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Research Article

Evaluation of the Effect of Three Different Esthetic Components on Smile Attractiveness - ə

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ABSTRACT

Objectives: To evaluate the perceptions of dental students, art students and lay-people, on the impact of different esthetic components on smile attractiveness.

Materials and methods: A photograph of an ideal smile was selected and digitally manipulated to create the following smiles: an ideal smile (IS), a smile with midline diastema (D1), a smile with Midline Deviation (MD), and a smile with Reversed Smile Line (RSL). The manipulated photographs were presented to three groups: 44 dental students, 44 art students and 44 lay-people. Raters were asked to rank the photographs from the least to the most attractive; then, each photograph was awarded a mark from 0.0 to 10.0.

Results: In all groups, ideal smile received the most score. Regarding the variations, dental students and art students rated MD the most attractive and D1 and RSL the least attractive, but lay people rated MD the best, D1 less attractive and RSL the least attractive.

Conclusion: Reverse smile line, midline diastema and maxillary midline deviation have a great negative impact on the attractiveness of the ideal smile. However, reverse smile line and midline diastema, overwhelmingly decrease attractiveness ratings, in comparison with maxillary midline deviation.

Keywords: Smile; Esthetics; Perception

INTRODUCTION

Aesthetics is not absolute and is extremely subjective [1]. An attractive smile helps win elections, despite the fact that even a well-treated orthodontic case that meets every criterion of the American Board of Orthodontics for successful treatment may not produce an esthetic smile [2]. As the use of cosmetic dentistry increases, the need for better understanding of esthetic principles arises [1]. Esthetics in dentistry is a major concern and primary reason for patients seeking dental care [3]. Some investigations have been done on smile esthetics, using a variety of methods [4-6]. In regard to facial esthetics, smile is the second most important feature of the face, from the point of view of the general public [7]. Teeth play an important role in facial attractiveness [8,9]. However, esthetic perception varies among different persons and social environments [10,11]. Recently, the perceptions of lay-people and dentists, when comparing altered esthetics have received greater attention [12-14]. Dental professionals and laypersons have different perceptions of attractive smile [15].

A beautiful smile is the consequence of the proper interaction of different components [10]. In order to provide an esthetic balance, a harmonious relationship among facial components is important [16, 17].

An aesthetically pleasing smile is dependent on several components [10]. Special attention has been given to some of smile components such as midline, diastema and smile line [3,6,18,19].

The midline, which is the most important focal spot in the smile, contributes to the desirable effect of balance of the dental composition [3,20]. Maxillary midline deviations can disturb the balance of an attractive smile [15]. Another component in the perception of dental esthetics is diastema. Smiles with the presence of a midline diastema are not socially acceptable [21]. Some studies have shown the compromising effect of diastema [14,18,22]. Moreover, smile line has an important role in dentofacial esthetics [2]. Frush and Fisher [23], stated that there should be harmonic relationship between the curvature of the upper border of the lower lip and the curvature of the incisal edges of the maxillary anterior teeth. A reverse smile line is a convex and esthetically disagreeable line that has an adverse effect on the degree of attraction of a smile, which forms when the incisal edges of the central maxillary incisors are above the canine cusps [1]. A number of factors influence a person's satisfaction with his or her oral appearance, such as age, sex and the level of education [24].

Therefore, the purpose of this study was to evaluate the perceptions of lay-people, dental students, and art students on the impact of different esthetic components on smile attractiveness.

MATERIAL AND METHODS

In this study, we used printed photographs to evaluate the attractiveness of different smiles. To have adequate control of confounding factors, distractors such as eyes, hairs, chin, part of the nose, any blemishes or facial hair minimized. A sample of ideal and attractive smile was selected after consultation with clinically experienced orthodontists, prosthodontists and general dentists. The image was colored with posed smile, which is the most repeatable smile [10]. Three smile criteria were considered: midline, diastema, and smile arch. To produce different images from ideal smile, it was first digitally scanned (Nikon Coolscan 9000 ED, Melville, NY, USA). The resulting image was imported into adobe photoshop CS7 software to make desired alterations. Only the teeth were altered; the soft tissues remained untouched. The size of images was the same (3 × 7 inches) and were then color printed on laminated paper (4 × 8.5).

All three alterations also were confirmed by the consulting dentists.

The resulted images were the following:

- Image1: Ideal Smile (IS) (figure 1)
- Image 2: a smile with 2-mm-wide midline diastema (D1) between maxillary central incisors. The measurement was made at the interproximal contact points between the central incisor crowns (figure 2).
- Image 3: a smile with dental Midline Deviation (MD). It was shifted 3 mm in relation to philtrum (figure 3).
- Image 4: a smile with Reverse Smile Line (RSL). The maxillary central and lateral incisal borders were repositioned more apically, creating a reverse arch (figure 4).

All attempts were made to preserve natural tooth angulation and papillary form.

In this cross-sectional study, three groups of raters (art students, dental students and lay-people) were used according to the following selection criteria: (1) age between 22 and 24, (2) for third group: recognizable status as lay-people, and (3) voluntary agreement to participate in the study.

Figure 1: Ideal smile (IS).

Figure 2: Smile with midline diastema (D1).

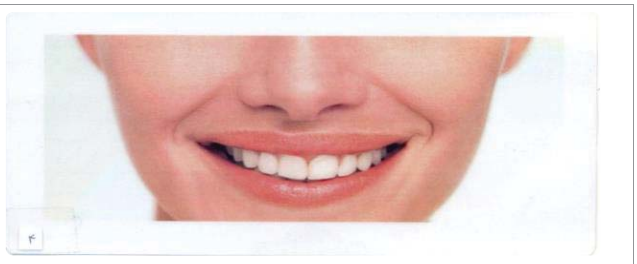

Figure 3: Smile with Midline Deviation (MD).

Figure 4: Smile with Reverse Smile Line (RSL).

Of the 132 female raters who evaluated the images, 44 were senior of dental students, 44 were senior of art students, who trained in portrait drawing (both groups belonged to Azad University of Khorasgan, Isfahan, Iran), and 44 were lay-people. The investigators all had a similar economic status. The students were selected randomly from relevant schools. Lay-people were selected randomly from:

1-Patients in the waiting-rooms of different departments in the khorasgan Dental School

2-Staff of khorasgan Dental School

Each rater was given as little information about the study as possible. The questionnaire consisted of the planned scale in addition to 4 separate smiling photographs. The raters were told that they would see 4 photographs.

For the evaluation, the photographs were coded. During the evaluation process, the photographs were presented together, and each rater was asked first to organize the photographs, starting with the least attractive and ending with the most attractive and then, to rate each photograph on a scale of 1 to 10, where 10 equals very attractive and 1 equals very unattractive. Each rater marked a point among the scale according to his or her perception of dental esthetics. In order to prevent an influence of opinion, each rater made his or her evaluation privately with no given information about the photographs. The raters were allowed to view the photographs again and revise their scores, if they desired. All measurements were repeated 30 days later by the same investigators. No differences were found in the remeasurements *(P > 0.05)*.

Data were analyzed with univariate statistics. Significance was determined by a P-value of < 0.05. All statistical tests were performed with the aid of a statistical software program (SPSS; Statistical Package for the Social Science for Windows, version 20, Chicago).

RESULTS

The descriptive analyses of marks from 0 to 10 awarded to the Ideal Smile (IS) and the variations (D1, MD, RSL), are given in table 1. According to the Repeated Measures ANOVA, differences were found in the judgments made of the various smiles (IS, D1, MD, RSL) *(P < 0.001)*.

The results of POST-LSD-HOC demonstrated that ideal smile in the all three groups of raters, received the highest score. Regarding the variations, dental students and art students rated MD the most attractive and D1 and RSL the least attractive, but lay-people rated MD the best, D1 less attractive and RSL the least attractive.

DISCUSSION

This study focused on esthetic ratings of smile characteristics evaluated by lay-people, for the reason that the satisfaction with treatment depends on patient expectations, by dental students knowing esthetic elements of the smile, and by art students, as they pay attention to smile components in drawing portraits. When observing the effect of alterations from ideal smile on the attractiveness of a smile, it was found that the ideal smile, in the all three groups of raters, received good evaluations; but, the present study, which examined three factors altering smile esthetics, showed that dental students, art students, and lay-people do not prefer smiles with these alterations.

To validate the method, the altered images had a natural smile appearance. Conversion of color photographs to black and white was not important in this investigation, because there were not multiple subjects and the images were obtained from one primary smile image, reducing the number of confounding factors.

Table 1: Descriptive statistics of marks from 0 to 10 attributed to the different smiles by three groups of raters.

group		mean	Std. Deviation	P-value
Dental students	picture.1	8.7727	1.25501	
	Picture.2	1.8182	1.10544	
	Picture.3	5.2045	2.07510	< 0.001
	Picture.4	1.8182	1.06253	
Art students	picture.1	8.5111	1.57570	
	Picture.2	3.0444	1.85810	
	Picture.3	5.5556	1.94884	< 0.001
	Picture.4	1.8667	1.17937	
Lay people	picture.1	8.8958	1.47662	
	Picture.2	1.9583	1.33621	
	Picture.3	5.3958	2.06015	< 0.001
	Picture.4	2.2708	1.31666	

Factors such as sex and age, have been considered to influence people's perceptions of the attractiveness of smiles [25,26]. In contrast, some investigators have found no influence of age or sex of the evaluators, when rating the attractiveness of smiles [2-4, 6,19,27]. According to these confusing results, the raters were restricted to young woman.

Several studies have been done to investigate how far the maxillary midline can laterally deviate, before achieving an unacceptable esthetic [22,28,29]. Johnston et al [29]. stated that a dental to facial discrepancy greater than 2 mm is unacceptable. Similar results were found in another investigation [30]. Kokich et al [22]. stated that discrepancies up to 4 mm could remain undetected. These confusing results are probably due to different statistical tests, or different sociocultural aspects. According to the results of the present study, 3 mm MD was unacceptable in the sight of all three groups. There were, however, little differences between them, with regard to their scores. Lay-people like students did not prefer noticeable MD.

Another aspect checked in this research was D1. 2-mm D1 was evaluated more harshly by young raters as compared with MD. These results are in accordance with another clinical study [19]. Also, other studies have shown the undesirable effect of D1 on esthetic smile [18,22]. It might be due to the loss of integrity in D1, unlike MD. It has been shown that a smile with integrity is more attractive [31]. Interestingly, there was a statistically significant difference between the art students and two other groups evaluating D1; it was more acceptable by art students. This is the first study evaluating art students' opinion about D1.

In the present study, various groups of raters did not prefer smile with RSL. This finding is in accordance with other studies [6,28,32,33]. We also found no differences between three groups evaluating RSL. Moreover, despite the fact that all three alterations were unacceptable, D1 and RSL had lower scores in comparison with MD.

These information could changed, as cultural and racial differences exist, with regard to smile esthetics. Thus, the result of our research should be interpreted with caution. However, using the same images to carry out another investigation in different nation, may result in obtain similar findings as compared with an investigation using other images.

We suggest further studies on the smile esthetics, using other smile components.

CONCLUSION

In this research, we evaluated the perceptions of dental students, art students, and laypeople to intentionally altered dental esthetics.

In general, reverse smile line, midline diastema and maxillary midline deviation have a great negative impact on the attractiveness of the ideal smile. However, reverse smile line and midline diastema, overwhelmingly decrease attractiveness ratings, in comparison with maxillary midline deviation.

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