



To Evaluate The Average Inclination Values of Central Incisors and Canines in Different Types of Arch Forms in Gujarati Population

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KEYWORDS :

INTRODUCTION

Orthodontist aims to align and place teeth in harmony with each other when in occlusion. The importance of achieving an ideal occlusion that is in harmony with the face has not diminished since the time of Angle. 1

The result of Andrew's assessment of 120 non orthodontic normal casts was his " six keys to normal occlusion These keys helped the orthodontist to appreciate the significance of occlusion and served as yardstick for critically analyzing treatment results. It proved that, despite the voluminous information from studies on occlusion, occlusion could still be simply explained. The findings of Andrews's study served as the foundation for the development of the straight wire appliance. This started the era of pre-adjusted edgewise appliance. Since the introduction of pre-adjusted edgewise appliance, it is being extensively used all over the world, including India.2

It is indicated that all the patient with different arch form will be having different crown inclination and thus the single prescription cannot be used applied to all the arch form. Hence is a need to establish the norms for torque in accordance with the type of arch form in the local population and to find out if they are comparable or in variance with those established by Andrews, which forms the basis of the bracket prescription of most pre-adjusted edgewise appliance systems.

The present study was carried out to study central incisors and canine torque values in 3 different arch forms (tapered, ovoid & square) in subjects from Gujarat, who were having ideal occlusion, well balanced profiles and no previous history of orthodontic treatment.

AIMS AND OBJECTIVES

The aim of this study is to evaluate and compare the average inclination value of central incisors and canines in three different types of arch forms in Gujarati population.

Objectives of the study:

To evaluate the inclination of central incisors and canines in tapered arch form.

To evaluate the inclination of central incisors and canines in ovoid arch form.

To evaluate the inclination of central incisors and canines in square arch form.

To compare the inclination values of central incisors and canines in three different types of arch forms.

MATERIALS AND METHODS

A set of study models of subjects attending the Department of Orthodontics and Dentofacial Orthopaedics and students at K.M. Shah Dental College & Hospital, Sumandeep University, Vadodara, Gujarat. 20 subjects for each of the 3 arch forms namely Tapered, Ovoid & Square which makes a total sample size of 60 subjects will be selected based on the above mentioned criteria. Inclusion criteria: Subjects in the age group of 18-30 years, Subjects having well balanced profiles, Subjects having class I normal occlusion, Subjects with normal overjet and overbite, No history of orthodontic treatment. Exclusion criteria: Presence of large overjet and overbite, Class II and Class III molar relation, Subjects with congenital dental anomalies.

METHODOLOGY

After selecting the samples to be included in our study as per the study design from OPD of the department of orthodontics, K.M.S.D.C.H, an alginate impression of upper and lower arches were taken, which was followed by study models preparation. The facial axis of clinical crown and its midpoint, the facial axis-point was marked on each crown of the both maxillary and mandibular arch. The facial axis clinical crown (FACC) is the reference line from which crown inclination is measured. The Crown inclination/Torque measurement will be carried out with the cast mounted on the base of the device facing the protractor on the movable datum adjusted to the eye-level of the examiner to avoid parallax error. The protractor will be positioned at right angles to the line that would connect the contact point of the crown being measured. The protractor's read out arm will be adjusted to be parallel and tangent to the FACC at facial axis point, and the inclination of the crown will read on the protractor's scale. Fig 1



Fig 1

OBSERVATIONS AND RESULTS

The results of the study have been tabulated in the following manner.

Table 1 : Inclination/Torque values of Central Incisor in Maxillary and Mandibular Arches in Ovoid, Square and Tapered Arch forms.

Table 2 : Comparison of Inclination/Torque values of Central Incisor in Maxillary and Mandibular Arches in Ovoid, Square and Tapered Arch forms.

Table 3 : Inclination/Torque values of Canine in Maxillary and Mandibular Arches in Ovoid, Square and Tapered Arch forms.

Table 4 : Comparison Inclination/Torque values of Canine in Maxillary and Mandibular Arches in Ovoid, Square and Tapered Arch forms.

TABLE 1

Arch form	Arch	Mean ± SD	Range (min-max)	95% CI (mean ± 2SD)
Square	MAXILLA (11,21)	13.77° ± 2.30°	10° – 17°	12.69° - 14.85°
	MANDIBLE (31,41)	5.80° ± 1.90°	3° - 9.5°	4.90° - 6.69°
Ovoid	MAXILLA (11,21)	14.22° ± 2.27°	11° - 18.5°	13.15° - 15.29°
	MANDIBLE (31,41)	5.47° ± 2.41°	0.0° - 10.0°	4.32° - 6.60°
Ta-pered	MAXILLA (11,21)	15.86° ± 2.32°	10° - 19.5°	14.77° - 16.94°
	MANDIBLE (31,41)	6.75° ± 1.97°	4° - 10°	0.44° - 5.82°

TABLE 2

ARCH FORM	MAXILLA MEAN ± SD	MANDIBLE MEAN ± SD
Square	13.77° ± 2.30°	5.80° ± 1.90°
Ovoid	14.22° ± 2.27°	5.47° ± 2.41°
Tapered	15.86° ± 2.32°	6.75° ± 1.97°
ANOVA F P	4.55 P < 0.01 , S	1.96 P < 0.01 , S
Sq – Ov	P = 0.8	P = 0.87
Sq – Tap	P = 0.01	P = 0.33
Ov – Tap	P = 0.07	P = 0.14

TABLE 3

Arch form	Arch	Mean ± SD	Range (min-max)	95% CI (mean ± 2SD)
Square	MAXILLA (13,23)	-5.25° ± 1.19°	-4.68° - -7.5°	-5.81° - -4.68°
	MANDIBLE (33,43)	-4.42° ± 1.59°	-8.50° - -1°	-5.1° - -3.67°
Ovoid	MAXILLA (13,23)	1.34° ± 1.14°	-1° - 3.25°	0.77° - 1.84°
	MANDIBLE (33,43)	1.37° ± 0.91°	0.0° - 3.0°	0.94° - 1.8°
Tapered	MAXILLA (13,23)	8.78° ± 1.41°	7.0° - 11.25°	8.12° - 9.44°
	MANDIBLE (33,43)	7.10° ± 0.34°	6.5° - 7.5°	6.9° - 7.2°

TABLE 4

ARCH FORM	MAXILLA MEAN ± SD	MANDIBLE MEAN ± SD
Square	-5.25° ± 1.19°	-4.42° ± 1.59°
Ovoid	1.34° ± 1.14°	1.37° ± 0.91°
Tapered	8.78° ± 1.41°	7.10° ± 0.34°
ANOVA F P	625.6 < .001 , S	566.0 < .001 , S
Sq – Ov	P < .001	P < .001
Sq – Tap	P < .001	P < .001
Ov – Tap	P < .001	P < .001

DISCUSSION

When the central incisor values both in maxilla and mandible in all the three arch forms were compared with each other it was found that the difference between each was not significant.

When central incisors torque values in maxillary arch in square arch form was compared with ovoid, the 'P' value was 0.8 which means it is not significant.

When central incisors torque values in maxillary arch in square arch form was compared with tapered, the 'P' value was 0.01 which means it is not significant.

When central incisors torque values in maxillary arch in ovoid arch form was compared with tapered, the 'P' value was 0.07 which means it is not significant.

When central incisors torque values in mandibular arch in square arch form was compared with ovoid, the 'P' value was 0.87 which means it is not significant.

When central incisors torque values in mandibular arch in square arch form was compared with tapered, the 'P' value was 0.33 which means it is not significant.

When central incisors torque values in mandibular arch in ovoid arch form was compared with tapered, the 'P' value was 0.14 which means it is not significant.

The values in this study when compared to MBT prescription7 in max-illa and mandible showed more canine crown prominence in Gujarati population.

The MBT philosophy7 uses only one type of upper incisor bracket to provide torque of (17°).

The MBT philosophy7 uses only one types of lower incisor brackets to provide a torque of (-6°).

As there is no prescription available commercially which matches with values in the study therefore customized brackets can be used or else a prescription whose values are closest to the values in the study can be used for Gujarati population.

In maxillary arch the readings in the present study for square, ovoid and tapered are -+13.77°, +14.22° and +15.86 ° respectively and MBT values7 are -17°.

In mandibular arch the readings in the present study for square, ovoid and tapered are +5.80°, +5.47° and +6.7° respectively and MBT val-ues7 are -6°.

An orthodontist must take arch form into consideration before selecting the bracket prescription for each case.

When the canine values both in maxilla and mandible in all the three arch forms were compared with each other it was found that the difference between each was significant.

When canine torque values in maxillary arch in square arch form was compared with ovoid, the 'P' value was < 0.001 which means it is significant.

When canine torque values in maxillary arch in square arch form was compared with tapered, the 'P' value was < 0.01 which means it is significant.

When canine torque values in maxillary arch in ovoid arch form was compared with tapered, the 'P' value was < 0.01 which means it is significant.

When canine torque values in mandibular arch in square arch form was compared with ovoid, the 'P' value was < 0.001 which means it is significant.

When canine torque values in mandibular arch in square arch form was compared with tapered, the 'P' value was < 0.001 which means it is significant.

When canine torque values in mandibular arch in ovoid arch form was compared with tapered, the 'P' value was < 0.001 which means it is significant.

The mean canine torque value in this study for maxilla is $+1.55^\circ$ which is more than Andrew's¹ value of -7° and for mandible is $+1.2^\circ$ which is also more than -11° which indicates more labial crown torque, both in maxilla and mandible.

The mean canine torque value in this study for maxilla is $+1.55^\circ$ which more than Roth's⁸ and Alexander's⁹ value of -2° & -11° respectively and for mandible is $+1.2^\circ$ which is also more than -11° & -7° which indicates more labial crown torque, both in maxilla and mandible.

The values in this study when compared to MBT prescription⁷ in maxilla and mandible showed more canine crown prominence in Gujarati population.

The MBT philosophy⁷ uses two types of upper cuspid bracket to provide three possible torque options (-7° , 0° , $+7^\circ$).

The MBT philosophy⁷ uses two types of lower cuspid brackets to provide three torque options (-6° , 0° , $+6^\circ$).

As there is no prescription available commercially which matches with values in the study therefore customized brackets can be used or else a prescription whose values are closest to the values in the study can be used for Gujarati population.

In maxillary arch the readings in the present study for square, ovoid and tapered are -5.25° , $+1.34^\circ$ and $+8.78^\circ$ respectively and MBT values⁷ are -7 , 0 , $+7$.

In mandibular arch the readings in the present study for square, ovoid and tapered are -4.42° , $+1.37^\circ$ and $+7.10^\circ$ respectively and MBT values⁷ are -6 , 0 , $+6$.

CONCLUSION

After thorough analysis of the current study we can say that there is no prescription available commercially which matches with values in the study therefore customized brackets can be used or else a prescription whose values are closest to the values in the study can be used for Gujarati population. The MBT philosophy⁷ uses two types of upper cuspid brackets to provide three possible torque options (-7° , 0° , $+7^\circ$) and two types of lower cuspid brackets to provide three possible torque options (-6° , 0° , $+6^\circ$). An orthodontist must take arch form into consideration before selecting the bracket prescription for each case.

References

1. Andrews LF. Straight wire. The concept and appliance. First edition, LA. Wells Co.
2. Currim S. Wadkar PV. Objective assessment of occlusal and coronal characteristics of untreated normals: A measurement study. *Am J Orthod Dentofacial Orthop* 2004; 125:582-588.
3. Dcwd BF. Clinical observations on the axial inclination of teeth. *Am J Orthod* 1949; 35:98-115.
4. Dempster WT, Adams WJ, Duddles RA. Arrangements in the jaws of the roots of the teeth. *J Am Dent Assoc* 1963;67:779-97.
5. Andrews LF. The six keys to normal occlusion. *Am J Orthod* 197
6. Allen C Brader. Dental arch form related to intraoral force PR = C. *Am J Orthod Dentofacial Orthop* 1972; 61:541-561.
7. Mc. Laughlin, Bennet and Trevisi. Systemized orthodontic treatment mechanics III, CV Mosby, 2001.
8. Roth RH. Roth straight wire appliance philosophy. San Diego, California: "A" Company, Inc., 1979.
9. Alexander RG. The varisimplex discipline. Part 1. Concept and appliance design. *J Clin Orthop* 1983; 17:380-92.