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CROWN ANGULATION AND INCLINATION OF NORTHERN THAIS WITH GOOD OCCLUSION

When patients of differing ethnicities are treated with one bracket system, negative consequences for the occlusion can result. This study investigated the crown angulation and inclination on study casts of 60 Northern Thais (30 males and 30 females) with a good occlusion. In all study casts, each tooth (except the third molars) was evaluated with the orthodontic Torque Angulation Device (TAD) twice on the right side; this was also performed twice on the left side. The mean of the two evaluations was used for the statistical analysis. The means of the males and females were compared with the independent Student t *test. The results were that the crown angulation of the mandibular first and second molars was significantly higher in females (*P *<.01) and that the crown inclination of all teeth did not differ between the two sexes.* World J Orthod 2010:71–74.

***Key words**: crown inclination, crown angulation, Northern Thais, normal occlusion, Torque Angulation Device*

Accurate bracket positioning is of critical importance for biomechanics and the realization of the potential of preadjusted edgewise appliances. Precise measurements of crown angulation and inclination are crucial for the construction of brackets for a specific population.

The advent of sophisticated appliances and materials has helped raise the standard of orthodontic treatment. As a result, achieving an ideal occlusion has become a realistic aim. The current concepts of ideal static occlusion are based on Andrews' keys of normal occlusion, of which crown angulation and inclination are important features.[1] Andrews stated that if these key factors are not achieved, there will be a space discrepancy in the dental arch or the occlusion will be compromised.[1] Crown angulation and inclination vary among populations. Only one study to date has described these parameters in Northern Thais. The measuring device used in this investigation was a modified protractor.[2] The orthodontic Torque Angulation Device (TAD) is a device that measures crown angulation and inclination in a precise and objective fashion.

MATERIALS AND METHODS

The materials comprised 60 plaster casts and facial and intraoral photographs of Northern Thais (30 males and 30 females) from the Department of Orthodontics, Faculty of Dentistry, Chiang Mai University, Thailand. The age distribution by sex and the number of teeth are shown in Table 1.

Inclusion criteria were:

- Excellent or good occlusion with normal overjet and overbite
- No or only slight incisor crowding
- Pleasing profile
- No interproximal caries or extensive restorations
- No previous orthodontic intervention

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Table 1 Mean age (y), standard deviation (SD), minimum, maximum, and sample size separately and combined for both sexes

	Age	SD	Minimum	Maximum	Total subjects
Males	20.18	1.60	16.30	25.90	30
Females	19.19	2.62	15.60	28.80	30
Combined	20.00	2.30	15.60	28.80	60

Fig 1 (right) The orthodontic Torque Angulation Device (TAD). The blade was set to lie along to long axis of the clinical crown by adjusting the fine angulation knob. The crown angulation was read from a digital screen.

Seven orthodontists evaluated all records to exclude any subject with an unacceptable occlusion or facial appearance.

On all casts, all teeth (except the third molars) on the right side were evaluated twice with the orthodontic Torque Angulation Device (TAD). The evaluation was also performed twice on the left side. The study casts were fixated on an adjustable table with the horizontal occlusal line (HOL) parallel to the TAD platform (Fig 1). The HOL is an imaginary line connecting the right and left midcrown molar points and the average of the clinical midcrown points of both central incisors.

The crown angulation was measured according to Andrews[1]: The long axis of clinical crown (LACC) was drawn on the labial surface of the clinical crown of every tooth (Fig 2). On the LACC of each tooth, the midpoint of the clinical crown (LA point) was marked. It was constructed by bisecting the height of the clinical crown (with 1.0 mm added for the gingival sulcus) on the LACC.

The model was then moved toward the blade of the TAD. At the same time, the table was adjusted in height. When the blade was running along the LACC, the crown angulation could be read on the display.

The crown inclination was recorded by moving the model until the middle of the blade coincided with the LA point and the curvature of the blade fitted optimally the vestibular surface of the tooth being measured. After this adjustment, the crown inclination was displayed.

Statistical methods

The mean of the first and the second measurement was used for the statistical analysis. If the independent Student *t* test showed no significant difference between the right and left side, the values from both sides were combined. The independent Student *t* test was also used to compare the means of the males and females. To test the reliability of the measurements, the intraobserver difference was calculated on six randomly selected models. Pearson correlation coefficient (*r*) was 0.978.

RESULTS

Box plots of the crown angulation of all teeth (right and left sides combined) of both sexes are shown in Fig 3. The crown angulation of the mandibular first and second molars was significantly higher ($P < .01$) in females.

Box plots of the crown inclination of all teeth (right and left sides combined) of both sexes are shown in Fig 4.

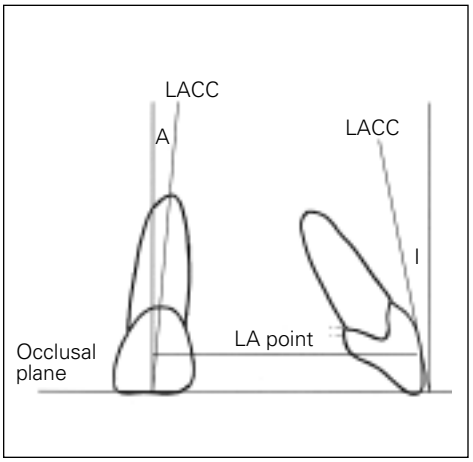

Fig 2 Construction of the long axis of the clinical crown (LACC) and the midpoint of the clinical crown (LA point) to evaluate crown angulation (A) and inclination (I). By connecting the average of the LA-points of the two central incisors with the mid-crown molar points, the horizontal occlusal line (HOL) is established as a reference line.

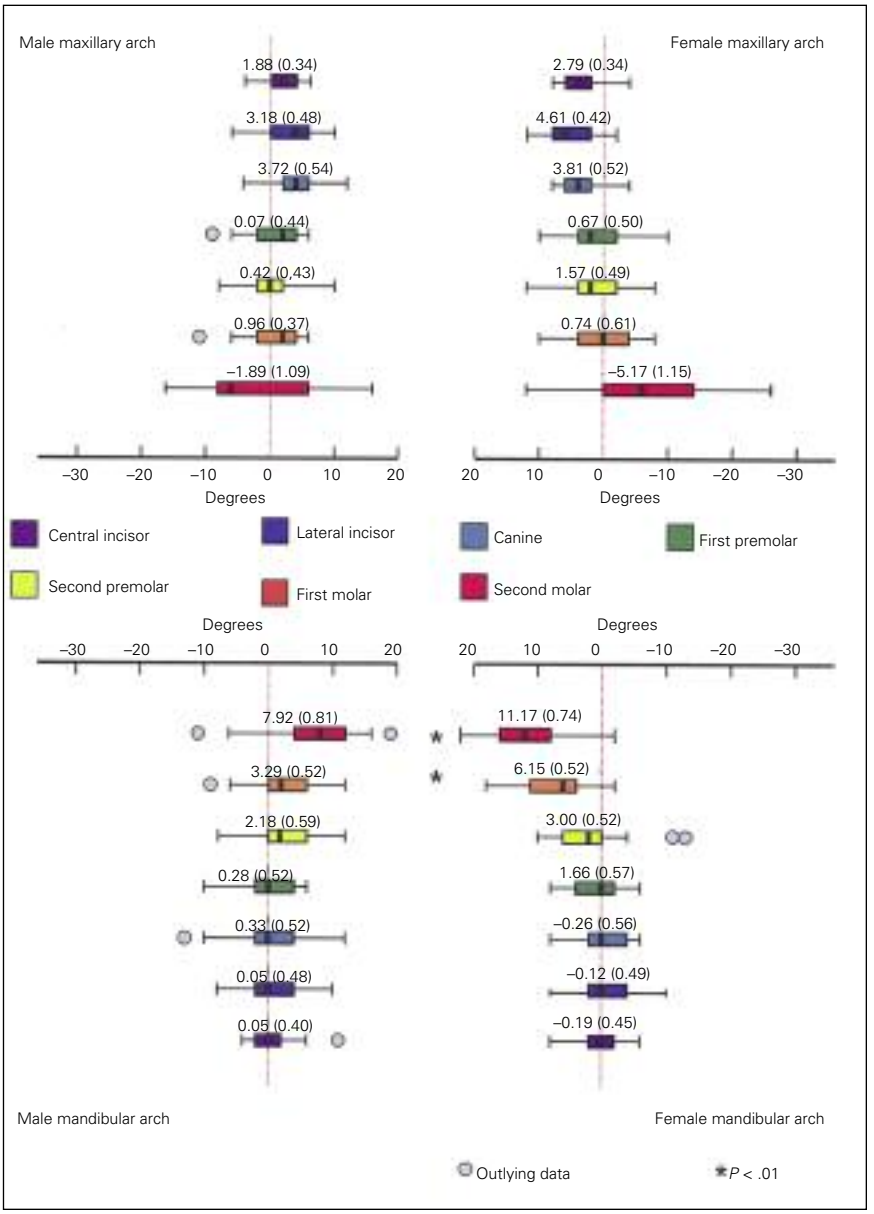

Fig 3 Box plot graphs of the crown angulation of all teeth in both sexes (right and left sides combined). * = significant difference ($P < .01$) between male and female.

DISCUSSION

The values of crown inclination and angulation measured in this study were similar to those of a previous study.[2] In the maxillary and mandibular arch, the crown angulations in the present study were smaller than those of Andrews,[1] except for the first and second molars.

The crown angulation of the central and lateral incisors in the present study was greater than that of studies by Vardimon and Lambertz[3] and Dellinger.[4]

CONCLUSION

This study investigated the crown angulations and inclination of Northern Thais with good occlusion. Measurements of each tooth (except third molars) from the study casts of 60 subjects (30 males and 30 females) were performed twice by using the Orthodontic Torque Angulation Device (TAD). The means of both measurements were used for statistical analysis. The respective values of the two sexes were compared with the independent Student

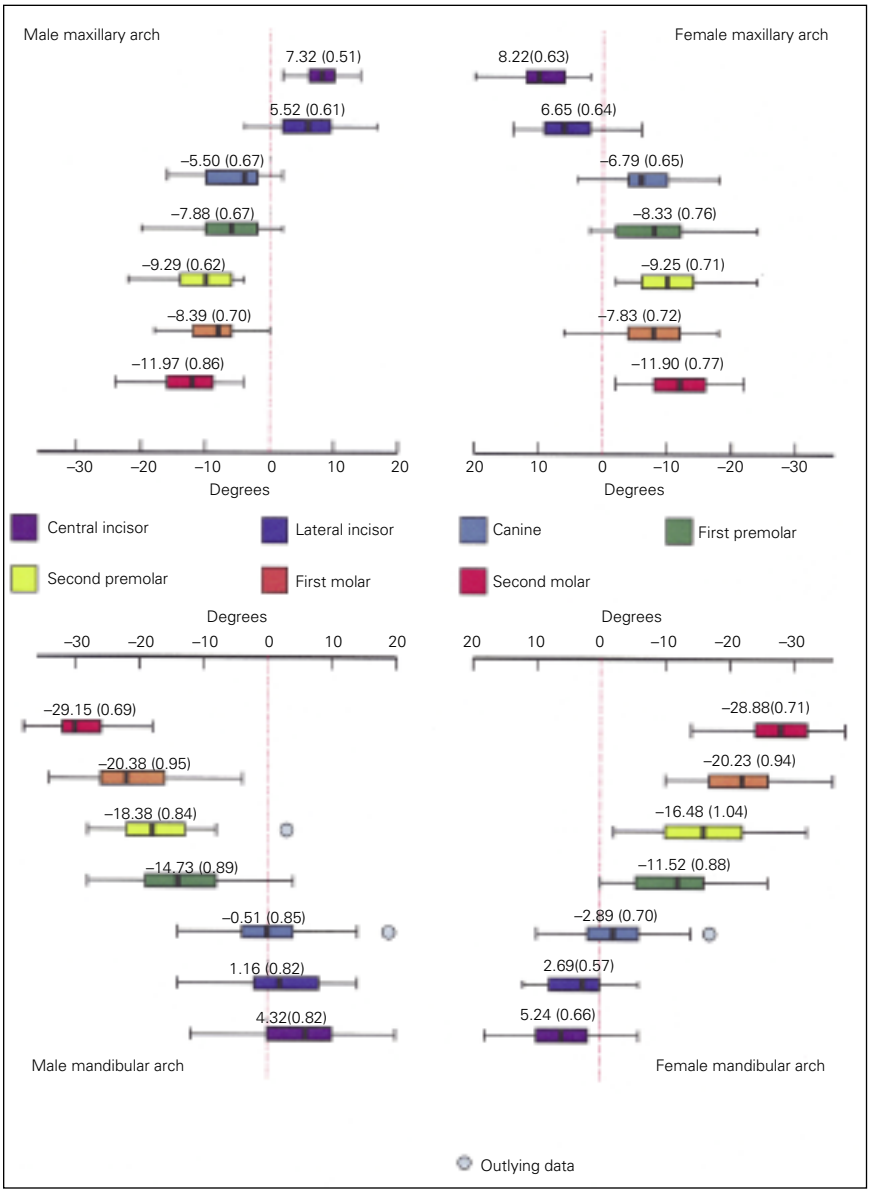

Fig 4 Box plot graphs of the crown inclination of all teeth in both sexes (right and left sides combined).

t test. The results were that females have a significantly higher ($P < .01$) crown angulation of the mandibular first and second molars and that there is no significant difference of the crown inclination of all teeth between the two sexes.

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