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CASE STUDY

EVALUATION OF SMILE AESTHETICS IN SOUTH INDIAN POPULATION – A CROSS SECTIONAL STUDY

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ABSTRACT

Aim: The aim of this study was to evaluate the various smile parameters among South Indian population.

Materials and Methods: 50 subjects of age 18 to 25 years with a pleasing smile were selected for the study. Static photographs of posed smiles were taken in natural head position, with camera lens perpendicular to the occlusal plane. The following smile parameters were quantified using Adobe Photoshop ruler software.

1. Maxillary incisor exposure (mm)
2. Smile index (SI) (mm)
3. Smile arc
4. Most posterior maxillary tooth visible
5. Anterior height of the smile (%)
6. Posterior height of the smile (%)

Results

1. Average maxillary incisor exposure was 8.05 mm.
2. Average Smile index was 8.60 mm.
3. Most common Smile arc was flat and parallel types.
4. Most posterior maxillary tooth visible was the 2nd premolar and 1st molar.
5. Anterior height of the smile (%) was average for most of the people.
6. Posterior height of the smile (%) was high for most of the people.

Conclusion: The dentist's knowledge of the smile aesthetics among a particular population is essential while restoring a patient's intraoral harmony so as to achieve functional and aesthetic balance.

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INTRODUCTION

Smile is defined as facial expression characterized by upward curving of the corners of the mouth (Peck, 1995). Although dental experts are subjected to the same natural patterns and media viewpoints, instructive encounters may predispose a clinician's esthetic inclination far from those of the general public. (Al-Johany, 2011; Brisman, 1980; Goldstein, 1969). Clinicians are committed to comprehend excellence, amicability, function, and extent as seen by public opinion when arranging treatment (Al-Johany, 2011; Peck, 1970). Dentofacial appeal is especially vital to a person's psychosocial well-being (Al-Johany, 2011; Shaw, 1985).

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Smiling is a standout amongst the most critical facial expressions and known as a nonverbal parameter of correspondence, communicating joy (Shaw, 1985; Fradeani, 2006; Matthews, 1978). Furthermore, an appealing smile is portrayed as a paramount apparatus to impact individuals. Overviews have checked that smiling individuals are trusted more than nonsmiling ones (Newton, 2003). Existing proof has additionally uncovered that facial allure, in which an alluring smile assumes a significant part, impacts voting and choices, work recruitments and other social interactions (Shaw, 1985; Fradeani, 2006; Matthews, 1978; Newton, 2003; Passia, 2011). Smiles are classified as stages I and II. (Al-Johany, 2011) Stage I smile is a posed (social) smile, while stage II is an unposed (enjoyment) smile (Ackerman, 1998). The social smile, or the smile typically used as a greeting, is a voluntary, unstrained, static facial expression (Janzen, 1977). The lips part due to moderate muscular contraction of the lip elevator

muscles, and the teeth and sometimes the gingival scaffold are displayed. The enjoyment smile, elicited by laughter or great pleasure, is involuntary. It results from maximal contraction of the upper and lower lip elevator and depressor muscles, respectively. This causes full expansion of the lips, with maximumanterior tooth display and gingival show (Ackerman, 2002). The social smile is repeatable photographically in comparison with the other smile (Rigsbee, 1988). Most studies refer to the posed smile as it is reproducible and can be used as a reference position (Sabri, 2005). During clinical examination emphasis is placed on the display zone of smile, which is determined by lip thickness, intercommissural width, interlabial gap, smile index (SI), and gingival architecture (Rigsbee, 1988). Inclusion of smiling photographs, with the usual frontal and lateral photographs makes it possible to observe patients in a much more natural attitude. Although various scientific studies examined smile esthetics using static photographs to determine relationships and proportions (Hulsey, 2014; Peck, 1995; Rigsbee, 1988), few studies have been reported in the Indian population.

This study was undertaken with the following aims and objectives:

To establish static norms in the South India population for the following smile parameters:

a. Maxillary incisor exposure (MIE) (mm)
b. Smile index (mm)
c. Smile arc
d. Most posterior maxillary tooth visible
e. Anterior height of the smile (%)
f. Posterior height of the smile (%).

MATERIALS AND METHODS

50 subjects from Chennai, aged about 18-25 years with a pleasing smile were selected for the study. The sample size has been taken on the basis of the pilot study. The selected samples had Angle's class I molar relationship with complete permanent dentition up to the second molars present. They had no previous history of orthodontic treatment, maxillofacial surgery, restoration/ prosthetic crowns in the anterior teeth, or periodontal treatment (except for routine scaling and polishing). Static photographs with posed smile in natural head position (NHP) were taken. All photographs were taken in a similar environment and lighting conditions using Nikon D-60 SLR camera, which was mounted on a tripod stand at a fixed distance of 20 inches. Focal length of 38 mm was set. The lens was positioned parallel to the true perpendicular of the face in NHP, and the camera was raised to the level of patient's lower facial third. The patient was asked to say "cheese" and then smile. The photographs were then transferred to computer software (Adobe Photoshop 7.0.1) and were cropped with vertical (tip of the nose and soft-tissuepogonion and perpendicular drawn from the zygomatic prominence) limits. All images were then adjusted to a standardized image size. Measurement between two points (subnasale to soft tissue menton) was considered representative to check magnification error. This was then compared with clinical measurements and was found to have a statistically significant correlation. The Adobe Photoshop ruler software was used to obtain measurements for this study.

The following parameters were recorded:

- Maxillary incisor exposure (Figure 1) — amount of vertical display of the maxillary central incisors was measured in mm. The Adobe Photoshop ruler software was used to measure MIE
- Smile index (Figure 2) — was described by Ackerman *et al*. (1998)(3) as: Intercommissural width on smiling — with the ruler tool in Adobe Photoshop a horizontal line was drawn from the corner of the lips on one side to the same point on the contralateral side. The distance between the two points was measured. Interlabial gap on smiling — the distance in mm between the upper and lower lips at midline. The Adobe Photoshop ruler software was used to measure distance between the upper and lower lips.
- Smile arc (Figure 3) — was entered as parallel (when the incisal edges of the maxillary anterior teeth followed the curvature of the lower lip), flat (when the incisal edges of the maxillary anterior teeth had no curvature relative the lower lip line), or reverse (when the incisal edges of the maxillary anterior teeth had a reverse curve relative the lower lip line
- Most posterior maxillary tooth visible (Figure 4) — entered either as canine, first premolar, second premolar, or first molar. In the case of a discrepancy between the two sides, the most posterior tooth was entered
- Anterior height of the smile (Figure 5) — entered as either high smile (a contiguous band of gingiva above the maxillary central incisor), average smile (showing 75% to 100% of the maxillary central incisors), or low smile (showing <75% of the maxillary central incisors)
- Posterior height of the smile (Figure 6) — entered as either high smile (a contiguous band of gingiva above the maxillary first premolar), average smile (showing 75% to 100% of the maxillary first premolar), or low smile (showing <75% of the maxillary first premolar visible).

Figure 1. Maxillary central incisor exposure

Figure 2. Smile index

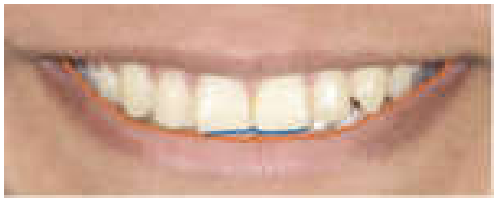
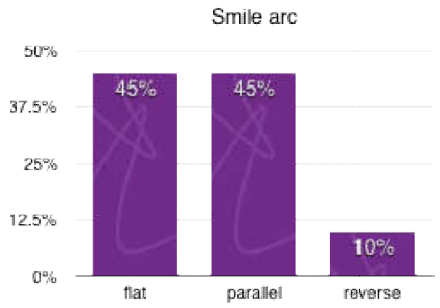


Figure 3. Smile arc

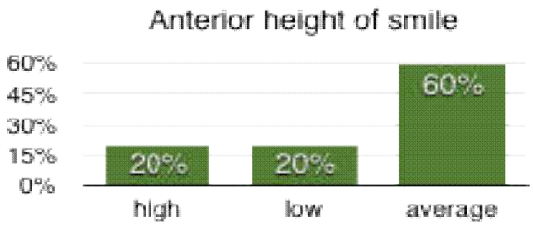
Figure 4. Most posterior maxillary tooth visible

Figure 5. Anterior height of smile

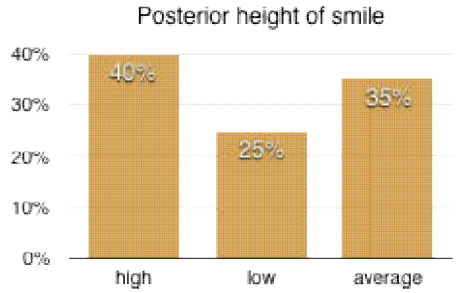
Figure 6. Posterior height of smile



Graph 1. Smile arc



Graph 2. Anterior height of smile



Graph 3. Posterior height of smile

RESULTS

- Average maxillary incisor exposure was 8.05 mm.
- Average smile index was 8.60 mm.
- Smile arc: 45% of the cases had flat smile arc, 45% of the cases had parallel smile arc, 10% of the cases had reverse smile arc (Graph 1)
- Most posterior maxillary tooth visible: For 45% of the cases, it was the 2nd premolar. For another 45% of the cases, it was the 1st molar, and for the remaining 10%, it was the 1st premolar (Graph 2)
- Anterior height of smile: For 60% of the cases, it was average. For 20% of the cases, it was high. And for another 20% of the cases, it was low (Graph 3)
- Posterior height of smile: For 40% of the cases, it was high. For 35% of the cases, it was average. And for the remaining 25% of the cases, it was low (Graph 4)

DISCUSSION

Maxillary incisor exposure (mm): According to Balani R *et al*, it was 7.97 mm, which is close to our study.

Smile index (SI) (mm): According to Balani R *et al*, it was 8.08 mm, which is close to our study.

Smile arc: According to Balani R *et al*, it was flat for 46%, parallel for 45% of the cases, and reverse for 9% of the cases. The results are similar to our study. According to Tjan AH *et al*, parallel smile arc was the most common (Tjan, 1984).

Most posterior maxillary tooth visible: According to Balani R *et al*, it was second premolar for 58% of the cases and first premolar for 42% of the cases. Second premolar was also seen in 51% of the cases in a study by Maulik C *et al*, (Maulik, 2007) and in 57% of the cases in a study by Dong JK *et al*. (Dong, 1999). In our study, first molar was as commonly seen as the second premolar.

Anterior height of the smile (%): According to Balani R *et al*, it was average for 64% of the cases (close to our study), low for 30% of the cases and high for 6% of the cases

Posterior height of the smile (%): According to Balani R *et al*, it was average for 47% of the cases, low for44% of the cases and high for 9% of the cases. Contrastingly, in our study, high posterior height of smile was most common, which is similar to a study done by Maulik C *et al*, where 42.6% of cases had high posterior height of smile (Maulik, 2007).

Conclusion

There is scientific evidence that a certain smile line/tooth arrangement is the most common parameter which can be applied for treatment planning purposes. These results underline the importance of the smile line when restoring a patient's intraoral harmony. The clinician should aim for these parameters for an esthetic and functional balance.

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