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MIXED DENTITION ANALYSIS IN IRANIAN POPULATION

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ABSTRACT

aim Tanaka and Johnston have offered a very simple method for estimating mesio-distal witdh of unerupted canines and premolars; But it seems that these estimations are not appropriate for iranian population . In this investigation we've tried to offer a new formula to estimate the width of unerupted teeth in Iranians.

Material and method: In this study we measured the size of premolars and canins on 400 dental casts and did a regression analysis to find any correlation between the size of these teeth and four lower incisors.

Results: We found that using Tanaka and Johnston analysis in Iranian children, unerupted teeth estimated wider than actual size.This study showed that there was a strong correlation between the width of lower incisors and unerupted canine and premolars of both jaws in Iranian population.

Conclusion: As we found Tanaka and Johnson's formula will estimate canines and premolars wider and a new formula is offered for Iranian population.

Key words : Mixed dentition analysis , Iranian Population.

Determination of teeth sizes by G.V.Black and his table was brought in to notice in the late 1900 s.

Predicting unerupted teeth size was offered by Nance through periapical radiographs in 1947.

A variety of studies in this respect were done by Seiple (1946), Ballard and Wylie (1947), Foster and Wylie (1958) Cohen (1959), Moyers, Hixon and Oldfather (1958) and others using radiographs and individual tables according to their own choice.

In 1974 Tanaka and Johnston develpoed another method to predict the size of unerupted upper and lower canine and premolars. This method was reasonably accurate and required neither radiographs nor reference tables. Therefore it got was easier and better recognition and simpler to use than other methods.

Tanaka and Johnston prediction values are as follows:

Sum of mesiodistal width of four lower incisors + 10.5 = Width of lower canine and premolars in one quadrant.

Sum of mesiodistal width of four lower incisors + 11 = Width of upper canine and premolars in one quadrant .

Alkhadra (1993) in Saudi Arabia , Sharron Lee Chan (1995) in Asian Americans and Keith Kwok in Hong Kong offered formulas most suitable to their population.

Materials and Methods

We evaluated 1400 dental casts of patients referred to Mashad dental school and private offices and selected 400 to fit the followings:

1- First molars , all premolars , canines and incisors were erupted.

2- Dental casts had good quality with no defect , no den-

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Fig-1. Difference between the estimated size of mandibular posterior teeth and their actual size

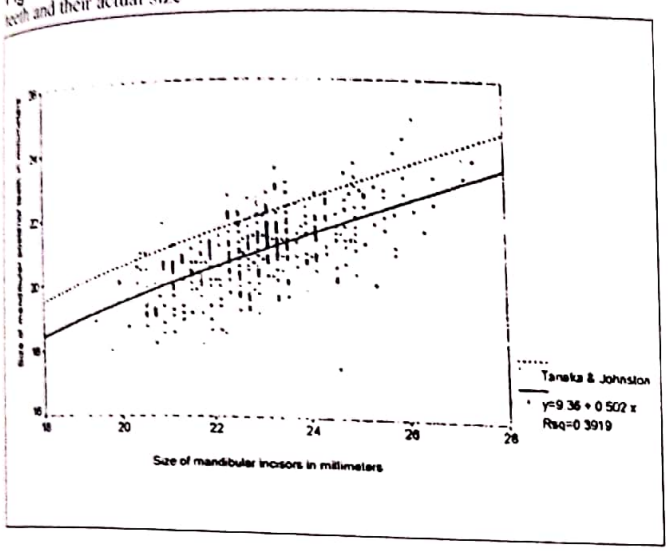


Fig-2. Difference between the estimated size of maxillary posterior teeth and their actual size

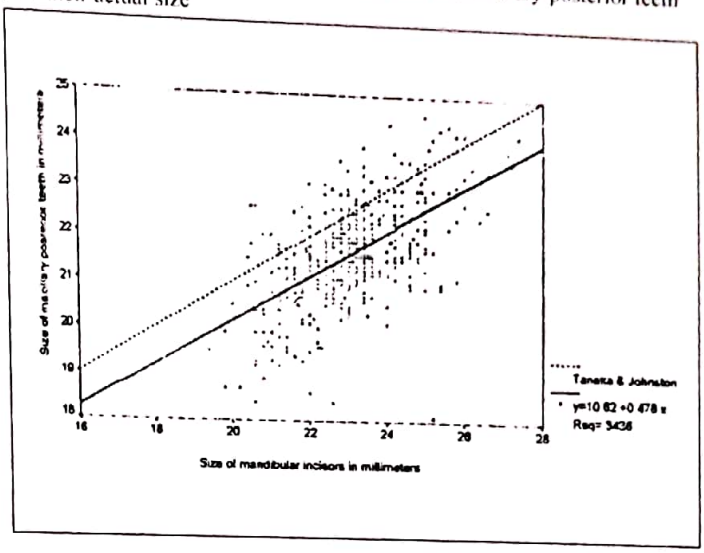


Fig-3. Correlation between mandibular posterior teeth and lower incisors in females

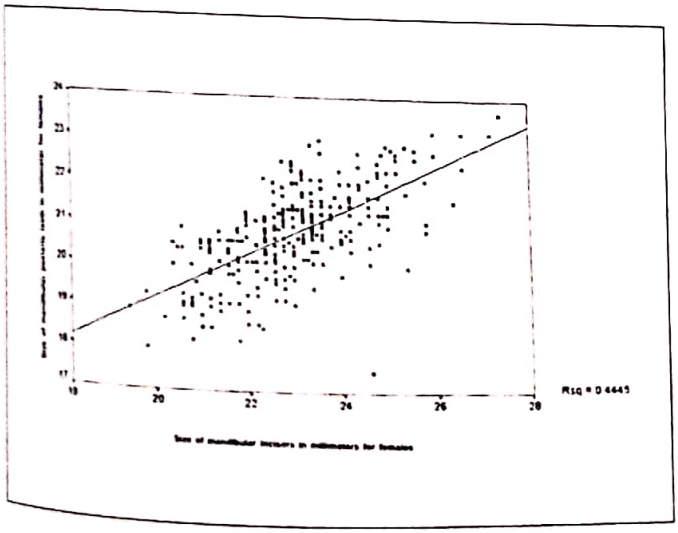
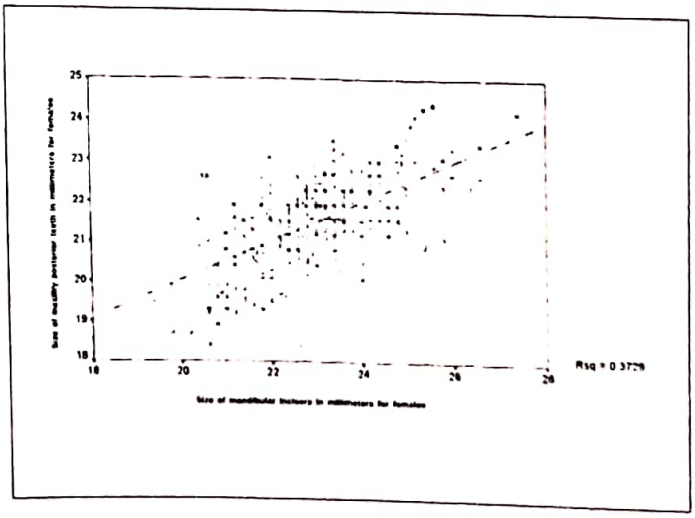


Fig-4. Correlation between mandibular posterior teeth and lower incisors in females



tal caries or tooth fracture.

3 - Hypoplastic teeth or any other dental anomalies were excluded

4 - To minimize inter - proximal and occlusal attrition or abrasion , maximum age was considered 22 yrs.

Age, sex, skeletal and dental classification. crowding , overjet and overbite and other data were registered.

From crowding point of view, dental casts were subdivided into 5 groups: group I with spacing, group II without any spacing or crowding , group III less than 4 mm crowding , group IV 4-9 mm crowding and groupV with more than 9 mm crowding.

Then Tanaka and Johnston prediction values were calculated for each individual and then the actual values were compared. In the second time we offered our own values of regression models to stablish local values to reexamine relationship between mesiodistal width of lower incisors , canines and promolars in each quadrant of both jaws.

A sharpened Boley gauge was used for measurement with accuracy of o.1 mm.

Results

Dental casts of 290 females (72.5%) and 110 males (27.5%) with the mean age of 16.27 yrs (SD = 2.57) were studied.

In mandibular arch , 1.3% (5casts) had spacing, 18.3% (73 casts) were nearly normal , 42.5% (171 casts) showed mild crowding, 31% (124 casts) moderate and 6.7 % (27 casts) severe crowding.

In the upper jaw , 1.3% (5 casts) of all cases had spacing , 35% (143 casts) were normal, 40.5% (162 casts) had mild, 20.8% (83 casts) moderate and only 1.8% (7 casts) severe crowding.

40.6% of cases had skeletal cl I relationship, 37.8%

Fig-5. Correlation between mandibular posterior teeth and lower incisors in males

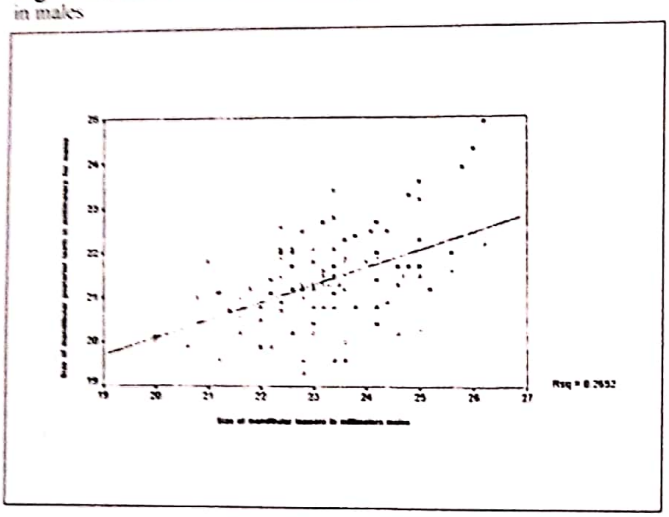
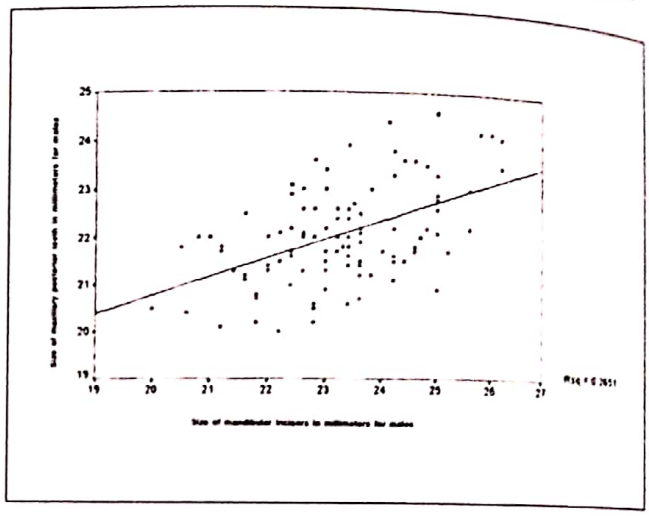


Fig-6. Correlation between maxillary posterior teeth and lower incisors in males



cl II and 21.5% cl III , but dental arch relationship was different; 56% cl I , 29.5% cl II and 14.5% cl III.

Predicted width of canine and premolars in mandibular arch derived by Tanaka and Johnston's formula , had a singinficant difference (P<0.01) from actual size of these teeth.(figure1)

In the maxillary arch results were the same (P<0.01) , when mesiodistal width of canine and

premolars was smaller, Tanaka's values viewed significantly larger (figure 2).

Our study presented to a new formula to suit Iranian population based on regression analyses (figures 3,4,5and6) as follows:

Ymand = 9.36 + 0.502 X

Ymax = 10.62 + 0.478 X

Ymand means sum of mesiodistal width of mandibular canines and premolars in each quadrant .

Ymax means sum of mesiodistal width of maxillary canines and premolars in each quadrant.

X is the sum of mesiodistal width of four lower incisors.

There was a significant difference between males and females for predicting the width of canines and premolors with these formulas. So it would be better to use specific values for each sex:

Ymand = 8.71 + 0.52 X in girls
Ymax = 10.13 + 0.49 X in girls
Ymand = 12.15 + 0.39 X in boys
Ymax = 12.89 + 0.39 X in boys

In different skeletal and dental classes of malocclusion and different groups of crowding

no significant difference was found.

X/Y ratio which is an index for the difference between the size of canines and premolars and mandibular incisors was singificantly larger in males both jaws (P<0.05)

Discussion

Tanaka and Johnstion (1978) based their study for prediction of unerupted tooth size , on regression models of relationship between width of canine and premolars in both jaws and lower inciors. The major advantage of this method was its simplicity and not requiring radiographs or reference tables. This study was carried out in Cleveland USA. We found it challenging to know the application of this method in different races and population groups.

Statistical analysis in our study showed that there was a significant difference between predicted size of canine and premolars by means of this method and their actual sizes (P<0.001).

We confirm the views expressed by Alkhadra in Saudi Arabia and we noticed similar findings : Tanaka and Johnston's formula showed teeth larger than actual.

In American Asians there were similar findings as shown by Lee Chane in 1988. He reported racial characteristics to be the basis of differences, as does Kwok - Wah Yuen in Hong Kong and south china.

In conclusion , We have offer new prediction values for each sex. prediction of unerupted canines and premolars in each quadrant is possible by these equations

in boys : Ymand = 12.15 + 0.39 X
Ymax = 12.89 + 0.39 X
and ingirls : Ymand = 8.71 + 0.52 X
Ymax = 10.31 + 0.49 X

We recommend a separate formulae to be used for eaeh sex. X/Y ratio is greater in males than females. It

would be logical to consider males to have larger unerupted teeth than their female counterparts in comparison to lower incisors. There was no significant difference in various malocclusions , So these formulas can be used in all patients.

Conclusion

This study was based on 400 dental casts of patients attended in a private orthodontic office and Mashad dental school.We concluded the followings :

1 - Tanaka and Johnston values were not universally applicable.

2 - A specific formula was derived for Iranian population.

3 - Canines and premolars were larger in males than females in comparison to lower incisors.

4 - There was no significant difference between the size of teeth in various types of malocclusions.

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