

ANALYSIS OF ESTHETIC COMPONENTS OF SMILE IN NORTH INDIAN FEMALES

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ABSTRACT

Background: The smile constitutes an important component in the presentation of a human being favoring his or her social acceptance. Both the upper and lower lips have a marked effect on the beauty of the smile.

Aim and Objectives: The aim of the study was to analyze the esthetic components of the smile, evaluating the relationship between the curve formed by the incisal line of the anterior superior teeth and the curve of the inferior lip, the touch of this incisal line on the inferior lip, the teeth displayed during smile, the relationship between the facial midline with the arch midline and compared the data with the previous studies.

Materials and Methods: This cross sectional study was conducted on 300 North Indian females age group 18-40 years in MM Institute of medical sciences and research Mullana. Prior informed written consent for this study was obtained from all the subjects. The exclusion and inclusion criteria for the subjects were predefined. Photographs were taken both in rest position as well as Smile position using digital camera with high resolution.

Results: Showed that in north Indian females the alignment of upper incisal edge to lower lip was convex in 166 (55.3%), Position of upper lip while smile was average type in 159(53%), 93(32.3%) showed touching of incisal line to lower lip, 8 teeth (six anterior and first premolars) were displayed during a full smile in 210 (70%) females, midline through philtrum was seen to pass most commonly through the centre of two central incisors in 226 (75.3%) females, Normal space was seen in 281(93.7%) female subjects. This standard may serve as a guideline for restoration or enhancement of esthetic and plastic surgery for smile of north Indian females which will enable the surgeon to offer a better cosmetic result.

KEY WORDS: Esthetic, Smile, North Indian females, plastic surgery, lip.

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INTRODUCTION

The smile plays an important role in the presentation of a human being favoring his or her social acceptance. For the psychosocial well being of an individual, the dentofacial attractiveness is particularly important. People with a normal dental appearance are judged socially more attractive as compared to those with malocclusions. The smile can be defined

as a change in facial expression that involves a sparkle in the eyes, an upper curvature in the corners of the lips, no sound emission, and less distortion of muscle forms than with a laugh [1]. Both the upper and lower lips have a marked effect on the beauty of the smile and they form the frame of display zone of the smile. Within this framework, the components of the smile are the teeth and the gingival scaffold. As the smile expands, the lips separate, the commissures

curve upwards, and the teeth are exposed. The maxillaries are separated, and a dark space develops between upper and lower teeth, known as negative space [2]. During smiling, upper lip height is diminished, and the width of the mouth is increased by 23% to 28% compared to the lip at rest [3]. There are two basic types of smiles: the social smile and the enjoyment smile. Each type has a different anatomic presentation of the elements of the display zone. The social smile typically used as a greeting. It is a voluntary, unstrained, static facial expression [4].

Smile height is influenced by age and gender. The older the individual, the greater is the tendency for a low-type smile [5]. This piece of information is clinically relevant, as high smiles tend to become medium smiles with age and low smiles become even lower over time. The smile line can be regarded as a determining factor in the evaluation of mouth aesthetics. The aesthetics is the pleasant sensation of beauty in the nature [6]. The midline of lips is esthetically important as it is the most important focal spot in the smile and it enhances aesthetics especially when the medial surfaces of the maxillary central incisors coincide with the midline of the face. The factors which contribute to a pleasant smile includes the location and shape of smile line, the extent of exposure of the facial surfaces of upper teeth, gingiva, buccal corridor and the outline of vermilion border of lips. These are harmoniously interrelated to each other. A disharmony may be greatly injurious to the attractiveness of smile. An attractive smile helps win elections and hearts and a beautiful smile sells products for companies whose subliminal message in advertising is "look better, feel younger"[7].

It would be useful to describe some desirable characteristics of the smile, which help to achieve optimum result in surgical and aesthetic oral rehabilitation. The objective of this study is to expand the baseline quantitative data of the north Indians including the comparison with available data from literature.

MATERIALS AND METHODS

The present study was conducted in department of Anatomy in MMIMSR Mullana, Ambala. 300 female subjects from North Indian states

(Punjab, Haryana, Rajasthan, Himachal Pradesh, Uttar Pradesh, Uttarakhand, Jammu & Kashmir) aged between 18 to 40 years, having full dentition were selected by simple random method for the study. Eruption of last molar was ignored in classifying person with full dentition as 3rd molar eruption is variable[8]. In the exclusion criteria subjects those with anomalies, malformation, deformities, inflammation, trauma and surgical scars (operations for cleft lip) of or around lips were excluded. Migrants of states other than North India mentioned above were excluded. An informed written consent was obtained from all the subjects. The subjects were photographed with rest position and posed smiles (Fig. 1 (a,b)). The photographs were taken for each subject followed the described standardized parameters: Canon Digital Camera 10 Mega pixel & 10 times optical magnification was used. Camera was mounted on a tripod stand with the lens positioned parallel to the lower facial third. The study was based on the parameters suggested by Patnaik et al. [9]. A beautiful and esthetic smile has following vital parameters.

Position of upper lip while smiling: Esthetically upper lip should be neither too high so that to expose the upper gums, nor too low so as to cover more than half of upper teeth. It should be ideally covering not more than 1/4 th of teeth. Depending on the extent of exposure of maxillary anterior teeth, interdental papilla, gingival and mucosa during smile, the smiles were categorized as one of the following three types- (Fig. 2)[9,10].

i) **High smile:** Also called mucosa smile. During smile there is full exposure of labial surface of teeth, interdental papilla, free marginal gingiva and labial mucosa. (Fig. 2a)

ii) **Average smile:** in this type of smile about 1/4th part of maxillary anterior teeth is covered. (Fig. 2,b,c)

iii) **Low smile:** in this type of smile about 3/4th part of maxillary anterior teeth is covered. (Fig. 2d)

Alignment of upper incisional edge to lower lip: The best position is a convex curve downwards, but it may be straight or even concave downwards (Fig. 3) [4].

i) Convex smile line: when the incisal margin of the maxillary central incisors appears below the canine cusps.

ii) Straight smile line: all the maxillary incisors and canine are in a straight line.

iii) Concave smile line: when the canine cusps appear more occlusal than maxillary central incisor tip margin.

The best position is convex curve downwards. [9]Convex smile line is a positive smile. It enhances the quality of smile. The concave smile line is a negative smile line. It gives a negative and unpleasant effect to smile. On the other hand straight smile can be positive or negative depending upon suitability of other components of smile like presence or absence of buccal corridor, tooth lower lip position. For an attractive or esthetic smile, contact should preferably be present between the incisal edges of upper teeth and vermillion border of lower lip.

Tooth Lower Lip position: The teeth may be just touching the lower lip or there may be a slight gap (Fig. 4).

Number of teeth exposed during full smile: The teeth may be canine to canine (6 teeth exposed); premolar to premolar (8-10 teeth exposed); molar to molar (12 -16 teeth exposed) (Fig 5).

Midline relationship of central incisors to philtrum: A midline through philtrum should ideally pass through the center of the central incisors. However, it may pass right or left of the center of central incisors (Fig. 6). In the esthetic smile it should pass through centre of central incisors.

Bilateral negative space: Under normal condition, there is little space visible between angles of mouth & teeth while smiling (Fig. 7). If oral mucosa is visible during smile then it is increased bilateral negative space. Ideally no bilateral negative space is visible in esthetic smile.

Fig. 1: a) Lips at rest, b) Lips in smile position



Fig. 2: Position of upper lip while smiling. a) High smile, b) Average smile, c) Covering 1/4th, d) Low smile.



Fig. 3: Position of upper incisal edge to Lower Lip while smiling. a) Convex, b) Straight, c) Concave.



Fig. 4: Tooth Lower Lip position while smiling. a) Touch, b) Not touch, c) Slightly covered



Fig. 5: No. of teeth visible during smile. a) 6, b) 8, c) 10, d) 12.



Fig. 6: Midline relationship of central incisor to philtrum. a) Central, b) Right, c) Left.



Fig. 7: Bilateral negative space. a) Normal, b) Increased.



RESULTS

Table 1: Showing following parameters were maximum found in the smile of North Indians.

| Parameter (while smiling) | Position | North Indian Females (n%=300) |
|--|------------------|-------------------------------|
| Position of upper lip | Average | 159(53%) |
| | High | 53 (17.7%) |
| | Low | 88 (29.3%) |
| Incisal edge to lower lip | Convex | 166 (55.3%) |
| | Straight | 127 (42.3%) |
| | Concave | 7 (2.4%) |
| Tooth - lower lip position | Touching | 97 (32.3%) |
| | Not touching | 139 (46.4%) |
| | Slightly covered | 64 (21.3%) |
| No. of teeth exposed | 6 | 62 (20.7%) |
| | 8 | 210 (70%) |
| | 10 | 26 (8.6%) |
| | 12-6 | 02 (0.7%) |
| Midline relationship of central incisors to philtrum | Centre | 226 (76.3%) |
| | Right | 11 (3.0%) |
| | Left | 63 (20.7%) |
| Bilateral negative space | Normal | 281 (93.7%) |
| | Increased | 19 (6.3%) |

Table 2:

Comparison of various positions of alignment of upper incisal edge to lower lip of present study with previous studies.

| Alignment of upper incisal edge to Lower Lip | | | | | |
|--|-------------|-----------------|----------|----------|---------|
| Author | Population | No. of subjects | Position | | |
| | | | Convex | Straight | Concave |
| Tzan et al[10] | California | 247 | 85.77% | 13.56% | 0.60% |
| Zacchrison et al[11] | Los Angeles | | 85% | 14% | 1% |
| Al johany et al [12] | Celebrities | 50 | 78% | 22% | 0% |
| Dong et al[13] | Korea | | 60% | 34% | 5% |
| Goel et al[14] | North India | 200 | 58.50% | 45.50% | 2% |
| Kaur et al[15] | Punjab | 350 | 59.50% | 29% | 11.50% |
| Present study | North India | 300 | 55.30% | 42.30% | 2.40% |

Table 3:

Comparison of various positions of upper lip of present study with previous studies.

| Position of Upper Lip while smiling | | | | | |
|-------------------------------------|-------------|-----------------|----------|--------|--------|
| Author | Population | No. of subjects | Position | | |
| | | | Average | High | Low |
| Tzan et al[10] | California | 247 | 73.71% | 13.79% | 12.50% |
| Zacchrison et al[11] | Los Angeles | | 69% | 11% | 20% |
| Al johany et al [12] | Celebrities | 50 | | | |
| Dong et al[13] | Korea | | 45% | 12% | 43% |
| Goel et al[14] | North India | 200 | 55% | 15.50% | 29.50% |
| Kaur et al[15] | Punjab | 350 | 65.50% | 22.50% | 12% |
| Present study | North India | 300 | 53% | 17.70% | 29.30% |

Table 4:

Comparison of tooth lower lip position of present study with previous studies.

| Tooth - Lower Lip Position | | | | | |
|----------------------------|-------------|-----------------|----------|--------------|------------------|
| Author | Population | No. of subjects | Position | | |
| | | | Touching | Not touching | Slightly covered |
| Tzan et al[10] | California | 247 | 57.89% | 27.63% | 14.47% |
| Al johany et al[12] | Celebrities | 50 | 34% | 42% | 24% |
| Goel et al[14] | North India | 200 | 35% | 48.50% | 16.50% |
| Kaur et al[15] | Punjab | 350 | 30.30% | 50.30% | 19.40% |
| Present study | North India | 300 | 32.30% | 46.40% | 21.30% |

Table 5:

Comparison of no. of teeth exposed during smile of present study with previous studies.

| No. of Teeth Exposed during Smile | | | | | | |
|-----------------------------------|-------------|-----------------|----------------------|--------|-------|-------|
| Author | Population | No. of subjects | No. of teeth exposed | | | |
| | | | 6 | 8 | 10 | 12 |
| Al johany et al[12] | Celebrities | 50 | --- | 8% | 60% | 24% |
| Goel et al[14] | North India | 200 | 20.50% | 70.50% | 8% | 1% |
| Present study | North India | 300 | 20.70% | 70% | 8.60% | 0.70% |

Table 6:

comparison of midline relationship of central incisors to philtrum of present study with previous studies.

| Midline relationship of central incisors to Philtrum | | | | | |
|--|-------------|-----------------|----------|-------|--------|
| Author | Population | No. of subjects | Position | | |
| | | | Central | Right | Left |
| Al johany et al[12] | Celebrities | 50 | 64% | 22% | 14% |
| Goel et al[14] | North India | 200 | 79.50% | 3% | 17.50% |
| Present study | North India | 300 | 76.30% | 3% | 20.70% |

Table 7: Comparison of bilateral negative space of present study with previous studies.

| Bilateral Negative Space | | | | |
|--------------------------|-------------|-----------------|----------|-----------|
| Author | Population | No. of subjects | Position | |
| | | | Normal | Increased |
| Goel et al[14] | North India | 200 | 95% | 5% |
| Present study | North India | 300 | 93.70% | 6.30% |

Maximum incidence of coverage of 1/4th of upper lip during smile i.e. average type of smile. Alignment of upper incisal edge to lower lip was convex. Maxillary teeth were not touching lower lip in 46.4% cases. 8 teeth were exposed during smile. Midline relationship of central incisors to philtrum is central. Bilateral negative space was normal in maximum subjects. So, North Indian Females fulfill the criteria of beautiful smile.

DISCUSSION

The present study showed that the alignment of upper incisal edge to lower lip was convex (55.3%), followed by straight (42.3%) and concave curve (2.4%). The study coincided with the previous studies [10-15] conducted on different populations as shown in table 2. Esthetically, convex smile is one of the criteria of best smile. In Aljohney et al [12] study concave incisal curvature was practically nonexistent in their study (0%). This may be due to celebrities may improve smile with practice.

In case of females - Acc. to Table 3, maximum number of subjects had 'Average' type of smile, after that 'High' type and least number of subjects had 'Low' type of smile. Present study coincided with previous studies of Tjan et al [10], Kaur et al [15] and Aljohany et al [12]. Their studies had also the same pattern of variabilities of position of upper lip while smiling. In female celebrities no subject had 'Low' type of smile. The position of upper lip regarded as one of the determining factor for evaluation of esthetic smile.

The data mentioned in table 4 revealed that in present study 21.6% subjects showed the maxillary teeth were just touching the lower lip while in 46.4% subjects maxillary teeth were not touching lower lip. These results were comparable to various studies conducted on celebrities, North Indian population and in Punjabi population by Aljohany et al [12], Goel et al [14] and Kaur et al [15] respectively. The difference of our study with study conducted in American population by Tjan et al [10] could be explained on racial basis. Variations in the contraction and intensity of muscle groups play an important role in the creation of different smiles. Vigorous contractions pull down the

lower lip, increasing tooth exposure. Individuals with intense contractions of the lower lip tend to also expose their lower teeth. This situation can vary among individuals or even in the same person depending on mouth opening [16].

Maximum subjects showed 8 teeth during smile. On comparing with Aljohany et al [12] study celebrities showed 10 teeth in 60% cases. While in Goel et al [14] study maximum subjects showed 10 teeth during smile. It was concluded that north Indian females showed less teeth than celebrities. The difference may be due to shy nature of Indian women [17] while celebrities are conscious about their smile. Smile exercises were effective to improve the esthetic level of the smile if exercises were continuously done [18].

76.3% female subjects of present study showed midline passing through centre of central incisors, while 20.7% showed left deviation and rest showed right deviation (table 5). This study did not agree with Aljohany et al [12] study on celebrities. In their study 64% showed midline passing through centre of central incisors, more subjects showed right deviation i.e. 22% while 14% showed left deviation. This indicated that smile was esthetic in north Indian females.

No bilateral negative space was visible in 95% of females (table 6). It was coincided with Goel et al [14] study. These days people are also more aware of esthetics, especially smile. Generally this is very common in models to improve their looks and smiles. Because the lips are forming a very important part of the face, modifications in this area can have a dramatic influence on facial appearance. To analyze soft tissue data as in planning of esthetic smile surgery it is mandatory to know about actual as well as desired soft tissue dimensions. The functional importance is the fundamental goal of reconstruction, however due to the prominence of the surgical site, obtaining the best aesthetic outcome should be a close second goal.

So, Esthetic considerations are paramount in treatment planning; however, rigid rules cannot be applied to this process because almost an infinite variety of faces could be esthetic [19].

Accordingly, it is important to have general guidelines that aid the clinician to optimize

dentofacial esthetics, while satisfying other treatment goals.

CONCLUSION

It was concluded that an average smile in North Indian females exhibited approximately full length of maxillary anterior teeth, has the convex incisal curve of the teeth parallel to the inner curvature of the lower lip, has the incisal curve of the upper incisors touching or not touching the lower lip, displays the eight upper anterior teeth and premolars, midline passes through centre of central incisors, no bilateral negative space was visible. It is inferred from the present study that smile is more esthetic in North Indian females.

Conflicts of Interests: None

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