Original Article

COMPARISON OF THE DENTAL MATURATION BY DEMIRJIAN'S METHOD AMONG THE THREE SAGITTAL FACIAL PATTERNS

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ABSTRACT

Objective: *To compare the dental maturation by Demirjian's method among the three sagittal facial pattern.*

Material and Methods: *A cross sectional study was conducted at Orthodontics department of Khyber College of Dentistry from the January 2017 to June 2017 using a sample of 75 subjects who had all their permanent teeth excluding third molars visible on the panoramic radiographs, regardless of the developmental stages of the teeth, having age between 8 and 16 years were included this study. Each Skeletal class comprised of 25 subjects. Cephalometric parameter ANB and Witt's appraisal were used to classify sagittal classification. Dental maturity score and dental age determination were made by a single examiner, using the method suggested by Demirjian et al using Panoroma. Data were analyzed using SPSS version 20.0. ANOVA test was applied to compare dental age among three sagittal classes of malocclusion.*

Results: *Out of total 75 participants, n=33(44%) were males andn n=42(56%) were females. The age range was 9 to 15 years with mean age of 11.706±2.058 years. The most common age was 9 and 12 years followed by 11 and 13 years. Mean dental age was 6.1 years in skeletal class I and 5.8 years in skeletal class II while 5.7 years in skeletal class III. So the mean and standard deviation of dental age were closer to each other. There was no difference in three sagittal class of malocclusion which was statistically non-significant (P=0.574).*

Conclusions: *Dental maturation does not differ in various sagittal classes of skeletal malocclusion.*

Key words: *Dental age, dental maturation, sagittal facial patterns*

INTRODUCTION

Maturation is an important concept for orthodontists when it is time to evaluate a growing child, especially one with dentofacial problems. Many researchers have investigated the different maturation indicators such as chronological age, hand-wrist ossification ,cervical vertebral maturation and dental maturation to find out the relationship between skeletal maturation and these parameters[1].

It has been reported that biological age is more reliable indicator than chronological age in term of determination of maturation phases of child because it include parameters such as somatic, sexual, skeletal, and dental maturity[2]. Dental age assessment is import-

ant for orthodontist in diagnosis, treatment planning and selection of appropriate growth modification and comprehensive Orthodontic therapy[3,4]. Various methods have been devised for determining the dental age of an individual based on either the tooth eruption stages or the tooth calcification stages[5].

Different methods are available for estimating the dental age as advanced by Nolla's (1960), Haavikko's (1970), Demirjian's (1973) and modified Demirjian method by Guy Willems (2001). The commonly used method for accessing dental age is Demirjian's method because of its simplicity and more accuracy[6]. Various studies have been conducted to see the influence of facial type and sagittal jaw relationship on dental maturation. Vertical growers have been seen to present a tendency towards an advanced dental age than horizontal grower[7,8] while in term of sagittal jaw relationship ,there was no significant difference revealed in dental maturation among the three sagittal skeletal classes[1,5].

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While in another study maxillary molar was found to be erupted earlier in skeletal class II patients[9].

Due to variation in previous studies results[1,5,9] and lack of study on our population it was necessary to carried out a study. The objective of this study was to compare the dental maturation by Demirjian's method among the three sagittal facial patterns.

METHODS AND MATERIALS

A cross sectional descriptive study was conducted at the Department of Orthodontics at Khyber College of Dentistry , Peshawar from the January 2017 to June 2017. The subjects were selected in this retrospectively from the records of the Department. A total sample of 75 subjects who had all their permanent teeth (except third molars) visible on the panoramic radiographs, regardless of the developmental stages of the teeth, age from 8 to 16 years were included in this study. Lateral cephalograms of these 75 subjects were classified according to their horizontal facial growth pattern. Skeletal class I, II and III each had 25 subjects. Cephalometric parameter ANB and Witt's appraisal were used to classify sagittal classification. Subjects having ANB of 2-40 and Witt's appraisal of 0-1mm were considered skeletal class I. ANB of greater than 40 and Witt's appraisal greater than 2mm were considered skeletal class II. ANB of less than 20 and Witt's appraisal less than 0 mm were considered skeletal class III[10].

Panoramic radiographs of all subjects obtained at 8 to 16 years of age were used to evaluate maturation of the mandibular right second molar. This age range was selected for evaluation of dental maturation because the permanent teeth demonstrate all stages of development.

The stages of calcification of the permanent mandibular second molar were evaluated on panoramic radiographs. Dental maturity score and dental age determination were made by a single examiner , using the method suggested by Demirjian et al[2].

Data were analyzed using SPSS version 20.0. Mean and standard deviation were calculated for age and dental age. ANOVA test was applied to compare dental age among three sagittal classes of malocclusion. $P<0.05$ were considered significant.

RESULTS

A total of 75 subjects record was extracted for our study in which n=33(44%) were males and n=42(56%) were females. The mean age of the participant was 11.706±2.058 years which ranged from 9 to 15 years.

Table 2 shows that mean dental age was 6.1 years in skeletal class I, 5.8 years in skeletal class II and 5.7 years in skeletal class III. So the mean and standard deviation of dental age were closer to each other.

ANOVA test showed that tooth developmental stages (dental age) of Demirjian et al was not different in three sagittal classes of malocclusions which was statistically non-significant(P=0.574).

Table-1: Descriptive statistics of age (year)

Mean	SD	Minimum	Maximum
11.706	2.055	9	15

Table-3: ANOVA test for Demirjian's stages in different classes of malocclusion

	Sum of squares	DF	Mean Square	F	Sig.
Between Groups	2.027	2	1.013	.560	.574
Within Group	130.320	72	1.810		
Total	132.347	74			

Table-2: Descriptive statistics of Demirjian's score in sagittal classes of malocclusion

	n	Mean	Std Deviation	95% Confidence	Interval for Mean	Minimum	Maximum
				Lower Bound	Upper Bound		
I	25	6.12	1.39	5.54	6.69	4	8
II	25	5.88	1.42	5.29	6.46	4	8
III	25	5.72	1.20	5.22	6.21	4	8
Total	75	5.90	1.33	5.59	6.21	4	8

DISCUSSION

The current study showed that tooth developmental stages (dental age) of Demirjian et al was not different in three sagittal classes of malocclusions at statistically significant level.

In analysis and management of orthodontic case, anteroposterior relation between jaws is critical[11]. Correction of sagittal relationship is much important in obtaining harmonized and well proportionate face after orthodontic treatment. Many parameters are designed to determine the anteroposterior relation[12].

To include the subjects with different sagittal facial patterns, 2 cephalometric variables (ANB and Witt's appraisal) were used in this study[7]. These cephalometric variables were selected for this study because they are commonly used by orthodontists to classify facial growth patterns. Therefore, with just 1 variable, classification of the type of facial growth pattern is simpler. Moreover, if a certain cephalometric measurement is individually taken into account, there might be influence from other factors (such as cranial base deflection and others)[13], which would mask the real predominance of sagittal patterns of facial growth. By using the sum of standardized cephalometric measures, the predominant type of facial growth pattern can be identified, reducing the effect of possible adverse factors.

In the study Demirjian's method for determining of dental age. Among many proposed methods, Demirjian's (1973) system of age assessment is widely accepted. The advantage of the Demirjian's method includes the objective criteria describing stages of tooth development, which have been illustrated with line diagrams and radiographs very clearly[14]. Demirjian's method is bases on evaluation of one to eight radiographic stages (A to H) of crown and root development on permanent teeth from left side of mandible excluding 3rd molar.

In this study, female were more than males. This may be due the fact that females are more aware about their smile and appearance. The most common age was 12 years. Which may be due to, the upper permanent canine is fully erupted and malpositioned in Orthodontic patients. So more patients are presenting at this age[15].

Growth modifications need to be performed in different classes of malocclusion at specific time. For example if a patient is skeletal class III due to maxillary deficiency. The treatment should be carried out early. Dental age is more reliable than chronological age[16]. So the aim of the current study was to know if there is any difference in dental maturation in different skeletal classes of malocclusion.

The current study showed that there is no statistically difference in various skeletal malocclusions. It means that dental maturation do not differ in sagittal classes of malocclusion. A previous study by Neves et al[8] on Brazil Population reported that a statistically significant difference was noted between the dental ages of the vertical and horizontal groups, with the vertical group having a more advanced dental age. Although in the current study we do not considered vertical patterns, the results of Neves et al[8] are in opposite to ours. This may be due to genetic, environmental, ethnic variations and small sample size.

CONCLUSION

Dental maturation is not affected by horizontal patterns of skeletal malocclusion in this sample of Peshawar. However, this is retrospective cross-sectional, single center and small sample study. More studies having large sample and prospective design are warranted.

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