Original Research

The Relationships of the Maxillary Central Incisors and Canines to the Incisive Papilla in Mithilanchal Population of Bihar- A Comparative Study

Shivam Sulok[1], Mahesh Suganna[2], Anuj Kumar Chowdhary[3], Raushan Kumar[4], Rafi Ahmed[5], Savitha Chakote[6]

[1]Department of Prosthodontics, Crown and Bridge & Oral Implantology, Mithila Minority Dental College and Hospital, (A Postgraduate Institute), Affiliated To L.N. Mithila University, Ekmi, Laheriasarai, Darbhanga - 846001, Bihar, India;
[6]Dept. of Dentistry, Bidar Institute of Medical Sciences, BIDAR- 585401, Karnataka, India

ABSTRACT:
Background: Esthetics and stability are very important and challenging component of complete denture prosthodontics which helps to restore the lost natural appearance of edentulous patients. These aspects of complete denture construction depend on many factors combining 'scientific' and 'artistic' principles. **Aim of the study:** To observe the distance of central incisor and canine to incisive papilla and other parameters in Mithilanchal population, Bihar. **Materials and methods:** The study was conducted in the Department of Prosthodontics and Crown & Bridge of Mithila Minority Dental College, Darbhanga, Bihar. The study involved 120 dentulous subjects (60 men, 60 women) of age group 20 to 40 years old. Impression of the maxillary dentulous arch was made in selected subjects and cast were prepared with Type I dental stone. In each cast, the following landmark has been selected and the distance between them will be measured with a Vernier caliper to the accuracy of tenth of a millimeter. The values thus obtained in study have been compared with the values of control group (Caucasians population). **Results:** A total of 120 samples studied (60 males and 60 females) to assess relationships of the maxillary central incisors and canines to the incisive papilla in Mithilanchal population of Bihar. Out of 120 samples studied, Course of canine papilla canine line was found to be mostly at body of incisive papilla (71.67%). In 20.83% it was found to be at base of incisive papilla and rest 7.50% were at anterior border of incisive papilla. Out of 120 samples studied type of incisive papilla was found to be mostly continuous with interdental papilla in both males (47.50%) and females (44.17%) and very few were discrete (2.50% males and 15.83% females). **Conclusion**: The horizontal relationship of the incisive papilla to the maxillary permanent central incisor teeth was determined in 120 dentulous subjects consisting of 60 males and 60 females. The mean distance between the base of incisive papilla and labial surface of central incisor was 11.993 mm. Biometric analysis of incisive papilla in dentate subjects serves as a guide to develop facial contour in upper occlusal rim and anterior tooth position in complete dentures. Incisive papilla—central incisor distance was found to be 11.993 mm. Inter Canine distance was found to be more in males (34.473) as compared to females (33.898) but difference in inter canine distance between males and females was found to be statistically not significant.
Key words: incisive papilla, central incisor, inter canine.

Corresponding Author: Dr. Mahesh Suganna, BDS, MDS, FPFA, FDSD, Prof and Head, Department of Prosthodontics, Crown and Bridge & Oral Implantology, Mithila Minority Dental College and Hospital, (A Postgraduate Institute), Affiliated To L.N. Mithila University, Ekmi, Laheriasarai, Darbhanga - 846001, Bihar- India

This article may be cited as: Sulok S, Suganna M, Chowdhary AK, Kumar R, Ahmed R, Chakote S. The Relationships of the Maxillary Central Incisors and Canines to the Incisive Papilla in Mithilanchal Population of Bihar- A Comparative Study. Int J Res Health Allied Sci 2019;5(6):1-6.

INTRODUCTION:

Esthetics and stability are very important and challenging component of complete denture prosthodontics which helps to restore the lost natural appearance of edentulous patients. These aspects of complete denture construction depend on many factors combining 'scientific' and 'artistic' principles.[1] Among the various factors, teeth alignment plays the most important tooth factor in producing a natural appearance with artificial restoration.[2] A pleasing lip support for edentulous patients is achieved by the correct placement of the anterior teeth and their matrix, with the burden being placed on the central incisors. Finding the most suitable position for artificial anterior teeth presents a new challenge in every denture. The most obvious landmark that appears to have survived intact from the dentate state is the incisive papilla (IP), and it has received a great deal of attention.[3] The incisive papilla otherwise known as palatine papilla is a small pear or oval shaped mucosal prominence situated at the midline of palate, posterior to the palatal surface of the central incisors. In dentulous subjects, it is seen in various forms either discrete or continuous with the interdental papilla of the upper central incisors. The incisive papilla is generally situated over the incisive foramen through which emerge the nasopalatine nerves and palatine vessels.[4]

The selection and arrangement of maxillary anterior teeth for edentulous patient in a natural and aesthetically pleasing form has remained an elusive and challenging. Dentist use various techniques, their clinical expertise and aesthetic sense to attain acceptable results.[5] For completely edentulous patients to achieve a correct speech, lip support and harmonious incisal guidance the maxilla anterior teeth should be positioned as close as possible to the positions originally occupied by natural teeth, which is a challenge for dentists in the absence of pre-extraction records. The surface anatomy of oral tissues offer traces that supports to locate the proper position of anterior teeth within the dental prosthesis and the most obvious anatomical landmark that appear to have survived intact from the dentate to edentulous state is the incisive papilla.[6] Hence, the purpose of this study is to observe the distance of central incisor and canine to incisive papilla and other parameters in Mithilanchal population, Bihar, as this can be referred as guidelines for prosthodontic implications.

MATERIALS AND METHODS:

The study was conducted in the Department of Prosthodontics and Crown & Bridge of Mithila Minority Dental College, Darbhanga, Bihar. The study involved 120 dentulous subjects (60 men, 60 women) of age group 20 to 40 years old.

Inclusion criteria:

- Aligned full complement of natural permanent teeth up to 2nd molar.
- No history of orthodontic treatment.
- Angle class I Maxillomandibular relationship.
- A well traceable incisive papilla.
- Mild attrition of canine cusp tip and central incisal edge.
- Absence of diastema.

Exclusion criteria:

- Subjects having any parafunctional habits.
- Any restoration and/or prosthetic treatment in maxillary anterior region.
- Missing, impacted and supraerupted central incisors, canine in the maxillary arch.
- Moderate and/or severe attrition or any pathologic wear of maxillary anterior teeth.
- Maxillofacial trauma.

Impression of the maxillary dentulous arch was made in selected subjects and cast were prepared with Type I dental stone. In each cast, the following landmark has been selected and the distance between them will be measured with a Vernier caliper to the accuracy of tenth of a millimeter.

Incisive Papilla-Central Incisor Distance;

The posterior point of the incisive papilla and the mesio incisal angle of the central incisor were taken as reference for measuring the papilla- incisor distance. [4] A horizontal line was marked at the posterior most point of the incisive papilla. A second line was marked in the midsagittal plane to bisect the papilla. The point of intersection was taken as the reference point for measurement[9]. Papilla-incisor distance was recorded to the tenth of a millimeter by adjusting the pointed arms of the Vernier caliper to contact the reference point of the incisive papilla and the mesio incisal angle of central incisor.

Inter-Canine Line;

Cast were placed photographic stand parallel to the floor. A camera Nikon D3300 (Nikon Corporation) was used. Photograph of each cast was taken at the shutter speed of 2 seconds, Magnifying power of (2/3) and a fixed distance between cast and camera of 25 cms. Photographs were taken at a focal length of 40 mm, ISO speed of 250, maximum aperture of 4,f/13 and 1/125 sec. Images of the cast obtained were printed using EPSON inkjet printer to determine the inter-canine line and to find the relationship between the incisive papilla and the inter-canine line. The tips of canines on both sides were located on the cast with pencil marks and on

the photograph the points will be connected by a line, designated as inter-canine line.

Incisive Papilla—Inter-Canine Line;

The relationship of the incisive papilla to the inter-canine line was observed in the photograph. The tips of the canines and the reference point of the incisive papilla were marked on photograph. The flat edge of a ruler was laid across the dental arch from premolars to premolars with the front edge touching the tips of the canines. The perpendicular distance between the reference point and inert canine line is measured with Vernier calliper. [4]

The values thus obtained in study have been compared with the values of control group (Caucasians population).

The data obtained was compiled systematically, transformed from a pre-coded proforma to a computer and a master table was prepared. The total data was distributed meaningfully and presented as individual tables along with graphs. Inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ±SD and results on categorical measurements are presented in Numbers (%). Significance is assessed at 5% level of significance. Chi square test, Fisher's Exact test and Independent 't' test (Parametric) has been used to find the significance of study

RESULTS:

A total of 120 samples studied (60 males and 60 females) to assess relationships of the maxillary central incisors and canines to the incisive papilla in Mithilanchal population of Bihar. Out of 120 samples studied, Course of canine papilla canine line was found to be mostly at body of incisive papilla (71.67%). In 20.83% it was found to be at base of incisive papilla and rest 7.50% were at anterior border of incisive papilla. Table 1 shows location of incisive papilla to the inter-canine line in 120 subjects. Table 2 shows relationship between incisive papilla of maxillary incisors in 120 subjects. Out of 120 samples studied type of incisive papilla was found to be mostly continuous with interdental papilla in both males (47.50%) and females (44.17%) and very few were discrete (2.50% males and 15.83% females). Difference in types of incisive papilla between males and females was found to be statistically non-significantA total of 120 samples studied (60 males and 60 females) to assess relationships of the maxillary central incisors and canines to the incisive papilla in Mithilanchal population of Bihar. Out of 120 samples studied, Course of canine papilla canine line was found to be mostly at body of incisive papilla (71.67%). In 20.83% it was found to be at base of incisive papilla and rest 7.50% were at anterior border of incisive papilla.

Out of 120 samples studied type of incisive papilla was found to be mostly continuous with interdental papilla in both males (47.50%) and females (44.17%) and very few were discrete (2.50% males and 15.83% females).

Table 1: Location of Incisive Papilla to the inter-canine line in 120 subjects

Location of incisive papilla	Course of C-P-C line	N	Percentage
Incisive papilla and canine present in the same line (CPC- line)	Anterior boder of incisive papilla (IP)	09	07.50
	Body of incisive papilla	86	71.67
	Base of incisive papilla	25	20.83
IP anterior to inter canine line		00	00.00
IP posterior to inter canine line		00	00.00

Graph 1:

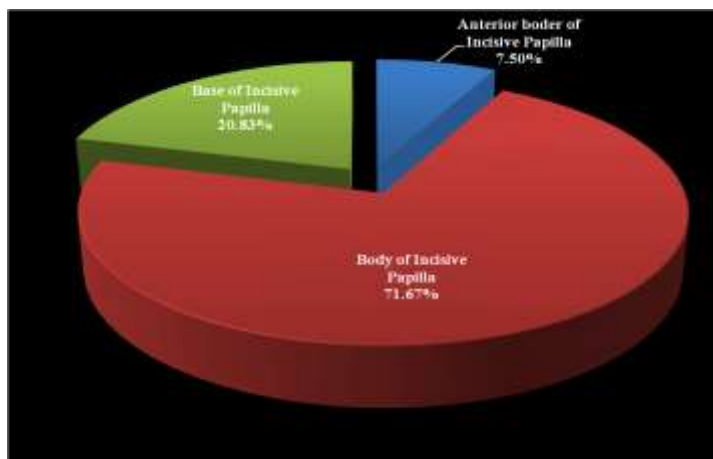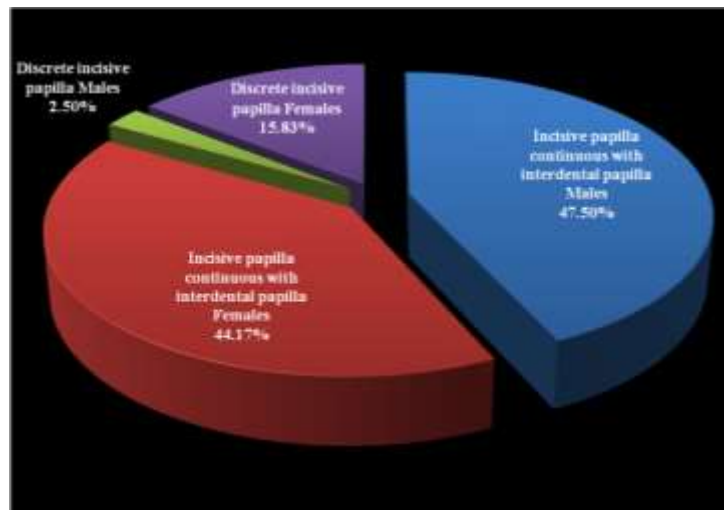**Table 2: Relationship between Incisive Papilla of Maxillary Incisors in 120 subjects**

Type of papilla	Gender	N	%	% In Both Sexes
Incisive papilla continuous with interdental papilla	Males	57	47.50	
	Females	53	44.17	91.67
Discrete incisive papilla	Males	03	02.50	
	Females	07	15.83	18.33

Chi – Square Test = 1.745, df = 1, p – value = 0.186 (Not Significant)

Graph 2:

DISCUSSION:

A small fold of mucous membrane situated at the anterior end of the raphe of the hard palate near the openings of the incisive canals. The hard and soft palates separate the oral and nasal cavities. The bony structure of the hard palate is composed of the paired incisive bones, palatine processes of the maxilla, and palatine bones. These bones are covered by cornified stratified squamous epithelial soft tissue, called the hard palate mucoperiosteum. The mucosa of the hard palate is nonelastic and has six to 10 transverse ridges or rugae.

Located just caudal to the maxillary incisors on midline is a rise of tissue called the incisive papilla. On either side of the papilla are the incisive ducts, which travel through the palatine fissures of the incisive bones to communicate with the vomer nasal organ. The greater palatine branch of the maxillary branch of the trigeminal nerve supplies sensory innervation to the hard palate. The main arterial supply is from the paired greater palatine arteries that branch off from the maxillary artery.

Alveolar resorption and atrophy causes the lip to move inward and there is loss of facial contour. The labial contour of upper occlusal rim which restores facial contour, lip support and appearance is usually determined by the visual judgement of the Prosthodontist and the esthetic preference of the denture wearer during jaw relation stage.

The shape of the incisive papilla in dentulous was also investigated since it can influence the center of the edentulous papilla from the dentulous state. The anterior border of the papilla is not a reliable landmark particularly when the papilla is continuous with the interdental papilla, since post extraction changes occur at the anterior border. The base/posterior border is a reliable landmark as it is definable and subject to least change in the edentulous state. In dentulous subjects, it is seen in various forms either discrete or continuous with the interdental papilla of the upper central incisors. In the edentulous maxilla it becomes round, present behind the crest of the residual ridge or on the tip of the ridge. Harper[7] found the position of the incisive papilla in the edentulous remained fairly constant since resorption took place in an anteroposterior direction. Progressive bone loss of the labial alveolar bone gives an illusion that the papilla has moved forward. The incisive papilla is generally situated over the incisive foramen through which emerge the nasopalatine nerves and palatine vessels. It was found that the papilla moved forward about 1.6 mm as a result of maxillary alveolar bone resorption and the incisive fossa lies slightly posterior to the papilla. Pressure on papilla by the maxillary denture can result in pain or burning sensation which requires relief. Nine different types of incisive papilla were recognized and they are classified according to the order of their occurrence. Papilla incisor distance is a useful biometric guide to both the

4

dentist and the dental technician. However, it may not be applicable in every case; clinician should judiciously consider individual variations. Other biometric guides, phonetic tests and clinical judgement should be considered to decide the most appropriate position of central incisors in the horizontal plane. [4]

120 samples studied (60 males and 60 females) to assess relationships of the maxillary central incisors and canines to the incisive papilla in Mithilanchal population of Bihar. Out of 120 samples studied pear shaped and spindle shaped incisive papilla was found to be more compared to other shapes. Pear shaped was more in males compared to females and vice versa for spindle shaped. Out of 120 samples studied Course of canine papilla canine line was found to be mostly at body of incisive papilla (71.67%). In 20.83% it was found to be at base of incisive papilla and rest 7.50% were at anterior border of incisive papilla. Out of 120 samples studied type of incisive papilla was found to be mostly continuous with interdental papilla in both males (47.50%) and females (44.17%) and very few were discrete (2.50% males and 15.83% females). FU PS, Hung CC, Hong JM, Wang JC24 concluded that study found the HIP occlusal plane tends to be more parallel to the occlusal plane II in angle class I subjects, which may be used as a clinical practice guideline. Shrestha S concluded that the incisive papilla is useful anatomical landmark to locate the position of central incisors and canine in upper complete denture. [8] However, clinician must base their Judgements on the basis of biometric guides and application of phonetics test to achieve the most functionally and esthetically affect scheme for placement of artificial teeth.

Papilla incisor distance is a useful biometric guide to both the dentist and the dental technician. However, it may not be applicable in every case; clinician should judiciously consider individual variations. Other biometric guides, phonetic tests and clinical judgement should be considered to decide the most appropriate position of central incisors in the horizontal plane.

CONCLUSION:

The horizontal relationship of the incisive papilla to the maxillary permanent central incisor teeth was determined in 120 dentulous subjects consisting of 60 males and 60 females. The mean distance between the base of incisive papilla and labial surface of central incisor was 11.993 mm. Biometric analysis of incisive papilla in dentate subjects serves as a guide to develop facial contour in upper occlusal rim and anterior tooth position in complete dentures. Incisive papilla—central incisor distance was found to be 11.993 mm. Inter Canine distance was found to be more in males (34.473) as compared to females (33.898) but difference in inter canine distance between males and females was found to be statistically not significant.

REFERENCES:

1. McCord JF, Grant AA. Registration stage III – selection of teeth. Br Dent J. 2000;188:660-66.
2. Krajicek DD. Achieving Realism with Complete Dentures. J Prosthet Dent. 1963;13:229-35.
3. Grave AM, Becker PJ. Evaluation of the incisive papilla as a guide to anterior tooth position. J Prosthet Dent. 1987;57:712-14.
4. Solomon EGR, Arunachalam KS. The Incisive Papilla: A Significant Landmark in Prosthodontics. J Indian prosthodont Soc. 2012;12:236-247.
5. Shah M, Verma AK, Chaturvedi S. A Comparative study to evaluate the vertical position of maxillary central incisor and canine in relation to incisive papilla line. J Forensic Dent Sci. 2014;6:92-96.
6. Avhad R, Tembhurne J, Sar R. Evaluation of the relation of maxillary canine and edge of cenral incisor to incisive papilla in Indian population with respect to arch form. J Indian prosthodont soc. 2014;3:228-232.
7. Harper RN. The incisive papilla: The basis of a technic to reproduce the positions of key teeth in Prosthodontia. J.D.Res.1948;27:661-668.
8. Shrestha K, Shrestha P. A study on the relationship of maxillary central incisors to incisive papilla in Nepalese Population. JNDA 2015;15:1-5.