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Age Estimation Among Children In Teritaray Hospital In Andhra Pradesh Using Demirjian's And Cameriere's Methods

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Abstract
The present study was aimed to compare Demirjian's & Cameriere's age estimation to chronologic age among children with mixed dentition attending Government dental college, Vijayawada, Andhra Pradesh. 20 male subjects of age range seven to fifteen years were considered for the study. Demirjian & Cameriere methods were used to assess the dental age and then compared with the chronologic age. Dental age was assessed with the orthopantomograph. Data was evaluated using paired t test and Karl Pearson's correlation. Insignificant values were obtained when both the methods were compared, however Negative correlation (–0.7598) was obtained in Demirjian's method and was statistically insignificant (P=0.9967), while Cameriere's method had a positive linear correlation (0.6393) with chronologic age and statistically significant (P=0.0171). The Cameriere's method is shown to be more reliable and accurate for age estimation than Demirjian's method.

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I. Introduction

Forensic odontology is important for identifying the age of the person, for Medicolegal issues and also for treatment planning. Age estimation constitutes an important part of the Forensic odontology. Age estimation can be done using the various parameters of skeletal, anthropological, dental, psychological methods. The commonly employed method in the pediatric cases is the skeletal method that uses hand wrist radiographs along with the development of the teeth.[1] Skeletal method of age estimation has its own flaws as the bone maturity is codependent on the factors like environment and the nutrition that may alter the maturation of the bone. On the other hand odontogenic hard tissue that has a bradytrophic tissues that is resistant to remodeling process. Hence odontological Age estimation among the pediatric subjects is preferred. Odontological age estimation is usually done by Goldstein, Demirjian, and Tanner methods.[2]

Cameriere method of age estimation was introduced in 2006. The measurenment of open apices is assessed in this method of age estimation.[1] Cameriere method of age estimation was seen to be more efficient in age estimation compared to both other methods, where the radiographs are measured to assess the age.[3] As the radiographs are used, this method is less invasive, doesn't need patient recalls, easy cooperation from patient, can be used multiple times and easy to use and economic.

In the present study we assessed the age of the children, with mixed dentition in a rural population of Vijayawada, Andhra Pradesh, by using the Demirjian & Cameriere methods, and also compared both methods to check for the reliability.

II. Materials and Methods

The subjects were the ages between seven to fifteen in the present study. The applicable inclusion and exclusion criteria were considered and taking the consent from the guardian, 20 OPGs were taken. The OPGs were considered only if there were no anomalies and had at least seven permanent teeth were present. Later the chronological age was registered from their birth certificate. And it was calculated by subtracting from the date

of radiograph taken.

SIDEXIS computer program was employed in the Radiographic evaluation and age estimation was done using two methods - Demirjian's & Cameriere's methods.

Cameriere's method[1]

The seven right permanent mandibular teeth were calculated. N0 was assigned with teeth that had completely closed apical ends of the roots. For teeth with one root, and with root apices open, the distance (Ai, i=1,...,5) between the inner sides of the open apex was measured (Figure 1). For teeth with two roots, the total of the distances between the inner sides of the two open apices was calculated (Figure 1). magnification and angulation errors were corrected, by normalizing the measurements by dividing the tooth length (Li, where i = 1,...7.) The dental maturity was calculated by using the standardized measurements of the seven right permanent mandibular teeth (xi=Ai/Li, i=1,…,7), The sum of all the normalised open apices is represented as 'S' where (S = X1 + X2 + X3 + X4 + X5 + X6 + X7). Further All measurements were carried out by the same observer.

Further all these values were substituted in the Indian-specific formula given by Cameriere et al. which is: [age = 9.402 − 0.879c + 0.663N0 − 0.711s − 0.106SN0] where 'c' is a dummy variable which denotes '1' for South Indian population and '0' for North and central Indian population.[3]

Demirjian's method [4]

An apt developmental age was given to the tooth based on the calcification of the permanent teeth on the right side. A maturity score of 0 to 9 was given to the tooth based on the developmental stage. In our study only Male subjects were considered. The total maturity score (S) score was obtained by adding all the eight teeth scores. And the following formula was applied to calculate the dental age by using Acharya's formula for Indian population.[5]

Males: Age = 27.4351 − (0.0097 × S2) + (0.000089 ×S3)

Statistical analyses

SPSS software was used for analysis. Mean and standard deviation were calculated in both the methods of age estimation for all the 20 subjects. The estimated age was assessed in both the methods. The Mean difference was calculated between estimated age and chronological age in both the methods using paired-t test. Correlation between chronological age and age estimated with the two methods was performed using Karl Pearson coefficient of correlation. Interclass correlation and p value using both the techniques were also assessed. $P < 0.05$ value was measured significant.

III. Results

Comparison of the estimated and chronological age was calculated using Demirjian's & Cameriere's method was done. The mean of difference in estimated ages by Demirjian's & Cameriere's methods and chronologic age was 3.4750 and 0.05 respectively (Table 1). Comparison of difference of age with actual age under the two methods showed a mean difference of -3.4250. Paired t-test showed insignificant difference (paired t= 1.3353, P=0.4092) (Table 2). However, age estimated using Cameriere's method showed a positive correlation (**0.7012**), whereas using Demirjian's method shows a negative correlation (–0.3218). The p valve obtained for Camerier's method showed significant results (P=0.0216) and Demirjian's method was insignificant (P=0.9967).

IV. Discussion

We compared the estimated age using Demirjian's & Cameriere's methods to the chronological age of in the subjects with the mixed dentition. By subtracting date of birth given by the patient/guardian from the date on which the radiograph was taken the Chronological age was premeditated. The measurements were done on the OPG, on seven mandibular right permanent teeth in both methods. The open apices of the teeth were taken for consideration in the Cameriere's method. The mineralizaion of tooth was considered in the Demirjian's method.

In the present study where we compared estimated age using Demirjian's & Cameriere's method, we found that the accuracy of Cameriere's method in age estimation was comparable with that of Demirjian's with a mean difference of 0.92. In the present study the Demirjian's method showed a great overestimation of age whereas Cameriere's method presented mostly underestimated ages. A positive correlation was observed in Cameriere's method and was statistically significant (P=0.0216). Similar observations were made by Javedinejad etal[6] 2015, where they found that applying the Demirjian's method overestimated the ages by a mean value of 0.87 whereas Cameriere's method underestimated all ages by a mean of 0.19. in their study Paired t-test revealed significant difference between mean chronologic age and dental age. In our study, the mean of difference of estimated age by Cameriere's method was 3.45 and by Demirjian's method was 0.05 years. The present study indicated an underestimation of age by Cameriere's method in 13 subjects, while

overestimation of age by Demirjian's method was noted only in 10 patients. However due to limited sample size, the overestimation by Demirjian's method may not be considered significant.

The observations made in our study are in contrast with the study of Wolf TG et al [7] in 2016, where between both the methods comparison shows an advantage of Demirjian's method for both genders. While Cameriere's method showed a higher inaccuracy in all age groups, Demirjian's method showed more appropriate results for dental age estimation of the German population. However, in the present study only male subjects with the age of 7-15 were considered to rule out the gender bias. Our study is in contrast with the study of Agarwal et al[8] where they observed that Demirjian's method underestimated the chronological age in their study where they compared Demirjian's Method and Willems Method in 150 subjects.

Pinchi et al[9] 2012 in their study also observed that Cameriere's method underestimated age while Demirjian's method overestimated the age. Between the two methods Demirjian's method was observed to be more accurate than Cameriere's method, nonetheless overestimated age. In their study Cameriere's method underestimated the age by one year. The present study also showed underestimation of age using Cameriere's method by approximately 1 year.

In our study, comparison of difference in actual age and in estimated age by the two methods showed that Demirjian's & Cameriere's were comparable with a mean difference of -3.4250. Paired t-test showed insignificant difference however the values were not significant (paired t= 1.3353, P=0.4092). Our study is in agreement with the results obtained in the study of Javedinejad et al[6] who found that Demirjian's and Cameriere's methods were comparable. Nevertheless Wolf et al[7] showed Demirjian's method to be more accurate in age prediction for both genders.

In our study Cameriere's method showed to be more precise statistically with a positive correlation between chronological and estimated ages than Demirjian's method, even though the mean difference was insignificant. Demirjian's method however showed a negative correlation with chronologic age though statistically insignificant. This was in contrast with previous reports where a higher inaccuracy by Cameriere's method was noted in all age groups. [7]

Galic et al[10] in 2011 compared the accuracy of Cameriere's, Haavikkon and Willems radiographic methods in age estimation on Bonnian-Herzegovian children age groups 6-13. Cameriere's method over-estimated the mean age by 0.09 years for girls and underestimated by –0.02 years for boys. Demirjian's method tend to have overestimated the age in both genders. Cameriere's method was more accurate for both genders which was similar to our study where a greater accuracy was noted for Cameriere's method.

Our study showed a mean difference of age by 3.45 in Cameriere's method and 0.05 in Demirjian's method. Eventhough there was an underestimation of age by Cameriere's method, there was a positive correlation which showed a greater accuracy for this method compared to Demirjian's. But the mean of difference showed insignificant difference.

V. Conclusions

The current study demonstrated that the ages assessed utilizing Demirjian's and Cameriere's strategies were comparable. This shows that Cameriere's technique dependent on the estimations of the width of open apices is similarly acceptable as Demirjian's strategy which is a genuinely exact and broadly practiced method dependent on the phase of mineralization of teeth. Cameriere's technique is more satisfactory if exactness is significant and Demirjian's strategy is adequate if simplicity of use is significant. Anyway keeping in view the impediment of our examination, further investigations utilizing more number of sample is suggested.

References

[1]. Cameriere R, Ferrante L, Cingolani M. Age estimation in children by measurement of open apices in teeth. Int J Legal Med. 2006;120(1):49–53.

[2]. Shrestha A, Yadav RP, Shrtestha S et al. M of open apices in teeth for estimation of age in children. HR 2015;12:33-7. No Title.

[3]. Vadla P, Surekha R, Rao GV, Deepthi G, Naveen S, Kumar CA. Assessing the accuracy of Cameriere's Indian-specific formula for age estimation on right and left sides of orthopantomogram. Egypt J Forensic Sci. 2020;10(1).

[4]. Demirjian A, Goldstein H. New systems for dental maturity based on seven and four teeth. Ann Hum Biol. 1976;3(5):411–21.

[5]. Nair VV, Thomas S, Thomas J, Fathima S, Thomas D, Thomas T. Comparison of Cameriere's and Demirjian's methods of age estimation among children in Kerala: a pilot study. Clin Pract. 2018;8(1):0–2.

[6]. Javadinejad S, Sekhavati H GRA comparison of the accuracy of four age estimation methods based on panoramic radiography of developing teeth. JDRDCDP 2015;9:72. No Title.

[7]. Wolf TG, Briseño-Marroquín B, Callaway A, Patyna M, Müller VT, Willershausen I, et al. Dental age assessment in 6- to 14-year old German children: Comparison of Cameriere and Demirjian methods. BMC Oral Health [Internet]. 2016;16(1):1–8. Available from: http://dx.doi.org/10.1186/s12903-016-0315-8

[8]. Agrawal NK, Hackman L, Dahal S. Dental age assessment using Demirjian's eight teeth method and willems method in a tertiary hospital. J Nepal Med Assoc. 2018;56(214):912–6.

[9]. Pinchi V, Gian-Aristide N, Pradella F et al. C of the applicability of four odontological methods for age esti-mation of the 14 years legal threshold in a sample of I adolescents. JFO-S 2012;30:2. No Title.

[10]. Galić I, Vodanović M, Cameriere R, et al. Accuracy of Cameriere, Haavikko and W radiographic methods on age estimation on B-H children age groups 6–13. IJLM 2011;125:315-21. No Title.

[11]. Cameriere R, Ferrante L, Cingolani M. Age estimation in children by measurement of open apices in teeth. Int J Legal Med 2006;120:49-52.
[12]. Shrestha A, Yadav RP, Shrtestha S, et al. Measurement of open apices in teeth for estimation of age in children. Health Renaissance 2015;12:33-7.
[13]. Rai B, Kaur J, Cingolani M, et al. Age estimation in children by measurement of open apices in teeth: an Indian for- mula. Int J Legal Med 2010;124:237- 41
[14]. Bagh T, Chatra L, Shenai P, et al. Age estimation using Cameriere's seven teeth method with Indian specific for- mula in south Indian children. Int J Adv Health Sci 2014;1:2-10.
[15]. Galić I, Vodanović M, Cameriere R, et al. Accuracy of Cameriere, Haavikko, and Willems radiographic methods on age estimation on Bosnian-Herzegovian children age groups 6–13. Int J Legal Med 2011;125:315-21.
[16]. Wolf TG, Briseño-Marroquín B, Callaway A, Int J Legal Med. Dental age assessment in 6-to 14-year old German children: comparison of Cameriere and Demirjian methods. BMC Oral Health 2016;16:120.
[17]. Pinchi V, Gian-Aristide N, Pradella F, et al. Comparison of the applicability of four odontological methods for age esti- mation of the 14 years legal threshold in a sample of Italian adolescents. J Forens Odonto-Stomatol 2012;30:2.
[18]. Javadinejad S, Sekhavati H, Ghafari R. A comparison of the accuracy of four age estimation methods based on panoramic radiography of developing teeth. J Dent Res Dent Clin Den Prospect 2015;9:72.

Table 1. Mean difference of estimated age using Cameriere and Demirjian's methods to the chronological age.

CA, chronologic age; EA, estimated age.

Sl No.	CA	EA using Cameriere's method	Difference	Mean	EA using Demirjian's method	Difference	Mean
1.	12	10.1	–1.9	0.050	11.3	+1.23	3.475
2.	12	10	–2.0		14.33	+2.33	
3.	10.7	8.8	–1.9		10.9	–0.2	
4.	7.8	7.2	–0.6		9.75	–2.15	
5.	11.8	11.4	–0.4		9.76	–1.94	
6.	11.9	11.0	–0.9		13.79	+1.89	
7.	10.1	10.0	+0.1		10.56	+0.56	
8.	10	11.5	+1.5		10.89	+0.89	
9.	10.5	10.5	0.0		9.8	+0.7	
10.	10.9	9.4	–1.5		9.77	-0.27	
11.	11.9	11.0	–0.9		10.9	+1.0	
12.	10.1	10.0	+0.1		9.75	–0.35	
13.	10	11.5	+1.5		9.76	–0.36	
14.	10.5	10.5	0.0		13.79	+3.99	
15.	10.7	8.8	–1.9		10.56	-0.04	
16.	7.8	7.2	–0.6		10.89	+3.09	
17.	11.8	11.4	–0.4		9.77	-2.23	
18.	11.9	11.0	–0.9		10.9	–1.0	
19.	10.1	10.0	+0.1		9.75	+0.35	
20.	11.9	11.0	–0.9		10.9	–1.0	

Table 2. Comparison of difference in age with actual age under different methods.

Group	Cameriere's method	Demirjian's method
Mean	0.0500	3.4750
SD	0.0707	3.5567
SEM	0.0500	2.5150
N	20	20

P value equals 0.4092, t = 1.3353, df = 1, standard error of difference = 2.565

Figure 1: Cameriere's method