

Original Research

The correlation between the facial form and the central incisor of Indian population: A clinical study

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ABSTRACT

Background and Objectives: The selection of artificial teeth for edentulous patient is a primary concern in denture aesthetics, especially maxillary central incisors because they are the most prominent teeth in the arch. This study evaluates the correlation between maxillary central incisor form and face form in Indian population. **Method:** 200 dental student subjects of Indian origin with 79 males and 121 females in age group of 18-28 years studying in Awadh Dental College and Hospital were randomly selected for the study. A standardized photographic procedure was used to obtain images of the face and the maxillary central incisors. The outline form of the face and the right maxillary central incisor tooth were determined by a standardized method. The means were considered as evaluated by 5 postgraduate students with 2 years of experience and results were tabulated. The statistical analysis was done by Chi-square test for the association and Z-test for equality of proportions. **Results:** Out of total 400 subjects, 3 different face forms: square, ovoid and tapering face forms and 4 different tooth forms: square, ovoid, tapering and combination tooth forms were evaluated. The predominant tooth form was square and combination tooth form in both males and females and the predominant face form was square in males and ovoid in females. **Interpretation and Conclusion:** Within the population evaluated, greater correlation exhibited between tooth form and face form by visual method than between tooth form and face form by William's method.

Key words: Tooth form; Face form; Maxillary central incisor.

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INTRODUCTION

Esthetics is defined as being a derivative of the Greek word *aisthetikos*, meaning perceptive. It pertains to the sense of the beautiful or the science which deduces from nature and tastes the rules and principles of art.^{1,2}

The term denture esthetics is defined as "the effect produced by a dental prosthesis that affects the beauty and attractiveness of the person". Esthetics, as applied to complete denture prosthesis, may be defined as a combination of science and art. Art is in itself a science - the appreciation of the beautiful in form and color. By the skilful application of this science, we make beautiful restorations, which is so natural in appearance that it is not easily detected.^{3,4}

Esthetics is the idealizing or harmonizing of the artificial with the natural, with major basic qualities beauty, harmony, naturalness and individuality. Lowry has stated that, "dental art is the theory or practice of

esthetics in the expression of beauty in form, arrangement and hue of teeth and facial expression".^{5,6}

The face is the mirror of the human body which gives recognition in our society. The facial appearance has important social and psychologic effects on the human personality and the features most commonly associated with facial attraction are the eyes and mouth.⁷

If some teeth remain, it is a relatively straightforward procedure to select artificial teeth that blend with the natural dentition. However, for the edentulous patient with no pre-extraction records available, 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.⁸

The size and form of the maxillary anterior teeth are important not only to dental esthetics, but also to 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 incisors as viewed from the front. Facial measurements were made by measuring the distance between zygomas for the face width and the distance from hairline to gnathion for the face length. The measurements obtained were divided by 16 to determine the length and width of the maxillary central incisor. Also, the total width of the maxillary anterior teeth were determined by dividing the bizygomatic breadth by 3.3. Measuring devices such as Trubyte Tooth Indicator, Trubite Teleform gauge, Tooth selector were used in determining the artificial tooth form.

To date, however, no universally reliable method of determining tooth form has been found. The William's classification is the most universally accepted method of determining maxillary central incisor tooth form. Many studies were conducted based on William's theory, to evaluate the correlation between the upside down facial form and the form of the maxillary central incisor. The prosthodontic literature seems to pertain only to foreign population and it is apparent that there is a lack of information in Indian population regarding selection of maxillary central incisors forms.⁹

Hence, an attempt is made in the present study to clinically evaluate the correlation between maxillary central incisor form and face form in Indian population and the correlation thus obtained could be used in selection of artificial maxillary central incisors for edentulous patients in Indian population.

MATERIALS & METHODS

In the present study, a total of 400 dentulous dental student subjects (158 males and 242 females) of Indian origin with age ranging from 18 to 28 years studying at Awadh Dental College and Hospital were randomly selected.

The subjects were selected under the following criteria:
- Dentulous subjects ranging from 18-28 years of age, completely dentate arch with presence or absence of third molars, Subjects with presence of natural maxillary anterior teeth in good alignment.

But the following subjects were excluded from the study :

- Subjects undergone any restoration by a complete veneer crown, partial veneer crown and crown buildup on the anterior maxillary natural teeth.
- Subjects with anterior teeth fractures.
- Subjects having maxillary anterior teeth with extensive carious lesions.
- Subjects with incisal wear of maxillary anterior teeth.
- Subjects with gingival hyperplasia in the maxillary anterior teeth.
- Subjects undergone orthognathic surgery.
- Subjects undergone orthodontic treatment.
- Subjects with congenital or surgical facial defects.
- Subjects with microdontia or macrodontia.

The subjects thus selected for this investigation represents an excellent cross section of Indian population in that, the subjects were young adults belonging to different states and of different age groups. The purpose and nature of the research procedure to be performed was explained adequately in subjects own language. A proforma, prepared for this purpose was filled up. A standardized photographic procedure was developed to obtain images of the face and the maxillary central incisors. Each subject were made to sit upright on a chair with occlusal plane of the maxillary teeth parallel to the floor. Two standardized photographs were taken for each subject : portrait (closed lips) and the maxillary incisors (without lips). For each photograph, standardized distances (portrait - 100cms, teeth-12cms) were used. The height of the Olympus FE-200 digital camera mounted on a tripod was adjusted individually according to the position of the subject face and the teeth. A full face photograph with closed lips was obtained, with lens positioned parallel to subject face. The subjects hair did not cover any part of the face and the teeth were in contact. The standardized photographic procedure was followed as per the study done by the authors. Intraoral photographs of maxillary central incisors were obtained until the lens was parallel to the labial surface of the teeth. Cheek retractors were used to obtain full exposure of the maxillary central incisors. The images of the teeth and the face were then transferred to a computer (windows PC, Microsoft) having image editing software (Photoshop 6.0 Adobe)

The facial outline form was determined by the outline of the temporal bone at the height of the hairline, temporal process of the zygomatic arch and the gonion. The maxillary right central incisor tooth form was determined by an outline tracing made around the buccal surface of the tooth, which corresponded to the mesial and distal contours, the incisal edge and the cervical margin.

The outline tracing of the maxillary central incisor tooth form was inverted and positioned over the outline tracing of the face form, so that the pairs of the outline tracings (face and the tooth) were enlarged until they were about the same size and saved as separate image files. The photographic printouts were taken. The photographic evaluation in classifying the outline tracing prints of the face form and the maxillary central incisor tooth form by visual method were performed by 5 postgraduate students studying prosthodontics having 2 years of experience.

The outline tracing prints of the face form and the maxillary central incisor tooth form were classified first into square, tapering, ovoid or combination forms by visual method.

A diagram of perpendicular lines was placed on the outline tracing prints of the tooth form and the proximal surfaces of the tooth in each quadrant were classified by William's method of classifying tooth forms similar to the study done by the authors as follows :

Square incisor tooth – mesial and distal proximal surfaces are parallel for atleast half of the cervicoincisal length of the crown.

Tapering incisor tooth – mesial and distal proximal surfaces converge from incisal to cervical.

Ovoid incisor tooth – mesial and distal proximal surfaces are biconvex.

- One of the 3 basic forms - square, ovoid or tapering tooth forms was attributed to a tooth only if that form predominated in atleast 75% of the outline tracing (3 quadrants).

- If 1 basic form predominated in 50% of the outline tracing (2 quadrants), the tooth form should be classified as a combination tooth form.

The means were taken from 5 post graduate students evaluations in classifying face form and tooth form and the respective percentages were calculated to determine the correlation between maxillary central incisor tooth form and face form by visual method and the correlation between maxillary central incisor tooth form and face form by William's method.

The results obtained were tabulated and statistical analysis was performed by Chi-square test for association and Z-test for equality of proportions.

RESULTS:

The present study was aimed to find out the correlation between maxillary central incisor form and face form in male and female subjects of Indian population. So that the results obtained could be used in the selection of artificial maxillary central incisors for edentulous patients of Indian population.

A standardized photographic procedure was used to obtain images of the face and the maxillary central incisors. The images of the face and the teeth were transferred to a computer having image editing software (Photoshop 6.0 Adobe) for determining the outline forms of the face and the right maxillary central incisor tooth by a standardized method.

The outline tracing of the maxillary central incisor tooth form was inverted and positioned over the outline tracing of the face form so that the pairs of the outline tracings were enlarged until they were about the same size and saved as separate image files. The photographic printouts were taken.

The photographic evaluation in classifying the outline tracing prints of the face form and the maxillary central incisor tooth form by visual method and William's method were performed by 5 postgraduate students studying prosthodontics having 2 years of experience.

The means were taken and respective percentages were calculated to determine the correlation between maxillary central incisor tooth form and face form by visual method. The results thus obtained were tabulated and statistically compared for the correlation between maxillary central incisor form and face form in Indian population.

Statistical method applied :

Following statistical methods were employed in the present study.

Chi-square test for association.

Z-test for equality of proportions.

Table 1 shows 72 square, 28 ovoid, 58 tapering tooth forms and 100 square, 26 ovoid and 32 tapering face forms in males out of total 158. The correspondence was – Out of 72 square tooth forms, 56 square tooth forms corresponded with square face forms followed by 8 ovoid and 8 tapering tooth forms did not corresponded with square face forms.

Out of 28 ovoid tooth forms, 8 ovoid tooth forms corresponded with ovoid face forms followed by 16 square and 4 tapering tooth forms did not corresponded with ovoid face forms. Out of 58 tapering tooth forms, 20 tapering tooth forms corresponded with tapering face forms followed by 28 square and 10 ovoid tooth forms did not corresponded with tapering face forms.

The Chi-square test value 7.2 obtained for males was found to be not significant at 0.03 level when compared between maxillary central incisor tooth form and face form by visual method.

Table 2 shows 106 square, 58 ovoid, 78 tapering tooth forms and 100 square, 102 ovoid and 40 tapering face forms in females out of total 242. The correspondence was – Out of 106 square tooth forms, 70 square tooth forms corresponded with square face forms followed by 32 ovoid and 4 tapering tooth forms did not corresponded with square face forms.

Out of 58 ovoid tooth forms, 24 ovoid tooth forms corresponded with ovoid face forms followed by 20 square and 14 tapering tooth forms did not corresponded with ovoid face forms.

Out of 78 tapering tooth forms, 22 tapering tooth forms corresponded with tapering face forms followed by 10 square and 46 ovoid tooth forms did not corresponded with tapering face forms.

The Chi-square test value 27.7 obtained for females was found to be highly significant at 0.001 level when compared between maxillary central incisor tooth form and face form by visual method.

The Chi-square test value 1.01 obtained for males and females was found to be not significant at 0.05 level and test for equality of proportions value 0.54 when correlated between maxillary central incisor tooth form and face form by visual method.

Table 3 shows predominant maxillary central incisor tooth forms in males and females of Indian population by visual method. Males : The results shows square tooth forms 72 is predominant in males followed by tapering 58 and ovoid 28 tooth forms out of 158. Females : The results shows square tooth forms 106 is predominant in females followed by tapering 78 and ovoid 58 tooth forms out of 242. The Chi-square test value 2.18 obtained was found to be not significant at 0.05 level when compared between males and females for predominant maxillary central incisor tooth form by visual method.

Table 1: Comparison between maxillary central incisor tooth form and face form by visual method.

Face form	Tooth form			Total
	Square	Ovoid	Tapering	
Square	126	36	38	200
Ovoid	40	32	56	128
Tapering	18	12	42	72
Total	184	80	136	400

Table 2: Descriptive statistics of males for comparison between maxillary central incisor tooth form and face form

Face form	Tooth form			Total
	Square	Ovoid	Tapering	
Square	56	16	28	100
Ovoid	8	8	10	26
Tapering	8	4	20	32
Total	72	28	58	158

Table 3: Descriptive statistics of females for comparison between maxillary central incisor tooth form and face form

Face form	Tooth form			Total
	Square	Ovoid	Tapering	
Square	70	20	10	100
Ovoid	32	24	46	102
Tapering	4	14	22	40
Total	106	58	78	242

DISCUSSION

The concept of tooth selection in complete denture prosthodontics has changed from basic human temperamental theory and geometric theory to the philosophy of creating the effects of sex, personality and age.^{10, 11} Since, most of the time an edentulous patient reports for complete denture treatment without any definitive information about his lost natural teeth. It has become necessary to look for some craniofacial landmarks and derive the information on the size of the natural teeth through biometry, to that the anterior teeth selected are in a pleasing proportion to the face.¹¹

The shape and the size of the artificial teeth selected should not exhibit extreme characteristics, but harmonize with the face and profile of the patient. Due to the inherent importance of the maxillary central incisor in the dental composition, it becomes imperative to use various anthropometric and biometric references to aid in the selection of an appropriate size of the maxillary central incisor.¹²

The term esthetics was coined in 1750 to designate the science of sensuous knowledge which gave beauty, in contrast to the science of logic which gave truth; the term in later years was related to the fine arts as the theory of beauty. Beauty can be defined as “Flawless in Form”. Facial and dental beauty have been extolled in the fine-arts field throughout the ages either by positive or negative characterizations. Leonarda da Vinci, stated, “The face excels in beauty when compared with other anatomical divisions of the human being”.¹³

For the artificial denture to achieve an artistic and esthetic beauty, special attention must be given to the selection of tooth, the arrangement of teeth and

contouring and coloring of the external form of the denture. For this, face form and tooth form are two of the few factors that influence the denture harmony, both esthetically and psychologically.¹⁴

J. Leon Williams discovered how Nature had systematized anterior tooth forms into 3 typical forms as square, tapering and ovoid and also discovered the innumerable nontypical forms. These nontypical forms were “combination forms”, created by the in blending, into each typical form, of more or less of the elements of one or both of the other types. Tapering or ovoid or both were in blended into square.

Square or ovoid or both were in blended into tapering. Square or tapering or both were in blended into ovoid. Many of the combination forms were more pleasing or beautiful than the typical forms. Dentists would need the typical forms only rarely, the combination forms continuously.

The predominant face form in males and females by visual method for the entire sample in the present study was square face 100 followed by tapering 32 and ovoid 26 faces for males and was ovoid face 102 followed by square 100 and tapering 40 faces for females. The values were not in correlation when compared with the study done by the author¹⁰ was combination face forms followed by typical face forms, in which the predominant face form was tapering face .

The predominant tooth form in males and females by visual method for the entire sample in the present study was square tooth 72 followed by tapering 58 and ovoid 28 teeth for males and was square tooth 106 followed by tapering 78 and ovoid 58 teeth for females. The

values were lesser when compared with the study done by the author was square tooth (56.9%) and type 1 teeth.

CONCLUSION

Mean correlation between maxillary central incisor tooth form and face form of the entire sample (males and females) of Indian population by visual method exhibited greater correlation and were highly significant. The predominant maxillary central incisor tooth form in males and females of Indian population was square tooth by visual method. The predominant face form in males and females of Indian population was square face in males and ovoid face in females. Till date, very less studies have been done to evaluate the correlation between tooth form and face form in Indian population. Hence, further research regarding the correlation between maxillary central incisor form and face form in males and females of Indian population are needed to validate the outcome of this investigation.

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