

ORIGINAL ARTICLE

Frankfort mandibular plane angle as a guide in anterior teeth selection and esthetics of the edentulous patients: A retrospective study

Tarun Kumar¹, Neha Arora², Nandeeshwar D. B³,

¹M.D.S., Sr.Lecturer, Department of Oral Medicine and Radiology, Yamuna Institute of Dental Sciences and Research, Yamunanagar, Haryana, India, ²M.D.S., Sr.Lecturer, Department of Prosthodontics, Yamuna Institute of Dental Sciences and Research, Yamunanagar, Haryana, India, ³M.D.S. HOD & Professor, Department of Prosthodontics, Bapuji Dental College and Hospital, Davangere, Karnataka, India.

ABSTRACT:

Background: It is truly said that “Nature has blessed with a marvelously dynamic stomatognathic system, allowing to function and therefore exist.” A multidisciplinary approach should be considered to restore form, function and esthetics in the management of edentulous patients. Esthetics is the major concern which reveals the external beauty of the person. And anterior teeth section is one of the major concern for restoring it. **Materials & Methods:** A retrospective study was conducted including 80 edentulous subjects with age ranging from 20-30 years. The Frankfort - mandibular plane angle, upper lip length and size of the maxillary incisors was determined. The data obtained was tabulated and subjected to statistical analysis using descriptive analysis and multiple logistic regression in SPSS 20.0, Chicago, USA. **Results:** Pearson’s correlation (r) for age, Frankfort - mandibular plane angle, upper lip length and length of central incisors was 0.67, 0.83, 0.72 and 0.52. The p-value of less than 0.05 was obtained, showing the results to be significant. On applying multiple logistic regression, a mathematical equation was obtained for calculating the length of central incisors based on the known values of other parameters. **Conclusion:** The radiographic method can be used as an adjunct to determine the size of the artificial teeth within the limitations of the study.

Key words: Anterior teeth selection, Radiographic method, Cephalogram, Edentulous patients.

Corresponding author: Tarun Kumar, M.D.S., Sr.Lecturer, Department of Oral Medicine and Radiology, Yamuna Institute of Dental Sciences and Research, Yamunanagar, Haryana, India

This article may be cited as: Tarun Kumar, Neha Arora, Nandeeshwar D. B., Frankfort mandibular plane angle as a guide in anterior teeth selection and esthetics of the edentulous patients: A retrospective study. J Adv Med Dent Scie Res 2017;5(12):147-150.

INTRODUCTION

A smile is one of the most powerful expressions and a universal welcoming greeting in all cultures. With aging and subsequent loss of teeth, the smile is severely compromised and may not be so pleasant any more.¹ The position of the maxillary and mandibular anterior teeth makes critical contribution to the smile the person.² The artificial replacement of teeth primarily aims to restore the previous natural appearance, function, and smile of the patient. Cephalometric applications in clinical prosthodontic practice have been well recognized in the recent years.³ The principle of cephalometric analysis helps to compare the patient to a normal reference groups so that differences between the patient’s actual dentofacial relationships and those expected for his or her racial group are revealed.³ This can actually enhance the capability the prosthodontist to give a more natural smile to the patients. So, a study was conducted to evaluate the correlation between the Frankfort - mandibular plane angle, upper lip length with size of the maxillary incisors.

MATERIALS & METHODS

The present study included 80 edentulous, male and female (40 each) subjects from the Orthodontic Department, of the Dental College, with age ranging from 20-30 years. Retrospective data including case sheets, maxillary models and lateral cephalogram were evaluated for each of the

subject. Ethical clearance was obtained from the Institutional Ethical Committee. Each patient included in the study was subjected to inclusion and exclusion criteria as follows:

Inclusion Criteria:4

- 1) Subjects with Class I molar relationship.
- 2) Subjects with age above 18 years, as facial growth will essentially be complete.
- 3) Subjects having a minimum of 28 teeth in occlusion.
- 4) Subjects with all the teeth in proper alignment.

Exclusion Criteria:4

- 1) History of orthognathic surgery.
- 2) History of periodontal surgery
- 3) Restoration of teeth.
- 4) Congenital facial defects.

Materials used:

Sharp lead pencil, metallic scale, tracing paper, digital vernier caliper, protector and radiographic viewing box were used.

Procedure:

- A.) Determination of Frankfort - mandibular plane angle:

The lateral cephalogram was taken from the records of the patient and tracing of various landmarks was done on the tracing paper.⁵ The angle between Frankfort horizontal plane and mandibular plane was measured using protector. (Photograph 1)

B.) Determination of length the upper lip:
On the cephalograms, the radiographic length of the upper lip was measured according to Rickett's analysis.⁶ The length between point ANS to Ls was measured using digital vernier caliper and recorded. (Photograph 2)

C.) Determination of length of maxillary central incisor:
The maxillary cast was taken from the records of the patient and length of the maxillary central incisors was measured using digital vernier caliper and recorded. (Photograph 3)
The data obtained was tabulated and subjected to statistical analysis using descriptive analysis and multiple logistic regression in SPSS 20.0, Chicago, USA.

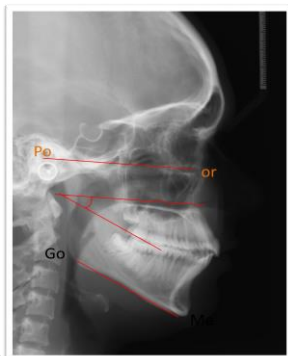
RESULTS:

Descriptive analysis showed that, the mean age of the patients included in the study was 21.18 (SD 1.629) years. Frankfort - mandibular plane angle showed a mean value of

22.96 (SD 4.205) degrees. Mean value for the upper lip length was 20.78 (SD 1.824) mm. The length of maxillary central incisors showed a mean value of 10.15 (SD 0.951) mm. Pearson's correlation (r) for age, Frankfort - mandibular plane angle, upper lip length and length of central incisors was 0.67, 0.83, 0.72 and 0.52 respectively. (Figure 1, 2 and 3) The p-value < 0.05 was obtained, showing that the results were statistically significant. Application of multiple logistic regression on the data lead to a mathematical equation that can be employed to calculate the length of central incisors in complete denture fabrication. The equation was:

$$\text{Length of Central Incisors (mm)} = 8.834 + 0.083(A) - 0.124(G) + 0.045 (FMP) + 0.009(L)$$

Where, A= age of the patient in years, G= gender of the patient (males=1 and females=2), FMP= Frankfort - mandibular plane angle in degree and L= upper lip length in mm. The results showed a standard error of 0.541.



1.) Photograph 1: Determination of Frankfort - mandibular plane angle.

Photograph 2: Determination of length the upper lip.

Photograph 3: Determination of length of maxillary central incisor.

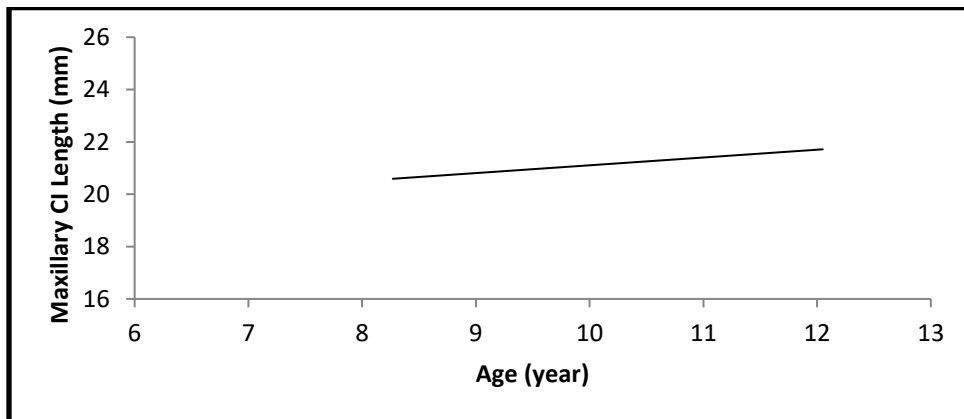


Figure 1: Correlation of Maxillary Central Incisor Length with Age of the patient.

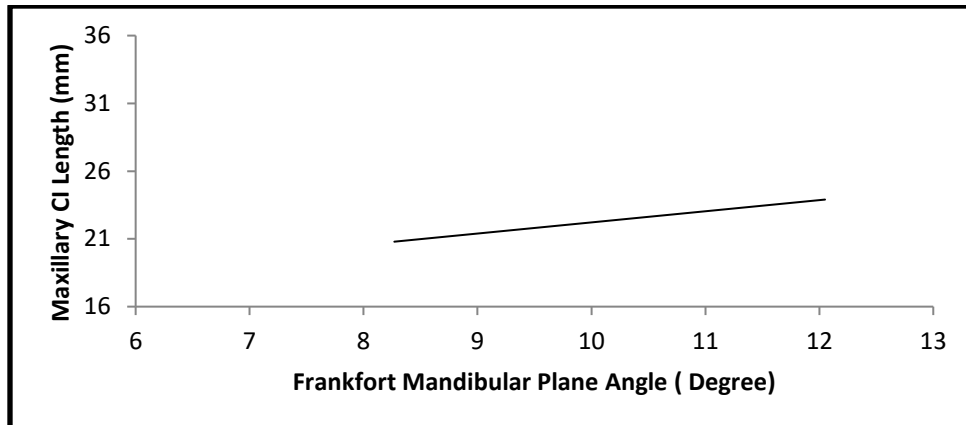


Figure 2: Correlation of Maxillary Central Incisor Length with FM Plane Angle.

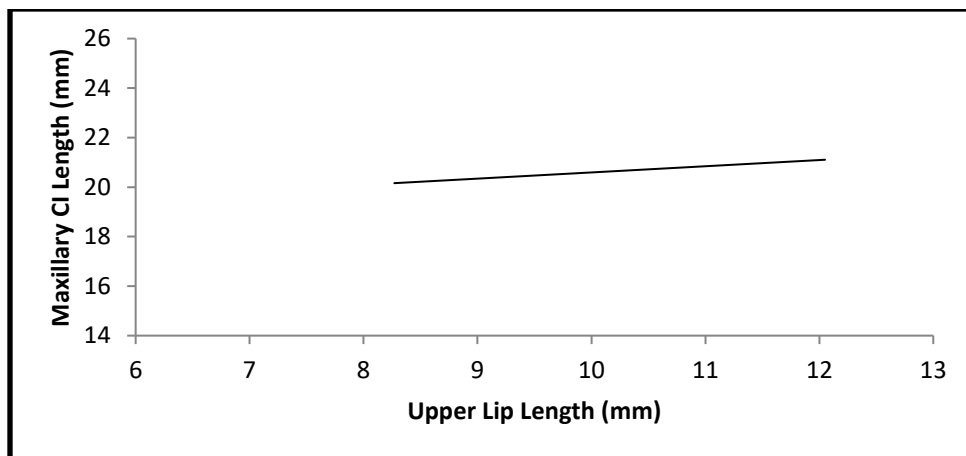


Figure 3: Correlation of Maxillary Central Incisor Length with Upper Lip Length.

DISCUSSION

A number of clinical methods are available for the anterior teeth selection. Interpupillary distance and bizygomatic width are some of the commonly followed methods.⁷ Though these methods reported good results, but all of these methods are arbitrary.^{8,7} The present article within the limitation of the study showed that radiographic method can also be employed to determine the size of central incisor in artificial denture. This method can be used as an adjunct to other methods to confirm the size of the artificial teeth mathematically. The main drawback of the study is the added exposure of the patient to the ionizing radiation that can be reduced by following the principle of ALARA.

CONCLUSION

This radiographic method can also be employed to determine the size of central incisor in artificial denture.

REFERENCES

1. Swenson MG. Complete denture. 6th ed. St Louis: Mosby Company; 1970, p. 177-80.
2. Payne AGL: Factors influencing the position of artificial upper anterior teeth. J Prosthet Dent. 26: 26-33, 1971.
3. Reitz PV, Aoki H: Masao-Yoshioka: A cephalometric study of tooth position as related to facial structures in profiles in human beings. J Prosthet Dent, 29: 157-165, 1973.
4. Sreenivasulu Kune. The Inclination And Position Of Mandibular Incisor Teeth In Dentures And Natural Dentition. Annals And Essences Of Dentistry Vol III. Issue 4 Oct- Dec 2011.
5. Radiographic cephalometry from basics to 3-D analysis. 2nd ed. RICHARD L. JACOBSON. Page 45-52, Aug-2006.
6. Ricketts R.M.A Foundation for Cephalometric Communication. Am. J. Orthodontics. 1960; 46: 330-357.

7. Sellen PN, Jagger DC, Harrison A. Methods used to select artificial anterior teeth for the edentulous patient: a historical overview. *Int J Prosthodont.* 1999 Jan-Feb;12(1):51-8.
8. M. Vasantha Kumar, S. C. Ahila, and S. Suganya Devi. The Science of Anterior Teeth Selection for a Completely Edentulous Patient: A Literature Review. *J Indian Prosthodont Soc.* 2011 Mar; 11(1): 7–13.

Source of support: Nil

Conflict of interest: None declared

This work is licensed under CC BY: ***Creative Commons Attribution 3.0 License.***

@Society of Scientific Research and Studies [Regd.]