



ERUPTION TIME OF PERMANENT SECOND MOLAR IN EASTERN POPULATION OF NEPAL

Forensic Medicine

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ABSTRACT

A community based study on the time of eruption of permanent 2nd molar teeth to establish the age of an Individual was undertaken on 500 subjects (250 males and 250 females) residing in Dharan, eastern Nepal in the age group of 10-14 yrs. Correlation between the age and eruption time of individual tooth was calculated stage wise in both jaws of both the sexes.

Eruption time of each tooth was to vary not only from population to population but also with in the same population. This is why the present study was under-taken in view of this because there is a significant time lag between the cutting of the tooth in to the oral cavity and completion of eruption (i.e. completion of bite), and hence it was felt that in age determination cases, their actual age of eruption should be taken in to account than presence or absence of 2nd molar in the jaw.

KEYWORDS

Age estimation, stages of eruption, permanent molars.

INTRODUCTION

Age estimation is an important activity that is frequently required to be carried out in medico legal work. An individual is often referred to a medical man by the court or investigating authority in various criminal as well as civil cases to give the opinion regarding his/her age. The case in which the opinion regarding the age is required includes criminal responsibility, consent, marriage contract, kid-napping, rape, attainment of majority, eligibility for employment and judicial punishment. Assessment age of the individual is done by external examination, secondary sexual feature examination skeletal examination and dental examination. Out of all those dental examination is one of the most important examination where a clear cut range of age is given.[1]

Along with playing great role in forensic investigations, age estimation has also importance in orthodontic and surgical treatment planning, and tooth transplantation.[2] In forensic applications, chronological as well as maturational stages of an individual are often determined by assessing the stages of tooth development. Teeth offer an excellent material for age determination by stages of development below the age of 25 years and by secondary changes after the age of 25 years.[3] Third molar is often not included for this purpose due to its notorious developmental patterns.

Teeth represent useful material for age estimation. In childhood, the observation of the dentition status results in highly accurate age assessment. However, this accuracy decreases simultaneously with the completion of a person's dental development.[10] The development of each individual can be affected by genetic, nutritional, climatic, hormonal and environmental factors.[11], [12] It has been reported that dental mineralization is less affected by external factors when compared to bone mineralization.[13] In addition to its clinical importance, the radio-graphic diagnosis may have possible medico-legal implications, because it is one of the parameters proposed to determine the age of undocumented youths.[14],[15]

The reason for the validity of dental examination is due to the fact that chronology of dental development is less variable than bone development and the method applied for this particular period of life is a reliable indicator of age. Though there are numerous parameters like diet, climate, race and geographical variation, the eruption time for both, deciduous and permanent teeth are fairly constant. Eruption of teeth is one of the changes observed easily among the various dynamic changes that occur from formation of teeth to the final shedding of the teeth. There is a significant time lag between cutting of a tooth into the mouth and completion of eruption (i.e. completion of bite) in both deciduous and permanent teeth.[5]

Skeleton maturity and dental maturity to some extent are related to morphological advancement during the whole growth period. It is observed, that unlike deciduous teeth there existed marked variation not only in the eruption time but also in the sequence of eruption of permanent teeth among different populations of the world.[7]

With the increase of criminals and crime in a country improved and rapid method of age estimation is required. An individual is often referred to a medical man by courts or investigating authorities in criminal as well as in civil cases to give opinion regarding his/her age.

Despite of rapid environmental and growth pattern changes in the population very few studies have been carried out in Nepal to evaluate their effect on the teeth. Hence, this study was planned to estimate the time of eruption of permanent 2nd molar in Dharan to compare with what is status as compare to rest of the world.

METHODS

The material for the present study consist of 250 boys and 250 girls, students from schools/colleges of Dharan, Nepal which is situated in eastern part of country from the period December 2013 to November 2015. The subjects were examined after obtaining informed consent from the participants.

Ascertained date of birth:

Only those cases whose date of birth were known and supported by one or more documentary proof such school/college Certificate of age were taken for the study.

Most of the individuals included in the study were bonfire residents of Dharan since birth and will be brought up in this region. Only those individual who at the time of study were having apparently sound health was included in the study.

The males and females belong in to age group 10-21 years irrespective of their caste; religion and socio-economic status were included in the study. All the selected cases were broadly classified in the following groups:

- Group I Age between 10 years to 10 years + 364 days
- Group II Age between 11 years to 11 years + 364 days
- Group III Age between 12 years to 12 years + 364 days
- Group IV Age between 13 years to 13 years + 364 days
- Group III Age between 14 years to 14 years + 364 days

In each group 100 cases were studied, consisting of 50 males and 50 females.

The following instruments and documents will be used in the study:

- I. Torch;
- II. Dental mirror;
- III. Age record;
- IV. Computer and related software.

The oral cavity was examined with the help of torch light with mouth widely open and a dental mirror. Detailed dental examination was done and details noted in the form of number of teeth erupted, type of teeth erupted, whether deciduous or permanent, stage of eruption and fall out temporary teeth. Dental charting was done according to F D I (Federation Dentaire Internationale) system, as follows:

18 17 16 15 14 13 12 11 21 22 23 24 25 26 27 28
 48 47 46 45 44 43 42 41 31 32 33 34 35 36 37 38

The staging of tooth eruption was done in the following manner:

- Stage 0 - Non-eruption of temporary tooth/fall out of temporary tooth and non-eruption of corresponding permanent tooth.
- Stage 1 - When tip of crown of tooth penetrated the gum margin.
- Stage 2 - When this crown has grown into oral cavity beyond gum margins but not yet reached the occlusal plane.
- Stage 3 - When the occlusal surface came in contact with its counterpart and the bite was complete.

RESULTS

Right maxillary second molar

The mean age of starting of eruption (stage1) of right maxillary second molar teeth in males was 11.11 years with standard deviation of 0.72. The earliest age of eruption was 10.21 years and the latest age was found to be 12.48 years. In case of females the mean age of eruption was 11.78 years with standard deviation of 0.58. The earliest age was 10.21 years and the latest age was 12.22 years.

Left maxillary second molar

The mean age of eruption (stage1) of left maxillary second molar teeth in males was 11.36 years with standard deviation of 0.59. The earliest age was 10.36 years and the latest age was 12.26 years. In females the mean age of eruption was 11.93 years with standard deviation of 0.77. The earliest age of eruption was 11.62 years and the latest age was found to be 12.24 years.

Right mandibular second molar

The mean age of eruption of right mandibular second molar (phase 1) teeth in males was 11.41 years with standard deviation 0.87. The earliest age of eruption was 10.36 years and the latest age was 12.48 years. In females the mean age of eruption of was 11.65 years with standard deviation 1.15. The earliest age of eruption was 10.063 years and the latest was 11.83 years.

Left mandibular second molar

The mean age of eruption left mandibular second molar teeth in males was 11.80 years with standard deviation 0.87. The earliest age of eruption was 10.36 years and the latest age was 12.48 years. In females the mean age was 11.58 years and standard deviation was 0.30. The earliest age was 11.18 years and latest was 11.80 years.

Table: 1 Eruption time of second molar

Sex	17	27	37	47
Male	11.11±0.72	11.36±0.59	11.41±0.87	11.80±0.87
Female	11.78±0.58	11.93±0.17	11.65±0.28	11.58±0.30

Abbreviations

- 17: right maxillary second molar
- 27: left maxillary second molar
- 37: right mandibular second molar
- 47: left mandibular second molar

DISCUSSION

Methods for determination of a child's growth and development are of great value for both the medical and deontological point of view. Although various methods for the age determination do exist, a universal system has not been achieved due to the varying differences in different ethnic population groups.

Workers from different parts of the world have studied the eruption of deciduous and permanent teeth. However, in Nepal studies relating to the eruption time and the sequence of eruption of deciduous and permanent teeth are yet to achieve their full momentum.

In our study the mean age of eruption i.e. stage 1 was 11.11 years for the right second maxillary molar and 11.36 years for the left maxillary in males. However; this difference is not statistically significant (anova p value >0.05). In females the mean age of eruption of right maxillary second molar was 11.78 years and in left maxillary second molar was 11.93 years. This difference is also not found statistically significant (anova p value >0.05) for eruption of permanent teeth.

A similar study by Kaul et al[4] from Chandigarh shows that the mean age of eruption in males for the right maxillary molar was 12.02 year. The study by Mishra et al[5] the mean age for males right maxillary molar was 12.00 years while in females the mean age of maxillary molar was 11.50 years which is slightly more for male and slightly less for female in comparison to our study. Another study conducted on females only, the mean age of eruption was found to be 11.87 years for 2nd maxillary molar[4] which is almost same in accordance to our study.

The mean age of eruption in both sexes in most of the studies has been found almost similar with the females having slightly early eruption which is again not in accordance to our study because it shows findings where slightly early eruption is seen in male. Though the age difference between eruption time is not significant in male as well as female.

In our study the mean age of eruption of right mandibular second molar in males was found to be 11.41 years and of left side 11.80 years. However; this difference is not statistically significant (p value >0.05). In females the mean age was 11.65 years for the right side and 11.58 years for the left. This difference was also not found statistically significant (p value >0.05).

In the study by Shourie[7] on Madras boys the mean age of eruption of mandibular second molar was 12.26 years and 11.41 years in Lahore boys. In madras fe-males the mean age of eruption was 11.59 years. In Kaul's study[4] the mean age of eruption of 2nd mandibular molar for males was 11.41 years and in females it was 11.72 years. The Study by Singhal[8] on females the mean age was 11.84 years. While in Mishra's study [5] the mean age in males was 11.9 years and in females it was 11.50 years. All these results are in consonance with the results of the present study.

The second mandibular teeth eruption has been found to be ahead of maxillary teeth in most of the studies and the same results have not been obtained in our study. The finding of a slightly early age of eruption in females than in males is again consistent with the other similar studies for mandibular second molars.

CONCLUSION

There exists a co-relation between the stages of eruption of a tooth with chronological age. It is better to assess the age of an individual based on the stages of eruption rather than by mere presence/ absence. A separate age data can be made for separate phase of erupted molars than a common data. Molars erupt earlier in male (Except left mandibular second molar) than female. Second maxillary molar erupts earlier than 2nd Mandibular molar.

TABLE 2: Comparison between present study and other similar studies.

Sn	Study with year	Region	2 nd molar							
			Maxillary				Mandibular			
			M		F		M		F	
			Rt	Lt	Rt	Lt	Rt	Lt	Rt	Lt
01	Shourie (1946)	Madras	12.37	12.37	11.86	11.93	12.26	11.90	11.95	11.48
02	Kaul (1989)	Haryana	11.48		11.35		11.00		10.89	
03	Laxmi kumar (1990)	A.p.	11.60		11.50		11.76		11.15	

04	Mishra (1994)	Himachal pradesh	12.66	12.10	12.50	12.30				
0606	Present 2016	Dharan	11.11	11.36	11.78	11.93	12.90	11.80	11.80	11.58

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