Original article:

Significance of gingival display during natural and forced smile on facial esthetics

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Abstract:

AIM: The purpose of the present study is to determine the amount of gingival visibility during natural smile and forced smile in the patients visiting the Government Dental college and hospital,ahmedabad.

MATERIALS AND METHODS: A total of 200 patients were included in the study.Participants were classified into 2 groups according to age groups: (a) 18-34 years and (b) 35-49 years. For evaluation of smile line, patients were photograph.2 pictures were taken of each participant: during natural smile and during forced smile.The smile line was analyzed according to the smile line classification.(Marie-Francoise Liebart 2004).

SIGNIFICANCE: Excessive gingival display is an esthetic problem both to the patient and clinician. The esthetic influence of gingival architecture on "smile line" can be altered through periodontal surgical techniques.

KEYWORDS: Age, gender, periodontium, smile line

Introduction:

If eyes are mirror to the heart of a person, then a smile can be considered as an important determinant of the facial attractiveness of an individual[2]. There are 2 types of smile. The one is a natural smile and the other one is forced smile[3]. The forced smile is voluntary in nature. It occurs when lips part due to moderate muscular contraction of the lip elevator muscles[4]. The natural smile is involuntary in nature and depicts the emotion a person feels at that moment. It results from maximum contraction of the upper and lower lip, elevator and depressor muscles, respectively. This causes full expansion of the lips, with maximum anterior tooth display and gingival visibility.

Studies have shown that agreement on attractiveness ratings is consistent even among different cultures, suggesting a core human perception of what constitutes beauty.Within the face, the mouth carries nearly one third of the importance in the level of factors that determine whether a person is judged to be attractive[3]. For dentists, esthetics along with form and function are one of the important factors of the clinical treatment delivered,. Some

characteristics of an esthetic smile include: 1) dental midline is straight; 2) central incisors are symmetric; 3) gingival margins of the central incisors are symmetric;4) smile line follows the convexity of the lower lip 5) teeth are straight or mesially inclined;6) incisal embrasures gradually deepen from central incisors to canines; and 7) width-tolength ratio of the central incisors is 75% to 80%[4].There are also other factors influencing the esthetics of a smile, including incisor show and gingival display[5-10.] A proposed major esthetic problem in dentistry is what is termed excessive gingival display, better known by common man as a ‘‘gummy smile.’’ The prevalence of excessive gingival display has been estimated at 10% of the population in the age group of 20 to 30 years. It is seen more in women than in men. Possible etiologic factors for this clinical presentation include gingival enlargement/overgrowth, vertical maxillary excess, short clinical crowns, altered passive eruption,or a short upper lip, or combinations of these conditions.A wide variety of therapeutic approaches may be considered, depending on the diagnosis. These may vary from simple procedures like gingivectomy, to complex procedures including mucoperiosteal flaps, osseous resective surgery and orthognathic surgery. Till now, very few studies have been done in which the association between gingival visibility during the natural and forced smile have been noted. So, the purpose of the present study is to determine the amount of gingival visibility during natural smile and forced smile in the patients visiting the Government Dental College and Hospital, Ahmedabad.

MATERIALS AND METHODS:

A total of 200 patients (Female-121, Male-79) were included in the study. All the participants were informed of the aim of the study and informed consent was taken. Participants were selected based on the following criteria: (1) More than 18 years of age. (2) Minimum 8 continuous anterior teeth equally distributed between right and left side, i.e. 34 to 44. (3) A healthy periodontium or a reduced but healthy one.Exclusion criterion included patients having fixed and/or removable prosthesis because that might have an effect on esthetics and periodontal health. Gender and age were recorded for each participant. Participants were selected into 2 groups according to age groups: (a) 18-35 years and (b) 36-49 years.

Methods

For evaluation of smile line, patients were photographed. Two photos were taken of each participant: during natural smile and during forced smile.

Standardisation of the photograph done in frankfurt horizontal plane.

The smile line was assessed according to the following classification[1]:

Class I:-Very High Smile Line: Greater than 2 mm of marginal gingiva visible or more than 2 mm apical to the cementoenamel junction visible for the reduced but healthy periodontium.

Class II:- High Smile Line: Between 0-2 mm of marginal gingiva visible or between 0 - 2 mm apical

to the cementoenamel junction visible for the reduced but healthy periodontium.

Class III:- Average Smile Line: Only Gingival embrasures visible.

Class IV:- Low Smile Line: Gingival embrasures and cementoenamel junctions not visible.

Statistical analysis

Chi - square test analysis was used to determine the statistical significance of difference between groups. A probability of $P < 0.05$ was determined to reject the null hypothesis.

Figure 1:

Class 1:-Very High Smile Line: More than 2 mm of marginal gingiva visible or more than 2 mm apical to the cementoenamel junction visible for the reduced but healthy periodontium

Class 2:- High Smile Line: Between 0 and 2 mm of marginal gingiva visible or between 0 and 2 mm apical to the cementoenamel junction visible for the reduced but healthy periodontium

Class 3:- Average Smile Line: Gingival embrasures only visible

Class 4:- Low Smile Line: Gingival embrasures and cementoenamel junctions not visible

RESULTS:

The sample of the present study was composed of 200 Subjects. Table 1represents the distribution of the male and female population in the younger (18-34 yrs) and older age group (35-49 yrs). Figure 2 represents pie chart of gender distribution. Class 4 was the most common for natural smile (48.5%) and Class 3 was the most common for forced smile (57.0%). During natural and forced smile, 2% of the total study population had a very high smile line. 48.5% had very low smile line during natural smile and 23.5% had a very low smile line during forced smile. It was

seen that the gingiva was more visible in the forced smile (Class 1 + Class 2 + Class 3 = 75.8%) [Table 2] than in the natural smile (Class 1 + Class 2 + Class 3 = 52.5%) [Table 3]. Women revealed their gingiva (52.84%) more than men (38.24%) during natural smile. During forced smile, women again revealed more of their gingiva (77.96%) in comparison to men (72.42%). Figures 3and 4 represents the distribution of males and females both during natural and forced smile.

When younger and older age groups were compared during forced smile, older age group revealed more gingiva (Class 1 + Class 2 + Class 3 = 80.38%) then younger age group (72.9%). [Table 4] During natural smile, older age group (54.25%) revealed more gingiva then younger age group (51%) [Table 5]. Figures5 and 6represents the frequency distribution for age group 18-35 yrs and 36-49 yrs both during natural and forced smile.

Table 1: Sample distribution of the male and female population in the younger and older age group

Age groups			18-34 years						35-49 years		
	c1	c2	c3	c4	Total		c1	c2	c3	c4	Total
Male	0	4	35	14	53		0	1	18	7	26
Female	2	23	50	26	101		0	3	15	2	20

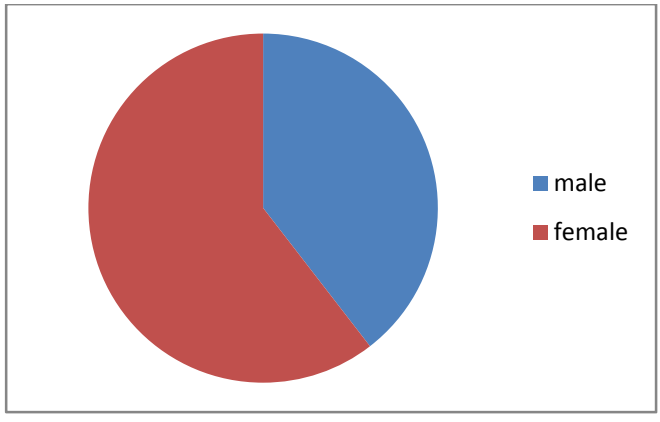
C1-very high smile line

C2-high smile line

C3-average smile line

C4-low smile line

Figure 2: Pie diagram of gender distribution



Male	female
79	121

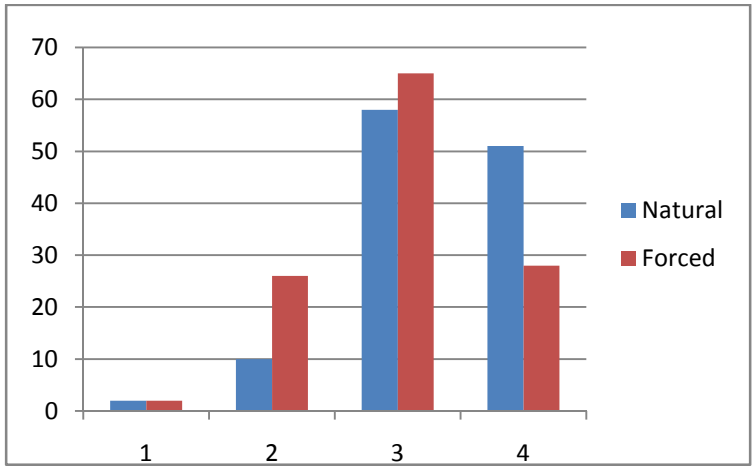
Table 2: The frequency distribution of the study sample according to age and gender during forced smiles

Age groups			18-34 years						35-49 years		
	C1	C2	C3	C4	total		C1	C2	C3	C4	total
male	0	4	35	14	53		0	1	18	7	26
female	2	23	50	26	101		0	3	15	2	20

Table 3: The frequency distribution of the study population according to age and gender during natural smile

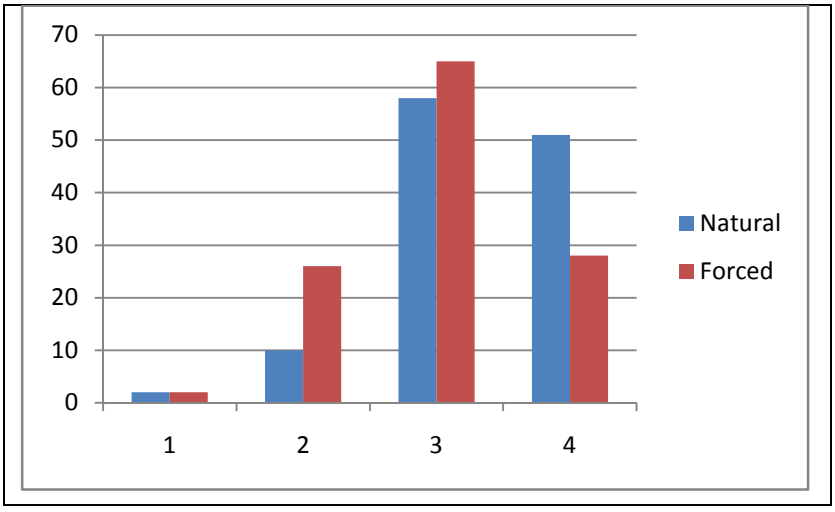
Age groups			18-34 years						35-49 years		
	C1	C2	C3	C4	total		C1	C2	C3	C4	total
Male	0	2	17	34	53		0	0	12	14	26
female	2	9	47	43	101		0	1	11	8	20

Figure 3: Frequency distribution of males during natural smile and forced smile



	C1	C2	C3	C4
Natural	0	2	26	48
forced	0	5	53	21

Figure 4: Frequency distribution of females during natural smile and forced smile



	C1	C2	C3	C4
Natural	2	10	58	51
Forced	2	26	65	28

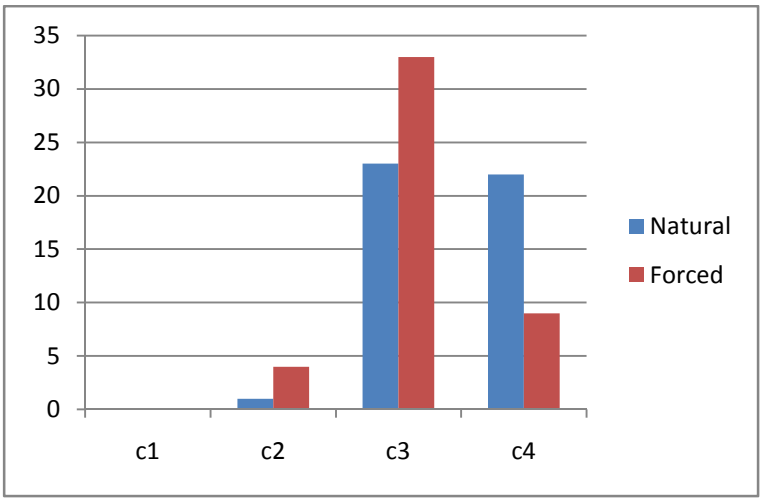
Table 4: Frequency distribution of the study sample during forced smile aged between 18-34 years and 35-49 years

age	C1	C2	C3	C4
18-34	2	27	85	40
35-49	0	4	33	9

Table 5: Frequency distribution of the study population aged between 18-34 years and 35-49 years during natural smile

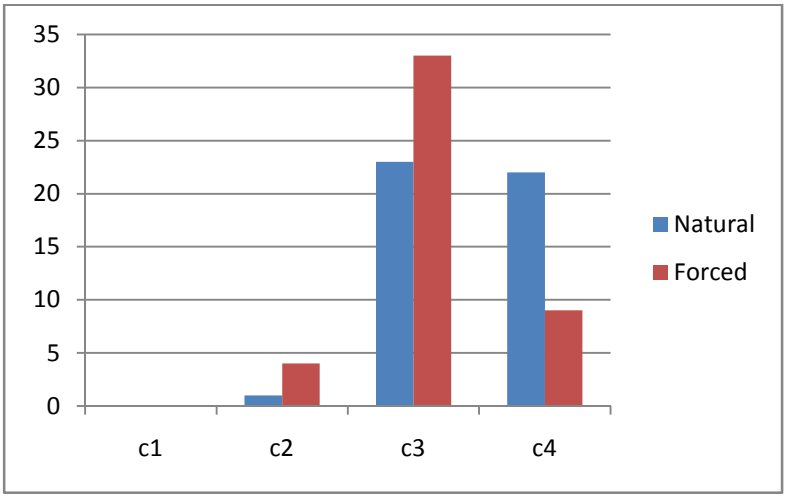
Age	C1	C2	C3	C4
18-34	2	11	64	77
35-49	0	1	23	22

Figure 5: Frequency distribution for age group 18-34 years during natural smile and forced smile



	C1	C2	C3	C4
Natural	2	11	64	77
forced	2	27	85	40

Figure 6: Frequency distribution for age group 35-49 years during natural smile and forced smile



	C1	C2	C3	C4
Natural	0	1	23	22
forced	0	4	33	9

DISCUSSION:

Excessive exposure of the gingival during a smile, called excessive gingival display, may concern both patients and clinicians. Patients often present to the dental clinic for treatment to their "gummy" smile. A clinician must fully understand the various factors involved in this situation, to provide patients with an appropriate answer.(Silberberg N et al.2009). Excessive gingival display is a frequent case of patient dissatisfaction that can occur because of various intraoral and extraoraletiologies.Gingival architecture and tooth length are important contributors to an esthetically pleasing smile[6]. The individual variables like upper and lower lip muscle mobility and strength, clinical crown length, lip vertical length and skeletal relationship, mainly vertical maxillary length can lead to variation in the amount of dental and gingival exposure during speech and smile in different persons[8].Various conditions like malpositioning of teeth, recession, altered passive eruption, loss of interproximal papilla leads to an unesthetic appearance[7].A large number of therapeutic approaches may be considered, depending on the diagnosis.These may vary from simple treatments such as gingivectomy,to more complex treatments including mucoperiosteal flaps, osseous respective surgery and orthognathic surgery.so, the purpose of this study is to determine the amount of gingival visibility during natural smile and forced smile.The smile line was analyzed based on the amount of marginal gingiva visible in to very high, high, average and low smile line. In the present study, data showed that low smile line was the most frequent smile for natural smile (49.5%), whereas average smile line was the most frequent smile for forced smile(59.0%). Age and gender can also influence smile attractiveness which is an important factor of personality traits and satisfaction of oral appearance[10].[Table 1] represents the distribution of the male and female population in the younger(18-34 yrs) and older age group(35-49 yrs). In the present study, women revealed more gingiva than men both during natural and forced smile.Table 2 shows that Women revealed their gingiva(51.84%) more than men (39.24%) during natural smile.Table 3 shows that during forced smile,women again revealed more of their gingiva (76.96%) in comparision to men (73.42%). Women had higher smile line in comparison to males according to Jensen et al.[5] Tijan et al.[2] did a study on 20- to 30-year-old students and reported that high and very high smile line was found more in women (14% and 75%) than in men (7% and 63%). The results of the present study are in accordance with the results of these studies. Morley et al.in 2001 reported that the female lip lines are an average 1.5mm higher than male lip lines,1-2mm of gingival display could be considered normal for females. The present study showed no significant differences in younger and older age groups both during natural and forced smile. Similar results have been reported by Wichmann M[11] in which they stated that there were no significant differences in visibility of gingival margins between younger (Average age 25 years) and older subjects (Average age 55 years). Statistically significant differences were found in C1, C2, and C3 groups when they were compared during forced and natural smile.Also, present study stated that low smile line group showed wide variation during natural and forced smile both in male and female groups.The gingiva was more visible in the

forced smile(class1+class2+class3=75.5%)[Table 2] than in the natural smile(class1+class2+class3=50.5%)[Table 3] Crispin and Watson[9] reported that gingival margin was visible in 66% of the students during normal smile, whereas 84% of the subjects displayed the gingival margin during forced smile. One of the drawbacks of this study was that it did not include the presence of interproximal papilla.The influence of age, gender on the subjects was also not examined. The present study included presence of interproximal papilla in Class 3, that is average smile line group (Class 3) which allowed only the detection of interproximal papilla, not involving the gingival margin.

CONCLUSION:

The present study was done to determine the amount of visibility of gingiva during natural and forced smile. A pleasant, beautiful and charming smile improves a person's esthetics which emphasizes on the importance of smile analysis. The wish to have an attractive personality compels an individual to have an attractive smile for which they seek dental treatment. With the expansion in the scope of dentistry, various new esthetic surgical procedures have evolved which offer a wonderful opportunity to enhance the patient's smile. Excessive display of gingiva is an esthetic concern both to the patient and the clinician. The esthetic factor of gingival architecture on "smile line" can be changed through periodontal surgical techniques. Therefore, understanding the etiology and treatment options is important for the treatment planning of such patients. So, it becomes a vital duty for the dentist to see that visual attractiveness of the smile is associated strongly with the health of the periodontium.

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