

## ORIGINAL ARTICLE

# Correlation Between Face Form and Maxillary Central Incisor Tooth Form in Dentate Patients Visiting Rehman College of Dentistry Peshawar

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## ABSTRACT

**Aim:** To determine the correlation between face form and maxillary central incisor tooth form in dentate patients visiting Rehman College of dentistry Peshawar.

**Methods:** 152 patients fulfilling the inclusion criteria were included in the study through consecutive non probability sampling. Photographs of their face and maxillary central incisor were taken, printed, traced and subjected to classification by William's method by 4 Prosthodontists.

**Results:** As per descriptive statistics, mean and SD's for age was 31+5.78, mean and SD's for face form measurements was recorded as 78+1.67, whereas mean and SD's for central incisor tooth form measurements was recorded as 25+0.69

**Conclusion:** It has been concluded that there is no highly defined correlation between the face form and maxillary central incisor tooth form in males and females. These results indicate that the maxillary central incisor tooth shows considerable asymmetry, whereas the face is basically symmetric. Instead, the opinions and desires of the patient should be considered, to ensure optimal dental esthetics for each individual.

**Keywords:** Face form, Tooth form, Central Incisor, Correlation

## INTRODUCTION

The term esthetics is derived from the Greek word *aisthetikosis*, meaning perceptive<sup>1</sup>. Esthetics as applied to a complete denture prosthesis, may be defined as a combination of science and art. Art is in itself a science, the appreciation of both form and color. By skillful application of this science it is possible to produce beautiful restorations that are almost completely natural in appearance<sup>2</sup>. The size and form of maxillary anterior teeth are important to not only dental, but also facial esthetics. The most influential factors contributing to a harmonious anterior dentition are the size, shape and arrangement of the maxillary anterior teeth, particularly the maxillary central incisor as viewed from the front<sup>4</sup>.

The position, shape and color of permanent upper central incisor enhance the esthetics of the smile. In cases involving the reconstruction of these teeth, parameters are required to assist in elaborating a plan of treatment that corresponds to the expectations of both patients and dental professional<sup>12</sup>.

If some teeth remain it is a relatively straight forward procedure to select artificial teeth that blend with the natural dentition. However, for edentulous patients with no available pre-extraction records the choice of tooth mold and arrangement becomes far more difficult, resulting in disappointment if the selection and expectations of the patient do not match those of the dentist<sup>3</sup>.

Facial dimensions have been obtained by measuring the distance between zygomas for face width and the distance from the hair line to the gnathion for face length. The measurements obtained are divided by 16 to

determine the length and width of the maxillary central incisor. Also measuring devices such as the Trubyte tooth indicator, Trubite Teleform gauge and tooth selector have been used for determining the form of an artificial tooth<sup>4, 5, 6</sup>. To date, William's classification<sup>7</sup> is the most universally accepted method of determining maxillary central incisor tooth form.

In a recent study conducted in dental college and hospital India<sup>8</sup>, a correlation more than 50% occurred between tooth form and face form by visual method, compared with one of 31.5% by William's method. According to a study by the Jordan University of Received on 07-05-2021

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Science and Technology<sup>9</sup>, Facial and tooth outlines were similar for each sex, although the similarity was stronger among the men.

According to Laith Mahmoud Abdulhadi and Hanna Abbas Mohammad in their study<sup>10</sup>, results revealed the presence of high metric dependence between the face and left central incisor widths and the face form can be predicted from the central incisor records.

Raghavendra N and Venkatesh V Kamath et al<sup>11</sup>, in their study found a definite correlation between the facial and tooth parameters, among the multiple parameters a definite correlation between the horizontal dimensions could be established between the mouth width and the Mesio-distal width of the tooth. In the vertical dimensions a definite relationship existed between the crown height of the tooth and the width of the midface (zygoma-mandible).

In a study by Felipe de Oliveira et al<sup>12</sup>, the correlation between the linear measures of FH/FW ratio (face) and

TH/TW ratio (incisor) was 0.263 which, although significant is low.

Despite the fact that many recent studies have been done on this topic, there are variations in the results between different studies conducted in different populations and no such studies have been conducted in our setting previously, therefore this topic needs to be further investigated, which will provide guidelines for further studies and will facilitate proper tooth form selection for edentulous patients.

## MATERIALS & METHODS

This cross-sectional Study was conducted in the Department of Prosthodontics, Rehman College of dentistry Peshawar. Sample size is 152 calculated by using WHO sample size calculator taking power= 0.95,  $\alpha = 0.05$ , and  $r = 0.26312$ . Sampling technique used was consecutive, Non probability sampling.

### Inclusion criteria:

- Dentulous aged 18-38 years Male and Female.
- Natural Maxillary anterior teeth in good alignment.
- Patients having distance of 7cm or less between the Nasion and Hairline.
- Maxillary central incisors having at least 10mm of incisocervical height.

### Exclusion criteria:

- Restoration of maxillary anterior teeth by a complete or partial veneer crown.
- Extensive carious lesions, incisal wear, tooth fracture and gingival hyperplasia of the maxillary anterior teeth.
- Previous Orthognathic surgery or Orthodontic treatment done.
- Congenital or surgical facial defects or any other anomaly of the teeth.

**Data collection procedure:** Approval was sought from institutional ethical committee. Subjects fulfilling the inclusion criteria were included in the study. The purpose, procedure, risks and benefits of the study were explained to them and informed written consent obtained.

Each subject was seated upright with the head supported by a head rest on a chair with the occlusal plane of the maxillary teeth parallel to the floor. Two standardized photographs were taken for each subject: facial portrait (closed lips) and maxillary incisors (without lips). For each photograph, standardized distances (portrait 100cm, teeth 12cm) was used. The height of the camera (Nikon D5200) was adjusted on a tripod according to the position of the subjects individually. A full face photograph with closed lips was obtained, with the lens parallel to the subject's face. The subject's hair did not cover any part of the face and the teeth were in contact during the snapshot.

An intraoral photograph of the maxillary central incisor was obtained using cheek retractors, with lens parallel to the labial surface of the teeth. The images of the face and the teeth were transferred to a computer running image-editing software (Adobe Photoshop cs8). The facial outline form (face form) was determined from the outline of the temporal bone at the height of the hairline, the temporal process of the zygomatic arch and the gonion.

The right maxillary central incisor tooth outline form (tooth form) was determined using an outline tracing made around the buccal surface of the tooth, which corresponds

to the mesial and distal contours, the incisal edge and the cervical margin. The photographic print-outs of the outline tracings were taken separately.

Photographic evaluation using the outline tracing print-outs for classifying face form and tooth form by William's method was performed by 4 prosthodontists (BDS, FCPS) each having 2 years of experience. During an organized session William's method of classification was explained to the prosthodontists and were asked to classify face form and tooth form in the print-outs based on William's method.

**Data analysis:** The data was analyzed using SPSS version 20 software programme. Mean and standard deviation was calculated as descriptive variables e.g. Age, Face form measurement and Central incisor tooth form measurement. Gender, Occupation, Education, Face form (square, square tapering, tapering, ovoid) and Maxillary Central incisor tooth form (square, square tapering, tapering, ovoid) was calculated as frequency and percentages. Effect modifier like age, gender, occupation, education and socio-economic status was addressed to certification. Post certification Pearson's correlation was calculated for face form measurement and Central incisor tooth form measurement, P-value equal to or less than 0.05 was taken as significance.

## RESULTS

This study was conducted at the Department of Prosthodontics, Rehman College of dentistry Peshawar. This study was carried out on 152 patients. As per descriptive statistics, mean and SD's for age was  $31 \pm 5.78$ , mean and SD's for face form measurements was recorded as  $78 \pm 1.67$ , whereas mean and SD's for central incisor tooth form measurements was recorded as  $25 \pm 0.69$ .

Table 1: Demographic data

Variables	Mean $\pm$ SD
Age	$31 \pm 5.78$
Face form Measurement	$78 \pm 1.67$
Central Incisor tooth form Measurement	$25 \pm 0.69$

As per frequencies and percentages for age, 74 (48.68%) patients were recorded in 18-28 Years Age Group whereas 78 (51.31%) patients were recorded in 29-38 Years Age Group. According to gender wise data distribution, 90 (59.20%) patients were recorded as Male whereas 62 (40.80%) patients were recorded as Females.

Table 2: Age and Gender Distribution (n=152)

	Frequency
Age	
18-28 years	74(48.68%)
29-38 years	78(41.60%)
Gender	
Male	90(50.20%)
Female	62(40.80%)

As per face form categories, 42(27.60%) patients had a Square face form, 49(32.20%) had a Square tapering face, 33(21.70%) had a Tapering face form and 28(18.40%) patients had ovoid face form. In the same manner, 69(45.40%) patients had a Square maxillary central incisor tooth form, 64(42.10%) had a square tapering, 13(8.60%)

had a tapering and 6(3.90%) patients had an ovoid maxillary central incisor tooth form.

Table 3: Face Form and Tooth Form

Face form	Frequency(%age)	
	Face form	Tooth form
Square	42(27.60%)	69(45.40%)
Square tapering	49(32.20%)	64(42.10%)
Tapering	33(21.70%)	13(8.60%)
Ovoid	28(18.40%)	6(3.90%)

Pearson correlation revealed a nonsignificant relationship between face form and maxillary central incisor tooth form measurements ( $r=0.125$ ,  $P=0.062$ ).

Table 4: Correlation between Face Form and Maxillary Central Incisor Tooth Form Measurements (n=152)

	Mean & SDs	Correlation Coefficient	Sig.
Face Form	78±1.67	0.125	0.0629
Maxillary Central Incisor Tooth Form Measurement	25±0.69		

## DISCUSSION

Esthetics as applied to a complete denture prosthesis, may be defined as a combination of science and art. By skillful application of this science it is possible to produce beautiful restorations that are almost completely natural in appearance<sup>2</sup>. The size and form of maxillary anterior teeth are important to not only dental, but also facial esthetics. The most influential factors contributing to a harmonious anterior dentition are the size, shape and arrangement of the maxillary anterior teeth, particularly the maxillary central incisor as viewed from the front<sup>4</sup>.

The position, shape and color of permanent upper central incisor enhance the esthetics of the smile. In cases involving the reconstruction of these teeth, parameters are required to assist in elaborating a plan of treatment that corresponds to the expectations of both patients and dental professional<sup>12</sup>.

If some teeth remain it is a relatively straight forward procedure to select artificial teeth that blend with the natural dentition. However, for edentulous patients with no available pre-extraction records the choice of tooth mold and arrangement becomes far more difficult, resulting in disappointment if the selection and expectations of the patient do not match those of the dentist<sup>3</sup>.

Facial dimensions have been obtained by measuring the distance between zygomas for face width and the distance from the hair line to the gnathion for face length. The measurements obtained are divided by 16 to determine the length and width of the maxillary central incisor. Also measuring devices such as the Trubyte tooth indicator, Trubite Teleform gauge and tooth selector have been used for determining the form of an artificial tooth<sup>4, 5, 6</sup>. To date, William's classification<sup>7</sup> is the most universally accepted method of determining maxillary central incisor tooth form.

In a recent study conducted in dental college and hospital India<sup>8</sup>, a correlation more than 50% occurred between tooth form and face form by visual method, compared with one of 31.5% by William's method as

compared to our study, 42(27.60%) patients had square face form, 49(32.20%) patients had square tapering, 33 (21.70%) had tapering and 28 (18.40%) had ovoid face form. In the same manner, 69(45.40%) patients had maxillary central incisor tooth form, 64(42.10%) patients had square tapering, 13(8.60%) had tapering and only 6(3.90%) had an ovoid maxillary central incisor tooth form.

According to a study by the Jordan University of Science and Technology<sup>9</sup>, Facial and tooth outlines were similar for each sex, although the similarity was stronger among the men. Our study also showed similarity between facial and tooth outlines for each sex, with predominance in males 90 (59.2%).

According to Laith Mahmoud Abdulhadi and Hanna Abbas Mohammad in their study<sup>10</sup>, results revealed the presence of high metric dependence between the face and left central incisor widths and the face form can be predicted from the central incisor records whereas in our study high dependence can be found between square, square tapering face forms with square, square tapering and tapering right maxillary central incisor tooth forms.

Raghavendra N and Venkatesh V Kamath et al<sup>11</sup>, in their study found a definite correlation between the facial and tooth parameters, among the multiple parameters a definite correlation between the horizontal dimensions could be established between the mouth width and the Mesio-distal width of the tooth. In the vertical dimensions a definite relationship existed between the crown height of the tooth and the width of the midface (zygoma-mandible). In our study, 42 (27.60%) patients having square face form also had square Maxillary central incisor tooth form 49 (32.20%) patients having square tapering face form also had a square tapering maxillary central incisor tooth form.

In a study by Felipe de Oliveira et al<sup>12</sup>, the correlation between the linear measures of FH/FW ratio (face) and TH/TW ratio (incisor) was 0.263 which, although significant is low which as compared to our study, the correlation between face form and right maxillary central incisor tooth form was found to be insignificant  $r = 0.1247$

Finally, despite the fact that many recent studies have been done on this topic, there were variations in the results between different studies conducted in different populations and no such studies had been conducted in our setting previously, therefore this study was conducted to further explore the correlation between face and tooth forms, which will now prove as guidelines for further studies and will facilitate proper tooth form selection for edentulous patients.

## CONCLUSION

It has been concluded that there is no highly defined correlation between the face form and maxillary central incisor tooth form in males and females. These results indicate that the maxillary central incisor tooth shows considerable asymmetry, whereas the face is basically symmetric. Instead, the opinions and desires of the patient should be considered, to ensure optimal dental esthetics for each individual.

## REFERENCES

1. Beder OE. Esthetics-an enigma. J Prosthet Dent. 1971; 25:588-591.

2. Richey EL. Esthetics: Selection of teeth and correlated factors. J am Dent 1947; 28:1270-1277
3. Sellen PN, Jagger DC, Harrison A. Computer generated study of the correlation between tooth, face, arch and palatal contour. J Prosthet Dent 1998; 80:63-168
4. Hasanreisoglu U, Berksun S, Aras K, Arsalan I. An analysis of maxillary anterior teeth: dental and facial proportions. J Prosthet Dent. 2005; 94:530-538
5. Wright WH. Correlation between face form and tooth form in young adults. J am Dent.1949; 29: 1388-1392.
6. Sellen PN, Jagger DC, Harrison A. Methods used to select artificial teeth for edentulous patients: a historical overview. Int J Prosthodont.1999;12:51-58.
7. Bell RA. The geometric theory of selecting artificial teeth: Is it valid? J am Dent. 1978;97: 637-640.
8. Pavankumar R, Kolarakunte, Dhayankumar H Budihal. A clinical study to evaluate correlation between maxillary central incisor tooth form and face form in an Indian population. Journal of oral sciences. 2012;54(3):273-278.
9. Shaweesh AI, Al-Dwairi ZN, Shamkhey HD. Studying the relationship between the outlines of face, maxillary central incisor and maxillary arch in Jordanian adults by using fourier analysis.J Prosthet Dent. 2015;113(3):198-204.
10. Laith M Abdulhadi, Hannah A Muhammad. Mathematic method to calculate the central incisor tooth form using face records and vice versa. J Biology and biomedical Engineering 2012;1(6):9-14.
11. Raghavendra N, Venkatesh V, Krishnanand P, komali R. Prediction of facial profile based on morphometric measurements and charecteristics of permanent maxillary central incisor teeth. J Forensic Sci Med 2015; 1:26-32
12. Felipe de oliveira, Jussara P. Ennes, Jose Roberto Zoratto. Aesthetic value of the relationship between the shapes of the face and permanent upper central incisor. International journal of dentistry. 2010; 2010:561957.
13. R. Rifkin, "Facial Analysis: A comprehensive approach to treatment planning in aesthetic dentistry". Practical Periodontics and Aestheti cdentistry.2000;12(9):865-872