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RESEARCH ARTICLE

ASSESSING SMILE SATISFACTION AND NEEDS OF DENTAL IMPROVEMENT TREATMENTS AMONG DENTISTS, INTERNS, AND STUDENTS IN YEMEN

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Abstract

Background and aims: Individual differences in how they view beauty may have an impact on their desire for cosmetic procedures. Several studies have compared dentists' perceptions of smile treatments with the general public. However, few studies have compared the perceptions of dental students, interns, and recent dental graduates with those of a similar group of dental professionals. This study aimed to compare how dental students perceive dental smiles and the extent to which they seek dental enhancement treatments.
Methods: This study aims to conduct a cross-sectional study targeting dental students in their final two years, training students, dentists and specialists in Yemen using a written questionnaire sample selected from the Faculty of Dentistry, Sana'a University and selected dental clinics in Sana'a city. The questionnaire was designed and distributed by the researchers. The study involved 329 dental students and dentists, with an average age of 25±4 years.
Results: The study found that 79.6% of participants were confident about their overall teeth, while 75.7% were confident about their tooth color, size, shape, and alignment. The study found that 40.4% of participants had crowding, 14.3% had gaps, 12.8% had fractures, and 37.1% had dental caries. 16.7% did not have cosmetic restorations, and 9.7% suffered from protruding teeth. 14% experienced a deep bite, while 4.9% experienced an open bite. The study found that 25.8% of participants sought orthodontic treatment, while 35.9% desired other treatments to improve their appearance. The majority (22.5%) preferred teeth whitening, while 39.2% prioritized function, while 53.2% prioritized aesthetics.
Conclusion: The study reveals that students, trainees, and dentists all respond positively to smile improvement procedures, showing satisfaction with their smiles and understanding the potential negative effects.
Keywords: Cosmetic treatment, dentists' perceptions, smile treatments, dental enhancement treatments.

INTRODUCTION

The concepts of beauty and dentistry are closely related. According to some theories, a person's appearance leaves a lasting impression[1]. The appearance of teeth is one of the key elements of facial beauty. The media promotion of the ideal appearance through television series, Snapchat, and Instagram applications has a significant impact on society's awareness of beauty. Therefore, individuals in our culture are increasingly demanding cosmetic care[2,3]. Patients' dissatisfaction with the appearance of their teeth is one of the most common reasons for seeking dental treatment[4,5]. People often focus on the lips and teeth of a person speaking because the mouth is located in the centre of the face.

Smiling has a special appeal and is also used to express emotions. A relationship has been revealed between emotional steadiness, self-esteem, dominant personality traits, and the apparent beauty of a person's smile [3,6]. From a dental perspective, tooth color, shape, and position, as well as the quality of restorations and the overall arrangement of teeth, especially the anterior teeth, are key elements that influence the overall appearance of teeth. Additionally, the position of the upper lip, tooth protrusion, and gingival width have been found to influence what is considered a beautiful smile. Even though each feature can be considered individually, to create the ultimate aesthetic impression, they must all cooperate to create a symmetrical and harmonious whole[2,3]. Individual differences in beauty perception may have an impact on a person's desire for cosmetic procedures. People's perceptions of beauty are greatly influenced by a number of factors, including age, socioeconomic position, gender, ethnicity, marital status, education level, employment, social media, familial influence, and cultural exposure[7-10]. Numerous studies have been carried out to assess how the general public and dentistry students see dental aesthetics[11]. These studies are crucial because they will examine the ways in which individuals, dental professionals, and students perceive dental aesthetics. They will also give dentistry students advice on how to comprehend the aesthetic demands of a patient. Few studies, nonetheless, have been done to evaluate how dentists and students view their own smiles and teeth[12-14]. Not a single study has been conducted in Yemen, so this study aimed to examine the attitudes and perceptions of dentists and dental student trainees toward smile enhancement treatments. The hypothesis was that, given their dental background, dentists, trainees, and students' perceptions of smile enhancement treatments might change when compared to a similar group from different backgrounds in Yemeni society.

METHODS

Study Design: This study is a KAP designed to examine the attitudes and perceptions of dentists and dental student trainees toward smile enhancement treatments.

Study Population: The study included 329 dental students and dentists. 118 (35.9%) were males and 211 (64.1%) were females. The average age of the participants was 25±4 years, and their ages ranged from 20 to 51 years, with the majority being in the 23-25 age group (59.9%).

Data Collection: Data were recorded in structured questionnaire for each participant.

Statistical Analysis: Software: SPSS (Version 30.0.0) was used for analysis data. For descriptive Statistics was done to summarize demographics and baseline characteristics.

Ethical Considerations: All participating patients gave informed permission at the start of the trial, which was approved by the Sana'a University Faculty of Dentistry's medical ethical council.

RESULTS

Table 1 shows the age and gender distribution of the dental students and dentists participating in the study. The study included 329 dental students and dentists. 118 (35.9%) were males and 211 (64.1%) were females. The mean age of the participants was 24.97±4 years, and their ages ranged from 20 to 51 years, with the majority being in the 23-25 age group (59.9%).

Table 1: Sex and Age distribution of dental students participate in the study.

Characters	N (%)
Sex	
Male	118 (35.9)
Female	211 (64.1)
Total	329 (100)
Age groups (years)	
20-22 years	51 (15.5)
23- 25 years	197 (59.9)
26- 28 years	47 (14.3)
≥29 years	34 (10.3)
Total	329 (100)
Mean age	24.97 years
SD	4 years
Median	24 years
Mode	23 years
Min - Max	20 years - 51 years

Table 2 shows the distribution of dental students by level. There were 264 students, including 4 students (1.5%) in level 4, 149 students (56.4%) in level 5, and 111 students (42%) in training.

Table 2: Distribution of dental students according to level.

Characters	N (%)
Level 4	4 (1.5)
Level 5	149 (56.4)
Level 6 (Internship)	111 (42)
Total	264 (100)

Table 3: Distribution of participants dentists according to specialty.

Characters	N (%)
General dentist	7 (10.8)
Periodontics	18 (27.7)
Orthodontics	5 (7.7)
Endodontic	17 (26.2)
Surgery	7 (10.8)
Operative	4 (6.1)
Prosthodontics	3 (4.6)
Pedodontics	4 (6.1)
Total	65 (100)

Table 4: Smile confidence and satisfied tooth among participants dental students and dentists.

Characters	N (%)
Confident	262 (79.6)
Color	249 (75.7)
Size	268 (81.5)
Shape	272 (82.7)
Alignment	225 (68.4)
Total	329 (100)

Table 3 shows the distribution of participating dentists by specialty. There were 65 dentists, including 7 general dentists (10.8%), 18 periodontists (27.7%), 5 orthodontists (7.7%), 17 endodontics (26.2%), 7 surgical dentists (10.8%), 4 operative dentists (6.1%), 3 prosthodontics (6.1%), and 4 pediatric dentists (6.1%). Table 4 shows smile confidence and dental satisfaction among dental student and dentist participants. 262 participants (79.6%) were confident about their overall teeth, 249 (75.7%) were confident about their tooth color, 268 (81.5%) were confident about their tooth size, 272 (82.7%) were confident about their tooth shape, and 225 (68.4%) were confident about their tooth alignment. Table 5 shows the characteristics of the anterior teeth of the dental student and dentist participants.

Table 5: Anterior teeth characteristic for participants dental students and dentists.

Characters	N (%)
Crowding	**133 (40.4)**
Upper teeth	47 (14.3)
Lower teeth	67 (20.4)
Both	19 (5.8)
Spaces	
Upper teeth	41(12.5)
Lower teeth	17 (5.2)
Both	12 (3.6)
Fracture	**42 (12.8)**
Upper teeth	25 (7.6)
Lower teeth	17 (5.2)
Both	0 (0.0)
Caries	**122 (37.1)**
Upper teeth	30 (9.1)
Lower teeth	43 (13.1)
Both	49 (14.9)
Esthetic restoration	**55 (16.7)**
Upper teeth	16 (4.9)
Lower teeth	20 (6.1)
Both	19 (4.9)
Protrusion	**32 (9.7)**
Upper teeth	22 (6.7)
Lower teeth	5 (1.5)
Both	5 (1.5)
Deep bite	46 (14)
Open bite	16 (4.9)
Edge to edge	23 (7)
Midline shifting	56 (17.02)
Discoloration	70 (21.3)
Total	329 (100)

Regarding crowding, 40.4% of the total participants had crowding, with 14.3% in the upper teeth, 20.4% in the lower teeth, and 5.8% on both sides. Regarding interdental spacing, 21.3% of the total participants had gaps, with 12.5% in the upper teeth, 5.2% in the lower teeth, and 3.6% on both sides. Regarding dental fracture, 12.8% of the total participants had a fracture, with 7.6% in the upper teeth, 5.2% in the lower teeth, and 0.0% on both sides. Regarding dental caries, 37.1% of the total participants had caries, with 9.1% in the upper teeth, 13.1% in the lower teeth, and 14.9% on both sides. In the case of no cosmetic restorations, 16.7% of the total participants did not have a cosmetic restoration, with 4.9% in the upper teeth, 6.1% in the lower teeth, and 4.9% on both sides. In the case of protruding teeth, 9.7% of the total participants suffered from protruding teeth, with 6.7% in the upper teeth, 1.5% in the lower teeth, and 1.5% on both sides. In the case of a deep bite, 14% of the total participants suffered from a deep bite. In the case of an open bite, 4.9% of the total participants suffered from an open bite, 7% suffered from inter-dental deviation, 17.02% suffered from midline deviation, and 21.3% suffered from tooth discoloration.

Table 6: Gingiva satisfied among participants dental students and dentists.

Characters	N (%)
Color	267 (81.2)
Shape	259 (78.7)
Black triangles	67 (20.4)
Gum smile	54 (16.4)
Lips line	
Normal	284 (86.3)
High	34 (10.3)
low	8 (2.4)
Hiding teeth during smile	76 (23.1)

Table 6 shows the satisfaction of dental student and dentist participants with their gums. Regarding gum color, 81.2% of participants expressed confidence in its color, while 259 participants (78.7%) expressed confidence in its shape. 20.4% had black, triangular gums. 16.4% had a gummy smile. Regarding lip line, 86.3% of participants had a natural lip line, while 10.3% had a raised lip line and 2.4% had a lower lip line. 23.1% had hidden teeth when smiling.

Table 7: The frequency of previous treatments for anterior teeth among participants dental students and dentists.

Characters	N (%)
Orthodontic treatments	85(25.8)
Tooth whitening	24 (7.3)
Crown/veneer	29 (10.5)
Anterior tooth implants	17 (5.2)
Root canal treatment	60 (18.2)
Composite filling	97 (29.5)
Periodontal therapy	65 (19.8)
Orthodontic surgery	11 (3.3)
Surgical correction of facial defect	12 (3.65)

Table 7 shows the frequency of previous anterior tooth treatments among dental student and dentist participants. Total 25.8% of participants had orthodontic treatment, 7.3% had tooth whitening, 10.5% had crowns, 5.2% had anterior dental implants, 18.2% had root canal treatment, 29.5% had composite fillings, 19.8% had periodontal treatment, 3.3% had orthodontic surgery, and 3.65% had facial defect correction surgery. Table 8 shows the percentage of dental student and dentist participants who desired the following treatments to improve their appearance: 35.9% of participants desired orthodontic treatment, 22.5% teeth whitening, 16.7% crowns/veneers, 4.26% anterior dental implants, 9.7% root canal treatment, 21.6% composite fillings, 22.5% gum treatment, 4.6%

orthodontic surgery, and 3.3% surgical correction of a facial defect. When participants were asked which was more important: function or aesthetics, 39.2% responded that function was more important, while 53.2% responded that aesthetics was more important.

Table 8: The frequency of wish to do the following treatments to improve appearance among participants dental students and dentists.

Characters	N (%)
Orthodontic treatments	118 (35.9)
Tooth whitening	74 (22.5)
Crown/veneer	55 (16.7)
Anterior tooth implants	14 (4.26)
Root canal treatment	32 (9.7)
Composite filling	71 (21.6)
Periodontal therapy	74 (22.5)
Orthodontic surgery	15 (4.6)
Surgical correction of facial defect	11 (3.3)
Which is more important?	
Function	129 (39.2)
Esthetic	175 (53.2)

DISCUSSION

The way that a grin is seen varies from person to person and is influenced by a number of things. A person's smiling self-perception may be influenced by a variety of characteristics, including media, gender, age, marital status, education level, financial position, influence from friends and family, and employment[15-23]. Moreover, someone's smile could be affected by many factors, such as tooth shape, color, size, and position; gingival color, shape, and amount of gingival display, and finally, the lip position[6]. In the current study, Table 4 shows smile confidence and dental satisfaction among dental student and dental practitioner participants. 262 participants (79.6%) were confident about their overall teeth, 249 (75.7%) were confident about their tooth color, 268 (81.5%) were confident about their tooth size, 272 (82.7%) were confident about their tooth shape, and 225 (68.4%) were confident about their tooth alignment. All rates were in the range of other studies that have shown higher rates of smile confidence and satisfaction with the teeth they have and express in their smiles[7].

The amount of space needed for teeth to be correctly aligned is known as dental crowding. There are two ways to get it: 1) by measuring the space needed and figuring out how much room is available across the tooth width, or 2) by measuring the degree of overlap between the teeth. In current study, with regard to crowding, 40.4% of the total participants had crowding. According to Angle, crowding leads to malocclusion, which is any deviation of the occlusion from the ideal[24]. On the other hand, the measurement of these conditions must take into account the correlation with aesthetics and the effect on function. Treatment might not be required if the patient finds these characteristics acceptable even if they fit the official diagnosis of malocclusion. It is estimated that about 30% of the population suffers from crowding and malocclusion classified as severe and would certainly benefit from orthodontic treatment[25]. The reasons for this high rate may be due to active skeletal growth,[26] mouth breathing, finger sucking, thumb sucking, pacifier sucking, nail biting, skin eating, pen biting, abnormal posture, swallowing disorders, and other habits that significantly affect facial and dental arch development[27]. Pacifier sucking habits are also associated with otitis media[28,29]. Dental caries, apical inflammation, and loss of primary teeth can alter the correct eruption of permanent teeth.

Dental caries affected 37.1% of all individuals in the current investigation (Table 5). Dental caries in permanent teeth affects over 3.6 billion individuals globally[30]. It affects roughly 620 million individuals, or 9% of the population, in their children's teeth[31]. Dental caries is less frequent in China[32] and more common in South Asian, Middle Eastern, and Latin American nations. Dental caries is the most prevalent chronic pediatric illness in the United States, occurring at least five times as frequently as asthma[33]. It is the most common pathological reason why children lose their teeth[34]. Dental caries affects between 29% and 59% of persons over 50. Treating dental caries costs between 5% and 10% of healthcare budgets in industrialized countries and can easily exceed budgets in low-income countries[36].

In the current study, in the case of a deep bite, 14% of the total participants suffered from a deep bite. This result is lower than the rate previously reported in different regions of the world, where it has been estimated that approximately 30% of the population suffers from a malocclusion (deep bite) that is classified as severe and would certainly benefit from orthodontic treatment[37]. The most common corrective treatments are fixed or removable appliances (such as braces), which may or may not require surgical intervention. Currently, there is no strong evidence of the success of the treatment[38]. In the current study, 4.9% of participants had an open bite. An open bite is when the upper teeth do not overlap the lower teeth. When this malocclusion occurs in the front teeth, it is known as an anterior open bite. Open bites are difficult to treat due to multifactorial causes, with relapse being a major concern. This is particularly true for anterior open bites[39]. Therefore, a comprehensive initial assessment is important to obtain a diagnosis and develop an appropriate treatment plan[39]. It is important to consider any common risk factors, as this is crucial for a successful outcome without relapse. The treatment approach includes behavioural changes, appliances, and surgery. Adults are treated with a mix of orthognathic surgery, intermaxillary elastics, permanent appliances, and extractions[40]. Orthodontics is usually utilized to adjust for children's continuous development. When permanent teeth emerge in children with mixed dentition, malocclusion may correct on its own. Additionally, stopping infantile behaviours like thumb, finger, or pacifier sucking may cause malocclusion to go away. Finger and thumb sucking can be prevented with the use of habit-blocking gadgets. For patients who are still developing, functional appliances and headgear are additional

therapy alternatives. Our rate is similar to that reported elsewhere[41].

In the current study, Table 6 shows the satisfaction of dental students and dentist participants with their gums. Regarding gum color, 81.2% of participants expressed confidence in its color, and 259 participants (78.7%) expressed confidence in its appearance. A gummy smile was found to be an important element rated as attractive by participants. This contradicts a study by Mukhtar *et al.*, in which most participants were dissatisfied with their gums. On the other hand, a gummy smile was accepted by a significant number of people with no dental experience, indicating that treatment planning for a harmonious smile does not require correcting all deviations from aesthetic standards[42]. Additionally, the results of studies by Osehal *et al.* and Benzan-Versellino *et al.*, concur, stating that dentists were more critical than people with no dental experience when evaluating gummy smiles[43,44].

In the current study, Table 7 shows the frequency of previous anterior tooth treatments among dental students and dental practitioners. 25.8% of participants had orthodontic treatment, 7.3% had teeth whitening, 10.5% had crowns, 5.2% had anterior dental implants, 18.2% had root canal treatment, 29.5% had composite fillings, 19.8% had periodontal treatment, 3.3% had orthodontic surgery, and 3.65% had facial reconstructive surgery. Our rates for all previous treatments in present study were low compared to their desired aesthetic treatments, with 35.9% of participants desiring orthodontic treatment, 22.5% seeking teeth whitening, 16.7% seeking crowns/veneers, 4.26% seeking anterior dental implants, 9.7% seeking root canal treatment, 21.6% seeking composite fillings, 22.5% seeking periodontal treatment, 4.6% seeking orthodontic surgery, and 3.3% seeking surgical correction of a facial defect. When participants were asked which was more important: function or aesthetics, 39.2% responded that function was more important, while 53.2% responded that aesthetics was more important. This result is similar to that reported from Saudi Arabia[45], Yemen and Iran[46,47] among dental students and dentists.

Limitation of the study

This study was the first in Yemen and the lack of similar studies is the concern of researchers in Yemen with more harmful and severe health problems such as temporomandibular joint dysfunction[48-50], jaw surgical site infection[51], the anatomical pattern of the mandibular canal course[52], interleukin-1 beta levels in the human gingival sulcus[53], the effect of dental implants on aerobic bacterial colonization in the oral cavity[54], deep malocclusion[55], determining the factors and patterns of permanent tooth extraction[56], and *Porphyromonas gingivalis* mouth infections[57]. Therefore, a broader study should be conducted, using previous research and filling in the gaps in this study. Although the research is conducted in Yemen, it does not explore local cultural elements that may influence people's perceptions of smile aesthetics or dental treatment. Including these factors would have added depth to the research and made the findings more meaningful in context.

CONCLUSIONS

Within the study's limitations, it can be concluded that dentists, trainees, and students generally react similarly to smile enhancement treatments and their understanding of the concept. Dentists, students, and trainees appear to be more satisfied with their smiles and have demonstrated an ability to detect and identify adverse effects of smile enhancement procedures.

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AUTHOR'S CONTRIBUTIONS

Shibam AHI: research, methods, and original draft writing. **Al-Anesi MLM:** conceptualization. **Al-Salou RGGY:** composition, evaluation. **Al-Maznae SNA:** formal analysis, data processing. **Al-Rohmi FMA:** editing, conceptualization. **ASA Sulaiman:** statistical analysis. **AQH Al-Muntaser:** editing, review. **Al-Shamahy HA:** review, data processing. Final manuscript was checked and approved by all authors.

DATA AVAILABILITY

Upon request, the accompanying author may furnish the empirical data used to bolster the findings of the study.

CONFLICT OF INTEREST

Regarding this project, there are no conflicts of interest.

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