

Evaluation of different smile types in males and females of south Rajasthan population on basis of upper incisor exposure parameter using clinical measurements and facial photographs

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ABSTRACT

Background: Evaluation of different smile types in males and females of south Rajasthan population on posed smile by clinical measurements and facial photographic methods on basis of upper incisor exposure parameter.

Materials and Method: Samples were obtained from 224 participants from south Rajasthan, Kota analyzed. Three Facial photographs (at rest, at posed smile and with cheek retractor) of the subjects were taken. Two linear measurements upper incisor exposure on smile (UIES), upper incisor crown length (actual) (UICL), were measured with vernier caliper in clinical study and on photo paper on photographic study.

Result: Clinically, the Upper incisor crown length, upper incisor exposure during a smile is greater than what is visible photographically ($p < 0.05$). Upper incisor exposure on smile is higher in female in respect to male. While Upper incisor crown length is higher in male study in respect to female. Upper incisor exposure on smile is higher in female in respect to male.

Conclusion: Males have higher tendency to increase crown length while exposure upon smile is very less compared to females' incisors. On a posed smile there is an average to high smile in females (more than 100%), while males have average to low smiles (less than 75%).

Keywords: Gender differentiation of smile, Incisor exposure rate, Smile types.

INTRODUCTION

Each and every individual connects with the world through the window of **smile** at a social and personal level. A pleasing smile involves a harmonious relationship between the teeth, gingival scaffold, and the lip framework. Social interactions like personality evaluations, performance, kinship opportunities, etc. are affected by a smile. ¹ There are various principles involved that create a balance between teeth and soft tissues, which need to be understood. The way that the lips and soft tissues

frame a smile affects the esthetic of the smile.² The smile, along with the associated perioral tissues, most visibly displays the results of orthodontic treatment; thus making smile esthetics a major goal of orthodontic Mechanotherapy.³

The two types of smiles are a) Unposed smile and b) Posed smile

- a) The smile that is involuntary, dynamic, no sustained, natural, induced by joy or mirth,

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expressing an authentic human emotion is an unposed smile.

- b) On contrast, a smile that is voluntary, static, not necessarily accompanied by emotions, is a pose smile.^{1,4}

The lip animation is fairly reproducible, similar to the smile that may be rehearsed for photographs or school pictures. An effective tool to analyze facial attractiveness is a facial photograph. A person gives a voluntary, unstrained and static, yet natural smile upon being used for a photograph. Rigsbee et al.⁴, Ackerman et al.^{5,6} and Hulsey⁷ agree that the posed smile has good reproducibility. Reproducibility is fore folds in a posed smile and hence it is routinely used to access facial and smile aesthetics.^{6,8}

According to Some studies, smile is classified based on upper incisor exposure and upper lip position during smiling into the following three categories: Low smile, Average smile and High smile^{9,10,11}

The study classifies, based on the upper incisor exposure rate (UIERs), the gender related frequency distribution of the three smile types, high, average, and low smiles of south Rajasthan young adults.

MATERIALS AND METHOD:

Source of the Data:

- The subjects for the present study were randomly selected from amongst students, residents, staff, faculty and patients presenting to the Department of Orthodontics and Dentofacial Orthopedics at Daswani Dental College and Research Centre, Kota, Rajasthan.
- The study sample consisted of 224 untreated young adults with pleasant profile of 18 to 30 years of age that were divided based on their gender into 2 groups of 113 males and 111 females.

Inclusion Criteria:

- Well nourished
- Free of any known serious illness.
- Individuals between 18-30 years of age.
- Pleasing profile (Straight)
- Skeletal and dental class I (angel's classification)

Exclusion Criteria:-

- Previous orthodontic treatment
- Edentulous spaces mostly in anterior region,
- Anterior crowding and malocclusion,
- History of trauma in face,
- Facial abnormality

Materials Required:

- For Clinical measurements:
 - Vernier caliper, (fig.1)
 - Metal scale (fig.2)
- Facial photographs:
 - Digital camera (Canon EOS 1300 D) (fig. 3)
 - Lens with focal length of 18-55 mm (fig. 3)
 - Tripod (fig. 4)
- Picasa 3 Viewer and Editor Software in computer. (fig. 5)
- Photography Room Set Up. (fig.6)

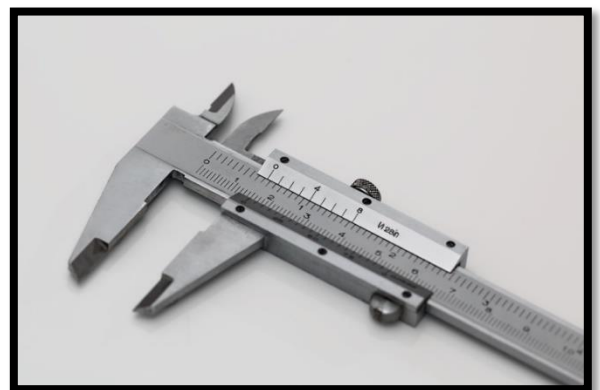


Fig 1: Vernier Caliper

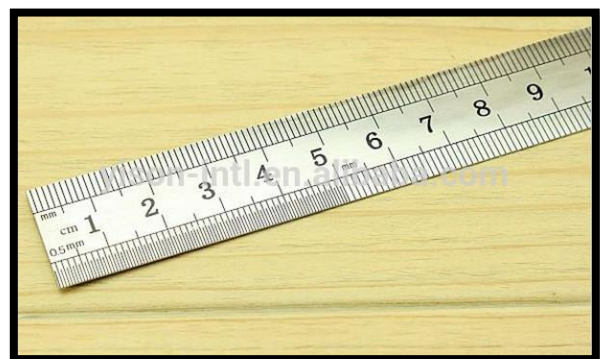


Fig 2: Metal scale.



Fig 3: Canon EOS 1300 D SLR Camera with 18-55mm lens



Fig 4: Tripod Stand.



Fig 5: Picasa 3 Viewer and Editor Software



Fig 6: Photography Room Set Up.

Methodology:

- 224 young adults Participants were obtained at the Daswani Dental College And Research Centre, Kota, South Rajasthan.
- Two Clinical measurements done on the students on chair side with vernier caliper of
 1. Upper incisor exposure on smile(UIES),
 2. Upper incisor crown length(actual)(UICL),
- The subjects sat on chairs, ensuring that their Frankfurt horizontal planes were parallel to the floor and at a fixed distance from the camera lens. The camera lens was centred on the midsagittal plane of the subject.
- A smiling practice session was held to achieve a natural posed smile. The subjects were instructed to hold the upper and lower teeth apart with their lip competent in rest position at rest position,
- Three types of extra oral photographs were taking like frontal at rest, at smile, with cheek retractor were taken.
- Photograph with cheek retractor is taken to measure the actual crown length of the upper incisors. (Fig.7)



Fig: 7 frontal photographs at rest, at smile, with cheek retractor (female).

- The photographs were taken using digital camera- Canon EOS 1300 D, lens of 18-55mm and a tripod.
- Photographs in the same lip position were taken at least 3 times to reduce errors. And a widest commissure to commissure posed smile is selected among three photographs.
- One profile view photograph also taken to check the pleasant profile of the patient. (fig.8)



Fig 8: Profile View.

- All the photographs will be transferred to the computer, and with help of in the picasa 3 viewer and editor photoshop software and resolution and size will be determined same to the all photographs.
 - In the software, three photographs were cropped and printed on A4 size photopaper to measure following structures.
1. Upper incisor crown length (from incisor edge to cervical margin of crown),

2. Upper incisor exposure on smile (from incisor edge to lower border of the upper lip).



Fig 9: Measurements on Photopaper (Female)

Statistical Analysis:

- Statistical analysis of data is done by help of SPSS (Statistical package for social sciences) 20.0 Software (trial Version).
- And Unpaired -T test and One Way ANOVA tests is use in data analysis. P value <0.05 is consider as significant.

RESULTS

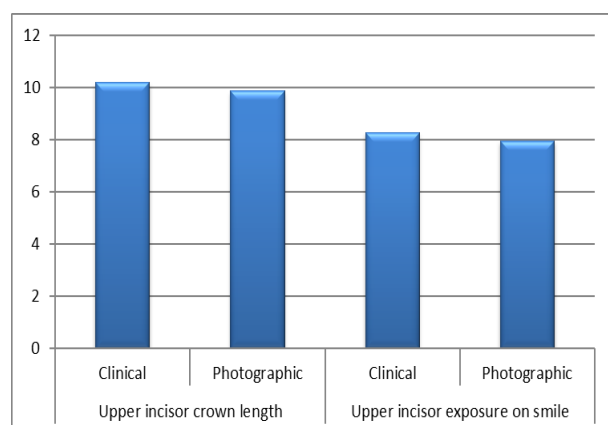
1. Distribution of Upper incisor crown length, Upper incisor exposure on smile according to

two Groups –clinical and photographic (224 subjects)

Table 1: Comparison of both technique-clinical and photographic.

	Group	N	Mean	Std. Deviation	T value	P value
Upper incisor crown length	Clinical	224	10.1875	1.03227		0.003*
	Photographic	224	9.8661	1.20998	3.025	
Upper incisor exposure on smile	Clinical	224	8.2835	1.53910		0.035*
	Photographic	224	7.9576	1.71886	2.114	

This comparison shows mean value of 224 patient with clinical technique are UICL – 10.18, UIES – 8.28 , While with photographic values results are - UICL – 9.86, UIES – 7.95, with standard deviation of 1 to 2 mm respectively.



Graph 1: Comparison of both technique-clinical and photographic.

- There is significant difference between Clinical and Photographic study in Upper incisor crown length and Upper incisor exposure on smile ($p < 0.05$). According to Mean Upper incisor crown length and exposure on smile is higher in clinical study in respect to Photographic.
2. Distribution of Upper incisor crown length, Upper incisor exposure on smile according to Groups in Females (111 samples).

Table 2: Two technique comparison values in females (111 samples).

	Group	N	Mean	Std. Deviation	T value	P value
Upper incisor crown length	Clinical	111	9.9234	.90000		0.438
	Photographic	111	9.8108	1.23224	0.778	
Upper incisor exposure on smile	Clinical	111	8.8063	1.20259		0.860
	Photographic	111	8.7748	1.44086	0.177	

This comparison shows mean value of 111 female patients with clinical technique are UICL – 9.92, UIES – 8.80 While with photographic values results are - UICL – 9.81, UIES – 8.77, , and standard deviation of average 1.5 mm respectively.

- There is no significant difference between Clinical and Photographic study in Upper incisor crown length and Upper incisor exposure on smile ($p > 0.05$) in female participants.
3. Distribution of Upper incisor crown length, Upper incisor exposure on smile according to Groups in Males (113 samples).

Table 3: Two technique comparison values in Males (113 samples).

	Group	N	Mean	Std. Deviation	T value	P value
Upper incisor crown length	Clinical	113	10.4469	1.09047		0.001*
	Photographic	113	9.9204	1.19068	3.467	
Upper incisor exposure on smile	Clinical	113	7.7699	1.66105		0.005*
	Photographic	113	7.1549	1.59110	2.842	

This comparison shows mean value of 113 male patients with clinical technique are UICL – 10.44, UIES – 7.76 , While with photographic values results are - UICL – 9.92, UIES – 7.15, and standard deviation of average 2 mm respectively.

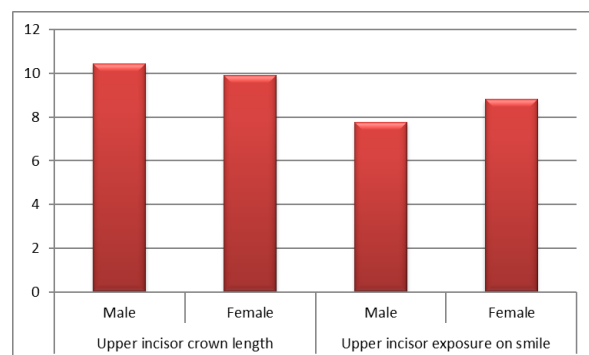
- There is significant difference between Clinical and Photographic study in Upper incisor crown length and Upper incisor exposure on smile ($p < 0.05$). Upper incisor crown length and Upper incisor exposure on smile is higher in clinical study in respect to Photographic.

4. Comparison of Upper incisor crown length, Upper incisor exposure on smile in males and females according to Groups in clinical study.

Table 4: Two group comparison (males and females) values in Clinical Study.

	Gender	N	Mean	Std. Deviation	T value	P value
Upper incisor crown length	Male	113	10.4469	1.09047		
	Female	111	9.9234	.90000	3.915	<0.0001*
Upper incisor exposure on smile	Male	113	7.7699	1.66105		
	Female	111	8.8063	1.20259	5.341	<0.0001*

This comparison shows mean value of 111 female patients with clinical technique are UICL – 9.92, UIES – 8.80 while mean value of 113 male patients with clinical study are UICL – 10.44, UIES – 7.76, with standard deviation of 2 mm averagely.



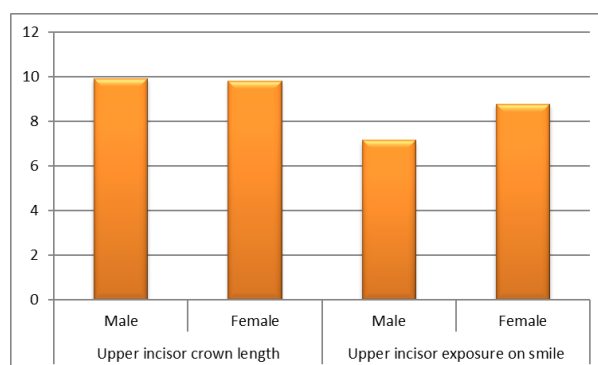
Graph 2: Two group comparison (males and females) values in Clinical Study

- There is significant difference between male and female in Upper incisor crown length ($p < 0.05$). Upper incisor crown length is higher in male study in respect to female.
 - There is significant difference between male and female in Upper incisor exposure on smile ($p < 0.05$). Upper incisor exposure on smile is higher in female in respect to male.
5. Comparison of Upper incisor crown length, Upper incisor exposure on smile in males and females according to Groups in photographic study.

Table 5: Two group comparison (males and females) values in Photographical Study

	Gender	N	Mean	Std. Deviation	T value	P value
Upper incisor crown length	Male	113	9.9204	1.19068		
	Female	111	9.8108	1.23224	0.677	0.499
Upper incisor exposure on smile	Male	113	7.1549	1.59110		
	Female	111	8.7748	1.44086	7.983	<0.0001*

This comparison shows mean value of 111 female patients with photographic technique are UICL – 9.81, UIES – 8.77 while 113 male subject's photographic values results are - UICL – 9.92, UIES – 7.15 and standard deviation of average 1.5 mm respectively.



Graph 3: Two group comparison (males and females) values in Photographical Study

- There is no significant difference between male and female in Upper incisor crown length ($p > 0.05$).
- There is significant difference between male and female in Upper incisor exposure on smile ($p < 0.05$). Upper incisor exposure on smile is higher in female in respect to male.

DISCUSSION

In orthodontic diagnosis and treatment planning, smile plays an important role. Several studies^{12,13,14} have concluded that the rest position of the lips and posed smile are the reproducible expressions. People from each and every region of the world have some specific features and genetic structures that makes them different from the others in more than one way like color, length, width and many more esthetic features. Appropriate vertical maxillary incisor and gingival display are important

aspects of an esthetic smile, and different treatment options including various orthodontic techniques: Botox, lip repositioning, or even orthognathic surgery are available to meet objectives regarding this smiling characteristic. The results in the current study provide average value difference on smile further classified into males and females in south Rajasthan region of the India.

In our study we had tried to evaluate some average values of facial structure like upper incisor length, upper lip length and upper lip thickness and their changes upon smile among south Rajasthan population and further classified them in two groups- males and females. Many studies classify smiles based on upper incisor exposure and upper lip position during smiling into the following three categories: ^{9,10,11}

- Low smile (in which less than 75% of the clinical crown height of the maxillary anterior teeth is revealed),
- Average smile (in which 75 - 100% of the maxillary anterior crown height and the interproximal gingival are revealed), and
- High smile (in which a band of contiguous maxillary gingival is exposed).

Tjan et al.¹³ and Dong et al.¹¹ reported that the average smile is the most common among adults while Tjan et al.¹³ and Rigsbee et al.¹⁰ studied the gender-related differences and reported that female showed high smiles more than male. Furthermore, Vig and Brundo¹⁶ reported that the upper incisor exposure decreases with age. However, there was no research found regarding maxillary incisor exposure while smiling, especially in Rajasthan (Indian) subjects. It is cheap and simple to produce very high quality records of each and every clinical situation with the help of digital photography. It is the perfect tool in a busy orthodontic practice and is irreplaceable.¹⁷

In this study we get the results as like.

1. First, we had compared two measuring technique in which one is clinical and another is photographic. Upper incisor crown length, upper incisor exposure on smile are higher in

clinical study in respect to photographic study ($p>0.05$).

According to Mean Upper incisor crown length, upper incisor exposure on smile are higher in clinical study in respect to Photographic ($p<0.05$).

2. The average values in 224 participants from South Rajasthan population as follow:

- Upper Incisor Crown Length – (UICL) = 9.86 mm
- Upper Incisor Exposure on Smile – (UIES) = 7.95 mm

3. The average values of upper incisor crown length in females are 9.81 mm while in males 9.92 mm. It shows males have higher tendency to increase crown length compared to females.

- On posed smile, it varies as exposure of upper incisor on smile in females is 8.77 mm while in males it is 7.15 mm respectively.
- That shows instead of having larger crown height in male incisors, exposure upon smile is very less compared to females incisors.
- There is significant difference between male and female in Upper incisor crown length ($P<0.05$). Upper incisor crown length is higher in male study in respect to female.
- There is significant difference between male and female in Upper incisor exposure on smile ($P<0.05$). Upper incisor exposure on smile is higher in female in respect to male.
- When we compare with our study that shows exposure of upper incisor is higher in females compared to boys. Our study positively supports previous studies showing average to high smile in females, while average to low smiles in males.

Sung-Hoon Han (2013)¹: and et al studied 127 students with facial photographs of frontal posed smiles. In result, Male subjects had higher rate of

low smiles (8.53 mm), and female subjects had higher rate of high smiles (9.18 mm). Our study positively correlates this study showing higher rate of high smile in females (8.80 mm) while higher rate of low smile in males (7.76 mm). Upper incisor exposure on smile is higher in female in respect to male ($P<0.05$).

According to Peck et al.¹⁵ the upper lips of female were positioned, on average, 1.5 mm more superiorly during maximum smiles when compared to male subjects.

Stephanie Drummond, Jonas Capelli Jr (2016)¹⁹: studied to evaluate age- and gender-related changes in the soft tissues, incisors, and gingival display during rest, speech, and posed smile with total of 265 participants (122 men, 143 women) ranging in age from 19 years to 60 years. In results, there was a significant decreased incisor display with aging and more markedly in men. Our study positively correlates this study showing decreased incisor display more markedly in males (7.76 mm). Upper incisor exposure on smile is higher in female in respect to male ($P<0.05$).

Miron H, Calderon S, Allon D. (2012)²⁰ studied the evaluation and quantification of upper lip soft-tissue changes in the vertical dimensions both at rest and at maximum smile. The mean maxillary central incisor display at rest was 1.78 mm greater in the women than in the men. A high smile line was 2.5 times more prevalent in the women. Our study shows similarity in high incisor exposure rate ($P<0.05$) and low lip length in females compared to males.

CONCLUSION

1. Upper incisor crown length and upper incisor exposure on smile in 224 patients are higher in clinical study in respect to Photographic study. ($P<0.05$).
2. The average values in 224 participants from South Rajasthan population as follow:
 - Upper Incisor Crown Length – (UICL) = 9.86 mm
 - Upper Incisor Exposure on Smile – (UIES) = 7.95 mm

3. Upper incisor crown length at rest and smile is higher in males in respect to female ($P>0.05$). Upper incisor exposure on smile is higher in female in respect to male. ($P>0.05$). It shows males have higher tendency to increase crown length compared to females while, exposure upon smile is very less compared to females' incisors.
4. There is an average to high smile in females (more than 100% of incisor show), while males have average to low smiles (less than 75% of incisor show).

CONFLICT OF INTEREST

No potential academic conflict of interest relevant to the above article was reported.

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