

Eruption Pattern of Dentition and Its Medico-legal Significance

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ABSTRACT

Background

The eruption pattern of temporary and permanent teeth are fairly constant with the growing age. So the age determination of an individual by examination of teeth is one of the accepted methods in legal system. A review of the literature shows there are differences in eruption pattern between different populations mainly due to variations in the constitutions and environment, so highlighting the importance of this study to the Nepalese population.

Objective

To assess the eruption age of temporary and permanent teeth in Nepalese population and compared the eruption age with other groups.

Method

This cross-sectional study, included 450 subjects, aged between six months to 25 years selected by simple random sampling method. The determinant variable such as age and number of teeth was recorded.

Result

Eruption of temporary and permanent teeth is slightly delayed in Nepalese population compared with others. First temporary tooth to erupt is lower central Incisor at around eight months and last to erupt is second molar at around 28 months. For permanent tooth, first molar erupts at around seven years and second molar erupts by 14 years. Eruption of third molar (wisdom tooth) varies from 18 to 25 years.

Conclusion

This study provides a model data on eruption age of teeth which is first study of its kind in Nepal. The findings of this study will help as a reference data for optimal use in clinical, academic and research activities especially in Nepalese population. Medico legally it helps in estimation of age along with other parameters.

KEY WORDS

Age, eruption, permanent teeth, temporary teeth

INTRODUCTION

Estimation of age is an important activity and is commonly carried in medico legal area which is often required while administering justice to an individual involved in civil and criminal litigation. An erupted tooth is defined as a tooth with any part of its crown penetrating the gingiva and visible in the oral cavity.^{1,2} Several studies have shown variation in teeth eruption between different ethnic and racial groups.³ Eruption of teeth is known to be affected by dietary, climatic, racial and geographical variations.⁴ The process of gingival eruption of teeth is one of those that cannot be dated exactly but can readily be recorded as having erupted or not.⁵ This fact can be made use of in ascertaining the average age of eruption of the tooth. Tooth eruption has not been investigated more in Nepalese population and information on ages of eruption of teeth used in clinical and academic situation in Nepal is based on other populations. It has been suggested in the literature that standards for tooth eruption should be derived from the population in which they are to be applied because factors related to temporary and permanent dentition may vary.⁶ The temporary teeth will guide from six months to thirty months while the permanent teeth will help from six years to twenty-five years in age determination. Some temporary and permanent teeth do co-exist up to twelve years of age known as mixed dentition. The branch of Forensic Medicine, which deals with the examination of teeth, is known as forensic odontology. By definition it is the application of Dental science to the law. Although, forensic odontology is a relatively small specialty but it has been utilized for many years especially in establishing identity. The first reported crime in the history of mankind was solved when bite marks were discovered in the remains of the forbidden fruit in the Garden of Eden and identified as those of the Adam and Eve.⁷ There are two methods of dental age assessment, radiographically and by clinically visualization of eruption of teeth. By radiographic methods it is possible to follow the formation of crowns and roots of teeth and their calcification. But the use of radiography is very rare below the age of three years because of difficulty of getting x-rays of this age group. In young age, this is possible to some extent by studying the calcification of root, but as the child grows, this is not possible. The clinical method to assess dental age is based on eruption of teeth in the mouth. This method is more suitable since it does not require any special equipment, expertise and is more economical. However when estimating the age with dentition it would be better to use along with other parameters such as physical development, appearance and fusion of ossification centers in bones.

METHODS

This cross sectional study included 450 healthy populations between the ages of six months and 25 years. The samples were taken from students of different schools around Dhulikhel, KUSMS student and patients coming to

Outpatient Department of Dhulikhel Hospital, Kathmandu University Hospital. Informed consent was taken during the time of sample collection. Ethical approval was taken from Institutional Review Committee of Kathmandu University School of Medical Sciences. Third year medical students were trained to collect the data. Age of the subject was noted in years with months. Clinical examination of the subject was done under torchlight with mouth mirror, tongue blade and dental explorer no. four with the subject seated on an ordinary chair. Then the number of tooth was counted, differentiating whether temporary or permanent. Then dental chartings were made according to universally accepted Federation Dentaire Internationale (FDI) standards. Data processing and analysis was carried out using the statistical package SPSS.

RESULTS

Study was conducted in 450 random cases from different schools, colleges and out patients departments of Dhulikhel Hospital. There were males and females of different age groups from five months to 25 years. (Table: 1)

Table 1. Distribution of cases according to age and sex

Age	Male (%)	Female (%)	Total (%)
5 months to 5 years	56 (22.05)	42 (21.43)	98 (21.78)
5.1 to 10 years	52 (20.47)	37 (18.88)	89 (19.78)
10.1 to 15 years	49 (19.29)	46 (23.47)	95 (21.11)
15.1 to 20 years	43 (16.93)	31 (15.81)	74 (16.44)
20.1 to 25 years	54 (21.26)	40 (20.41)	94 (20.89)
Total	254	196	450 (100)

In temporary tooth (Table: 2), both the central incisors were erupted approximately at the age of 6 to 11 months followed by lateral incisors at the age 8 to 15 months. The eruption of lower lateral incisors was found to erupt earlier than the upper lateral incisors. Next to erupt was upper first molar between the ages of 12 to 16 months. Lower jaw molar was first to erupt followed by upper jaw molar. Canines tooth erupted at the age between 19 to 24 months followed by second molar between 27 to 32 months.

Table 2. Age at which temporary tooth erupts

S.No.	Teeth	Upper/ Lower jaw	Range of age at which tooth erupts (Months)	Mean $\pm$ SD
1	Central Incisor	Lower	06.7-09.8	07.92 $\pm$ 1.30
		Upper	08.2-11.0	09.83 $\pm$ 0.96
2	Lateral Incisor	Upper	08.2-13.6	10.96 $\pm$ 0.86
		Lower	08.8-14.9	12.52 $\pm$ 1.51
3	First Molar	Lower	12.9-16.5	13.94 $\pm$ 1.01
		Upper	14.3-16.2	15.83 $\pm$ 0.84
4	Canines	Upper	19.1-23.6	21.32 $\pm$ 1.43
		Lower	19.5-24.0	21.80 $\pm$ 1.46
5	Second Molar	Upper	24.6-31.1	28.54 $\pm$ 3.24
		Lower	24.3-31.6	28.57 $\pm$ 3.21

In permanent teeth (Table: 3), first tooth to erupt is first molar at the age between 5 to 8 years. Both the upper and lower first molar erupted approximately at the same time. Central incisor was next to erupted between 6 to 9 years and lower was erupted earlier than upper central incisor. Lateral incisor erupted at the age between 7 to 10 years. Next tooth found to erupt was first premolar between 9 to 12 years followed by second premolar between 10 to 12 years. Canine tooth erupted at the age between 10 to 13 years. Upper jaw canine was erupted earlier than lower jaw canine. After that second molar erupted at the age between 12 to 14 years, lower slightly earlier than upper second molar. Last temporary tooth to erupt was third molar which was very variable so that between the age of 18 to 25 years.

Table 2. Age at which temporary tooth erupts

S.No.	Teeth	Upper/ Lower jaw	Range of age at which tooth erupts (Years)	Mean $\pm$ SD
1	First Molar	Lower	05.9-07.8	06.60 $\pm$ 0.52
		Upper	05.9-07.6	06.01 $\pm$ 0.51
2	Central Incisor	Lower	06.4-08.6	07.32 $\pm$ 0.64
		Upper	06.7-08.9	07.89 $\pm$ 0.72
3	Lateral Incisor	Lower	07.6-09.8	08.92 $\pm$ 0.56
		Upper	07.6-09.8	08.92 $\pm$ 0.56
4	First Pre-molar	Upper	09.3-11.3	10.16 $\pm$ 0.44
		Lower	09.5-11.4	10.13 $\pm$ 0.43
5	Second Premolar	Upper	10.1-11.3	10.69 $\pm$ 0.39
		Lower	10.2-11.6	10.71 $\pm$ 0.40
6	Canine	Upper	10.5-12.9	11.05 $\pm$ 0.91
		Lower	10.7-13.0	11.18 $\pm$ 1.02
7	Second Molar	Lower	11.9-14.4	13.12 $\pm$ 1.14
		Upper	12.0-14.7	13.14 $\pm$ 1.20
8	Third Molar	Upper	18.6-24.8	21.92 $\pm$ 2.35
		Lower	18.9-24.9	21.98 $\pm$ 2.37

DISCUSSION

The mean age for eruption of teeth has been studied for most of the different population groups and shows that there are some differences in eruption age of teeth for both temporary and permanent teeth. The differences are mainly due to variations in the constitutions and environment of the groups investigated. A study conducted in Sunsari district of Nepal for temporary teeth shows that, mean age for emergence of upper (maxillary) central incisor was 11 months, lateral incisor 13 months, canine 19 months, first molar 15 months, second molar 25 months, and for lower (mandibular) teeth, central incisor 10 months, lateral incisor 13 months, canine 21 months, first molar 16 months and second molar 26 months.⁸ But in our study, temporary central incisor erupted earlier so that lower central incisor at 7.92 months and upper central

incisor at 9.83 months whereas other remaining tooth eruption was approximately at the same age groups. So that mean age for eruption are 11.74 months for lateral incisor, 21.56 months for canine, 14.88 months for first molar and 28.54 months for second molar. Comparing to the study done in the population of Himachal Pradesh, India four eruption age of temporary tooth was delayed in Nepalese population.

Permanent teeth erupt first in the lower jaw and then in the upper jaw. The permanent teeth appears earlier in the female compared to the male. The eruption of third molar tooth was very irregular, usually erupts by 18-25 years of age. According to the different Indian study, the eruption of permanent teeth starts at the age of 6 years, by eruption of first permanent molar, behind the second temporary molar and by age of twelve to thirteen years, all permanent teeth erupts, with the exception of third molar whose eruption is most erratic and is between 17 -25 years of age.⁹ And the other study done in school boys and girls in Madras and Lahore shows that, mean age of eruption of permanent teeth as 7.10 years for central incisor, 7.88 years for lateral incisor, 10.87 years for canine, 10.50 years for first premolar for 11.01 years for second pre molar, 6.48 for first molar and 11.70 for second molar.¹⁰ The above Indian study has utilized the same method for estimation of tooth eruption as in this study and hence the results have been compared which suggest that there was delayed in eruption of teeth in Nepalese population. According to our study, the mean age of eruption of permanent teeth are 7.89 years for central incisor, 8.92 years for lateral incisor, 11.05 years for canine, 10.16 years for first premolar, 10.71 years for second premolar, 6.60 years for first molar, 13.14 years for second molar and 21.94 years for third molar which are delayed compared to the other populations.

Hence it is not correct to apply the same data for different populations. Moreover no recent study on eruption of teeth has been performed in this region especially for both temporary and permanent tooth. Because of this, the present study was performed for age estimation from eruption of temporary and permanent teeth to apply for the Nepalese population.

CONCLUSION

The results suggested delayed eruption of teeth in Nepalese population compared to other groups. The findings of this study gives a new chronological table for eruption age of temporary and permanent teeth in Nepalese population which can be used in academic, anthropological research and forensic applications in medico legal system for age determination along with other parameters.

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