

Dental age assessment of 7 to 15 years-old children of Rajasthan using Demirjian's method

Pandey M*, Hamdani S*, Ali SM*, Goswami S**, Rajpara Y***

*Department of Orthodontics and Dentofacial Orthopaedics, Rungta College of Dental Sciences and Research, Bhilai

** Department of Oral and Maxillofacial Pathology, Rungta College of Dental Sciences and Research, Bhilai

***Consultant Orthodontist, Ahmedabad

ARTICLE INFO

ABSTRACT

Keywords:

Dental age, Chronological age, Demirjian method, Age determination

In the medical and dental practice the age estimation is an important procedure, as it can be utilized for forecasting the physical and mental development of the patient with the progressive growth. The study was designed to determine dental age from Orthopantomograph using the Demirjian method to investigate applicability of the Demirjian method for estimation of chronological age in north Indian (Rajasthan) population. The sample for study consisted of 69 subjects between 7 years to 15 years of age with a normal dentition & without any dental lesions or deformities. The result of this study depicts that the Demirjian's method has shown high accuracy in determination of the chronological age. It has a non significant correlation with the chronological and dental age of the patients.

Aim: The aim of this study was to estimate the dental age of the North Indian children living in Rajasthan aged 7 to 15 years using the Demirjian method and to check the accuracy of Demirjian's method.

Corresponding Author:

Dr.Madhu Pandey
Senior Lecturer,
H.No. 1, street-11, sector-9, Bhilai,
Chhattisgarh
E Mail: pandey.drmadhu@gmail.com

Introduction

Different fields of dentistry and medical science require an accurate age data to estimate the exact timing for the treatment procedure in endocrinology, pediatric dentistry and orthodontics. This information is also important in area of forensic science, when matters of consent or criminal ability arise, or in the identification of deceased persons. In developing countries reliable registration of birth details is often not a priority.

Individuals may not have accurate information as their date of birth, or they may choose to suppress such information. In such circumstances age determination technique i.e . estimation of chronological age, may be required.[1]

The main criteria for forensic age determination in the relevant age group based on odontological examination are tooth eruption and tooth mineralization, both developmental and biological features. Tooth mineralization is evaluated by using an orthopantomogram, a radiograph of the complete dentition. For the evaluation of tooth mineralization, various stages classifications have been put forward.[2-5] The most widely used method for the comparison between different populations was first described in 1973 by Demirjian et al.[2] His method is based on the development of seven left permanent mandibular teeth. Later the same author suggested using a smaller number of teeth to save time and to avoid a situation when it is not possible to visualize all teeth in the left mandibular quadrant. This method has achieved widespread

acceptance because of its maturity scoring system that provides for universal application.

Although the conversion to dental age depends on the population being considered, it can be accomplished using a relatively small local sample to determine an equivalent dental age when compared to a different population. [2-10]

Hence, The aim of this study was to generate dental maturity scores for a population of children in Rajasthan, using the revised system of Demirjian.2,16 Ages estimated from these scores were compared with chronological ages of subjects, to determine if the system provides accurate results that could be used for children in Rajasthan; or whether new population specific standards has to be generated.

Materials and Method

The study was conducted at the Department of Orthodontics, Darshan Dental College, Udaipur, Rajasthan. The data used in this study was obtained from copies of orthopantomographs required for clinical purposes for a sample of 69 children from Rajasthan population, 36 female and 33 males, between 7 years to 15 years of age.

The tooth development of the left quadrant is determined by Demirjian's method. For any subject with an absent left permanent mandibular tooth, with the exception of third molar, the equivalent tooth on the subject's right was used.

Tooth formation is divided into eight stages and the criteria for these stages are given for each tooth separately. Each stage of the seven teeth is given a score. The sum of score for the seven teeth is transferred to a dental age.

The parent or guardian of each subject was required to submit a copy of birth certificate for accurate age estimation. The data was fed into SPSS software version 15 to check inter examiner variability it accounts 0.85. T-test was applied to check the correlation between the chronological age and dental age obtained from the Demirjian method.

Results

In the present study, 69 subjects i.e. (36 F: 33 M) were selected from the Department of Orthodontics and Dentofacial Orthopedics, which was divided into 9 groups in accordance with their age group.

Table 1: Mean, Standard Deviation (Mean \pm SD) in the Chronological and Dental Age in 7 to 15 years in both gender Group Mean \pm SD

Gender	Chronological age	Dental age by Demirjian's methods	P value
7 years	7.48 \pm 0.17	7.68 \pm 0.46	0.040
	7.67 \pm 0.05	7.59 \pm 0.47	0.030
8 years	8.87 \pm 0.04	8.74 \pm 0.32	0.030
	8.64 \pm 0.12	8.76 \pm 0.39	0.394
9 years	9.57 \pm 0.11	10.35 \pm 0.52	0.296
	9.45 \pm 0.16	10.47 \pm 0.67	0.027
10 years	10.56 \pm 0.18	11.04 \pm 0.68	0.045
	10.47 \pm 0.15	11.53 \pm 0.45	0.056
11 years	11.34 \pm 0.17	12.13 \pm 0.42	0.065
	11.35 \pm 0.07	12.18 \pm 0.24	0.036
12 years	12.45 \pm 0.04	12.64 \pm 0.36	0.072
	12.31 \pm 0.14	12.63 \pm 0.53	0.056
13 years	13.53 \pm 0.64	13.84 \pm 0.53	0.030
	13.45 \pm 0.15	13.75 \pm 0.71	0.046
14 years	14.47 \pm 0.07	14.84 \pm 0.69	0.043
	14.76 \pm 0.53	14.65 \pm 0.67	0.045
15 years	15.53 \pm 0.39	16.41 \pm 0.53	0.043
	15.76 \pm 0.16	16.16 \pm 0.47	0.045

When chronological age was compared with dental age using Demirjian method, both male and female samples showed statistically insignificant difference.

Discussion

Tooth development shows less variability than other developmental features and also low variability in relation to chronological age.[11,12] Hertz observed a greater degree of association between dental age and chronological age than between dental and skeletal age.[13] A number of methods have been proposed to determine dental age,[14,15] but the system developed by Demirjian [11] has gained wide acceptance. As the Demirjian's method was based on the data obtained from the French Canadian population, so it is desired to check the accuracy of this method in Indian population. Attempts were made to check the accuracy of Demirjian's method on some other Indian ethnic groups.[16] In this, we checked for the accuracy of Demirjian's method in Rajasthan population.

In the study, chronological and dental age showed insignificant positive correlation between male and female sample, as earlier reported.[16,17] When Demirjian method was applied to north Indian population, mean difference between chronological age and dental age was minimal, as reported earlier.[18-21] The study supports use of Demirjian method for assessment of dental age in Indian population with few modifications.

Conclusion

The results of our study have showed that the Demirjian's method showed high accuracy in predicting the age; when applied to Rajasthan population. Insignificant positive correlation was found between chronological and dental age.

References

1. Voor AW. Can dental development be used for assessing age in underdeveloped communities? *J Trop Pediatr Environ Child Health* 1973;19:242.
2. Demirjian A, Goldstein H, Tanner JM. A new system of dental age assessment. *Hum Biol* 1973;45:221-7.
3. Greaser EE. The permanent mandibular first molar, its calcification, eruption and decay. *Am J Phy Anthropol* 1955;13:253-84.
4. Kullman L, Johanson G, Akesson L. Root development of the lower third molar and its relation to chronological age. *Swed Dent J* 1992;16:161-7.
5. Kohler S, Schmelzle R, Loitz C, Puschel K. Die Entwicklung des weisheitszahns. *Adv Med Dent Sci* 1994;2(3):53-55.
6. Tanner J, Whitehouse R, Marshall W. 1975. Assessment of skeletal maturity and prediction of adult height TW2 method. New York: Academic Press, pp. 200.
7. Kahl B, Schwarze CW. 1988. Aktualisierung der Dentitionstable von I Schour und M Massler Von 1941. *Fortschr Kieferorthop*, 49:432-43.
8. Nolla CM. The development of the permanent teeth. *J Dent Child* 1960;27:254-66.
9. Liljequist B, Lundberg M. Skeletal and tooth development. A Methodological investigation. *Acta Radiol* 1971;11:97-111.
10. Gustafson G, Koch G. Age estimation upto 16 years of age based on dental development. *Odont Revy* 1974;25:297-306.
11. Nielson HG, Ravn JJ. A radiographic study of mineralization of permanent teeth in a group of children aged 3-7 years. *Scand J Dent Res* 1976;84:109-18.
12. Demirjian A, Goldstein H. New systems for dental maturity based on seven and four teeth. *Ann. Hum. Biol.*, 3: 411-21.
13. Demirjian A, Buschang PH, Tanguay R, Patterson DK. Interrelationships among measures of somatic, skeletal, dental and sexual maturity. *Am J Orthod* 1985;88:433-8.

14. Hotz R. The relation of dental calcification to chronological and skeletal age. Proceedings of the European Orthod Soc Albani. The Hague 1959;140-49.
15. Hagg U, Matsson L. Dental maturity as an indicator of chronological age. The accuracy and precision of three methods. Eur J Orthod 1985;7:25-34.
16. Staaf V, Mornstad H, Welander U. Age estimation based on tooth development: A test of reliability and validity. Scand J Dent Res 1991;99:281-6.
17. Jaeger U. Dental age in dependence on the stage of selected physiological development parameters. Stomat 1990;40(12):511-4.
18. Carvalho AA, Decarvalho A. Radiographic study of the development of permanent dentition of Brazilian children with chronologic age aof 84 and 131 months. Odontol Revy 1991;19(1): 31-9.
19. Nanda RS, Chawla TN. Growth and development of dentition in Indian children and development of permanent teeth. Am J Orthod 1966;52:837.
20. Sapoka A, Demirjian A. Dental development of the French Candian child. J Canada Dent Assoc 1971;3:100-4.
21. Rai B. Dental Age Assessment of 7.5 to 16 Year-old Indian Children Using Demirjian's method. Adv Med Dent Sci 2008;2(3):53-5.

Source of Support: Nil. **Conflict of Interest:** None