

Dental Communication

Influence of Upper Lip Curvature on Smile Attractiveness in Patients with Different Degrees of Gingival Smiles: A Study in Dravidian Population

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ABSTRACT

The importance of an attractive smile and its effect on positive self-image cannot be emphasized enough, which is why an attractive and balanced smile is a valued treatment goal in addition to creating a functional occlusion. Therefore, the aim of the current study was to Correspondence evaluate the influence of upper lip curvature on smile attractiveness in patients with different degrees of gingival smiles by a lay person, post graduate students and general dentists. A frontal photograph was digitally altered to generate 3 types of upper lip curvature shapes (upward, straight, and downward) with 3 different levels of gingival smile exposure (0 mm, 3 mm and 5 mm). Nine images were generated. Three groups of evaluators (10 dentists, 10 orthodontists, and 10 laypersons) assessed the images using a visual analog scale. One-way ANOVA to evaluate the difference in median aesthetic scores between postgraduate students, general dentist and lay persons was performed. A statistically significant difference was observed in median aesthetic scores between the general dentist and lay person when there was 3mm gingival exposure in upward curvature ($p < 0.05$, p value 0.032). Upward or straight upper lip curvature shapes have a positive effect on the perceived smile aesthetic, while the downward curvature shapes of the upper lip have a negative effect on perception when different degrees of gingival smiles are rated. The study was conducted to produce results that can act as a milestone for future researchers helping them with establishing their findings using this as a credible reference.

KEY WORDS: AESTHETIC HARMONY, GINGIVAL DISPLAY, SMILE AESTHETICS, UPPER LIP CURVATURE.

INTRODUCTION

A pleasant smile not only plays a fundamental role in social interaction and personal development, it also improves the attractiveness of the face (Adams 1977; Feingold 1992). During interpersonal interaction, individuals focus on another person's eyes and mouth (Miller 1970). The importance of an attractive smile and its effect on positive self-image cannot be emphasized enough. Therefore, an attractive and balanced smile is a valued treatment goal, along with the creation of a functional occlusion (Petrungaro 2002). There are many factors that determine an attractive smile: a smile shows the entire length of the upper front teeth, shows an incisal curve of the upper teeth, that is, parallel to the inner part of the lower lip, and shows the upper front teeth and the

premolar (Tjan, Miller and Josephine 1984). This depends not only on components such as the size, shape, color and position of the teeth, but also on the number of visible gums and the shape of the lips (Geld et al. 2007; Rozhkova et al. 2019).

Excessive gingival display or the "gummy smile" can interfere with an otherwise pleasing smile (Bedavanija, 2019). It is the result of a combination of factors such as the vertical excess of the upper jaw, increased overjet, increased overbite, a short upper lip, and a short incisor crown length (Allen, 1988). Tjan and Miller divided the smile line into three types: a high smile line that shows the complete upper incisors and a continuous band of the gingiva; an average smile line that shows 75 to 100 per cent of the upper incisors; and a low smile line that reveals less than 75 percent of the upper incisors (Machado et al. 2013; Rozhkova et al. 2019). Although it has been suggested in Western society that no more

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than 2mm of the maxillary gingiva should be visible when a person smile (Mew 1998; Rozhkova et al. 2019). There is no scientific evidence to support this point of view in the Dravidian population. Therefore, the aim of the present study was to evaluate the influence of upper lip curvature on smile attractiveness in patients with different degrees of gingival smiles by a lay person, post graduate students and general dentists.

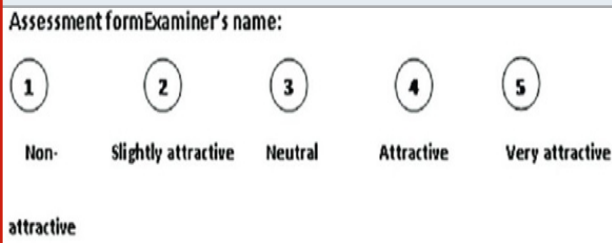
MATERIAL AND METHODS

Construction of a series of images were carried out. A female frontal intraoral photo of ideally aligned teeth and a female extraoral photo showing aesthetically smiling lips were obtained from a subject. These ideally aligned teeth and lips together formed a standard composite smile, with all teeth up to the first molar and the upper lip touching the upper gingiva of the upper central incisors. The lower lip coincided with the curvature of the incisal edges of the upper incisors and canines. These images were modified with Adobe Photoshop CS2 (San Jose, California, USA) to create bilaterally symmetrical teeth and lips. 3 types of upper lip curvature were generated, that is lip curvature upwards, lip curvature straight and lip curvature downwards, in addition 3 different exposure levels of the gingival smile of 0 mm, 3 mm and 5 mm. Fig 1 represents the different curvature of upper lip and degrees of gingival smiles and fig 2 represents VAS scale with 1 score being the lowest and 5 score being the highest.

Figure 1: Represents the different curvature of upper lip and degrees of gingival smiles.



Figure 2: VAS scale with 1 score being the lowest and 5 score being the highest.



The smile raters were 10 Dravidian laypersons (4 males and 6 females; age 28 ± 7.6 years), 10 post graduate students (5 males and 5 females; age 24.8 ± 2.5 years) and 10 general dentists (7 males and 3 females; 29.6±2.66

years). Determination of the subjective aesthetic value of each smile was accomplished using a visual analogue scale (VAS). This rating scale was designed for minimal constraints and the most freedom to express a personal response style. The VAS was used to rank each smile from 'non-attractive attractive' to 'very attractive'. An aesthetic score was obtained by 1 being the least attractive (zero) and 5 being the most attractive. One-way ANOVA to evaluate the difference in median aesthetic scores between postgraduate students, general dentist and lay persons was performed using the Statistical Package for Social Sciences (SPSS, Version 23; Chicago, USA).

RESULTS AND DISCUSSION

A statistically significant difference was observed in median aesthetic scores between the general dentist and lay person when there was 3mm gingival exposure in upward curvature (p<0.05, p value 0.032) which is observed in the table below (Table 1). VAS has been used to assess pain intensity and has proven to be a valid, reliable, and reproducible method for measuring subjective pain (Ohnhaus and Adler 1975). Since many researchers used the VAS method to assess attractiveness, the VAS method became the Assessment used. The aesthetics should also provide simple, quick and reproducible results (Roden-Johnson et al. 2005; Martin et al. 2007; Krishnan et al. 2008). Excessive gingival display or gummy smiles are a common trait that has been reported to affect 7 percent of young adult men and 14 percent of young adult women (Tjan, Miller and Josephine 1984). In the present study it was observed that the lay person and general dentists preferred a smile with 3 mm of gingival exposure and high lip curvature which was found to be statistically significant (p<0.05) (Rozhkova et al. 2019; Valverde-Montalva et al. 2021).

The 0 mm gingival smile with straight upper lip curvature was considered the most attractive by postgraduate students (not statistically significant), while the 3mm gingiva smile with high curvature of the upper lip was considered the most attractive by general and laypersons. This finding is in contrast with finding reported by Geron and Atalia et al. (2005), who examined the influence of the gingival presentation on the perception of the aesthetics of smile in lay people and reported that the most attractive smile images were those with a coverage of the upper lip of the central incisors by 0-2 mm (Geron and Atalia 2005; Rozhkova et al. 2019; Valverde-Montalva et al. 2021).

However, it was observed that the shape of downward curvature of lip had a negative influence on aesthetic assessment of the smile in all assessment groups with gingival exposures of 3 mm or more. This finding agrees with that of Valverde-Montalva et al. (2005), the study carried out reported that downward curvature of lip had a negative effect in all groups, but at the same time laypeople had a more positive impact by high upper lip curvature with 5 mm gingival exposure (Valverde-Montalva et al. 2021).

Table 1. Represents the values of one-way ANOVA.

	Mean sum of squares	df	Sig.
0 mm gingival exposure with high lip curvature	0.46	2	0.47
3 mm gingival exposure with high lip curvature	7.20	2	0.032
5 mm gingival exposure with high lip curvature	2.06	2	0.23
0 mm gingival exposure with low lip curvature	0.20	2	0.78
3 mm gingival exposure with low lip curvature	4.4	2	0.07
5 mm gingival exposure with low lip curvature	0.46	2	0.50
0 mm gingival exposure with straight lip curvature	1.86	2	0.53
3 mm gingival exposure with straight lip curvature	2.06	2	0.36
5 mm gingival exposure with straight lip curvature	1.40	2	0.54

Laypersons' views on the assessment of gingival display may differ from those of orthodontists. Other investigations using laypersons as evaluators seem necessary. If the aesthetics of the orthodontist does not match the perception of the patient, the results may be unacceptable to the patient. Therefore, it is important that patients must participate in the decision-making process when planning orthodontic treatment. Limitations of the current study include a small sample size (Rozhkova et al. 2019; Valverde-Montalva et al. 2021).

CONCLUSION

Within the limitations of the current study, it was observed that upward or straight upper lip curvature shapes have a positive effect on the perceived smile aesthetic, while the downward curvature shapes of the upper lip have a negative effect on perception when different degrees of gingival smiles are rated. Future scope suggests that along with the amount of gingival display, different factors of smile aesthetics have received attention: the presence of the smile arc and buccal corridor spaces and the same should also be evaluated in the Dravidian population.

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Conflict of Interest: There was no recorded conflict of interests.

Ethical Clearance Statement: The Current Research Work Was Ethically Approved by the Institutional Review Board (IRB) of Saveetha Dental College and Hospital, Chennai, India.

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