



Evaluation of Co-Relation between Facial Form and Maxillary Central Incisors Form (Part II)

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Authors' contributions

This work was carried out in collaboration between all authors. Authors AA, KKP, MA and AKV designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Authors PK and AG managed the analyses of the study. Author FT managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aim and objective: To evaluate the correlation between facial form and maxillary central incisor form in north Indian population.

Materials and method: Detection of the maxillary central incisor form was done by tracing the inverted picture of central incisor. The detection of facial form was done with the help of customised trubyte tooth indicator instrument (Dentsply/work division, dentsplyinst, USA).

Results: The agreement between face form and tooth form. There was a moderate agreement between face and tooth form (40.8%).

Conclusion: There appeared to be an moderate agreement between face form and tooth form, 40.8% to be precise, this goes with the previous literature available. It was also pointed out that the most common facial and tooth form was ovoid, followed by tapering.

Keywords: Facial form; tooth form; central incisor form; selection of the shape of teeth; aesthetics.

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1. INTRODUCTION

The restoration of natural and pleasing lip support is one of the prime requisites of esthetics denture. Denture esthetics is defined as 'the cosmetic effect produced by a dental prosthesis which affects the desirable beauty, attractiveness, character, and dignity of the individual' [1].

Pound stated 'anterior and posterior teeth should be placed in the same natural position from which they came, relative to lips, cheeks, and tongue' [2]. Hence, the knowledge of natural tooth position would be valuable as a starting point in establishing anterior tooth position for most of the complete denture patients [3]. Placing teeth in these positions results in enhanced esthetics, phonetics and denture stability.

Numerous guidelines introduced by authors currently do artificial tooth selection in anterior maxilla. The reliability of these guidelines, however, becomes questionable when the predicted size for anterior teeth leads to fabrication of a prosthesis which does not meet the esthetic, functional and phonetic demands of the patient [4].

Based on William's theory, many studies have attempted to evaluate the correlation between the upside down facial form and the form 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. To date, William's classification is the most universally accepted method of determining maxillary Central Incisor tooth form [5].

The literature of Prosthodontics is based mostly on study populations outside India, and there is an apparent lack of information about the selection of Maxillary Central Incisor forms in subjects of Indian ethnicity [5].

Hence this study is framed to evaluate the correlation between facial form and maxillary Central Incisor form in North Indian population. If positive co-relation is found, this study will be helpful to clinicians in the selection of anterior maxillary teeth for fabrication of partial and complete denture prosthesis.

1.1 Instruments Used in the Study

Trubyte tooth indicator instrument (Dentsply/work division, Dentsplyinst, USA), Digital Camera

(Nikon Coolpix L-820), computer running image-editing software (Adobe Photoshop 6, USA), cheek retractor, photo printing machine.

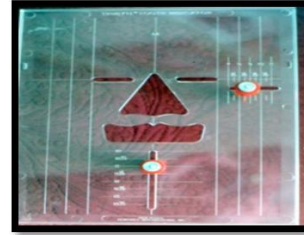


Fig. 1. Trubyte tooth indicator



Fig. 2. Digital camera

2. METHODOLOGY

2.1 Detection of the Maxillary Central Incisor Form

Each subject was seated upright with the head supported by a headrest on a chair with the occlusal plane of the maxillary teeth parallel to the floor. Standardized one photograph was taken for each subject: the maxillary incisors with lips retracted for every photograph, approximate distances of 12 cm from teeth was kept. The height of digital camera (Nikon Coolpix L820) mounted on a tripod was adjusted individually according to the position of the subject's teeth. An intraoral photograph of the maxillary central incisors was obtained using cheek retractors, with the lens parallel to the labial surface of the teeth. The images of the teeth were transferred to a computer running image-editing software (Adobe Photoshop 6, USA). The right maxillary central incisor was inverted, and outline of tooth form was determined using an outline tracing made around the buccal surface of the tooth, which will correspond to the mesial and distal contours, the incisal edge, and the cervical margin. The photographic print-outs of the outline tracings were taken separately. Detailed evaluation using the outline tracing prints for classifying face form and tooth form by both the

visual method and William's method was performed by the main researcher in the department of prosthodontics (Fig. 3)



Fig. 3. Inverted photograph of central incisor for detection of face form



Fig. 4. Detection of face form using Trubyte indicator

2.2 Detection of Facial Form

Facial form was detected with the help of Customized Trubyte Tooth Indicator Instrument (Dentsply/work division, Dentsplyinst, USA). All subjects were asked to sit in upright position with his/her teeth in centric occlusion, lips relaxed and with unsupported head, looking straight forward to maintain natural head position. Facial form of all subjects was checked and noted (Fig. 4).

All tabulated data was send for statistical analysis.

3. RESULTS

Table 1 & Fig. 5 shows the agreement between face form and tooth form. There was moderate agreement between face and tooth form (40.8%).

4. DISCUSSION

The term esthetics is derived from the Greek word *aisthetikos*, meaning perceptive. Webster's

Third New International Dictionary defines 'esthetic' as 'appreciative of, responsive to, or zealous about the beautiful; having a sense of beauty or fine culture.' Since the face is the most exposed part of the body, and the mouth a prominent feature, teeth are getting a greater share of attention [6].

Mostly esthetics is the primary consideration for patients seeking prosthetic treatment. The size and form of the anterior maxillary teeth are not only an aid to dental esthetics but also to facial esthetics. The goal is to restore the anterior maxillary teeth in harmony with the facial appearance.

In the restoration of anterior teeth, many factors are to be considered, depending on the patient's expectations and the expertise of the dental practitioner. General dentists and prosthodontists use some common principles regarding esthetic features of teeth forms, such as gender characteristics and tooth, arch, and face form correlation.

An acceptable cosmetic effect in any dental restoration has always been regarded as important for good dentistry. A well-made prosthesis will fail if it is deficient in this respect. Central Incisors are principal teeth which decide the esthetics of all the anterior teeth. Restoration of aesthetics in a completely edentulous individual is complicated due to difficulty in selecting the artificial anterior teeth of proper size and shape. The problem becomes more vivid when there is complete lack of any pre-extraction records.

'Williams's law of harmony' proposes that a square face should have square Central Incisor, a tapering face should have tapering Central Incisor, and an oval face should have ovoid Central Incisor. Only in this way harmony between the teeth and the face of a patient could be achieved.

Recent studies such as those by Mahmoud [7] and Rodriguez et al. [8,9] confirmed Williams's law concerning the presence of harmony between the shape of the face and the shape of the upper Central Incisor [10]. This was a historic moment, and it lured the dental profession away from the popular 'temperamental classification', which was a system of classifying people according to their physical characteristics and was used as a basis for tooth selection [11].

Prior to Williams, the selection of teeth for prosthetic dentistry was taught by the theory of temperament. Temperamental types were sanguine, nervous, bilious, and lymphatic, named for the physiologic functions of blood, nerves, bile, and lymph. Artificial teeth were arbitrarily selected to fit the patient's temperament.

After the study of thousands of skulls in the Royal College of Surgeons in London, Williams demonstrated subjectively that similar teeth existed in dissimilar skulls. He also observed that a racial tooth form did not exist and that there were three types of tooth forms for all races. He proposed to the manufacturers of artificial teeth that three or four sizes of each of the three types of tooth forms be manufactured and organised for systematic selection by the dentist. This system is exemplified by the Trubyte Bioform system [12] (Dentsply International Inc., York, Pa.) of tooth selection by face and tooth form harmony [11].

However, many other studies have shown that there is no real relationship between the shape of the face and the shape of the upper Central Incisor as stated by 'The law of harmony' proposed by Williams.

According to the facial form and tooth form Correlation with teeth and face forms has long been recognised. W.R. Hall in 1887 [13] projected the 'Typal form concept' based on the tooth's labial surface curvatures, outline form and neck width. Accordingly, he classified face form as ovoid, tapering and square. Wright .W.H [14] did a study to evaluate the relation between face form and tooth form on the students of school of dentistry at the university of Pittsburgh. He found an identical face and tooth forms in only 13% of 600 subjects. Sellen et al. [4], Ibrahimagic et al. [15], and Wolfart et al. [16] found similarities between forms in about 30% of cases. The greatest percentage of correspondence was 51.3%, found by Berksun et al. [17] Varjão et al. [18] found that a

Table 1. Agreement between face form and tooth form

Face	Tooth							
	Ovoid		Square		Tapering		Total	
	No.	%	No.	%	No.	%	No.	%
Ovoid	29	24.2	15	12.5	27	22.5	71	59.2
Square	8	6.7	5	4.2	6	5.0	19	15.8
Tapering	8	6.7	7	5.8	15	12.5	30	25.0
Total	45	37.5	27	22.5	48	40.0	120	100.0

$$\text{Agreement} = (29 + 5 + 15) / 120 * 100 = 40.8\%$$

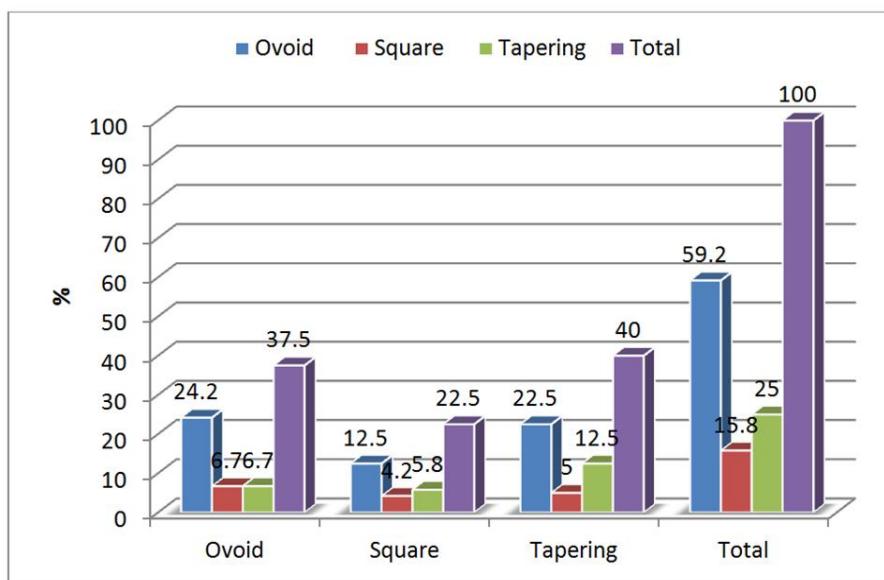


Fig. 5. Agreement between face form and tooth form

correspondence between tooth and face forms was found in 23.75% of all cases. Pound [2] did not only evaluate the outline form of the face in the frontal plane, but also in the sagittal plane. This assessment then was related to the labial surfaces of the artificial teeth in the frontal and sagittal views to determine whether the patient has a convex, straight, or a concave profile.

This study was conducted in the Department of Prosthodontics & Crown and Bridge, Career Post Graduate Institute of Dental Sciences and Hospital, Lucknow. The study involved 120 dentulous subjects including male & female north Indian patients. All dentulous subjects selected for this study were in-between 20-35 year age group. Written consent and ethical committee approval was taken after explaining the procedure in detail.

Material and method for this study here kept simple according to Indian scenario. In this study, the facial form was determined using the Trubyte indicator. The central incisor form was determined by first taking a photograph of central incisor with digital camera and then inverting the photograph of the central incisor, drawing an outline form and analyzing the outline to determine its form in all subjects. The facial outline was determined by the outcome of the temporal bone at the height of hairline, temporal process of zygomatic arch and gonion and the face form was found using the Trubyte indicator. [18] Brodbelt et al. [11], Alssadi Ahmed et al. [19], Bansal Deepak et al. [18] etc. used Trubyte tooth indicator in their study.

Heartwell [20] stated that by using tooth indicator, patients face forms can be determined. It is best observed by noting the particular characteristics of each form as it appears in comparison with the vertical lines of the indication. In the square face form, the side of the face will be in comparison with the vertical lines of the indicator. In the square tapering face form, from the upper third to the lower two third will taper inward. In tapering faces, the sides of the forehead to the angle of the jaw will taper inward diagonal. Ovoid faces will be best determined by the examination of the curved outline of the face against the straight vertical lines of the tooth indicator. In this study, this method is used to evaluate facial forms of different subjects [18].

For determining the tooth form an intraoral photograph of the maxillary Central Incisors was obtained, the images of the teeth were then

transferred to a computer and an outline was drawn using latest software and then tooth form was determined by using Visual and William's method.

After the data was collected from the patients, a statistical analysis was done.

In this study only frontal view of central incisor and face was selected rather than frontal and sagittal view as there was only requirement of facial form and tooth form.

In this study 89 patients were in between 20-25 year age group and 31 patients were of more than 25 year age. Majority of patients were between 20-25 years (74.2%). The mean age of patients was a 24.01 ± 2.72 year ranging from 20-32 years. In the present study 62 male and 58 female subjects had participated. About half of patients were males (51.7%).

There was a moderate agreement (40.8%) between the face form and tooth form. This is in line with the findings of other studies where Berksun et al. [21], Korlakunte Pavankumar R [9] found an agreement between 40-50% between them.

5. CONCLUSION

Within the limitation of the study, the following conclusions were drawn:-

1-There appeared to be a moderate agreement between face form and tooth form, 40.8% to be precise, this goes with the previous literature available. It was also pointed out that the most common facial and tooth form was ovoid, followed by tapering. Using this result we can easily provide an esthetically pleasant maxillary Central Incisors with proper tooth width and tooth form according to philtrum width and face form.

After the observation of the study, we can suggest for selection of Central Incisor in complete denture patients according to their face form if it suits esthetically in individual patients.

CONSENT

Consent taken individually from all the patients.

ETHICAL APPROVAL

Ethical approval was taken from institutional ethical research cell committee. Ethical approval certificate number is CPGIDSH/565/17.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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