significantly different regarding the need for cosmetic procedures.

**Keywords:** Angle class II, Cross-sectional studies, Dentistry, Dentists, Malocclusion, Personal satisfaction, Surveys and questionnaires

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## Introduction

Health-related quality of life is defined as satisfaction with physical and psychological characteristics based on which, people can perform their daily activities. This definition includes physical, psychological, mental, and social health, the ability to perform daily activities, and satisfaction with their conduction (1).

An unattractive smile due to dental problems can lead to low self-esteem and compromise the overall physical and mental health of individuals (2). In today's world, excessive attention is paid to esthetic appearance and resultantly, the demand for dental cosmetic procedures has greatly increased (3,4). Contemporary dentistry has shifted from functional to cosmetic since esthetic appearance of the teeth is often the primary demand of patients (5). By the great emphasis placed in the media on a beautiful smile, the demand for cosmetic dental procedures such as tooth bleaching and orthodontic treatment has greatly increased in the recent years (6). Tooth appearance plays a pivotal role in smile attractiveness and facial beauty, and improvement of tooth appearance by cosmetic dental procedures can often improve the self-esteem, social interactions, and oral health-related quality of life of patients (7,8).

Considering the increasing demand for invasive and non-invasive cosmetic dental procedures, it is imperative for dental clinicians to fully understand the patient expectations from treatment in order to meet their satisfaction. Some studies have reported similarities between the opinion of dental clinicians and patients regarding esthetic appearance of the teeth while some others reported some disagreements between the two groups in this respect (9,10).

Differences in perception of esthetics exist not only among different individuals, but also among different cultures (11). Thus, the opinion of dental clinicians may not match the perception and expectations of the patients (12). Some studies have reported discrepancies between the treatment needs perceived by patients and dental clinicians (13-17). There is a risk of over-treatment when dental clinicians are more skeptical about the appearance of a patient's teeth than the patient himself. Also, if the dental clinician is less skeptical, the patient may not be satisfied with the treatment outcome; both of the abovementioned scenarios can complicate the management of esthetic

needs of the patients.

Differences between the opinion of dental clinicians and patients are primarily due to differences in their level of dental knowledge, expertise, and perception of the situation. Dental clinicians are obliged to follow the basic scientific principles to achieve optimal dental esthetics (18); however, the patients often pay attention to antimeric teeth which may not match the ideal principles of esthetics. Antimeric teeth are defined as teeth with symmetrical mesiodistal width and buccolingual diameter (19-22). Antimeric teeth can guide the dental clinicians and technicians, and can also be used by patients to ensure the accuracy of the provided treatment (23).

Esthetics is a subjective topic, and its definition may vary depending on age, gender, race, socioeconomic status, marital status, level of education, occupation, culture, and the media (18-21). Thus, self-perception of patients is important to assess their treatment needs (24). Knowledge about the perception of patients from their dental appearance is an important aspect in management of the patient needs, and can greatly help in treatment planning and achieving the highest level of patient satisfaction (25). Thus, the attitude and priorities of patients with respect to their dental appearance should be identified prior to treatment planning (12).

The overall dental appearance depends on tooth shade, size, shape, leveling, and alignment, the golden ratio in maxillary anterior teeth, and quality of anterior restorations (25), and all of these factors can affect the patients' satisfaction with their tooth appearance. Considering the fact that knowledge about the level of dissatisfaction of patients with their dental appearance and their interest in cosmetic dental procedures can serve as a basis for efficient treatment planning to improve dental esthetics (26), and the possible differences between the opinions of patients and dental clinicians in this respect, this study aimed to compare the opinion of dental clinicians and patients regarding dental appearance and the need for cosmetic dental procedures.

## Materials and Methods

This cross-sectional study was conducted on 200 dental patients, 5 general dentists, and 5 restorative dentists.

### Eligibility criteria

The inclusion criteria for the patient group were age over 18 years, no maxillary anterior tooth missing, no current orthodontic treatment, no history of laminate or composite veneers, no cognitive disorders, and the ability to fill out the questionnaire. The exclusion criteria were unwillingness for participation in the study, incomplete questionnaires, and selection of multiple answer choices for a question.

### Sample size

The sample size was calculated to be 200 for assessment of satisfaction with dental appearance assuming 95% confidence interval, standard deviation of 5, and absolute error of 0.7. The sample size was calculated to be 100 for assessment of the need for cosmetic dental procedures according the patients' opinions, general dentists, and restorative dentists.

### Data collection

A valid and reliable questionnaire designed by Ghasemi *et al* (27) was used for data collection in this study. After obtaining written informed consent, the questionnaire was administered among 100 male and 100 female patients presenting to the Oral Medicine Department of Shahid Beheshti University of Medical Sciences, who were selected by convenience sampling. The patients were ensured about the confidentiality of their information, and were informed that their photographs would be cropped such that only their smile would be visible. The questionnaire had five sections: The first section asked for demographic information of the patients including their age, gender, and level of education. The second part (5 questions) had 5-point Likert scale questions about satisfaction of the patients with their dental status. Score 5 and 25 indicated very dissatisfied and very satisfied, respectively. The third part of the questionnaire had yes/no questions regarding personal experience of the patients with respect to esthetic problems of their anterior teeth such as caries, fracture, restorations, and unesthetic crowns. The fourth part included yes/no questions considering previous esthetic treatments of the patients. The fifth part contained yes/no questions regarding their perceived need for cosmetic dental procedures.

After filling out the questionnaire, a Williams probe

was utilized to measure the overjet and overbite of half of the patients, and the shade of their maxillary central incisors was determined by using a VITA classical shade guide (VC; VITA Zahnfabrik). Next, a lip retractor was placed, and one frontal view and two lateral view photographs were taken of all the 100 patients using Canon EOS 7D (EF-S 18-135 Lens) camera. The photographs of the patients along with their overbite, overjet and tooth shade information were provided to 5 general dentists (randomly selected among the graduates of Shahid Beheshti University of Medical Sciences) and 5 restorative dentists (randomly selected from the Restorative Dentistry Department faculty members of Shahid Beheshti University of Medical Sciences) and they were asked to evaluate this information and respond to the second part and fifth part of the questionnaire regarding the patients.

### Statistical analysis

Normal distribution of data was evaluated by the Kolmogorov-Smirnov test, and the homogeneity of the variances was analyzed by the Levene's test. The Spearman's test was used to analyze the correlation between non-normally distributed quantitative variables. Repeated measures ANOVA followed by the Bonferroni post-hoc test was utilized to compare the opinion of the three groups of the patients, general dentists, and restorative dentists regarding satisfaction with dental appearance and the need for cosmetic dental procedures. Males and females were compared regarding the mean satisfaction score by independent t-test; while, the Mann-Whitney U test was applied to compare males and females regarding hiding their smile (ordinal qualitative variable). All the statistical analyses were carried out using SPSS version 25 (IBM Corp., Armonk, NY, USA) with 0.05 level of significance.

### Results

A total of 100 male and 100 female patients were evaluated in this study, and their information and frontal and profile view photographs were evaluated by 5 general dentists and 5 restorative dentists. They were asked to answer questions 1 to 5 regarding esthetic appearance of anterior teeth of the patients, and questions 14 to 17 regarding their need for

cosmetic dental procedures.

**Demographics**

The patients had a mean age of 27.94±5.26 years (range 20 to 39 years). Of all, 50.5% had a Bachelor's degree, 18% had a Master's degree, 31% had high-school diploma, and 0.5% had middle-school education.

**Dental appearance of the patients**

Table 1 presents the frequency distribution of the satisfaction level of patients, general dentists, and restorative dentists with dental appearance of patients. The first question asked for satisfaction with

the overall dental appearance. As shown, 73% of the patients were satisfied while 13% were not satisfied with their overall dental appearance. The level of satisfaction of the general and restorative dentists was 65 and 48%, respectively while 23 and 50% of the general and restorative dentists, respectively, were not satisfied with the overall dental appearance of the patients.

Questions 2 to 5 were about satisfaction with different tooth-related parameters such as color and shape. Question 2 asked about tooth color. The results showed the lowest satisfaction of the patients with their tooth color (60%); this rate was 70 and 62% in the general dentists and restorative dentists,

**Table 1.** Frequency distribution of the satisfaction score of patients, general dentists, and restorative dentists with dental appearance of patients

		Very satisfied		Somehow satisfied		No opinion		Somehow dissatisfied		Very dissatisfied	
		Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Dental appearance	Patients	37	18.5	109	54.5	28	14	20	10	6	3
	General dentists	7	7	58	58	12	12	23	23	0	0
	Restorative dentists	1	1	47	47	2	2	39	39	11	11
Tooth shade	Patients	21	10.5	99	49.5	39	19.5	30	15	11	5.5
	General dentists	7	7	63	63	20	20	8	8	2	2
	Restorative dentists	3	3	59	59	3	3	32	32	3	3
Tooth shape	Patients	59	29.5	83	41.5	35	17.5	17	8.5	6	3
	General dentists	14	14	61	61	11	11	13	13	1	1
	Restorative dentists	2	2	63	63	6	6	23	23	6	6
Tooth size	Patients	56	28	101	50.5	25	12.5	15	7.5	3	1.5
	General dentists	15	15	63	63	14	14	7	7	1	1
	Restorative dentists	2	2	66	66	6	6	21	21	5	5
Leveling and alignment	Patients	52	26	98	49	20	10	23	11.5	7	3.5
	General dentists	15	15	46	46	22	22	16	16	1	1
	Restorative dentists	1	1	53	53	8	8	31	31	7	7

respectively. Tooth color was the only parameter that acquired lower satisfaction of the patients compared with dentists.

Questions 3 and 4 asked about satisfaction with shape and size of the anterior teeth. The satisfaction rate of the patients with shape and size of the anterior teeth was 71 and 78.5%, respectively, which were not significantly different from the dentists' opinions. The highest satisfaction level of the patients, general dentists, and restorative dentists was found to be related to size of teeth.

Question 5 asked for satisfaction level with leveling and alignment of anterior teeth. Of all, 75% were satisfied with the alignment of their anterior teeth, which was higher than the satisfaction level of the general and restorative dentists with this parameter. Question 6 asked for masking/hiding of smile due to dental appearance, which had a 4-point Likert scale answer choice. Of all 45% (n=90) replied "never", 29.5% replied occasionally, 21% replied sometimes, and 4.5% replied most of the time.

Questions 7 to 9 asked for other reasons for dissatisfaction with dental appearance. The patients mentioned presence of caries (n=42, 21%), fracture or chipping (n=44, 22%), and presence of unesthetic restorations/crowns (n=8, 4%) as other reasons for their dissatisfaction.

Questions 10 to 13 were about cosmetic dental procedures of anterior teeth such as bleaching,

orthodontic treatment, composite veneers, and ceramic laminate veneers. Since no history of such treatments was an inclusion criterion for study enrollment, all the patients gave a negative answer to questions of this section.

### **Perceived need for cosmetic dental procedures**

Questions 14 to 17 asked about the perceived need for cosmetic dental procedures such as bleaching, orthodontic treatment, and ceramic and composite laminate veneers. As shown in table 2, bleaching was the most popular cosmetic dental procedure (68%) followed by ceramic laminate veneers (42%), and orthodontic treatment (39%). A significant difference existed in the responses of the patients and dentists (general and restorative dentists) to all the questions of this section except question 15 (regarding the need for orthodontic treatment). The patients' perceived need for bleaching and composite veneers was 20% to 25% lower than that of general and restorative dentists, while the patients' perceived need for ceramic laminate veneers was 20% to 25% higher than that of general and restorative dentists.

### **Combination of satisfaction and perceived need**

For a more precise comparison, these two parameters were combined such that overall satisfaction was

**Table 2.** Frequency distribution of participants' responses to questions about the perceived need for cosmetic dental procedures

		Number	Percentage
Bleaching	Patients	136	68
	General dentists	88	88
	Restorative dentists	92	92
Orthodontic treatment	Patients	78	39
	General dentists	35	35
	Restorative dentists	36	36
Ceramic laminate veneers	Patients	84	42
	General dentists	21	21
	Restorative dentists	20	20
Composite veneers	Patients	63	31.5
	General dentists	56	56
	Restorative dentists	52	52

determined by combining the answers to questions 1 to 5. Score 5 was allocated to 'very dissatisfied', and score 25 was allocated to 'very satisfied'. Since the questions regarding the perceived need were dichotomous yes/no questions, minimum need (negative response to all 4 questions) was scored 0 while maximum need (positive answer to all 4 questions) was scored 4. As shown in table 3, the mean satisfaction level of the patients with their dental appearance (13.845) was insignificantly higher than that of general dentists (13.300) and significantly higher than that of restorative dentists (10.960). The mean perceived need of the patients (1.805) was lower than that of general dentists (2) and restorative dentists (2).

The Kolmogorov-Smirnov test showed non-normal distribution of data. Thus, the Spearman's test was applied to analyze the correlations. Question 6 (hiding of smile) which revealed the actual satisfaction of the patients had a relatively strong inverse correlation ( $r=-0.682$ ) with patient satisfaction ( $p<0.001$ ), showing that by an increase in patient satisfaction, they were less interested to hide their smile, and vice versa. Patient satisfaction had a direct correlation with general dentists' satisfaction ( $r=0.500$ ,  $p<0.001$ ), and restorative dentists' satisfaction ( $r=0.566$ ,  $p<0.001$ ). However, as expected, patient satisfaction had an inverse correlation with their perceived need ( $r=-0.591$ ,  $p<0.001$ ), perceived need of general dentists ( $r=-0.452$ ,  $p<0.001$ ), and perceived need of restorative dentists ( $r=-0.538$ ,  $p<0.001$ ). Aging ( $r=0.481$ ,  $p<0.001$ ) and level of education ( $r=0.436$ ,  $p<0.001$ ) had

significant correlations with satisfaction level of the patients. The strongest correlation was found between general dentists and restorative dentists' satisfaction with dental appearance of the patients ( $r=0.819$ ,  $p<0.001$ ).

Repeated measures ANOVA was applied to compare the mean satisfaction of the patients, general dentists, and restorative dentists, which revealed a significant difference ( $p<0.001$ ). Pairwise comparisons by the Bonferroni test demonstrated no significant difference in the satisfaction level of the patients and general dentists ( $p=0.325$ ). However, the satisfaction level of restorative dentists was significantly different from that of general dentists and patients ( $p<0.001$ ). ANOVA revealed no significant difference in the perceived treatment need of the patients, general dentists, and restorative dentists ( $p=0.414$ ).

Independent t-test was applied to compare the male and female patients, which revealed no significant difference between them in the perceived need ( $1.76\pm 1.12$  in males versus  $1.85\pm 0.98$  in females,  $p=0.561$ ) and satisfaction level ( $13.88\pm 4.27$  in males and  $13.81\pm 3.77$  in females,  $p=0.902$ ). The Mann-Whitney test showed no significant difference between the males and females regarding hiding their smile ( $p=0.256$ ).

## Discussion

This study compared the opinion of dental clinicians and patients regarding dental appearance and the need for cosmetic dental procedures. According to the present results, 73% of the patients were satisfied with the appearance of their anterior teeth,

**Table 3.** Measures of central dispersion for the satisfaction and perceived need in the three groups of participants

	Patient satisfaction	General dentists' satisfaction	Restorative dentists' satisfaction	Patients' need	General dentists' perceived need	Restorative dentists' perceived need
Number	200	100	100	200	100	100
Mean	13.845	13.300	10.960	1.805	2.000	2.000
Median	14	14	11	2	2	2
Std. deviation	4.022	3.409	4.167	1.092	1.073	1.034
Minimum	5	5	5	0	0	0
Maximum	25	25	25	4	4	4

13% were dissatisfied, and 14% had no opinion. The satisfaction rate of the patients in majority of the previous studies was equal or lower than this rate. For instance, the satisfaction level of the patients was 64% in a study by Ghasemi *et al* (27) in Iran, 76% in a study by Alkhatib *et al* (28) in Britain, 69.3% in a study by Maghaireh *et al* (5) in Jordan, 76% in a study by Meng *et al* (29) in Florida (United States), and 79.4% in a study by Azodo and Ogbomo (30) in Nigeria, which were close to the value obtained in the present study (5,28-30). The satisfaction level was lower in studies by Tin-Oo *et al* (25) in Malaysia (47.2%), Al-Zarea (31) in Saudi Arabia (50%) and Samorodnitzky-Naveh *et al* (7) in Israel (62.7%) (7,25,31). Such differences indicate the difference in perception and attitude of patients towards their dental appearance in different populations, and even in the same population (32). Such differences can be due to cultural and religious beliefs, different criteria used for assessment of satisfaction, racial differences, variations in individual opinions, and unrealistic complaints and expectations of the patients about their dental appearance (11,25,33,34).

Of different factors affecting the satisfaction level with dental appearance, the lowest satisfaction was reported with tooth color (60%), which was similar to the results of studies by Maghaireh *et al* (5) (66%), Odioso *et al* (35) (62.7%), Samorodnitzky-Naveh *et al* (7) (58%) and Shulman *et al* (36) (68.4%). Higher rate of dissatisfaction with tooth color was reported in some other studies (25,31,37,38). Thus, it may be stated that dissatisfaction with tooth color is a primary cause of dissatisfaction with dental appearance in general (7,25). Also, 68% of the patients reported tooth bleaching as the most favorable cosmetic dental procedure, which further highlights the importance of tooth shade to the patients. The same was reported in previous studies (7,25,31). High popularity of dental bleaching can be due to its conservativeness and availability of over-the-counter bleaching products (39). Also, patients and dental clinicians are well aware of the complications of other cosmetic dental procedures, and therefore, they are more interested in more conservative procedures such as bleaching, since bleaching has the lowest rate of complications. In the present study, 45% of the patients stated that they never hid their smile due to dissatisfaction

with their dental appearance, while 30% reported doing it occasionally. Hiding of smile is the result of dissatisfaction, and not a cause for it (7,5). However, Ghasemi *et al* (27) in Isfahan, Iran reported slightly different results since only 16% of the patients had never hid their smile and 31% had done it occasionally in their study. Of all the patients, 71% of those in the study by Maghaireh *et al* (5) in Jordan, 86% of those in the study by Samorodnitzky-Naveh *et al* (7), and 88% of those in the study conducted by Grzić *et al* (26) in Croatia gave a negative response to this question. Difference between the present results and those of other studies in this regard can be due to the fact that this question had dichotomous yes/no answer choices in previous studies and four answer choices in the present study. A significant correlation seems to exist between satisfaction with dental appearance and hiding of smile (5,7,37,40), such that patients with higher satisfaction level are less interested to hide their teeth.

In the present study, 21% of the patients were dissatisfied with dental caries in their anterior teeth; this rate was 30% in the study by Maghaireh *et al* (5), 23% in the study by Samorodnitzky-Naveh *et al* (7), and 16% in the study by Al-Zarea *et al* (31). Higher rates were reported by Ghasemi *et al* (27) (44%) (probably due to higher rate of caries in their study population) and Tin-Oo *et al* (25) (43%); however, a lower value was reported by Grzić *et al* (26) (7%). Such differences can be due to differences in sample size, study design, and racial, cultural, and geographical factors, access to dental care and services, oral hygiene, diet, and lifestyle habits (26,29,41).

In the present study, 22% of the patients reported fracture or chipping of their anterior teeth as a cause of their dissatisfaction. This rate was 35% in a study by Agrawal *et al* (42) and 10% in a study by Mohammad Alizadeh (43).

In the current study, aging had a direct correlation with higher satisfaction with dental appearance and lower need for cosmetic dental procedures, which was similar to some previous studies (28,37,44). However, some others found no significant correlation between age and satisfaction with dental appearance (5,25,31,33-35). Alkhatib *et al* (28) reported higher satisfaction rate of older individuals, compared

with younger ones, but explained the reason to be due to perceptive and cognitive factors rather than social or cultural issues, and paying less attention to such problems, having other more important health problems, preferring function to appearance (45), and the peer effect (28).

In the present study, no significant difference was found between males and females in any parameter; however, females showed slightly higher perceived need and satisfaction scores, and the percentage of males who never hid their smile was slightly higher than females. The same results were reported by many previous studies (5,31,33,34,37,38,44); whereas, some others reported higher satisfaction level (7,25, 32) or perceived need for cosmetic procedures (5,25) in females. This finding may indicate similarity of the esthetic taste and esthetic needs of males and females in today's world. The role of education in satisfaction level should also be taken into account. The present study also suggested that higher level of education was associated with higher satisfaction level, which was in line with the results of Xiao *et al* (38) Strajnić *et al* (46) and Akarslan *et al* (37). However, some others (5,25) found no correlation between these two variables. Higher satisfaction level of the patients with higher educational level may indicate their higher self-esteem (47).

In the present study, the general satisfaction level of the patients with their dental appearance was higher than the ratings of general and restorative dentists, which was in agreement with several previous studies (7,10,48-50). The difference between the patients and general dentists' opinions was not significant. However, the satisfaction level of the restorative dentists was significantly lower than the other two groups. Many previous studies also pointed to higher sensitivity of orthodontists compared with general dentists and patients in ratings (50-53). The difference between the opinion of patients and restorative dentists was mainly related to parameters with which, they were dissatisfied (rather than satisfied). The patients and general and restorative dentists were least satisfied with tooth color, followed by leveling and alignment, and general appearance of the teeth, and the highest satisfaction of all the three groups was with the size of anterior teeth. Difference in opinion of the patients and specialists can be due to

the academic education of the latter group, and their greater attention to details (54).

The difference in perceived need for cosmetic procedures was not significant among the three groups. In general, higher satisfaction level was associated with lower perceived need. Also, the correlation between the perceived need of the patients and dentists was significantly weaker than the correlation between their satisfaction scores, which highlights the difference in opinion of the dentists and patients regarding selective treatments, as also mentioned by Tortopidis *et al* (12) and Mehl *et al* (55).

In the present study, 88.5% of the patients were interested in cosmetic dental procedures, which was close to the rate reported by Moon and Millar (56) (86%). Composite veneers were the least commonly selected procedure (31.5%) by the patients while ceramic laminate veneers were the least commonly selected procedure by general and restorative dentists (21 and 20%, respectively). Bleaching was the most desired procedure by all three groups. The patients were more interested in more invasive procedures (20% higher for ceramic veneers) than general and restorative dentists, which indicates that they are willing to sacrifice their sound tooth structure to have more beautiful teeth, as also mentioned by Mehl *et al* (57). This finding may be due to higher esthetics provided by ceramic veneers and their greater durability; however, this finding was in contrast to the results of Tortopidis *et al* (12).

This study was a single-center study, which might limit the generalizability of the results. Future multi-center studies with a larger sample size are required to better elucidate this topic.

## Conclusion

Restorative dentists had a significantly lower satisfaction level with dental appearance of the patients, compared with general dentists and patients themselves. However, the opinion of the three groups was not significantly different regarding the need for cosmetic procedures.

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The study protocol was approved by the ethics committee of Shahid Beheshti University of Medical Sciences (IR.SBMU.REC1400.104).



## Conflict of Interest

interests.

The authors declare that they have no competing

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