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OBSERVATIONAL STUDY TO DETERMINE THE ACCURATE RELATIONSHIP OF DENTAL MIDLINE WITH ANATOMICAL LANDMARK OF FACE AND ORAL CAVITY

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ABSTRACT

OBJECTIVE: The purpose of the present study was to determine which anatomical landmarks are closer to the dental midline in order of accuracy, in both, the anatomical landmark of the face and the anatomical landmark of the oral cavity so, it will be helpful during the planning of esthetic oral rehabilitation.

MATERIALS AND METHODS: The study was done in 100 subjects (students and patients), of GDCH Aurangabad. In this study used facial anatomical landmarks bisector of interpupillary line and dental midline were marked and analyzed using clinically in 100 subjects. A frontal full-face digital image was used for dental midline analysis in relationship with these facial anatomical landmarks.

For anatomical landmarks of the oral cavity, Alginate impressions were taken, and casts were analyzed under standardized conditions. The incisive papilla was marked. Cast images were taken and analyzed.

RESULTS: There was no significant correlation between the pupillary midline and the maxillary dental midline, irrespective of gender.

A significant correlation was seen between the incisive papilla and the maxillary dental midline, irrespective of gender.

CONCLUSION: No significant coincidence was observed between the interpupillary and dental midline. However, the interpupillary distance and its relationship with other anatomic structures may be used as a reference in treatment, but measurements must be assessed individually.

The incisive papilla can be regarded as a more suitable landmark and is more often referred to as a reliable key indicator for determining the position of the maxillary central incisors.

So, the anatomical landmark of the oral cavity will be more helpful during the planning of esthetic oral rehabilitation.

INTRODUCTION

Smile is the primary creation of our personality and An attractive or pleasing smile clearly enhances the acceptance of an individual in our society by improving the initial impression in

interpersonal relationships. The symmetrical smile midline has exquisite importance. The stable smile relies upon the twist of fate of facial and dental midlines respectively.[1]correct information on the midline allows for a higher knowledge of facial and dental esthetics. The facial midline is described as "the vertical line bisecting a horizontal line originating on the exocanthion of one eye and assembly the exocanthion of the alternative eye" .Glossary of prosthodontic terms (May 2017) defines dental midline as "the reference to a vertical line drawn through the tip of the incisal embrasure between the two maxillary central incisors and parallel to the vertical lines of the esthetic frame of the face"[2].

To plan for orthodontic, prosthetic, or restorative treatments that achieve a pleasing esthetic appearance, some anatomic measurements have been suggested. [3] These include the pupillary distance and the midline determination. Patients with more deviations are considered less attractive from an esthetic [perspective4].

In a few cases, together with uneven development, trauma, and facial neoplastic lesions in which landmarks are changed, In those cases, a few intraoral landmarks, together with incisive papilla, labial frenum, and median palatal suture, also are advised through researchers. The incisive papilla had the good coincidence with the midline of the face according to various study .[5]

The relationship between facial midlines and anatomical landmarks in the mouth is not well supported by medical evidence. The aim of this study was to determine which anatomical landmarks are closest to the dental midline with accuracy, in both facial and oral regions, so that they can be useful for planning esthetic oral rehabilitation.

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METHODOLOGY

A total of 100 subjets (students and patients) from GDCH Aurangabad participated in the study. The age of the participants ranged from 20 to 45 years.

The inclusion criteria were as follows: (1) no anterior teeth extraction, (2) no orthodontic treatment, (3) no restorative or prosthetic treatment, (4) no cosmetic surgery on the jaws or rhinoplasty, (5) no crowding or spacing in the upper and lower dental arches, and (6) no obvious asymmetry or disorder on the face and dental arch.

The exclusion criteria were subjects with a history of facial palsy, neuropathy, congenital facial abnormality, and linear smile (anterior teeth are not exposed during posed smile). Informed consent was obtained from all participants after explaining the nature of the study in detail.

Each subject was guided by the observer to help itself in assuming the natural head position. The natural head position was evaluated in the horizontal and vertical axis and lack of any rotations. Standard definitions for anatomic landmarks were used in this study. Full-face photos of 100 individuals were taken with teeth in occlusion, using a digital camera. Photographs were analyzed using computer software to examine the images.

For the Anatomical landmark of the face, lines were drawn on digital images: line A, horizontal, from pupil to pupil; and line B, perpendicular, and median to line A. A vertical line was drawn on the perpendicular midline bisector of line A to examine whether there was a coincidence with the mesial surface of the central incisors. This line was related to the maxillary dental midline which was taken as the contact area between the maxillary central incisors.(fig. 1)

For the Anatomical landmark of the oral cavity, Each subject's impression for the maxillary arch was made with alginate (Algitex) and poured in type III Dental stone (Gypstone). Casts were retrieved from the impression. A thin mixture of type II dental plaster (Dentex) base was prepared. Then the following anatomic landmarks were marked on the cast: The line extending from the incisive papilla to the maxillary midline. (fig. 2)

Analysis of the axial symmetry related to the pupillary perpendicular midline bisector was performed, classifying the cases of coincidence as Yes (group Y) and the others as No (group N) (Fig. 3). Group N was submitted to secondary analysis in which the direction of displacement of the median line (Fig . 4) was assessed. Analysis of the axial symmetry related to the Anatomical landmark of the oral cavity i.e. incisive papilla to the maxillary midline was performed in a similar way.(Fig .5 and 6)

The results were analyzed by one-way analysis of variance and Tukey's test at a significance level of 5%

(A) **(B)**

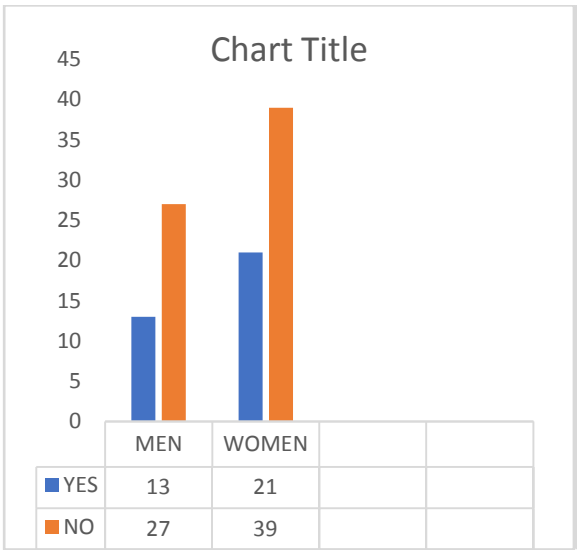
FIGURE . 1:- ABSENCE (A) OR COINCIDENCE (B) OF COINCIDENCE BETWEEN BIPUPILLAR BISECTOR LINE AND DENTAL MIDLINE.

(A) **(B)**

FIGURE . 2 CAST IMAGE WITH LINE DRAWN DIGITALLY. ABSENCE (A) OR COINCIDENCE (B) INCISIVE PAPILLA WITH DENTAL MIDLINE.

RESULTS

Coincidence Between the Maxillary Midline and Bisector to the Interpupillary Line-



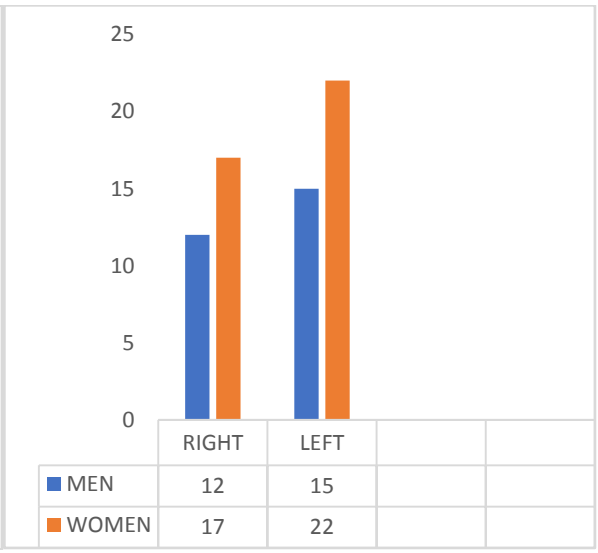


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FIGURE 3. DISTRIBUTION OF THE RESULTS IN RELATION TO GENDER

FIGURE 4. DIRECTION OF DISPLACEMENT OF THE MEDIAN

GROUPS	NUMBER OF SAMPLES (N)	GENDER	QUANTITY IN EACH GROUP(N)	DIRECTION OF DISPLACEMENT
YES	34	MALE	13	
		FEMALE	21	
NO	66	MALE	27	RIGHT 12
				LEFT 15
		FEMALE	39	RIGHT 17
				LEFT 22

TABLE 1. NUMERICAL DISTRIBUTION OF THE RESULTS OBSERVED.

Statistical analysis showed a significant difference between the groups Y (N = 34) and N (N = 66) (Table 1), evidencing that there was no coincidence between the maxillary midline and the perpendicular bisector of the interpupillary distance. Analyzing the two groups with regard to gender, there was no statistically significant difference between men and women samples for both groups. For group N, the males and females both presented a statistically significant difference in the direction of the deviation of the line, showing the deviation to the left to be more frequent. (Table 1)

Coincidence Between the Maxillary Midline and incisive papilla

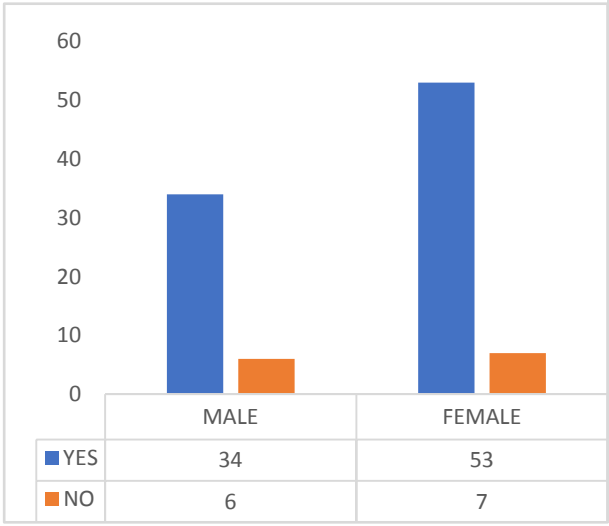

FIGURE 5. DISTRIBUTION OF THE RESULTS IN RELATION TO GENDER

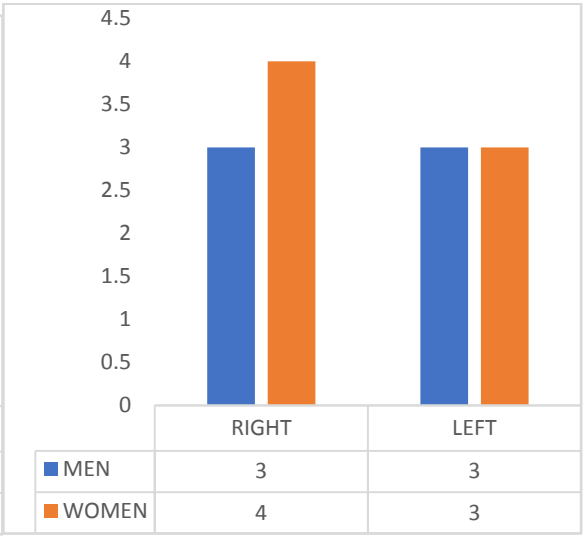

FIGURE 6. DIRECTION OF DISPLACEMENT OF THE

GROUPS	NUMBER OF SAMPLES	GENDER	QUANTITY IN EACH GROUP	DIRECTION OF DISPLACEMENT
YES	87	MALE	34	
		FEMALE	53	
NO	13	MALE	6	RIGHT 3
				LEFT 3
		FEMALE	7	RIGHT 4
				LEFT 3

TABLE 2. NUMERICAL DISTRIBUTION OF THE RESULTS OBSERVED.

Statistical analysis showed a significant difference between the groups Y (N = 87) and N (N = 13) (Table 2), evidencing that there was a coincidence between the maxillary midline and the incisive papilla distance. Analyzing the two groups with regard to gender, there was no statistically significant difference between men and women samples for both groups. For group N, the males and female both presented a no statistically significant difference in the direction of the deviation of the line. (Table 2)

DISCUSSION

Facial esthetics and beauty depend on the facial and dental midlines.[7] The golden proportion suggests that the alignment, symmetry and shape of the face determine its attractiveness.[5] The harmony between the maxillary dental midline and the facial midline significantly enhances the esthetic[11].

The esthetic perception of teenagers is affected by the dental midline deviation with gender.[8] The facial anatomic landmarks are important for measuring the discrepancy between the facial

and dental midlines. [9], 2D images can be widely used to study the dental midline discrepancy from reference points.[10] However, the clinical evaluation of anatomical landmarks and midlines is a practical method to detect the facial and dental midlines and quantify discrepancies. Therefore, in this study, we assessed the dental-facial midline clinically.

The aim of the study was to determine the norm and relation of facial midline with maxillary dental midline among the subjets (students and patients) from GDCH Aurangabad. The facial midline can be used as a guide for establishing the maxillary dental midline when replacing anterior teeth.[3] We found 34 % coincidence of facial and maxillary midline, while 66 % showed no coincidence. For group N, the males and females both presented a statistically significant difference in the direction of the deviation of the line, showing the deviation to the left to be more frequent. (Table 1)

This study is similar to Eskelsen et al., who found only 38% of the participants to have inter-pupillary midline coinciding with the maxillary midline.5 In contrast to this, Miller et al., using philtrum as the alternative of the facial midline, found that the maxillary dental midline coincided in 75% with the median line of the philtrum in the 500 participants with natural dentition.5 Nold et al. examined 106 Caucasian participants and found that 85% had to coincide facial and dental midlines.[12]

Eskelsen et al. reported that when the maxillary midline deviates, it more frequently deviates towards the left in both genders.[5] This agrees with the present study. Dental midline discrepancies are considered a factor in reducing smile attractiveness; discrepancies of 2 mm or more have 56% chance of being noticed by laypeople. The minor discrepancy in the midlines is considered acceptable.[4]

The second part of this study (Table 2) supports the previous work of Mavroskoufis et al. (1981), Jacob and Gazit (1975) and Grave (1987) showed that the incisive papilla is located between the two central incisors and remains intact after tooth extraction. In this study there was a coincidence of 87% between the maxillary midline and the incisive papilla distance. Analyzing the two groups with regard to gender, there was no statistically significant difference between men and women samples for both groups. Harper's study of incisive papillae concluded that incisive papillae are located between the two maxillary central incisors in edentulous patients and in the ridges in edentulous patients (Peng and Cocke, 1999). Lau (1993) conducted a similar study on Chinese people and found the location of the incisive papilla relative to the central incisors. The dental midline, an imaginary line through the two central incisors on a vertical line, the relationship between the dental midline and the incisivepapilla, and other facial landmarks can be drawn on the horizontal imaginary line with the vertical axis. However, no clinical studies have demonstrated the relationship between known anatomical sites and the incisive papilla. The incisive papilla is a fixed point for determining the midline of the maxillary tooth in the oral cavity. [6]

Future studies can be done to prove this relation. Also, consideration should be given to (a) the Degree of normal resorption and abnormal resorption under tissue-bearing appliances; (b) The growth of certain posterior teeth below the occlusal plane and its effect on the position of the papilla.[13]

Future studies will be conducted to prove this relationship. You should consider the following: (b) Influence on tooth growth, particularly the bottom of the occlusal surface and the position of the papilla.[13]

The present study was conducted by a single observer and the population was selected by convenience sampling. Therefore, the change is limited. Similar studies can be conducted in other areas with larger populations to confirm the results of this study..

From a medical perspective, it is important for physicians to know the best choice or hierarchy of anatomical landmarks that can be used to determine a patient's midline. Local population studies will help shed light on the criteria for determining the appropriate average for special people who are suitable for esthetic treatment. This study obtained such results and the results of this study can be confirmed by conducting similar studies in other high-population areas.

CONCLUSION

Based on the methodology applied and the results obtained, it can be concluded that there is no coincidence between the maxillary midline and the perpendicular midline bisector of the interpupillary distance.

It is more probable that the dental midline occurring naturally deviates towards the left side of the face.

The incisive papilla can be regarded as a more suitable landmark and is more often referred to as a reliable key indicator for determining the position of the maxillary central incisors.

So, the anatomical landmark of the oral cavity will be more helpful during the planning of esthetic oral rehabilitation.

CONFLICT OF INTERESTS: The authors have not declared any conflict of interests

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