



**SMILE ANALYSIS IN 600 NORTH INDIAN ADULTS – A DATA BASE STUDY FOR SEXUAL DIMORPHISM**

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**ABSTRACT**

Aesthetic components of smile are different for different sexes, races, and ages. They also have a marked effect on the beauty of the smile and personal identification. The aim of this study was to evaluate gender related changes in components of smile and present a data for personal identification. This cross sectional study was conducted on 600 North Indian adults (300 females and 300 males) aged 18-40 years. Prior informed written consent for this study was obtained from all the subjects. The exclusion and inclusion criteria for the subjects were predefined. All the parameters of smile showed sexual dimorphism in most of the parameters of smile being greater in females. This standard may serve as a guideline for restoration or enhancement of aesthetic and plastic surgery and for personal identification.

**KEYWORDS** : Smile, Personal Identification, Sexual Dimorphism

**INTRODUCTION**

Aesthetic components for various groups are different but it is important to consider what is aesthetic for different subjects according to their age, sex and race. Evidence suggest that the esthetic components for different sexes, races, and ages are not entirely the same (Garber DA et al, 2000). There is also a sex difference in smile type: Generally, females have significantly more maxillary and less mandibular teeth exposure as compared to males at all ages . So, low smile line is predominantly a male characteristic, while high smile line is predominantly a feminine characteristic (Tjan AHL et al, 1984).

This study formulates a standard position of upper and lower lip during active smile which may serve as a guideline for restoration or enhancement of aesthetic and plastic surgery. Apart from becoming guideline for restoration or enhancement of esthetic and plastic surgery it may serve as base line data for forensic science. As no data regarding smile is being available in a manner which can be used scientifically. Objective of this study is to evaluate gender related changes in the gingival display, teeth display and midline relationship of incisors to philtrum during smile.

**MATERIAL & METHODS**

Smile analysis done in 600 north indian adults which includes 300 males and 300 females (aged between 18 -40 years). Subjects belong to North Western Indian states (J&K, Punjab, Haryana, Himachal Pradesh, Rajasthan, Uttar Pradesh, Uttrakhand, Delhi). Prior informed written consent for this study was obtained from all the subjects in writing both in English & vernacular. The subjects having full dentition were included in dentofacial analysis. Eruption of last molar was ignored in classifying person with full dentition as 3<sup>rd</sup> molar eruption is variable (Ekstrand KR et al, 2003). Subjects with anomalies of lips and inflammation, trauma, malformation, deformities of lips and surgical scars (operations for cleft lip) were excluded because of their unsuitability for this investigation. Canon Digital Camera 10 Mega pixel & 10 times optical magnification was used for this study. Photographs were taken in two positions i.e. When lips were at rest and in full smiling position as shown in Figure 1 & 2 respectively. Results calculated in percentage. Present study based on parameters for esthetic smile suggested by (Patnaik VVG et al, 2003); (SolomonEGR 1999).

**1. Three types of smile identified according to position of upper lip while smiling –**

High smile (mucosa smile) – full exposure of anterior surface of teeth, free marginal gingival and labial mucosa. Average smile (gingival smile) - about 75% to 100% exposure of anterior surface of maxillary teeth. Low smile (teeth smile) - exposure of less than 75% of anterior surface of maxillary teeth.

**2. Tooth-lower lip position** – Depending upon the contact of lower lip and labial surface of maxillary teeth, it is divided into three types of smile. It may be just touching the lower lip, there may be a slight gap or maxillary teeth covers small portion of mandibular teeth.

**3. Number of teeth exposed during full smile** – During smile there may be exposure of canine to canine (6 teeth); premolar to premolar (8-10 teeth); molar to molar (12 - 16 teeth).

**4. Midline relationship of central incisors to philtrum** - A midline through philtrum may pass through the center of the central incisors or it may pass right or left of the center of central incisors.

**RESULTS**

**Table 1- Various positions of upper and lower lips during smile in present study**

S.No.	Positions	North Indian Females [n(%)=300]	North Indian Males [n(%)=300]
1.	Various positions of upper lip		
	Average	159(53%)	155 (51.7%)
	High	53(17.7%)	25 (8.3%)
	Low	88 (29.3%)	120 (40%)
2.	Various tooth lower lip positions		
	Touching	97 (32.3%)	65 (21.6%)
	Non touching	139 (46.4%)	190 (63.4%)
	Slightly covered	64 (21.3%)	45 (15%)
3.	Number of teeth exposed		
	6	90 (30%)	63 (21%)
	8-10	208 (69.3%)	236 (78.7%)
	12-16	02 (0.7%)	01 (0.3%)
4.	Midline relationship of central incisors to philtrum while smiling		
	Central	226 (76.3%)	237 (79.3%)
	Right	11 (3.0%)	13 (4%)
	Left	63 (20.7%)	50 (16.7%)

The result of this study revealed the differences of smile in both males and females.(Table 1): Average type of smile was maximum followed by low smile and then high type of smile was observed in both North Indian males and females. Tooth lower lip position was maximum non touching type followed by touching type in both males and females. The number of teeth exposed during full smile was 8-10 teeth (Six anterior teeth, first and second premolar) followed by 6 teeth in both cases. The central relation of central incisors to philtrum was maximum followed by midline passing through left of center while it was rarely passing through right side of the philtrum.

**Table 2: Comparison of various parameters of smile of present study with earlier reported data**

Position	sex	Present study (North Indian) [n(%) 300 males, 300 females]	(Tjan AHL et al, 1984) (American) [n(%) 207 males, 247 females]	(Kaur G et al, 2011) (Punjabi) [n(%) 350 females]	(Al- johany SS et al, 2011) (Celebrities) [n(%) 50 females]
Average	M	155 (51.7%)	131 (63.28%)	-----	-----
	F	159(53%)	182 (73.71%)	65.5%	40 (80%)
High	M	25 (8.3%)	14 (6.76%)	-----	-----
	F	53 (17.7%)	34 (13.79%)	22.5%	10 (20%)
Low	M	120 (40%)	62 (29.95%)	-----	-----
	F	88 (29.3%)	31 (12.50%)	12.0%	0 (0%)
Touching	M	65 (21.6%)	68 (39.31%)	-----	-----
	F	97 (32.3%)	124 (57.89%)	50.3%	17 (34%)
Non touching	M	190 (63.4%)	75 (43.35%)	-----	-----
	F	139 (46.4%)	59 (27.63%)	30.3%	21 (42%)
Slightly covered	M	45 (15%)	30 (17.34%)	-----	-----
	F	64 (21.3%)	31 (14.47%)	19.4%	12 (24%)

**Table 3 - Comparison of various parameters of smile of present study with previous studies**

Parameter	Positions	sex	Present study (North Indian) [n(%)300 males, 300 females]	(Al- johany SS et al, 2011) (Celebrities) [n(%)50 females]
No. of teeth exposed in full smile	6	M	63 (21%)	-----
		F	90 (30%)	-----
	8 -10	M	236 (78.7%)	-----
		F	208 (69.3%)	4 (8%)
	12 -16	M	01 (0.3%)	-----
		F	02 (0.7%)	30 (60%)
Midline relation of central incisor to philtrum - straight	M	237 (79.3%)	-----	
	F	226 (76.3%)	32 (64%)	
Midline passes through right	M	13 (4%)	-----	
	F	11 (3%)	11 (22%)	
Midline passes through left	M	50 (16.7%)	-----	
	F	63 (20.7%)	7 (14%)	

**Discussion**

In present study, position of upper lip during smile was 'Average' in almost equal proportion of the two sexes (51.7% in males & 53% in females) but 'High' smile was more common in females than males as shown in Table 1. This coincided with Peck S et al, 1992 study, which revealed that gingival smile was a more common characteristic of females. They found that women show on average, 0.7mm of gingiva during smile, while in males 0.8mm of clinical crown is covered by upper lip on average. Our results agreed with Tjan AHL et al, 1984, Kaur G et al, 2011 and Al- johany SS et al, 2011. 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. (Table 2)

In present study, teeth were just touching the lower lip in 21.6% of males and 32.3% of females & non touching in 63.4% in males and 46.4% in females as shown in table 1. This follow a trend with the study by Tjan AHL et al, 1984 where maximum male subjects (43.35%) showed maxillary incisal curvature not touching the lower lip, while 39.31% male subjects showed maxillary incisors touching the lower lip. While in case of females percentage of subjects with maxillary incisal curvature slightly covered by lower lip was comparable between all studies done by Tjan AHL et al, 1984, Kaur G et al, 2011 and Al- johany SS et al, 2011.(Table 2) This may be due to racial differences because all studies done on different populations. In present study, more number of females showed 6 teeth (30%) as compared to males (21%). On the other hand 78.7% males showed 8-10 teeth during smile as compared to females (69.3%).(Table 1) Less no. of teeth visible in case of North Indian females (present study), may be due to shy nature of Indian women so, that fewer teeth were exposed by them during smile. Only 0.7% of present

study females displayed 12 teeth while 24% of celebrities displayed 12 teeth.(Table 3) It may be due to that celebrities are more conscious about their smile. Smile exercises were effective to improve the esthetic level of the smile if exercises were continuously done (Murakami Y et al, 2008). No authentic comparable data was available in case of males.

In present study straight smile was more common in males than in females.(Table 1) Here, North Indian males out number females in esthetics. 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. This study did not agree with Al- johany SS et al, 2011 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.(Table 3) No authentic comparable data was available in case of males.

**CONCLUSION**

Sexual Dimorphism was seen. Smile was more esthetic in females.

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