

## DENTAL AGE ESTIMATION USING DEMIRIJAN'S 7 TEETH AND 8 TEETH METHOD APPLYING IN RAJASTHAN (KOTA) POPULATION

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### **Abstract:-**

**Introduction** Accurate age estimation is required in the field of health sciences, as it is relevant to the timing of various treatment procedures. Differences in the development among children of the same chronological age have led to the concept of physiologic age as a means to define progress toward completeness of development or maturity in the individual child. The most common dental age estimation methods are Nolla & Demirjian's. Demirjian's being the more result oriented method of age estimation.

**Aim and Objective:** To evaluate the Dental age estimation using Demirjian's 8 teeth method and 7 teeth method.

**Materials and methods:** The sample for the study consisted of 400 individuals aged between 6-18 years. The chronological age of the patient will be obtained by official birth certificate. Radiographic age estimation of the selected sample was done after analyzing Orthopantomographs using both Demirjian's 7 teeth and 8 teeth method. The chronological age was then statistically compared with the results obtained by the radiographic age using SPSS v16 software.

**Results:** The estimation of dental age estimation using Demirjian's 7 teeth method showed overestimation compare with Demirjian 8 teeth method.

**Conclusion:** Dental age estimation using Demirjian's 8 teeth method reduces the margin of error in correctly estimating age

**Keywords:** - Demirjian's method .chronological age, dental maturity

## INTRODUCTION –

The evolution of dentistry has taken the dentist as an expert in legal proceedings and in the field of forensic sciences. The estimation of age is important for forensic, legal and clinical work.<sup>1</sup> Age estimation plays a significant role in paediatric endocrinology, clinical dentistry, and archeology. Differences in the development among children of the same chronological age have led to the concept of physiologic age as a means to define progress toward completeness of development or maturity in the individual child. (Rizig OH, Elamin F, Zeidan AZ, M0ohamed KKZ 2013 & Smith, B. Holly 1991). Demirjians method arrived at an age estimation by classifying the development of teeth in to eight classification stages that represents the crown and root calcification to the apex closure easier. Demirjian used only seven left mandibular teeth and gender specific maturity score was assigned to each teeth the score were summed up and compared with centile charts to arrive at age, but the reliability under this method was lacking. (Demirjian A., Goldstein H 1973) this method can only use in individual above 16yrs.as only seven teeth were included to overcome this ,3<sup>rd</sup> molar for the age assessment of 14 children Belgian here added and regression formulas were derived for age assessment which included additional stages for easier calculation. (Chaillet N, Demirjian A 2004) This is the first study of Dental age estimation to be conducted in population of hadoti region (Rajasthan).

## MATERIALS AND METHOD

### Sample Description

The study sample consisted of panoramic radiographs of 431 subject (219 males and 212 females) from hadoti region of Rajasthan, India visiting the department of Oral and Maxillofacial Radiology for radiologic examination between the age group of 6-18 years.

### Inclusion Criteria

Inclusion criteria of panoramic radiographs of subjects included were:

- Who had authentic official birth certificate?
- Free of obvious developmental, nutritional, endocrinal and mental disorder.
- Complete mandibular permanent dentition (erupted/ unerupted) included 3rd molar.
- Pre – treatment radiographs

### Exclusion Criteria

- Crowding of teeth where the root structure of the teeth were not clearly discernible
- Distorted or unclear panoramic radiographs
- Parents and grandparent not from Hadoti region.

The study was explained to the subjects and to the guardian in case of minors and written informed consent was taken for each patient. Each panoramic radiograph selected was labelled with identification number from 1 to 248 and the age and sex were kept anonymous from the investigators. Each panoramic radiograph was interpreted by two investigators simultaneously and the age was recorded only when the decision was indisputable by using PlanmecaRomexis® 4.0v (computer software provided by the manufacturer).

### Analytical Method

All the 431 digital panoramic radiographs were analyzed to determine dental age by 2 methods.

- In Demirjian's system weight scored assigned to each of the 7 left mandibular teeth depending on 8 stage of development from calcification of the tip of the cusp to the closure of the apex (are designated from A to H). The sum of these points of 7 teeth presents dental maturity score on a scale from 0 to 100.
- For Demirjian's modified method we added the third molar in the calculation of the dental maturity score using the same method to obtain specific weighed score and predictable curves.
- In Demirjian's 8 teeth methods each tooth was staged from 0 – 9 and depending on the stage of calculation and sum of the scores gave a total maturity score (which was then substituted in the regression formula given by Chaillet and Demirjian's 2001)
- Chronological age of each subject was calculated as the difference between date of birth on birth certificate and the date on which the panoramic radiograph was taken.

### Statistical Analysis

Afterwards the chronological age was compared individually with age obtained by Demirjin's 7 teeth and Modified Demirjin's 8 teeth. All the data was tabulated using Microsoft Excel and comparison was done using SPSS v16 software.

## RESULT-

A total of 431 subjects participated in the study aged between 6 – 18 years with a mean of 11.7 years. Out of these subjects 219 were males and 212 were females with a mean of 10.8 years and 10.7 years respectively. (Table 1) A comparison of chronological age and Demirjin's 7 teeth method done using z test gave a *p* and *r* value of 0.037 (mildly significant) and 0.86 (moderately significant) respectively. A comparison of chronological age and Demirjin's 8 teeth method done using z test gave a *p* and *r* value of 0.031 (mildly significant) and 0.54 (mildly significant) respectively. (Table 2) For the 219 males the comparison of chronological age and Demirjin's 7 teeth method done using z test gave a *p* and *r* value of 0.021 (mildly significant) and 0.87 (highly significant) respectively. A comparison of chronological age and Demirjin's 8 teeth method done using z test gave a *p* and *r* value of 0.019 (moderately significant) and 0.75 (moderately significant) respectively. (Table 3) For the 212 female the comparison of chronological age and Demirjin's 7 teeth method

done using z test gave a *p* and *r* value of 0.038 (mildly significant) and 0.69 (moderately significant) respectively. A comparison of chronological age and Demirjian's 8 teeth method done using z test gave a *p* and *r* value of 0.032 (mildly significant) and 0.81 (moderately significant) respectively. (Table 4)

**DISCUSSION** - The study of morphological parameters of teeth on dental radiographs is more reliable than most other methods for age estimation. The most commonly used radiographic method for age estimation is Demirjian's method which has been widely applied for many populations for estimating age of children and adolescents. This is because of its simplicity as well as radiographic and schematic illustrations of tooth development with descriptions provided in all works (Demirjian A., Goldstein H., Tanner JM 1973 & Levesque GY, Demirjian A 1980, Koshy S, Tandon S 1998 ) According to study conducted by Galc I *et al* 2002 . Demirjian's method in BH Children showed an over estimation of age which ranged from 0.60 to 2.17 years in girls and from 0.63 to 2.60 years in boys depending on the age group from a sample of 1106 OPGs. Ages compared with Demirjian standers international maturity standards showed a lower overestimation of dental age in BH children. In another study conducted by Cruz L *et al.* 2011 on a Spanish Caucasian sample of 308 OPGs an overestimation of 0.21 1.07 and 0.37 1.04 years for girls and boys, respectively, using Chaillet's method which was more accurate when compared with 0.88 1.09 year in girls and 0.76 1.01 years in boys using Demirjian method. In the same study, authors found greater underestimation using the Chaillet's method in Venezuelan children by 0.61 1.07 years and 0.48 0.92 year in girls and boys respectively, comparing with Demirjian's method which underestimated age by 0.1 1.04 year in girls and 0.23 0.93 years in boys respectively. Most studies indicated that original Demirjian's scores were inadequate. Kosy and Tandon 1998 showed the greatest mean overestimation in literate of 2.82 years for boys and 3.04 years for girls in South Indian children statistically significant overestimation of dental age using Demirjain's method was reported in many Caucasian Europeans, and many other nations (Farah CS, Booth DR, Knott SC. 1999) According to literature a significant under-estimation of Demirjian's method was reported in Venezuelane and Indian children (Orhan K, Ozer L, Orhan AI, Dogan S, Paksoy CS 2007). in order to improve accuracy of Demirjian's scores. Many authors suggested the adaptation of original method. Previous studies ( Chaillet N, Demirjian 2007 & Koshy S, Tandon S 1998) have shown overestimation of age in Indian population, however all of them evaluated Demirjian's 7 teeth method and did not consider the third molar. A drawback of the Demirjian 7 teeth method was that, it excluded the third molar owing to its variability in regard to size, shape and likelihood of congenital absence and also because of wide variation in its development. Nevertheless, this tooth is one of the few predictors available for the assessment of age in individuals of 16–23 years age group. Chaillet and Demirjian 2004 method utilized third molar and developed new maturity scores for age estimation in French children. Many of the studies in the past decades have focused on original Demirjian method by rating seven teeth and eight calcification stages by the authors like Hegde and Sood, 2002 Pechnikova *et al.*, 2011 Farah *et al.* 1999 As the reason of certain demerits, Chaillet and Demirjian modified the original method by including third molar tooth and by adding two extra stages, which became most popular since 2004 for age estimation in different ethnic groups. Orhan *et al.* 2007, Shahrzad *et al.* 2010 and Sang S *et al.* 2011 reported their study results with less errors when modified Demirjian method 2004 was used. Therefore, the present study was undertaken to determine the applicability of Demirjian's 7 & Demirjian's 8 teeth method in Kota (Rajasthan) population and it was observed that Demirjian's 8 teeth method was found to be more reliable.

### Conclusion

In the present study 431 radiographs used for age estimation using Demerijian's 7 and 8 teeth method among Hadoti population and it is concluded that Demerjjan's 8 teeth method was found to be more reliable in estimating age of subjects aged between 6 – 18 year when compared to Demerjin's 7 teeth method. Though Demerijin's 8 teeth method is widely used for estimating age, other methods should also be tried.

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**Tables**

**Table 1: The Mean age of subjects**

SUBJECT	TOTAL	AGE (in years)	
		Range	Mean
Males	219	6 – 18	10.8
Females	212		10.7

**Table 2: Statistical Comparison of 431 Subjects**

COMPARISON	<i>P</i>	<i>r</i>
Chronological Age Vs Age using 7 teeth	0.021 (mildly significant)	0.76 (Moderately significant)
Chronological Age Vs Age using 8 teeth	0.031 (Mildly Significant)	0.54 (Mildly Significant)

Z- Test was and co-efficient of correlation was applied to obtain the results-

**P Value:** Probability Value using z – test

**R Value:** Co-efficient of Correlation

**Table 3: Statistical Comparison of 219 Males**

COMPARISON	<i>p</i>	<i>r</i>
Chronological Age Vs Age using 7 teeth	<0.021 (Mildly Significant)	0.87 (Highly Significant)
Chronological Age Vs Age using 8 teeth	<0.019 (Moderately Significant)	0.75 (Moderately Significant)

Z- Test was and co-efficient of correlation was applied to obtain the results-

**P Value:** Probability Value using z – test

**R Value:** Co-efficient of Correlation

**Table 4: Statistical Comparison of 212 Females**

COMPARISON	<i>p</i>	<i>r</i>
Chronological Age Vs Age using 7 teeth	<0.038 (Mildly Significant)	0.69 (Moderately significant)
Chronological Age Vs Age using 8 teeth	<0.032 (Mildly Significant)	0.81 (Moderately Significant)

Z- Test was and co-efficient of correlation was applied to obtain the results-

**P Value:** Probability Value using z – test

**R Value:** Co-efficient of Correlation