An Evaluative Study on Smile Variations from Esthetic Norms, Photographic Framing and Order of Presentation

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ABSTRACT

An understanding of the factors that help or harm the attractiveness of a smile is an important step in creating attractive smiles. Many studies of beauty standards and norms are supposed to guarantee that clinicians can create the desirable ''golden smile.'' Usually these norms and standards are applied in line with diagnostic methods and esthetic treatment plans.[1-3] To date; little work has been produced to evaluate the actual influence of applying these beauty norms, and variations from them, on the attractiveness of a smile. A ''golden model'' is achieved when beauty norms and standards are confirmed in the results of esthetic treatments. Many of these esthetic norms and references have come from diverse origins: from principles of esthetics in art, from average measurements of a specific ethnic population, from observations of groups who are considered esthetically privileged, etc.[4–6] However, not all the norms and references have been scientifically proven effective for clinical application. According to Peck and Peck4 and Oumeish, [6] many factors can influence the formation of esthetic beauty standards, such as culture, income, and age. This implies that the ideals of beauty are always changing. Facial attractiveness plays a key role in social interaction. It influences mating success, kinship opportunities, personality evaluations, performance, and employment prospects.[7-9] Empirical evidence for this relationship is given by a meta-analysis of facial-attractiveness studies.[10] These showed that attractive children and adults are judged and treated more positively than unattractive children and adults, even by those who know them. Attractive children and adults also exhibited more positive behaviors and traits. Facial attractiveness correlated with extraversion and self-confidence/ self-esteem.[10]

MATERIALS AND METHODS

Data collection method: Female individuals were chosen in this cross sectional study according to the following selection criteria: (1) high degree of facial attractiveness, (2) age between 20 and 28, and (3) smile with characteristics close to textbook norms. [17] The individual was photographed using a digital camera (Nikon D5500) in a frontal pose, smiling, with the head in a naturally relaxed position, so that his whole face would be framed.

The photograph was digitally manipulated14 using Adobe Photoshop 7.0 software to give it the selected norms of beauty. An ideal control smile13 (I) (Figures 1) was created to serve as a control and golden model for the rest of the photographs.

The other structures of the smilewas not be manipulated. The original smile was used only to create the ideal control smile. Afterward, smile I (control) was used to make further digital manipulations, i.e., to create smiles with variations from esthetic norms. The criteria for the selection of these norms took into account the frequency with which they clinically occur and their clinical significance in esthetic planning.

These variations were

- A smile with midline deviation (LM3)(Fig 2): the dental midline was shifted 3 mm in relation to the patient's philtrum.
- A smile with diastema (D1): a 1-mm-wide diastema was created between the maxillary incisors only (Fig 3)
- A smile with deviation from the long axes of the lateral incisors (10D)(Fig 4): the long axes of the lateral incisors were inclined 10 degrees distally in relation to their axes
- A smile with a reverse smile arc (LSRV)(Fig 5): the maxillary central and lateral incisal borders were repositioned more apically, creating the contour of an inverted parabola.

Fig 1. (Ideal Smile, Smile I)

Fig 2. Midline off(LM3)

Fig 3. Midline Diastema(D1)

Fig 4. Lateral incisor inclined(10D)

Fig 5. Reverse Smile Arc(LSRV)

Evaluation of Photographs: The criteria for selection of the evaluators were (1) age above 18 years old, (2) recognizable status as laypeople, and (3) voluntary agreement to participate in the study. Demographic data such as income, age, and sex were collected. For the evaluation, the photographs were coded and separated into five frames. The order of presentation in the groups was selected randomly to minimize the influence of this factor. The presentation was done in random order with the mouth shots. During the evaluation process, the photographs in each group were presented together, and each evaluator was asked first to organize the photographs, starting with the least attractive and ending with the most attractive, regardless of the framing, and then to rate each photograph (scale of 0.0 to 10.0), with at least one decimal point of difference between marks. Results from a study conducted to assess the perception of smile attractiveness in New Canaan, CT, USA was taken and the minimum sample size was estimated to be100; 20%,excess was taken to cover withdrawal issues and the sample size of 120 was taken for the study.[1] Written and informed consent will be taken from the patients prior to the examination. Purposive sampling will be done to select a hospital in Jorpati. From among the patients visiting the Department of Orthodontics, 120 individuals, fulfilling the inclusion criteria will be taken on a first come first serve basis. The criteria for selection of the evaluators were (1) age between 18-44 years, (2) recognizable status as laypeople, and (3) voluntary agreement to participate in the study. Patients who refuse to participate in any part of the study will be discontinued from the study. The duration of study is one month. All recorded data will be entered and statistically analyzed using SPSS version 17 data analyzer and various comparisons will be performed by chi square test. Analysis of variance will be used to evaluate the mean marks given to the attractiveness of the smiles.

Ethical Clearance was obtained from Nepal Medical College, Research and Ethical Sub Committee.

RESULT

The distribution of evaluators, according to age and sex, is found in Table 1. The evaluators all had a similar economic status. The evaluations given to the smiles were not influenced by the sex of the evaluators.

Table 1: Distribution of evaluator according to Gender

Variables		Frequency	Percent
Valid	Male	57	42.2
	Female	78	57.8
	Total	135	100.0

There was significantly low score for the the smile with diastema (D1); the evaluators made harsher evaluations

of these smiles compared to other smiles (Table 2). Because there were no other influences according to sex, this factor was not taken into account in subsequent analyses. The descriptive analyses of marks from 0 to 10 awarded to the ideal control smile(I) and the variations of it (D1, LM3, LSRV, and 10D), in both framings, are given in Table 2. Differences were found in the judgments made of the various smiles (I, D1, LM3, LSRV and 10D). The marks awarded to smile D1 in both the photographic framings were significantly lower than the averages of the other smiles (P value: .001).

Table 2: Descriptive Statistics of Marks from 0 to 10 Attributed to the Different Smiles

	N	Minimum	Maximum	Mean	Std. Deviation
first photograph	135	1.50	10.00	7.6289	1.95966
second photograph	135	.50	8.50	4.2413	1.96109
third photograph	135	1.40	9.50	5.9022	1.83016
fourth photograph	135	1.50	9.00	6.1311	1.81928
Fifth photograph	135	2.00	9.00	6.1911	1.89888
Valid N (listwise)	135				

Table 3: ANOVA Analysis of comparison of different photographs with the Ideal Smile Photograph

		Sum of Squares	df	Mean Square	F	Sig.
Third photograph	Between Groups	266.519	22	12.115	7.442	.000
	Within Groups	182.310	112	1.628		
	Total	448.829	134			
Fourth photograph	Between Groups	329.618	22	14.983	14.734	.000
	Within Groups	113.892	112	1.017		
	Total	443.509	134			
Fifth photograph	Between Groups	280.324	22	12.742	7.035	.000
	Within Groups	202.845	112	1.811		
	Total	483.169	134			
second photograph	Between Groups	323.251	22	14.693	8.567	.000
	Within Groups	192.097	112	1.715		
	Total	515.348	134			

DISCUSSION

A study done by Rodrigues *et al* found that ideal smile is considered as esthetically most acceptable smile as compared to other smiles that are deviated from ideal smile norms.[11] When observing the influence of variations from beauty norms on the attractiveness of a smile, it was found that the ideal smile generally received good evaluations from laypeople, which suggests that it is valid to use the standard model as a reference when constructing a smile. Other works on perception found similar results: smiles without deviations got good evaluations.[20-21]Midline diastema is considered more unaesthetic according to the study done by L. Ousehal *et al.*[18] According to an study done by Abdullah A Al Nazeh , negative perceptions of attractiveness of maxillary midline diastema was discovered.[19] Our study also found that the midline diastema could make a smile unacceptable. Although the LM3 and 10D smiles contained variations, they got positive evaluations, this shows that the presence of a variation does not necessarily hamper the attractiveness of a smile. Therefore, when esthetic treatment to obtain a harmonious smile is performed, it's not always necessary to correct all the variations from esthetic norms. Various factors need to be considered in this clinical decision, such as: what type of deviation from the norms the smile presents, to what degree it deviates, the opinion of the patient, the cost of treatment, the invasiveness of the procedure, and any time constraints on the patient. In addition, based on our results, the correction of a deviation is not always going to create perfect smile, according to the evaluations of laypeople. Some studies show that laypeople accept a wider range of deviation compared to dentists, and because of this a dentist must be careful about imposing his or her own beauty norms upon patients.[11,20]

The order of presentation of the photographs did not show influence on esthetic perceptions of the smile. One element that could explain this result is that, the viewer's optical perspective did not change with respect to order of presentation.

The presence of deviations from esthetic norms does not necessarily affect the perception of a smile as esthetically consonant. Midline diastema may have a negative impact on the esthetic evaluation of a smile. Changing the sequence of presentation of the different smiles for evaluation of their esthetics does not interfere with their judgment.

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