

In Vivo Analysis of Visibility of Maxillary and Mandibular Anterior Six Teeth at Rest

Visibility of
Maxillary and
Mandibular
Anterior Six
Teeth

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ABSTRACT

Objective: The Objectives of this study was to determine mean visibility of maxillary and mandibular anterior six teeth among the patients at rest position of lips.

Study Design: Cross-sectional study

Place and Duration of Study: This study was conducted at the at the Prosthodontics department of Liaquat Medical University from March 2022 to December 2022.

Methods: A total of 30 patients with sound maxillary and mandibular anterior teeth free of any restorations, extrinsic stains and caries were included. Measurements were taken with Vernier Caliper. For teeth measurement, internal Jaws of Vernier Caliper were used to avoid lip distortion. Every tooth was measured (mesially, distal, and midway), and the mean was obtained.

Results: The average age of patients were 25.13 ± 3.19 years with 40% male and 60% female. On right side of Arch, mean visibility of maxillary central incisor was 1.77 ± 0.25 mm, lateral incisor 1.24 ± 0.18 mm, and canine 0.41 ± 0.09 mm and mean visibility of mandibular central incisor was 1.49 ± 0.27 mm, lateral incisor 1.50 ± 0.26 mm and canine was 0.85 ± 0.27 mm. Similarly, on left side of Arch mean maxillary central incisor visibility was 1.77 ± 0.25 mm, lateral incisor 1.29 ± 0.21 mm, and canine 0.43 ± 0.06 mm and mean mandibular central incisor visibility was 1.48 ± 0.24 mm, lateral incisor 1.51 ± 0.26 mm and canine was 0.88 ± 0.27 mm respectively.

Conclusion: For treatment planning in esthetic zone we should follow some fundamental guidelines. It is important during replacement or even during restoration of maxillary and mandibular anterior teeth, to consider dento-facial specificities of each person and different natural teeth proportions.

Key Words: Anterior teeth visibility, dento-facial esthetics, anterior teeth measurements.

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INTRODUCTION

Esthetics is one of the primary concern for patients pursuing prosthodontic treatment, as anterior teeth play a significant role in facial appearance¹. Amount of anterior tooth display plays significant role in facial esthetics, as it determines the outcome of removable, fixed as well as of implant prosthodontics treatments^{1,2}. It has been well established that the position of anterior teeth serves as a basis for successful esthetic, functional and phonetics outcomes³.

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The amount of anterior maxillary and mandibular teeth that is visible, is influenced via various factors such as muscle position, age, gender, racial dependency etc. Peoples with smaller lips shows more maxillary incisor surfaces especially central incisors than peoples having longer lips and hence the latter display more mandibular incisors especially central incisors⁴. As compare to females, males generally have longer upper lips, that's why females' maxillary incisors are more visible than males^{5,6}.

Similarly, reduced tonicity of orofacial muscles or reduced upper lips elasticity with increasing tooth support by gingival two-thirds of maxillary incisors leads to less display of maxillary anterior teeth than mandibular teeth^{2,5,7}. If we compare racial differences, more maxillary anterior teeth visibility is evident amongst Blacks than Asians or Caucasians⁶.

In Patients for complete denture treatment and with no previous dental record, dentists rely on subjective assessment, taking aesthetics as a key determine factor for teeth selection which may vary as per experiences of the operator^{8,9}. According to the "law of Harmony" given by Leon William states that, the outline of patient's face is more likely matches with the basic

tooth forms like square, taper and ovoid. Hence, the size and shape of anterior teeth is important for dental as well as facial aesthetics⁶.

One of the common reason for failure of removable and fixed prostheses is dissatisfaction with appearance¹⁰. It has generally been observed that dentists often feel difficulty in selecting size of artificial teeth for the edentulous persons due to lack of experience or exposure to complete denture patients, which suggests that there is a need of continuous training, guidance on artificial teeth selection, their arrangement as well as should have knowledge of visibility of teeth during rest and functional position⁷.

Therefore, the aim of this study was to determine the maxillary and mandibular anterior teeth visibility in dentate persons which will help us in establishing the biometric guides for our local populations as well as, will help us during measurements in teeth selection for fixed, partial or complete prosthesis and therefore provides a comfortable and aesthetically pleasing prosthesis to patients.

METHODS

Using a non-probability consecutive sampling technique, this cross-sectional study was completed in the prosthodontics department at Liaquat Medical University. Patients within 18 to 30 years of age, of both genders, having well aligned anterior maxillary and mandibular teeth which are free of any restorations, extrinsic stains and caries were included for data collection after taking written informed consent from all of these. While patients having Congenital anomalies in anterior teeth, having previous history of Oral and maxillofacial surgery, Orthodontically treated, having Gingivitis and Periodontitis examined clinically and patients with Crowding or spacing specially in anterior teeth assessed clinically were excluded from study.

With the help of Vernier Caliper, measurements of visible portion of tooth for each patient were taken for the designated measured dimensions, to the closest tenth of a millimeter, while patients were seated on dental chair in upright position.

From lowest border of upper lips at resting position up to incisal edges of the incisors and cusp tips in case of canines, visible portion of maxillary anterior six teeth were scaled vertically. The visible surface of the mandibular teeth in the resting position of the lips was measured, starting at the upper border of the lower lip and ending at the cusp tip of the canines and incisal edges in the case of the incisors. Measurements were considered 0 in case of no visibility at the rest. Three measurements (at mesial, distal and midpoint) per tooth were done and the mean finalized. Proforma were filled accordingly. For quantitative variables like age, mean and standard deviation were calculated; for qualitative variables like gender, frequency and percentages were

calculated. Effect modifiers were controlled by stratification. The chi-square test was used, and a P value <0.05 was considered significant.

RESULTS

Thirty patients having maxillary and mandibular anterior teeth free of any restorations, extrinsic stains, and caries were included in this study and their data recorded. Figure one is exhibiting, age distribution of patients. We found average age of the patients in our study 25.13±3.19 years with 40% male and 60% female as revealed in Table-1. Amount of tooth visibility is reported in Table 2. For right side, mean maxillary central incisor was 1.77±0.25mm, lateral incisor 1.24±0.18mm, and canine 0.41±0.09mm and mean mandibular central incisor was 1.49±0.27mm, lateral incisor 1.50±0.26mm and canine was 0.85±0.27mm. Similar for left side mean maxillary central incisor was 1.78±0.25mm, lateral incisor 1.29±0.21mm, and canine 0.43±0.06mm and mean mandibular central incisor was 1.48±0.24mm, lateral incisor 1.51±0.26mm and canine was 0.88±0.27mm. Stratification analysis was performed with respect to gender and age groups, but mean difference was not statistically significant between gender and age groups as shown in table 3 and 4 respectively.

Table No. 1: Age and Gender Distribution of Patients (N=30)

Descriptive statistics for Age distribution

Mean age in years	25.13
Standard Deviation (SD)	+ 3.19

Descriptive statistics for Gender distribution

Percentages

Males	12n (40%)
Female	18n (60%)

Table No. 2: Mean Maxillary and Mandibular Anterior Teeth Visibility Among Patients During Lips Rest Position

Visible Teeth	Right Side of Arch Mean ± SD	Left Side of Arch Mean ± SD
Maxillary central incisor	1.77 ± 0.25	1.78 ± 0.25
Maxillary lateral incisor	1.24 ± 0.18	1.29 ± 0.21
Maxillary canine	0.41 ± 0.09	0.43 ± 0.06
Mandible central incisor	1.49 ± 0.27	1.48 ± 0.24
Mandible lateral incisor	1.50 ± 0.26	1.51 ± 0.26
Mandible Canine	0.85 ± 0.27	0.88 ± 0.27

Table No. 3: Mean Visible Portion of Maxillary And Mandibular Anterior Teeth Comparison Between Different Age Groups Among Patients at Rest Position of Lips

Visible Teeth	≤25 yrs n=16		26-30 yrs n=14		P-Value
	Mean	Std. Deviation	Mean	Std. Deviation	
Right Maxilla Central Incisor	1.81	0.25	1.71	0.256	0.298
Right Maxilla Lateral Incisor	1.25	0.20	1.23	0.15	0.832
Right Maxilla Canine	0.42	0.09	0.38	0.08	0.243
Right Mandible Central Incisor	1.52	0.22	1.45	0.31	0.496
Right Mandible Lateral Incisor	1.56	0.22	1.43	0.28	0.188
Right Mandible Canine	0.90	0.27	0.78	0.25	0.224
Left Maxilla Central Incisor Left Side	1.820	0.25	1.72	0.25	0.297
Left Maxilla Lateral Incisor Left Side	1.26	0.19	1.31	0.23	0.513
Left Maxilla Canine	.45	0.08	0.40	0.09	0.186
Left Mandible Central Incisor Left Side	1.52	0.22	1.45	0.31	0.489
Left Mandible Lateral Incisor Left Side	1.56	0.22	1.43	0.28	0.185
Left Mandible Canine Left Side	0.90	0.27	0.85	0.27	0.578

Table No. 4: Comparison of Mean Visibility of Mandibular and Maxillary Anterior Teeth Between Genders During Lips Rest Position

Visible Teeth	Males		Females		P-Value
	Mean	Std. Deviation	Mean	Std. Deviation	
Right Maxilla Central Incisor	1.71	0.26	1.81	0.25	0.312
Right Maxilla Lateral Incisor	1.19	0.16	1.28	0.19	0.203
Right Maxilla Canine	0.39	0.09	0.42	0.09	0.469
Right Mandible Central Incisor	1.47	0.30	1.51	0.25	0.764
Right Mandible Lateral Incisor	1.47	0.29	1.53	0.25	0.539
Right Mandible Canine	0.83	0.33	0.86	0.23	0.786
Left Maxilla Central Incisor	1.72	0.25	1.81	0.26	0.335
Left Maxilla Lateral Incisor	1.18	0.16	1.36	0.22	0.026
Left Maxilla Canine	0.41	0.09	0.44	0.09	0.277
Left Mandible Central Incisor	1.47	0.30	1.51	0.25	0.756
Left Mandible Lateral Incisor	1.47	0.29	1.53	0.25	0.532
Left Mandible Canine	0.85	0.34	0.90	0.22	0.627

DISCUSSION

A smile significantly influences how attractive something seems overall. A beautiful smile typically encourages people to take up prosthetic treatment in particular, as it can boost their self-esteem, advance their professional lives, and live happier lives¹¹. Smile analysis provides information about the relationship between teeth and surrounding soft tissues, which primarily assists in diagnosis and better treatment planning¹²⁻¹⁴.

Understanding several smile criteria, such as smile line and smile arc, is essential to delivering a beautiful smile. Additionally, it's critical to minimize the impact of factors like age and gender on a person's final appearance by being aware of the facts that may influence a smile. A smile line is a single curve that runs from one canine's tip to the other's canine tip¹⁶. A smile line is considered low if half of the maxillary anterior teeth are visible when smiling, average if 1-2

mm of gingiva is visible along with teeth, and high if a significant portion of the gingiva is visible together with teeth¹⁷. On the other hand, the relationship between the incisal edge of the maxillary anterior teeth and the superior border of the lower lip is known as the smile arc¹⁸. A consonant smile arc is parallel relationship between lower lip and anterior teeth, which is esthetically more pleasing¹⁷⁻¹⁸. However, a flat or reversed smile arc is referred to as nonconsonant because it is characterized by a maxillary incisal curve that is either reversed or flatter than the lower lip's curvature. When teeth are worn down, the smile arc typically becomes flat or reversed¹⁹.

Patients in this study had an average age of 25.13 ± 3.19 years. There were 40% male and 60% female. In another such kind of study done by Arighbede and Igwedibia⁴ 59.1% were females and the remaining 40.9% were males, where average range of age of study participants was 17-60 years with mean age of 28.52 ± 9.037 years.

In present study for right side, mean visibility for maxillary central incisor was 1.77 ± 0.25 , lateral incisor 1.24 ± 0.18 , and canine 0.41 ± 0.09 whereas mandible central incisor visibility was 1.49 ± 0.27 , lateral incisor 1.50 ± 0.26 and canine was 0.85 ± 0.27 . Similar for left side mean maxillary central incisor was 1.77 ± 0.25 , lateral incisor 1.29 ± 0.21 , and canine 0.43 ± 0.06 and mean mandibular central incisor was 1.48 ± 0.24 , lateral incisor 1.51 ± 0.26 and canine was 0.88 ± 0.27 . In Alqahtani, et al study²⁰ the mean visibility length for maxillary central and lateral incisor and canine were 9.84, 8.09 mm and 9.08 mm correspondingly. The mean width for the canine remained 7.82 mm, the lateral incisor comprised 6.64 mm, and the central incisor stood 8.74 mm, according to Alqahtani et al²⁰. He observed that the canine/lateral incisor had an apparent width/width ratio of 78.35 mm, while the lateral incisor/central incisor had a mean value of 63.69 mm. The mean values of the apparent width/width ratio of the right and left sides of the arches did not differ in a statistically significant manner²⁰.

Al Wazzan²¹ and Al-Hababbeh⁶ et al. found in their studies, that females are exposing more amount of maxillary central incisors than males. Various studies have documented variations in the manner in which that maxillary incisors display²¹⁻²². According to Awad et al's study²², the maxillary central incisors' mean \pm SD of teeth at rest was 2.40 ± 0.79 mm for females and 2.09 ± 0.92 mm for males. In another study, the measurements for males and females were 1.82 ± 2.80 mm and 4.09 ± 2.27 mm, respectively. However, researcher found that men averaged 1.91 mm and females 3.40 mm. Al-Hababbeh et al's⁶ values, on the other hand, were 2.63 ± 1.15 mm and 3.02 ± 1.96 mm. However, Awad et al²² found in his research that while females display large maxillary lateral incisors, males display much more maxillary canines. Furthermore, contrary to earlier research, a small number of studies found no gender differences in the appearance of the mandibular anterior teeth at rest²³. This inequality in results may be due to racial variances of population of each study, size and types of lips of that area peoples or differences in measurement techniques. Digital video camera²⁴ was used for indirect measurement or direct measurement techniques were performed on the participants with the help of ruler or Bowley gauge in previous studies.

Furthermore, a one survey has also revealed that compared to men, women show more maxillary incisor clinical crowns²⁵. These results are consistent with the current investigation, while some discrepancies would need to be explained by variances in the populations under research and in the methods of measurement.

It has long been thought that prosthodontists evaluate facial aesthetics in connection to the overall harmony of the face. In future days, esthetic concerns considered to be a major factor for patients pursuing prosthodontics

treatments. The arrangement and selection of teeth, particularly the maxillary anterior teeth, are primarily determined by the experience of the clinician. The patient's age, gender, lip size, and desired aesthetic outcome should all be taken into consideration while placing the anterior teeth²¹. Those with shorter upper lips have more of their maxillary teeth visible. Although this appears apparent that, despite the accepted rule, some physicians surprisingly still place anterior teeth 1 to 2 mm below the upper lip border, regardless of lip length. However, one useful technique for determining the appropriate vertical dimension of occlusion is the quantity of anterior teeth that are visible.²⁶⁻²⁷ However, it is equally important to consider the significance of age, gender and lip length while establishing anterior esthetics. Therefore, it is concluded that dependency on only one biometric guideline of incisal show of 2 mm is not sufficient but requires involvement of multiple guidelines collectively.

CONCLUSION

In dentistry esthetics cannot be justified mathematically. We cannot standardize all persons in same way. It is noted that esthetics varies greatly from person-to person. For treatment planning in esthetic zone we should follow some fundamental guidelines. Therefore, it is important during replacement or even during restoration of the maxillary and mandibular anterior teeth, to consider the dento-facial specificities of each person and proportions of various natural teeth.

Author's Contribution:

Concept & Design of Study:	Sanam Baby
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