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Applicability of Dental age assessment in Nepalese population using Demirjian's Method -A Radiographic Study

Dental Science

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ABSTRACT

Introduction: Age estimation has been an important role of forensic odontologists and they determine it by methods like incremental analysis, Nolla's method and Demirjian's method. In this study, we have used the Demirjian's method of age assessment on a Nepalese population and seen the applicability by relating it to the chronological age.

Materials and methods: This study was conducted on panoramic X-rays of 285 patients including 170 males, 115 females were taken and the chronological age and the dental age as estimated by the demirjian method used on seven left mandibular teeth has been compared.

Results: The difference between the dental and chronological age in the Nepalese population sample was significant statistically. ($P<0.0001$) Also, it was found that in the girls and boys of age 6 to 7 years, the difference was significant where as in 9.1 – 11 years age group, the difference was insignificant.

Conclusion: Our study on Nepalese population has also showed a more advanced dental age. It is thought to be mainly because of the variability in ethnicity, nationality, socio- economic status and hence the nutrition of the patient.

KEYWORDS:

Introduction

Forensic sciences includes all the branches of science that give evidence when a crime or an incident has happened and that evidence or the fact can be presented in a court of law. Forensic odontology has been very beneficial in identifying the victims of war, natural disasters, etc. In many crimes, forensic odontologist plays an important role in determining the age and maturation of the victim of the suspect.1

Age estimation has been tried by many ways like skeletal maturation, secondary sexual features appearance or the dental age. The correlations between the dental age and the chronological age has been found to be of significant importance.2 And this is the easiest and fastest way to determine the age in case of mass disasters. Many methods have been used to determine age by forensic odontologists like incremental analysis, Nolla's method and Demirjian's method.3,4 In this study, we have used the Demirjian's method of age assessment on a Nepalese population and seen the applicability by relating it to the chronological age.

Materials and Methods:

This study was conducted at College of Medical Sciences, Bharatpur, Nepal. The panoramic X-rays of 285 patients including 170 males, 115 females were taken from the records of the Oral Radiology Department.

The aim of this study was to check the applicability of Demirjian's method of age assessment on a Nepalese population. The chronological age was calculated from the difference in the date of birth of the patient and the date on which Orthpantomograph was taken.

The children included in the study were between 6 to 13 years of the age with no previous history of orthodontic or maxillofacial treatment. The medical history was taken from all patients and was found to be non-contributory.

Demirjian's method was applied on seven left mandibular teeth by a single observer to avoid the bias. Demirjian has given eight stages of tooth formation and labelled them from "A" to "H".

Dental formation stages given by Demirjian are as follows4:-

Stage A: In both uniradicular and multiradicular teeth, a beginning of calcification is seen at the superior level of the crypt in the form of an inverted cone or cones. No fusion of these calcification points is observed.

Stage B: Fusion of calcified points forms one or several cusps which unite to give a regularly outlined occlusal surface.

Stage C: Enamel formation is complete at the occlusal surface, dentine deposition has started and the pulp chamber has a curved shape at the occlusal border.

Stage D: Crown formation is complete, extending down to the cemento- enamel junction. Beginning of root formation is seen in the form of a spicule.

Stage E: The walls of the pulp chamber form straight lines. The root length is less than the crown height. In molars the formation of the radicular bifurcation is seen like a calcified point or a semi-lunar shape.

Stage F: The walls of the pulp chamber form an isosceles triangle. The apex ends in a funnel shape. The root length is equal to or greater than the crown height.

Stage G: The walls of the root canal are parallel and the apical end is still partially open.

Stage H: The apical end of the root is completely closed and the periodontal membrane has a uniform width around the tooth apex.

Results:-

The sample taken in this study was divided into four sub-groups

Table 1. Division of groups

Age	Male	Female
6-7 YEARS	AB	AG
7.1-9 YEARS	BB	BG
9.1-11YEARS	CB	CG
11.1-13 YEARS	DB	DG

Fig.1 Demirjian stages depiction

It was found out that the difference between the dental and chronological age in the Nepalese population sample was significant statistically. (P<0.0001) Also, it was found that in the girls and boys of age 6 to 7 years, the difference was significant where as in 9.1 – 11 years age group, the difference was insignificant.

Statistically significant values for the difference in chronological and dental age was also found in girls of age group (11.1-13 years). The difference depicts as a more advanced dental age in girls in age groups AG, BG whereas dental age was almost in coordinate in CG.

Whereas in boys, group AB, BB should an advanced dental age whereas CG and DG, chronological age was ahead of dental age.

Table.2 The results

Group	No. of patients	Mean chronological age	Mean dental age	p-value
AB	28	7.051	7.736	<0.0001
BB	62	8.821	8.881	<0.0001
CB	50	10.91	10.90	0.6877
DB	30	13.02	12.687	0.1045
AG	29	7.424	7.986	<0.0001
BG	40	9.086	9.245	<0.0001
CG	30	10.915	10.76	0.5151
DG	16	12.612	12.813	<0.0001

Discussion:

Many methods for estimating the age have been given in the literature. Some rely on the skeletal age while some others take into consideration the dental age. Dental age can be defined as the age that is found by seeing the maturity of the teeth by various methods. Some other methods used by forensic odontologies include the cemental incremental analysis.

While calculating the dental age, Nolla's stages or Demirjian stages have been used by various authors.3,4 We have done this study to check the applicability of age estimation done by Demirjian method in Nepalese population.

Many studies have been done till date for the checking of accuracy of this method on various populations. In certain studies the result were found to be positive and accurate for the population5,6,7 (Hedge et al., 2002, Baghdadi et al., 2012, Bagherpow et al., 2010), while some other studies proved it to be inaccurate for their population8,9 (Nik-Hussein et al ., 2011, Crus-Landeira et al ., 2010)

In comparison to the Demirjian's French-Canadian standards, it was seen that in our study, the girls were more advanced in the age group 6-7 years and 7.1-9 years whereas girls in 9.1-11 years and 11.1-13 years age group showed good correlation to the Demirjian value.10

Our results were found to be opposite to a study done on Romanian population in which girls presented a significantly advanced age in groups 5 – 5.6 years and 11.5 – 14.4 years whereas in our study it was not true.11 In boys, our study showed advanced age in 6 – 7 years and 7.1 – 9 years age group whereas chronological age was ahead in 9.1 – 11 and 11.1 – 13 years age groups whereas in Romanian population advanced chronological age in most age groups except the groups of lowest and highest ages.

In comparing various studies, it is seen that many studies done on Caucasian samples as well as in Indian and Black sample show dental age to be less advanced than the chronological age whereas studies showing more advanced dental age was seen in studies in Nordic countries.12,13,14,15,16

Our study on Nepalese population has also showed a more advanced dental age. It is thought to be mainly because of the variability in ethnicity, nationality, socio- economic status and hence the nutrition of the patient.

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