

Determination of Cameriere Regression Equation Accuracy for Age Estimation In Haryana sub Population

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ABSTRACT

Age estimation in children is important in clinical as well as forensic dentistry. The orthopantomograph samples of 50 healthy children (25boys: 25girls) aged between 5-15 years was selected and Cameriere regression equation was applied. We observed underestimation of estimated age in boys and overestimation in girls as compared to their chronological age.

Keywords

Forensic dentistry, Cameriere regression equation, Haryana population, OPG, Age estimation.

INTRODUCTION

Tooth formation is widely used to assess maturity and predict age. In clinical dentistry, this information aids in diagnosis and treatment planning.¹ The continuous patterns of tooth development can be observed on a longitudinal series of radiographs and various mineralization stages.²⁻⁶ Previously number of methods have been proposed to determine dental age,⁷⁻¹⁵ but, the system developed by Demirijian has gained wide acceptance.⁹ During developmental stages particularly in root formation, a notable difference between sexes arises with females being advanced when compared with males.⁹⁻¹⁹ Previously Cameriere et al proposed a regression equation for age determination from open and closed apices in children¹⁶⁻¹⁷. It has been reported that teeth development depend upon number of

factors such as genetic, environmental, nutritional and geographical factors⁴⁻⁷. Since these factors play major role in tooth formation, they may have effect on dental age estimation. Hence the aim of this study was to determine the accuracy of Cameriere equation for age estimation from open and closed apices on Haryana sub Population.

MATERIAL AND METHODS

The orthopantomographs sample of 50 healthy children (25 boys: 25 girls) aged between 5-15 years taken during the course of diagnosis and treatment was selected. Panoramic radiographs that were unclear or that showed hypodontia, gross pathology and previous orthodontic treatment were excluded.

The chronological age for each subject was calculated by subtracting the date radiograph was taking from the date of birth. Orthopantomographs were digitized using a scanner (HP) at 150dpi. Images obtained were imported to Adobe Photoshop 7.

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The number of teeth with closed apices (N0) and open apices (S), were calculated. The length of left and right permanent mandibular teeth

were measured, measurements was done twice and mean value was taken (see figure 1).

Age estimation was done by applying Cameriere regression equation¹⁶,

$$(\text{Age} = 8.387 + 0.282 g + 1.692 X + 0.835 N - 0.116 s - 0.139 s \times N)$$

The variable g is 1 for male and 0 for female.

Figure 1 . Orthopantomogram of a 12 year old boys showing open apex of second molar and second premolar, the length of tooth to size of open apex of second premolar was measured as shown in the figure.



RESULTS

The chronological age as well as estimated age was shown in table 1a and b for boys and girls respectively

The estimated age obtained was compared with chronological age using student paired t test.

Data analysis was done with sas 9.1.2 software when the whole data was consider (i.e.male and female) there is no significant difference between chronological age and estimated age ($P=0.6954$) but when male and female data were considered separately there is a significant difference between chronological age and estimated age. (Male $P = 0.0001$, Female = 0.0001). We observed an underestimation of age in boys and overestimation in girls as compared to their chronological age.

DISCUSSION

Chronological age, as recorded by registration of date of birth, is referred to throughout individual's life. This information is relevant in medical and dental practice for evaluating developmental progress, educational purposes and in legal matters.^{9,10}

The need to estimate the age of individuals is becoming increasingly important in forensic odontology since there are increasing numbers of illegal immigrants without any documents of birthday.

When data was analysed without taking gender into consideration there was no significant difference seen between estimated and chronological age, this support previous finding by.. Cameriere.et al¹⁹, however when male and females data were analysed separately, we observed a significant difference between chronological and estimated age, this differ from previous finding by. Cameriere.et al¹⁶.. but agrees with. Maber et al¹...

Table 1a

Sr. No	Chronological age	Estimated age
1	4.5	3.8
2	6.8	5.7
3	8.7	7.6
4	8.9	8.2
5	11.2	10.9
6	6.7	5.6
7	7.8	6.7
8	12.7	11.6
9	15.3	13.2
10	13.2	12.7
11	10.6	9.8
12	7.8	6.9
13	11.8	11.5
14	15.9	14.9
15	16.9	15.9
16	12.5	12.1
17	14.6	13.9
18	15.6	15.4
19	8.9	8.7
20	5.1	4.9
21	5.9	5.1
22	9.1	8.3
23	7.5	6.9
24	6.3	6.1
25	8.5	8.1

Table a showing chronological and estimated age(years) in boys .

From the result we observed an overestimation of age in female and underestimation in male when Cameriere regression equation was applied. It is possible that the over/under estimation balances out in the over all data when gender was not taking into consideration during data analysis . This may be the reason why no significance difference was observed between estimated and chrolonogical ages in the overall data.

From this finding we concluded that there is a need to add correction factor to Cameriere regression equation before applying it. Differences seen may be due to different in geographical ,genetic and environment factors that have effect on tooth formation in different population 4-6. Hence there is a need for further study on application of this equation for age determination on different population. There

Table 1b

Sr. No	Chronological age	Estimated age
1	4.5	3.8
2	6.8	5.7
3	8.7	7.6
4	8.9	8.2
5	11.2	10.9
6	6.7	5.6
7	7.8	6.7
8	12.7	11.6
9	15.3	13.2
10	13.2	12.7
11	10.6	9.8
12	7.8	6.9
13	11.8	11.5
14	15.9	14.9
15	16.9	15.9
16	12.5	12.1
17	14.6	13.9
18	15.6	15.4
19	8.9	8.7
20	5.1	4.9
21	5.9	5.1
22	9.1	8.3
23	7.5	6.9
24	6.3	6.1
25	8.5	8.1

Table b showing chronological and estimated age(years) in girls

may be an need to add correction factors to this equation for it to be applicable in different population.

In conclusion, to estimate dental age of india population using Cameriere Regression Equation we observed inaccuracies between gender and there is a need to add a correction factor if this equation will be used in this population.

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