

Relationship of incisive papilla to inter-canine line and anterior teeth in the population of Gujrat

¹Dr. Abhay Machchhar, Department of Prosthodontics, Assistant Professor, Siddhpur Dental College and Hospital, Patan, India

²Dr. Nilesh Patel, Department of Prosthodontics, Assistant Professor, Siddhpur Dental College and Hospital, Patan, India

³Dr. Nilesh Gadiya, Prosthodontist, Community Health Center, Bhachau, Kutch, Gujarat

Corresponding Author: Dr. Nilesh Patel, Department of Prosthodontics, Assistant Professor, Siddhpur Dental College and Hospital, Patan, India

How to citation this article: Dr. Abhay Machchhar, Dr. Nilesh Patel, Dr. Nilesh Gadiya, “Relationship of incisive papilla to inter-canine line and anterior teeth in the population of Gujrat”, IJMACR- February - 2025, Volume – 8, Issue - 1, P. No. 223 – 227.

Open Access Article: © 2025 Dr. Nilesh Patel, et al. This is an open access journal and article distributed under the terms of the creative common’s attribution license (<http://creativecommons.org/licenses/by/4.0>). Which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Arrangement of artificial teeth play crucial role in esthetics of complete dentures. Incisive papilla is considered as stable landmark for artificial teeth arrangement. Horizontal distance from incisive papilla to maxillary central incisor vary depending upon ethnicity of population. So, this study was planned to measure horizontal distance between incisive papilla and maxillary central incisal edge as well as relationship of inter-canine line with incisive papilla. A total of 100 male and female volunteers were selected for the study. Maxillary arch impressions were made and casts fabricated. Photographs were taken using DSLR camera and analysed in ImageJ software. Horizontal distance from centre and posterior border of incisive papilla to maxillary incisal edge was measured and relationship of inter-canine line was determined. Student’s t test was

used for statistical analysis. There was significant difference ($p < 0.05$) between male and female for all the measurements.

Keyword: Horizontal distance, Incisive papilla, Inter-canine line, Posterior border

Introduction

Awareness of esthetics play an important part in patient’s smile nowadays. It is important to achieve all objectives of esthetics while replacing maxillary anterior teeth.^{1,2} After extraction of anterior teeth alveolar bone resorption and bone remodelling play a crucial role in labial fullness of maxilla. There is loss of facial contour and lip support due to alveolar resorption and atrophy.³ When replacing maxillary anterior teeth objective of esthetics like labial contour, lip support, structure, colour and visibility of teeth play a crucial role.^{1,3} Placement of anterior teeth has significant effect on esthetics as well

as phonetics. Horizontal distance from incisive papilla to central incisor in dentate patients help to guide re-establishment of labial contour and phonetics in edentulous patients. Correct positioning of anterior teeth can be achieved by placing maxillary central incisor 8-10 mm anterior to incisive papilla.⁴ Various authors have recommended different values based on ethnicity of population.³

Also, it recommended that the inter-canine line connecting tips of both maxillary canines should pass through centre of incisive papilla while arranging artificial teeth for complete dentures.⁴ Various studies have been done to assess the position of inter-canine line and its relation with incisive papilla.^{3,10,16}

This study aims to assess the relationship of inter-canine line with incisive papilla and measure horizontal distance between middle and posterior point of incisive papilla to maxillary central incisor in the population of Gujarat.

Materials and Method

A total of 100 volunteers consisting of 50 male and 50 female aged between 18-30 years were selected for the study. Subjects with Angles’ class 1 molar occlusion were selected for the study. All the subjects had well aligned maxillary anterior dentition without any restorative or orthodontic treatment. Primary impression was taken using Alginate (Imprint Alginate, Bombay Burmah trading corporation Ltd, Uttarakhand, India) and cast was fabricated.

Incisive papilla was outlined on each cast. Middle of incisive papilla was marked. Each cast was photographed with scale placed in front of cast using DSLR with 100 mm macro lens (Canon 1500D, Tokyo, Japan) at 1:3 magnification. Using the measurements of the scale, actual measurements were made in Image J

software. (NIH and University of Wisconsin, United States)(Fig 1)



Figure 1: Measurements made in Image J software

The following measurements were made:

1. Distance from centre of incisive papilla to maxillary central incisal edge
2. Distance from posterior border of incisive papilla to maxillary central incisal edge (Mesioincisal point was used as reference for measurements)
3. Relationship of Inter-canine line with incisive papilla

Results

All the data collected was analysed in Microsoft Excel data analysis. Student’s t test was used and p value was set to 0.05%. Table 1 shows mean distance of centre and posterior border of incisive papilla to maxillary central incisor.

Table 1: Mean distance between maxillary central incisor and incisive papilla

Distance	Mean (mm)	±SD
Centre of Incisive papilla to Maxillary central incisor	8.32	0.87
Posterior border of Incisive papilla to Maxillary central incisor	11.24	0.83

The mean distance from centre of incisive papilla to mesioincisal point of maxillary central incisor for male and female were 8.56 ± 0.86 mm and 8.08 ± 0.81 mm respectively. The student’s t test was performed which was statistically significant with $p < 0.05$. (Table 2)

Table 2: Student's t test - Centre of incisive papilla to Maxillary Central incisor distance

Gender	Mean (mm)	±SD	P value
Male	8.56	0.86	0.005
Female	8.08	0.81	

The mean distance from posterior border of incisive papilla to mesioincisal point of maxillary central incisor for male and female were 11.43 ± 0.74 mm and 11.04 ± 0.91 mm respectively. The student's t test was performed which was statistically significant with $p < 0.05$. (Table 3)

Table 3: Student's t test - Posterior border of incisive papilla to Maxillary Central incisor distance

Gender	Mean (mm)	±SD	P value
Male	11.43	0.74	0.020
Female	11.04	0.91	

The inter-canine line was passing through centre of incisive papilla in 26% males and 56% females. The inter-canine line was passing through posterior border in 42% males and 6% females. The inter-canine line was passing between centre and posterior border of incisive papilla in 32% males and 38% females. (Table 4)

Table 4: Inter-canine line relation with incisive papilla

Location	Male	Female
Centre	26%	56%
Between Centre and posterior	32%	38%
Posterior	42%	6%

Discussion

The present study was conducted to measure the distance between centre and posterior border of incisive papilla to maxillary central incisor and relationship of inter-canine line with incisive papilla. Incisive papilla is considered as most stable landmark because of minimal changes in its position after tooth loss.^{1,2} Harper found that incisive

papilla remains stable during resorption of anterior residual ridge after tooth loss.⁵

McGee suggested 8 mm of distance between labial surface of incisor and incisive papilla.⁶ Hickey, Boucher and Woelfel proposed placement of central incisor 8-10 mm forward to middle of incisive papilla.⁷ Martone and Mavroskoufis & Ritchie recommended the distance of 10 mm.^{8,9} Erlich and Gazit measured the distance from posterior border to labial surface of incisor as the centre and anterior part of papilla tend to change position after extraction. They found the distance of 12-13 mm.¹⁰

In the current study, we found the mean distance of 8.56 mm and 8.08 mm from centre of incisive papilla to central incisor for male and female respectively. The findings of the current study are similar to finding of Hicky, Boucher and Woelfel (8-10 mm),⁷ and Sawris (8.50 mm).¹¹ Contrary to our study, Memon F et al found the distance of 9.20 mm in the population of Hyderabad.¹²

In our study, we found the mean distance of 11.43 mm and 11.04 mm from posterior border of incisive papilla to central incisor for male and female respectively. The findings of the study are not in accordance with study done by Memon F et al (12.47 mm),¹² Ortman and Tsao (12.45 mm)¹³ and Grave and Becker (13.17mm),¹⁴ and Amin WM et al (12.93 mm).¹⁵

Inter-canine line in the present study was passing through posterior border for 42% male and centre of incisive papilla for 56% female. Ehrlich and Gazit found inter-canine line passing through centre of incisive papilla in 57.6% patients.¹⁰ Solomon found it to be 78%.³ In the study by Lau and Clark, it was 57.3 % for Chinese subjects.¹⁶

There was statistically significant gender difference for centre as well as posterior border to maxillary central

incisor distance which is in accordance with the study done by Memon F et al.¹²

Various methods in the past have been used for measuring the distance between incisive papilla and maxillary central incisor. Ehrlich J et al and Mersel A utilized caliper for horizontal distance measurements.^{10, 17} a Ortman HR et al used profile projection made up of set of magnifying lenses.¹³ Lau GC et al did measurements using photographs with sonic digitizer.¹⁶ Zia M et al used surveyor with protector to measure the distance.¹⁸ In our study, we used DSLR camera for photographs and ImageJ software for the measurements. Advantages of the method include simplicity, accuracy, no lapse in measurements as can happen with manual caliper. Disadvantages of the method are cost and availability.¹⁹

Conclusion

Within limitations of this study, it can be concluded that horizontal distance between centre and posterior border of incisive papilla to maxillary central incisor should be kept around 8.32 mm and 11.24 mm respectively for the population of Gujarat. Inter-canine line should pass through posterior border of incisive papilla in males and centre in females while arranging artificial teeth for the population of Gujarat.

References

1. Pachore N, Bhakhar V, Patel J, Patel A, Adeshra K. An In-vivo Comparison of Vertical and Horizontal Distance between Incisive Papilla and Incisal Edge of Maxillary Central Incisors in Dentates with Different Arch Forms. *J Clin Diagn Res* 2017;11(4):ZC97-ZC100.
2. Samarth Kumar A, Singhal R, Pagia S, Kalpana K. Evaluation of papillo-incisal distance in different arch forms and with different shapes of incisive

papilla in Moradabad population - A descriptive study. *J Dent Probl Solut* 2021;8(1):42-6.

3. Solomon EG, Arunachalam KS. The incisive papilla: a significant landmark in prosthodontics. *J Indian Prosthodont Soc* 2012;12(4):236-47.
4. Zarb G, Hobirk JA, Eckert SE and Jacob RF. *Prosthodontic treatment for edentulous patients*, 13th edi. Mosby. Pg 209, 211.
5. Harper RN. The incisive papilla-The basis of a technique to reproduce the positions of key teeth in Prosthodontia. *J Dent Res* 1948; 27:661-8.
6. McGee GF. Tooth Placement and base contour in denture construction. *J Prosthet Dent* 1960;10(4):651-7.
7. Hickey JC, Boucher CO, Woelfel JB. Responsibility of the dentist in complete denture construction. *J Prosthet Dent* 1962;12:637-653.
8. Martone LC. Clinical application of concepts of functional anatomy and speech science to complete denture prosthodontics. *J Prosthet Dent* 1963;13(2):204-28.
9. Marvroskoufis F, Ritchie GM. Nasal width and incisive papilla as guides for selection and arrangement of maxillary anterior teeth. *J Prosthet Dent* 1981;45(6):592-7.
10. Ehrlich J, Gazit E. Relationship of the maxillary central incisors and canines to the incisive papilla. *J Oral Rehabil* 1975;2(3):309-12.
11. Sawiris MM. The role of anthropometric measurements in the design of complete denture construction. *J Dent* 1977;5:141-8.
12. Memon F, Chandio R, Khan R, Faryal A, Muhammad G. Measurement of distance between maxillary central incisors and incisive papilla in

- dentate individuals. *J Muhammad Med Coll* 2023;14(1):10-2.
13. Ortman HR, Tsao DH. Relationship of incisive papilla to the maxillary central incisors. *J Prosthet Dent* 1979;42(5):492-6.
14. Grave AMH, Becker PJ. Evaluation of the incisive papilla as a guide to anterior tooth position. *J Prosthet Dent* 1987;57(6):712-4.
15. Amin WM, Sandra K, Ghazawi A. The relationships of the maxillary central incisors and canines to the incisive papilla in Jordanians. *J Contemp Dent Pract* 2008;9(5):1–18.
16. Lau GC, Clark RF. The relationship of incisive papilla to the maxillary central incisors and canine teeth in southern Chinese. *J Prosthet Dent* 1993;70(1):86–96.
17. Mersel A, Ehrlich J. Connection between incisive papilla, central Incisor and rugae canine. *Quintessence International* 1981;12(12):1327-9.
18. Zia M, Azad AA, Ahmed S. Comparison of distance between maxillary central incisors and incisive papilla in dentate individuals with different arch forms. *J Ayub Med Coll Abbottabad* 2009;21:125-8.
19. Sibal A, Ikharr A, Singi S, Jaiswal A. Digital dental photography: A review. *J Res Med Dent Sci* 2022;10(7):9-13.