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ORIGINAL ARTICLE

DENTAL AGE ESTIMATION BY DEMIRJIAN'S and NOLLA'S METHOD IN ADOLESCENTS OF WESTERN UTTAR PRADESH

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ABSTRACT:

The estimation of age of a person has been an archaic exercise and since decades even dentists have contributed to this science with several methods .Age estimation forms one of the most important sub-disciplines of forensic science and medico-legal issues. In current scenario, radiology branch comes handy and provides baseline data for age estimation.The paper aims to evaluate the reliability of age estimation using Demirjian's dental age estimation method following the Regression formulas and India specific formulas.The study will be conducted on 50 panaromic radiographs which were predominantly pre-treatment orthodontic radiographs from patients without obvious dental anomalies. The radiograph will be evaluated as per Demirjian's criteria and age will be calculated using formula developed for Indian population.

KEYWORDS Demirjians, Nolla, Age estimation, development, maturity

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INTRODUCTION:

The evolution of dentistry have taken the dentist as an expert in legal proceedings and in the field of forensic sciences [1]. The estimation of age is important for forensic, legal and clinical work. In current scenario, the branch of radiology comes handy which provides baseline data for age estimation [2]. The aim of an ideal age estimation technique is to arrive at an age as close to the chronological age as possible. Various age estimation methods have been tested and reported in the literature. In children and adolescents, somatic development, such as skeletal maturity, height, menarche, etc., has been used to assess the age when unknown.

Demirjian et al classified teeth development into 8 stages which includes only 7 mandibular teeth and concluded a method for age estimation [2]. This method is most widely accepted.[3,4] Later, Acharya included the 3rd molar as well and arrived at a formula for Indian population[5]. Nolla classified the teeth development into 10 stages and arrived at a method [6]. There is no exclusive comparative study between these two methods in the literature.

AIM:

The aim of study is to compare the efficacy of Demirjian's and Nolla's method using the Indian formulas in age estimation of adolescents (8-13 years) by Conventional tracing technique.

METHODOLOGY:

The study was carried out on 20 orthopantomograms (OPGs) of patients which were pretreatment orthodontic radiographs from patients. The radiographs were taken of patients visiting the OPD of our institution.

The radiographs were traced using a tracing paper with a pencil and the required dimensions were measured.

The inclusion criteria of radiographs were-

- Patients of age between 8-13 years

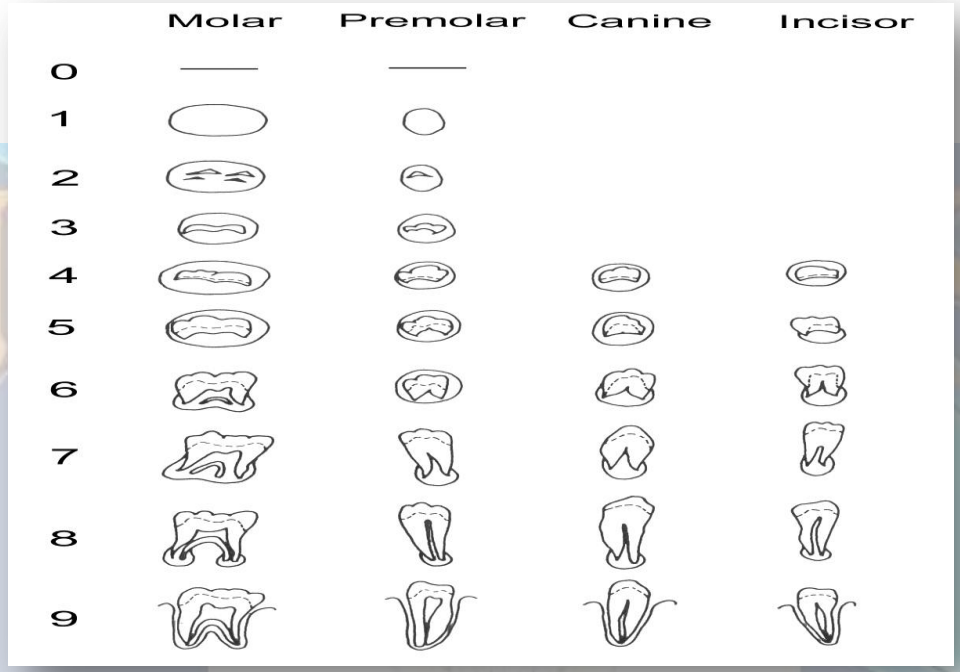
- Patients free of developmental anomalies.
- OPGs without any distortions

The exclusion criteria of radiographs were-

- radiographs of patients with developmental anomalies
- Radiographs of patients with bilaterally missing teeth in mandible

Demirjian's method

TOOTH DEVELOPMENT CHART



[2]

TOOTH MATURITY SCORE

Stage	31	32	33	34	35	36	37	38
0							1.70	6.19
1					1.69		2.98	7.64
2				1.70	2.27		3.41	8.28
3			1.70	1.98	3.41		4.74	8.86
4			2.67	3.52	3.41		4.88	9.89
5	2.31	2.55	4.34	5.19	5.59	2.13	6.69	11.17
6	4.35	4.71	6.14	6.47	6.96	3.73	7.89	12. 25
7	5.16	5.75	7.59	8.18	8.68	4.94	9.08	13.66
8	6.56	6.97	9.52	9.84	10.64	7.00	11.13	14.07
9	10.68	10.91	12.56	12.57	13.11	11.22	13.63	15.32

Indian formulas

Females:

- Age = (0.3164 × S) – 13.154

Males:

Age = (0.3118 × S) – 12.852

Nolla's Method

- Right side of the mandibular arch was assessed on OPGs of the patients for dental age according to Nolla's developmental stages
- Age= sum of stages/total no. of teeth assessed
- The value is assessed according to the norms for maturation of teeth for males and females. [4]

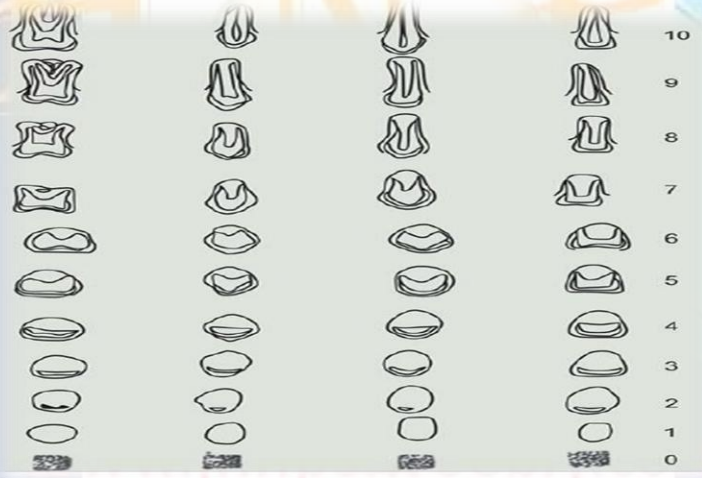


Fig. 3: Nolla's developmental stages of permanent teeth

RESULTS:

The efficiency of Demirjians and Nolla's method was calculated statistically using a paired t-test in SPSS v17. The comparison of Chronological age and Dental age by Demirjian's methods revealed non significant results (p=0.057) whereas the same comparison for Nolla's method revealed significant results (p<0.05). Both the methods then were compared using ANOVA. It was found that Demirjian's is a much more reliable method of age estimation as compared to Nolla's. Furthermore in Nolla's, we noted underestimation of age in 100% of the subjects. Dental age correlates closely with chronological age in a person's development. Demirjian's

method is one of the simplest and widely employed method of age estimation which clearly defines the developmental changes of teeth in 9 stages. Nolla's method has been the method of choice for so many years which defines the teeth development in 10 stages.

DISCUSSION:

Dental age correlates closely with chronological age in a person's development. In recent times, many methods have been devised to estimate dental and chronological age of a person [7,8,9,10]. Demirjian's method is one of the simplest and widely employed method of age estimation which clearly defines the developmental changes of teeth in 9 stages.[11] Nolla's method has been the method of choice for so many years which defines the teeth development in 10 stages.[12] It has additional staging of mineralization which proves it to be more accurate and reliable and thus making it the most commonly used method around the world [13]. The methods based on staging of teeth formation, primarily taking the degree of mineralization into account are considered more accurate as the calcification is controlled genetically and is least affected by environmental factors.[14] These stages are visualized using radiology – it is the simplest, fastest and most economical diagnostic aid done in routine dental examinations since 1982 [15]

In a study done by Patnana (2015) [11], Demirjian's method exceeded the chronological age with a mean difference of 0.55 years. The overestimation of dental age in Demirjian's method might be because of two reasons, which include: (A) the study was done in French-Canadian population and so it may not be applicable to all the population, (B) dental maturation demonstrates few pubertal changes and thus is a poor indicator of pubertal growth spurt. Demirjian's method calculates overall maturity of the tooth and dental maturation is rather independent from overall skeletal maturation.

Miloglu et al conducted a study on Turkish males using the Nolla's method and inferred that the mean difference in the dental and chronological age ranged from -0.5 to 0.0 years proving the accuracy of Nolla's method above any other method of dental age estimation, similar statistics were obtained by Caro et al (2001) [7, 17] The present study agrees with the previously mentioned analysis by various researchers and proves the Nolla's method of estimating dental age by analysing 10 stages of teeth development as compared to the 9 stage system of Demirjian's. However, the reason why Demirjian's is most widely used method might be

because of lesser complex formulas and least exhaustive staging of development as compared to Nolla's.

CONCLUSION:

According to the study conducted on 20 subjects of age group 8-13 years; it was found that Demirjian's showed less significant difference in chronological and dental age of the patients as compared to Nolla's method.

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