Research Article

Applicability of Moyer's Mixed Dentition Analysis

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Abstract

Background and Objective: To evaluate the applicability of Moyer's mixed dentition analysis at 75th Percentile in predicting the size of permanent canines and premolars in children of Aligarh city.

Materials and Method: 60 sets (30 Males and 30 Females) of study models were included in the sample. Mesiodistal widths of permanent maxillary and mandibular incisors, canines and premolars were measured and compared with the predicted values derived from Moyer's mixed dentition analysis.

Results and Conclusion: Moyer's mixed dentition analysis at 75th Percentile overestimates the mesiodistal width of canines and premolars in both the sexes.

Keywords: Study models; Canines and Premolars; Mesiodistal width

Introduction

The estimation of the mesiodistal width of the permanent canines and premolars before their eruption is important for the early evaluation of the need for spaces in the dental arches. This represents a most important part of early diagnosis and orthodontic treatment procedures [1]. Mixed dentition analysis help to assess the amount of space required for alignment of unerupted permanent canines and premolars teeth in a dental arch. Invalid mixed dentition analysis results could lead to incorrect treatment decisions that negatively alter a patient's dentition as well as soft-tissue facial profile [2]. Moyers prediction tables at 75th percentile level are the globally used method to estimate the mesiodistal width of unerupted canines and premolars teeth. Moyer's prediction tables are based on the data obtained from an unspecified number of North American white children [3,4]. So, the accuracy with this method is questionable when applied to a population of different ethnic origin.

The purpose of this study is to test the applicability and reliability of Moyers mixed dentition analysis at 75th percentile in children of Aligarh city, Uttar Pradesh, India.

Materials and Methods

A total of 97 pretreatment study models of dental arches, collected from the Department of Paediatric and Preventive Dentistry, Dr. ZA Dental College and Hospital, Aligarh. Pretreatment study models were examined and selected for the study according to following criteria: 1) Presence of fully erupted permanent teeth; 2) Presence of intact dentition; 3) There was no interproximal restoration, wear and fracture; 4) Age of children between 11 -14 years old; 5) There was no dental anomalies which may alter the size, shape, number or form of the teeth. Using these criteria, 60 pretreatment study models (30 male and 30 female) were selected for this study.

Actual mesiodistal widths of mandibular incisors, maxillary and mandibular canines and premolars were made with the help of Electronic digital Vernier caliper (Aerospace Ltd.) calibrated to 0.01 of a millimeter. Accurate mesiodistal dimension of each tooth was recorded between its contact points, with the electronic digital caliper placed parallel to the occlusal and vestibular surfaces of the tooth [5,6,7]. Predicted mesiodistal dimensions of permanent maxillary and mandibular canines and premolars were obtained from Moyer's probability table at 75th percentile and compared with actual mesiodistal values of canines and premolars by paired t-test.

Statistical analysis

All analyses were performed on SPSS (SPSS Inc. Version 16.0 Chicago: SPSS Inc) software. Data were summarized as Mean ± standard deviation (SD) paired observations were compared by paired t-test (two-tailed test). The level of significance was at P<0.001.**5. Results**

In both the male and female samples, Moyer's mixed dentition analysis at 75th percentile overestimated the mesiodistal width of canines and premolars. Male teeth were found to be generally larger in size compared to the females (Table 1).

The distribution of mean differences of mesiodistal width of maxillary and mandibular canines and premolars for both the sexes as predicted by Moyer's mixed dentition analysis at 75th percentile showed significance when compared with actual mean value (Table 2).

Statistically significant differences (P < 0.001) were found between the actual values and the values obtained by Moyer's mixed dentition analysis at 75th percentile (Table 2).

Discussion

The correct prediction of the mesiodistal width of unerupted permanent canines and premolars during the mixed dentition period is of clinical importance in early diagnosis and treatment planning. So, accurate prediction of the mesiodistal dimension of the canines and premolars allows the dentist to better manage the discrepancies [3,4].

Moyer's mixed dentition analysis method is a good way to use the mesiodistal width of the permanent lower incisors to predict the mesiodistal width of unerupted canines and premolars in both the arches. Moyers' mixed dentition analysis tables were given for

Table 1: Mean values (Actual and Predicted) of Maxillary and Mandibular (C+P1+P2).

	MALES				FEMALES			
	Mean	N	Std Deviation	Std Error Mean	Mean	N	Std Deviation	Std Error Mean
Moyer's 75th (Maxillary C+P1+P2)	22.04	30	±.587	0.089	21.43	30	±.567	0.079
Actual value (Maxillary C+P1+P2)	20.86	30	±1.122	0.145	19.54	30	±1.011	0.146
Moyer's 75th (Mandibular C+P1+P2)	20.78	30	±.534	0.082	19.87	30	±.545	0.075
Actual value (Maxillary C+P1+P2)	19.76	30	±1.121	0.141	18.98	30	±1.045	0.143

(C+P1+P2 = sum of canines and premolars)

Table 2: Comparison of means mesiodistal width of Maxillary and Mandibular (C+P1+P2) in Males and Females by Paired t –Test.

	Males			Females		
	Paired Differences			Paired Differences		
	Mean	Std. Deviation	P value	Mean	Std. Deviation	P value
Moyer's 75th - Actual value (Maxillary C+P1+P2)	1.18	±.798	.000*	1.89	±.845	.000*
Moyer's 75th - Actual value (Mandibular C+P1+P2)	1.02	±.721	.000*	0.89	±.674	.000*

(*P < 0.001: Statistically Significant, C+P1+P2 = sum of canines and premolars)

American White population. Since it is necessary to evaluate the applicability on different Populations. Mesiodistal measurements by Manual caliper can lead to error in accurately assessing the value on a scale; hence an electronic digital vernier caliper was used in our study [6].

In the present study, gender discrepancy was observed, the sum of the mesiodistal widths of permanent maxillary and mandibular canines and premolars were significantly larger in males than in females. This finding was similar with studies conducted by Ling JYK and Wong RWK for Hong Kong [8]; Jaroontham J and Godfrey K [9] for Thai population.

In the present study, Significant differences (p < 0.001) was found between the predicted and actual values of canines and premolars in maxillary and mandibular arches in both the sexes. It was evident from the findings of the present study that the Moyer's mixed dentition analysis 75th percentile overestimated the actual size of canines and premolars. This overestimation can partly be explained by racial differences between the present study and that of Moyer's mixed dentition analysis. However, our finding is in support of studies done on different population groups like Durgekar and Naik (2009) for Indian population [10]; Verzi P et al. (2002) for Italian children [11]; Memon and Fida (2010) for Karachi population [12]; Sonahita A et al. (2012) for contemporary Indian population [13]; Maroli S et al. (2015) for Bengal and Kerala population [14]; Agrawal N et al. (2013) for children of Bhopal city [15]; Grover N et al. (2017) for children of Lucknow population [16].

Conclusion

On the basis of the findings of the present study, Moyer's method at 75th Percentile level significantly overestimates the mesiodistal widths of maxillary and mandibular canines and premolars in males and females children of Aligarh City, UP, India. Further studies are required based on larger sample size, to confirm the reliability of Moyer's mixed dentition analysis in the population.

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