

CORRELATION OF INTER CANINE WIDTH WITH VERTICAL FACIAL MORPHOLOGY IN PATIENTS SEEKING ORTHODONTIC TREATMENT

¹AMBER FAROOQ

²AMJAD MAHMOOD

³ABDUL JABBAR

ABSTRACT

It is generally accepted that an important relationship exists between the arch width and vertical facial morphology. The size and form of the dental arches can have considerable implications on orthodontic diagnosis and treatment planning. The objective of this study was to determine relationship between inter canine width and vertical facial morphology in a sample of patients seeking orthodontic treatment. This cross sectional comparative study was conducted at out patients department of Orthodontics, KRL Hospital, Islamabad from 11-03-2010 to 11-09-2010. 100 subjects were included in the study. 100 lateral cephalometric radiographs and dental casts were obtained, and traced. On lateral cephalograph, SN-MP angle was measured. On dental casts inter-canine widths were measured. When comparison was made between Inter-canine width with SN-MP angle, the p-value for all the results was significant with a p value <0.05. It was concluded from this study that there is a statistically significant relationship between inter canine widths and vertical facial morphology.

Key Words: Arch width, Vertical facial morphology, inter-canine width.

INTRODUCTION

Facial esthetics has always been a vital part of our society. In this new era, facial harmony is of paramount value to dentists and especially to orthodontists. While treating an orthodontic patient, our aim is not only to correct the malocclusion but also to improve facial esthetics and profile. That is why during treatment planning, orthodontists have to rely on different diagnostic parameters.

Various cephalometric analyses have been developed to study the relationship of teeth with each other and with skeletal bases in the sagittal and vertical planes. Vertical facial pattern of face can be determined by a number of factors, among which SN-MP angle is one of the most important.¹⁻⁴ Facial types are determined by different parameters, such as ratio between the lower and upper anterior facial height, the angle formed between the mandibular plane and the base of the skull, and the gonial angle.⁵⁻⁸ A subject with high

SN-MP angle tends to have a long face, and one with low SN-MP angle often has a short face.^{5,9}

In a study, the relationship between dental arch width and vertical facial morphology were determined.¹ Ricketts et al. (1982), Enlow and Hans (1996) and Wagner and Chung (2005)¹ reported that a long-face individual usually has narrow transverse dimension and a short-face individual has wider transverse dimension.

The changes in the dental arch dimensions that occur as a result of growth and treatment are of interest to the orthodontist, and require careful consideration during treatment planning. A greater understanding of these changes could influence the formulation of the treatment and retention plans by the clinician.⁹⁻¹²

Clinically, preformed arch wires are routinely used by many orthodontists regardless of the facial type and gender of the patients. The purpose of the present study was to investigate the correlation of dental arch width with vertical facial patterns. This will help us to determine which arch wires to be used in individual facial types.

METHODOLOGY

A cross sectional study was conducted from 11.03.2010 to 11.09.2010 at out patients department of Orthodontics, KRL Hospital, Islamabad. Male and female patients having permanent dentition up to first

¹ Amber Farooq, BDS, FCPS, Assistant professor, Abbotabad international medical and dental college Abbotabad
Email: ambersaeedkhan@hotmail.com Cell: 0333-4257421

² Amjad Mahmood, BDS, FDS RCS Ed (UK), Associate professor, Margalla Institute of Health Sciences, Rawalpindi
Email: amjadasim84@hotmail.com Cell: 0344-9557738

Correspondance Author: Abdul Jabbar, BDS, FCPS, Assistant Professor Orthodontics, Liaquat University of Medical and Health Sciences Jamshoro

Email: a_jabbar_lumhs@hotmail.com Cell: 0333-2608489

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permanent molar, no supernumery tooth, no permanent tooth extraction before the study (excluding 3rd molar) and no skeletal asymmetry were included in the study. Patients who had received previous orthodontic treatment, unilateral or bilateral posterior cross bites were excluded from the study.

PASS software was used to calculate the sample size. A sample size of 100 was calculated. Patients' history was taken and clinical examination was done to confirm the inclusion criteria. Patients' impression was taken and casts were made out of them. A Vernier caliper was used to take the measurements on the dental casts. The following maxillary and mandibular measurements were taken:

Inter-canine width: taken from the buccal cusp tip of the left canine to the buccal cusp tip of the right canine.⁵ Lateral cephalograph was taken and each radiographic film was traced on 8 x 10 inch standard translucent acetate tracing paper, over a standard illuminated view box with lead pencil.

For each individual SN-MP angle was measured. The data was analyzed using SPSS version 10. Descriptive statistics were used to calculate mean and SD for age, inter-canine width and SN-MP angle. Frequency and percentage were presented for gender. Pearson's correlation coefficient was determined for the correlation of inter-canine width and SN-MP angle. *r* value was determined between -1.0 and +1.0.

RESULTS

A total of 100 untreated adults were selected in this cross sectional study to find out the correlation between inter-canine width and vertical facial morphology in patients seeking orthodontic treatment. The minimum age was 12 years whereas the maximum age of patients was 38 years with a mean age of 15.62 ± 4.974 years. In this study sample, there were 66 (66%) females and 34 (34%) males.

The distribution of SN-MP angle showed that the mean SN-MP angle was 33.33 ± 5.284 with a minimum angle of 24 and maximum of 46 degrees. There were 18 (18%) persons who had low SN-MP angle (< 27), 54 (54%) had normal SN-MP angle (28-36) and 28 (28%) participants of the study had high SN-MP angle.

The inter-canine width of maxilla was significantly (p -value < 0.05) different in low, normal and high SN-MP angle with means of 35 ± 2.475 , 33.73 ± 2.158 and 32.77 ± 3.213 mm respectively, that is the mean inter-canine width decreased as the SN-MP angle increased. (Table 1)

Similarly the means of inter-canine width of mandible decreased significantly (p -value < 0.05) as the SN-MP angle increased with mean values of 29.31 ± 3.544 mm, 26.97 ± 2.685 mm and 25.39 ± 2.447 mm respectively. (Table 2)

To find out the correlation of SN-MP angle with inter-canine width of maxilla, Pearson correlation analysis was applied whose result showed that there was statistically significant but weak correlation between SN-MP angle and inter-canine width of maxilla in this study. The value of (Pearson correlation coefficient) $r = -0.226$ with p -value < 0.05 . Showed that the relationship between SN-MP angle and inter canine width of maxilla was inverse and significant. (Table 3) The correlation of SN-MP angle with inter-canine width of mandible was weak with $r = -0.431$ but significant statistically (p -value < 0.05). (Table 4)

TABLE 1: OVERALL DISTRIBUTION OF INTER-CANINE WIDTH IN MAXILLA WITH RESPECT TO SN-MP ANGLE

SN-MP Angle categories	N	Mean	Std. Deviation	P-value
Low Angle	18	35.42	2.475	0.004*
Normal Angle	54	33.73	2.158	
High Angle	28	32.77	3.213	

* Statistically significant at 5% level of significance

TABLE 2: OVERALL DISTRIBUTION OF INTER-CANINE WIDTH OF MANDIBLE WITH RESPECT TO SN-MP ANGLE

SN-MP Angle categories	N	Mean	Std. Deviation	P-value
Low Angle	18	29.31	3.544	0.000*
Normal Angle	54	26.97	2.685	
High Angle	28	25.39	2.447	

* Statistically significant at 5% level of significance

TABLE 3: CORRELATION OF SN-MP ANGLE WITH INTER CANINE WIDTH (MAXILLA)

Correlations		Inter canine width (Maxilla)
SN-MP angle	Pearson Correlation	-.226(*)
	Sig. (2-tailed)	.024
	N	100

* Correlation is significant at the 0.05 level (2-tailed).

TABLE 4: CORRELATION OF SN-MP ANGLE WITH INTER CANINE WIDTH (MANDIBLE)

Correlations		Inter canine width (Mandible)
SN-MP angle	Pearson Correlation	-.431(**)
	Sig. (2-tailed)	.000
	N	100

** Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION

Correction of vertical dysplasia is very important in achieving a balanced profile after orthodontic treatment. In this study more female subjects were present as the sample was not collected on the basis of gender. As far as the distribution of sample according to SN-MP angle was concerned, patients with normal angle were more as compared to the patients in the other groups.

As per the results of this study mean inter-canine width decrease as the vertical angle increases hence individualized arch forms should be used in patients with variable vertical pattern. This confers to the basic law of stability according to which arch dimensions should not be changed especially across the canines. Use of arch expansion mechanics in patients with increased SN-MP angle should be at all avoided or used with maximum caution.

In comparison with a study performed by Forster CM, Sunga E, Chung CH⁵ for the maxillary arch, there was a statistically significant inverse relationship between the mandibular plane angle and dental arch widths. However, statistical analysis showed that the *r* value was small, which suggests that the correlation was not very strong. Similarly in this study, results showed that there was statistically significant and weak correlation between SN-MP angle and inter-canine width of maxilla.

For the mandibular arch, there was statistically significant correlation between the mandibular plane angle and mandibular inter-canine widths. Similar to the maxillary arch, the *r* value was small, suggesting the correlation was not strong.⁵

The study performed by Forster CM, Sunga E, Chung CH⁵ included only skeletal Class I (as determined by ANB angle) subjects, contrary to our study which included all malocclusion groups. Because more dental compensation is expected in skeletal Class II or III subjects, which might obscure the relationship between vertical facial morphology and transverse dental arch widths. This was one of the limitations of our study.

Our study did not compare the difference of arch widths on basis of gender, like the previous studies by Howes, 1957; Isaacson et al, 1971; Nasby et al, 1972; Schulhof et al, 1978.¹³⁻¹⁷ but another study⁵ investigated untreated adult males and females separately which showed a significant differences in maxillary and mandibular arch widths in males and females.

Ideally, this type of study should have been conducted on patients with ideal dentitions without any crowding or spacing. However, due to difficulties in finding ideal untreated subjects and subsequent limitations in sample size, the degree of crowding and spacing was not included in the accepted criteria.

CONCLUSION

In both males and females, as SN-MP angle increased inter canine width tended to decrease in both maxilla and mandible. There is significant but weak correlation of SN-MP angle with inter canine width.

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