

Smile Arcs of North Indian Youth

Priti Airun^{1*} Chetan Sharma² Akshay Sharma³ Sachin Yadav⁴ Mansi Kalra⁵ Rajnee Yadav⁶

¹Ex Resident, Department of Prosthodontics & Crown and Bridge, NIMS Dental College & Hospital, Jaipur, India.

²Senior Lecturer, Department of Prosthodontics & Crown and Bridge, NIMS Dental College & Hospital, Jaipur, India.

³Ex Resident, Department of Prosthodontics & Crown and Bridge, NIMS Dental College & Hospital, Jaipur, India.

⁴Post Graduate Student, Department of Prosthodontics & Crown and Bridge, NIMS Dental College & Hospital, Jaipur, India.

⁵Post Graduate Student, Department of Prosthodontics & Crown and Bridge, NIMS Dental College & Hospital, Jaipur, India.

⁶Post Graduate Student, Department of Prosthodontics & Crown and Bridge, NIMS Dental College & Hospital, Jaipur, India.

ABSTRACT

Aim and Objective: The objective of this study is to measure and compare the smile arc (tooth and lip arc) between young north Indian male and female population to achieve in restoring pleasing smiles, which is one of the various parameters of smile.

Materials and Method This study included smile view photographs of 100 subjects (50 males and 50 females) of age group 18-30 years evaluated using the Math GV4.0 software and adobe Photoshop 7 professional. The tooth arc and the lip arc are measured by using the software and comparative evaluation has been done between the males and females.

Result: Smile arc is more in Females (0.597) and less in Males (0.241). Females have more curved smile as compare to males. Lip arc is higher in males and females then the tooth arc. Mean value of tooth arc (total) is 0.0305 and lip arc (total) is 0.0445. This result provides useful guidance for evaluating anterior teeth and planning treatment for aesthetic restorative care.

Conclusion: It was concluded that the mean lip arcs had greater curvature than the Tooth arcs. There were statistically significant differences due to ethnicity and gender. The lip arcs were found to be steeper than the tooth arcs in both male and female. In the present study the tooth arc and lip arc are higher in females then in males.

Keywords: Esthetics, Smile Arc, Lip Arc, Tooth Arc.

INTRODUCTION

Esthetics is a derivative of the Greek word 'aisthetikos', meaning perceptive. Esthetics can be defined as "the branch of philosophy dealing with beauty, the qualities involved in the appearance of a given restoration or perception of being pleasant or unpleasant."¹ The smile is one of the most important facial expressions and is essential in expressing friendliness, agreement and appreciation.² An esthetically pleasing smile is not only dependent on components such as tooth

position, size, shape and color, but also on the amount of gingival display and the framing of the lips. All of these components are supposed to form a harmonic and symmetric entity.³ The measurement of average facial values, facial symmetry, and sexual dimorphism are good candidates for biologically based standards of facial beauty.⁴ Obtaining a beautiful smile is always the main objective of any aesthetic dental treatment. After all, it is the beauty of the smile that will make the difference between an acceptable or pleasing aesthetic result for any given treatment.⁵ These principles are established

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*Correspondence Dr. Priti Airun.

Department of Prosthodontics & Crown and Bridge, NIMS Dental College & Hospital, Jaipur, India.

Email: preetiairun1@gmail.com

through data collected from patients, diagnostic models, dental research, scientific measurements and basic artistic concepts of beauty.

Digital videography is particularly useful in both smile analysis and in doctor/patient communication. Smile design is a multi factorial process, with clinical success determined by an understanding of the patient's soft-tissue treatment limitations and the extent to which multidisciplinary treatment can satisfy the patient's esthetic goals.⁶

The purpose of this study is to measure and compare the smile arc (tooth and lip arc) between young North Indian male and female population to achieve in restoring pleasing smiles.

MATERIALS AND METHOD

The present study was carried out in Department of Prosthodontics, NIMS Dental College and Hospital to evaluate measure and compare the smile arc (tooth and lip arc) between young North Indian male and female population from frontal view photographs.

Materials and equipment used in the study:

- Digital single Lens Reflex (DSLR) camera (canon EOS 500D digital SLR)
- Camera accessories Tripod camera stand
- Cephalostat – for a fixed subject lens distance and for stable head and chin position
- Computer with installed software Math GV4 and adobe Photoshop 7 professional.
- Diagnostic Instruments (mouth mirrors, probes)

Methodology:

The methodology used in the study has been described in the following order-

- I. Selection of the subjects.
- II. Taking photographs of subjects.
- III. Evaluation of images using computer software.
- IV. Comparative evaluation of tooth arc with the lip arc.

Selection of the Subjects:

100 subjects (50 male and 50 female) were selected from amongst the North Indian student

population of NIMS University between the age groups 18-30 years. The subjects were considered as per the following criteria- the one who is having an apparent esthetic/ pleasing smile with no overlapping, no spacing and no crowding in the anterior teeth, overbite and overjet esthetically acceptable, with no remarkable malformations, discolorations and structural deformity. Unpleasant color or contour of gingiva was not preferred. The subjects with any missing permanent teeth other than third molars, any retained deciduous tooth, history of orthodontic treatment, any tooth size alteration or anterior restorations and/or plastic or maxillofacial surgery were not considered. All the subjects were informed about the nature of study and their consent was taken.

Preparation of the Subject for Photography:

The subjects to be photographed were made to achieve the Natural Head Position (NHP) by looking at a distant point. NHP represents a valid craniofacial reference system with larger inter-individual and intra-individual reproducibility compared to other planes. Head supporter and chin supporter of Cephalostat used for NHP and to stabilize the patient face. Once the desired position was achieved the photograph was taken, using grid system of the camera.

Taking photographs of subjects:

A Digital Single Lens Reflex (DSLR) camera- (canon EOS 500D digital SLR) was used to take photographs. A smile view was taken at a fixed focal length of 35mm and at fixed subject-lens distance of 34 inches and at fixed subject-lens length of 38.5 inches. By using Cephalostat, the distance between the subject and lens remains constant when the subject rests his/her chin over the chin support of the Cephalostat and camera placed on the tripod at the distance of 34 inches. The grid system of camera was used to position the lens with central focus point focusing at the incisal embrasure between central incisors. A face view was clicked to confirm the head position of the subject.

Evaluation of the Images:

All the photographs were then transferred to the computer (Dell inspiron windows 7 ultimate) and analyzed with the software MathGV4 and

Table 1: Mean values with standard deviation of tooth and lip arc in north Indian males and females population [t test].

	Sex	N	Mean	Std. Deviation	T	DF	P VALUE
Tooth Arc	M	50	0.0295	0.019358	-0.534	98	0.595
	F	50	0.0315	0.018077			
Lip Arc	M	50	0.0425	0.018385	-1.018	98	0.311
	F	50	0.0465	0.020831			

Table 2: Total mean values with standard deviation for both gender for tooth and lip arc in north Indian population [Level of significance:- $p \leq 0.05$] [paired t test].

Sex			Mean	N	Std. Deviation	Paired Differences		T	DF	P VALUE
						Mean	Std. Deviation			
F	Pair 1	Tooth Arc	0.0315	50	0.018077	-0.015	0.013363	-7.937	49	<0.001
		Lip Arc	0.0465	50	0.020831					
M	Pair 1	Tooth Arc	0.0295	50	0.019358	-0.013	0.01906	-4.823	49	<0.001
		Lip Arc	0.0425	50	0.018385					
T	Pair 1	Tooth Arc	0.0305	100	0.018661	-0.014	0.016407	-8.533	99	<0.001
		Lip Arc	0.0445	100	0.01965					

Table 3: Paired samples correlations for both tooth and lip arc for both the gender.

Paired Samples Correlations					
Sex			N	Correlation	Sig.
F	Pair 1	Tooth Arc & Lip Arc	50	.773	<0.001
M	Pair 1	Tooth Arc & Lip Arc	50	.491	<0.001
T	Pair 1	Tooth Arc & Lip Arc	100	.634	<0.001

Adobe Photoshop7. Professional curves were generated with Math GV FREEWARE version 4 (Greg Van Mullem) as parabolas of the formula $f(x)^2 = nx^2$ where n ranged from 0.025 to 0.350 in increments of 0.025. The curves were rendered as semitransparent overlays, which were manipulated over the images using Adobe Photoshop to determine the best fit for the tooth and lip arc.

Method of Statistical Analysis:

The following methods of statistical analysis have been used in this study.

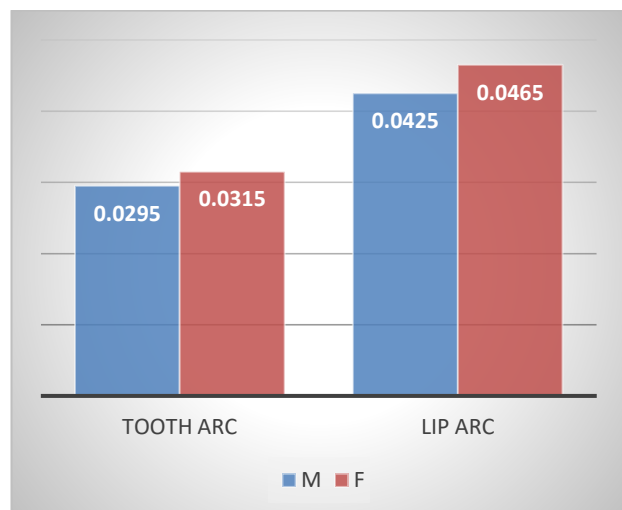
The results for each parameter averaged (mean $\pm$ standard deviation) for continuous data are presented in Table and Figure.

The **Students't test** was used to determine whether there was a statistical difference between Male and Female in the parameters measured.

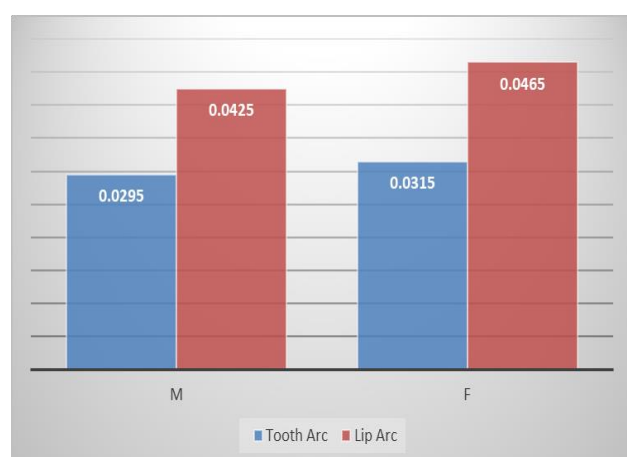
Paired t test-A paired t test was performed to determine whether there were difference between the right and left measurements on the parameter.

RESULTS

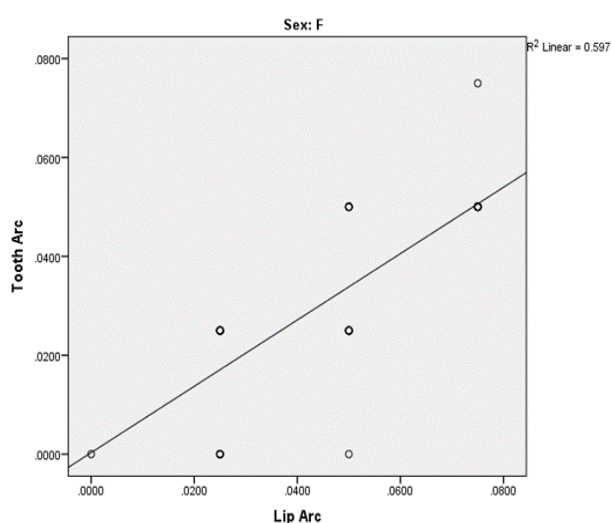
The present study was carried out to evaluate the smile arc in North Indian Youth. Paired t Test was used .lip and tooth arc were calculated for each patient by using Meth GV4.0 Software and Adobe Photoshop 7 Professional. These tooth and lip arc than compared between Genders. Total 100 patients were included in this study. Out of these 50 were Males (50%) and 50 were Females (50%).All



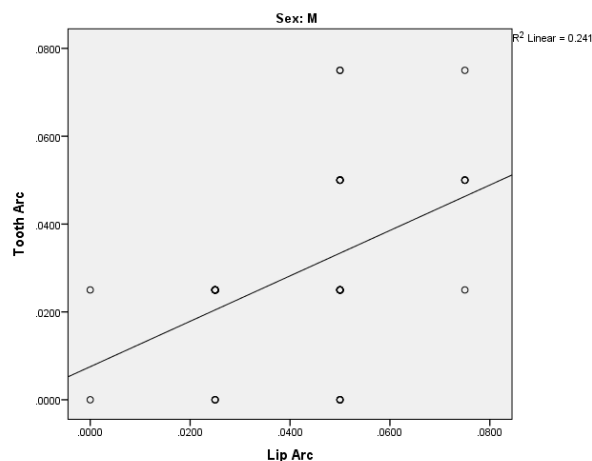
Graph I: Tooth and lip arc is higher in females.



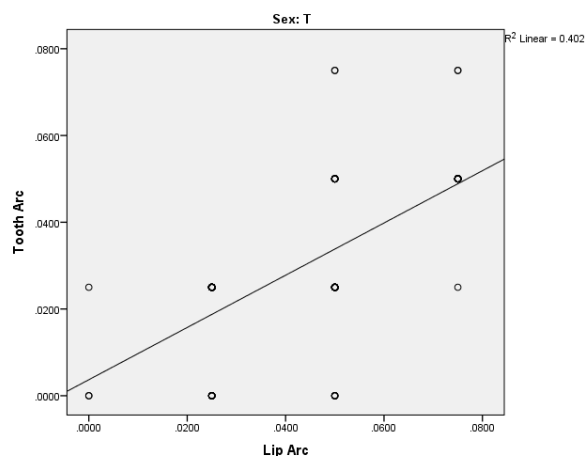
Graph II: Higher Lip Arc In Both And In Total.



Graph III: Comparison of tooth and lip arc in females.



Graph IV: Comparison of tooth and lip arc in males.



Graph V: Comparison of tooth and lip arc in total (males and females).

patient were in the age group of 18-30 years. Included smile view photographs.

Mean value of the Tooth arc and Lip arc is more in Females as compare to Males as seen in Table I and Graph I

Total Lip arc is more than Tooth arc as seen in Table II and Graph II

Both Lip and Tooth arcs are more in Females than Males as shown in Table III

Graph III, IV and V shows that smile arc is more in Females (0.597) and less in Males (0.241).

DISCUSSION

Attractive people are somewhat more relaxed and outgoing and have more social finesse

than less attractive individuals. The results of this study extend the attractiveness research and demonstrate that one's smile is an important part of the physical attractiveness stereotype. One's smile clearly plays a significant role in the perception that others have of our appearance and our personality.⁷

There are two dimensions in self-perception of the smile. The first dimension is perception of attractiveness of the smile. This perception is especially defined by the opinions of others and cultural norms. The social dimension (field of social psychology) is relative to the history of culture. As cultures are changing, perception of attractiveness is changing too. The second dimension in self-perception of the smile is satisfaction with its appearance. This perception originates from the internal view, the inner experience of the individual itself. (Field of personality psychology).

Prosthodontists must leverage their treatment planning and technical strengths with effective marketing strategies to address the esthetic expectations of today's patients. These strategies may include a combination of public relations, branding and advertising. Marketing esthetic procedures benefits Prosthodontists and the specialty in several ways: (1) an expanded scope of Prosthodontic services (2) an increased patient demand for these services (3) a larger patient base (4) improved recognition of the specialty of Prosthodontics and ultimately (5) survival of the specialty. To achieve these benefits, the Prosthodontist must develop and execute a customized marketing plan.

1. Identification of marketing goals and objectives
2. Development of a Unique Selling Proposition
3. Commitment of a marketing budget and resources
4. Selection of suitable marketing techniques
5. Education of staff regarding the overall marketing plan
6. Execution of the marketing techniques
7. Tracking the success of the marketing techniques
8. Annual review of the marketing plan

The primary objective of this study was to examine the role of the posed smile in overall facial esthetics. The results show that the posed smile has considerable impact on facial esthetics, especially

before treatment. Other studies have reported that the overall facial attractiveness is more important than the dental attractiveness. Although this observation may be true, this study proves that the smile region is important to the esthetics of the face. More specifically, it demonstrates that an unattractive smile can have a negative influence on overall facial attractiveness.

According to the principles of visual perception, a harmonic and symmetric composition of teeth, visible gingiva, buccal corridors and lips is a requirement for an esthetic and pleasing smile. This "smile composition" is framed by the lips; in this way, the arrangement of the teeth and the visible gingiva is dictated by the outline of the lips and the height of the smile line. Therefore, from a dental esthetic and patient point of view, the height and course of the smile line are important aspects of diagnosis, treatment planning and adequate long-term results. In spite of the digitized methods, performing smile line measurements is, however, relatively time-consuming and therefore less feasible for regular diagnostic use in clinical practice. With the focus on daily patient care, the combination of digital videography and visual estimation of lip line height and tooth display on the images could be an efficient way of dynamic soft-tissue analysis.⁸

A cephalometric analysis of the head in frontal and lateral views is useful in determining bony relationships of the face and the mandible, and their relationship to the teeth in the alveolar bone. The facial features related to gender and age involves the soft tissues and include the texture, complexion and tissue integrity of the epithelial tissues. Facial features that have a particularly important impact on the dental facial composition are those that relate the inter-pupillary plane with the commissure line and the occlusal plane. The inter-pupillary line should be parallel with the horizon line and perpendicular to the midline of the face. In addition, the interpupillary line should be parallel with the commissure line and occlusal plane.

SUMMARY

An attractive smile is an asset greatly affecting a person's life style. It often motivates the patients to seek dental care in today's health and esthetic conscious world. There are multiple factors

that determine the attractiveness of a smile and to restore it dentists must be cognizant of these factors. In order to define the esthetic rehabilitation of the smile, smile analysis must be assessed in association with the face, taking into consideration the following factors: midline of the smile, labial line, smile line, the line between commissure.

Smile analysis provides information about the relationship of the teeth with their surrounding soft tissue. Smile analysis can also be done with the help of tooth arc and lip arc. Consideration of racial and gender differences when developing an esthetic treatment plan. The study will be useful and clinically applicable for cases requiring restorations and replacements of maxillary anterior teeth.

CONCLUSION

- It was concluded that the mean lip arcs had greater curvature than the Tooth arcs. There were statistically significant differences due to ethnicity and gender.
- The lip arcs were found to be steeper than the tooth arcs in both male and female. In the present study the tooth arc and lip arc are higher in females than in males.
- Lip arc is higher in males and females than the tooth arc. Mean value of tooth arc (total) is 0.0305 and lip arc (total) is 0.0445.
- Smile arc is more in females than in males. Females have more curved smile as compared to males.
- The skeletal and muscular structures are different in males and females.
- This result provides useful guidance for evaluating anterior teeth and planning treatment for esthetic restorative care.

- Clinician should consider racial and gender differences when developing an aesthetic treatment plan.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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