

AGE ESTIMATION FROM ERUPTION OF PERMANENT TEETH

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ABSTRACT

This study was conducted on 578 individuals and eruption of various permanent teeth was noted in age group from 4 years to 25 years. Correlation of sex with the eruption of teeth was also noted and was found statistically that there was no significant difference in this. Eruption of teeth was compared between the two jaws and also the two sides of the jaws.

Key Words: Molars, Age estimation, Teeth.

INTRODUCTION

The estimation of age is an important activity and is commonly carried in medico legal area. Assessment of age is often required while administering justice to an individual involved in civil and criminal litigation. The temporary teeth will guide from six months to thirty-three months while the permanent teeth will help from six years to twenty-five years in age determination. Eruption of teeth is known to be affected by dietary, climatic, racial and geographical variations [1].

The branch of Forensic Medicine, which deals with the examination of teeth, is known as Forensic Odontology. In a developing country like India, a large number of people are illiterate and have no knowledge or records of their date of birth which is required by law enforcing agencies in matters like, criminal responsibilities, identification, judicial punishment, consent, rape, criminal abortion, employment, attainment of majority, kidnapping and prostitution [2].

There are two methods of dental age assessment, radio-graphically 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. . 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 emergence of teeth in the mouth. This method is more suitable since it does not require any special equipment, expertise

and is more economical. Tooth formation is the best choice for estimating the age as variations are less as compared to other development factors.

There are charts and tables for the assessment of age during development period, which shows the formation, eruption, and calcification of teeth. For this purpose table of Krenfield and Logan further modified by Kronfield and Schour (1939) is commonly used (Mc Donald and Avery, 1998) which has been accepted standard for many years. Since population of India is very large and its climate are different in hence a cross-sectional study was carried out in Patiala to estimate the eruption time of permanent teeth in the age group of five years to twenty five years.

Gonzales et al described that the teeth may give, reliable information as to the age in childhood and youth. The permanent teeth eruption starts at sixth year and by twelve to fourteen years, all the permanent teeth except the third molars or wisdom teeth erupt [3].

Polson described that when a tooth of the first dentition has erupted, the infant is in all probability six to eight months old. An infant, who has completed first dentition, has attained about two years of age. The first permanent molar erupts in boys at the age of 73 to 74 Months where as in girls; it erupts at 70 to 72 months. The central incisors showed a wide range in the time of

eruption, which were 72 to 84 months in boys and 69 to 79 months in girls. The eruption of third molar is variable, and these teeth are prone to impaction. When present, one is more than seventeen years [4].

Smith described the earlier eruption of teeth in the lower jaw than in the upper jaw. Temporary dentition begins at 6-8 months off age by eruption of lower central incisors and is completed at 24 months by eruption of second molars. Permanent dentition begins at 6 years of age by eruption of 1st molar behind the 2nd maxillary temporary teeth and is completed at 17-21 years by eruption of 3rd molar teeth (wisdom teeth). The eruption of wisdom teeth is very variable and is never before seventeen years of age [5].

Grewal described eruption of temporary teeth in children at six months for lower central Incisors, seven months for upper central incisors, upper lateral incisors, seven to nine months for lower lateral incisors, tenth to twelfth month. First molar at one year, canine eighteenth month, second molar twenty fourth month. The appearance of permanent teeth is at seventh to eighth year for central Incisor, eleventh to twelfth year for canine, ninth to tenth year for central premolar, tenth to twelfth year for post premolar, sixth to seventh year for first molar, twelfth year for second molar, third molar at seventeen to twenty five year or any age after this [6].

Billewicz et al studied on 635 West African (Gambian) children with in the range of 4.5 to 14.0 years. They found no difference between eruption ages of homologous permanent teeth on the left and the right side of the same jaw. Teeth erupted in the lower jaw with the exception of 1st and 2nd premolars. The eruption in females was earlier than males. One can estimate the calendar age from permanent dentition with an error of 0.5 years for one to teeth and over one year for twelve teeth or more [7].

Sharma and Mittal studied patterns of secondary tooth eruption in Gujjars in a cross-sectional sample of 483 between 6 to 13 years of age. They observed female tooth emergence advancement over males but in the sequence of emergence, there were no sex differences. Emergence time difference between median right and left sides was only 14.29% namely central

incisors, mandibular 1st molars, in males and lateral maxillary incisors in females. In general mandibular teeth except premolar tend to emerge earlier than their maxillary counterparts [8].

Ilieva, Veleganova and Belcheva conducted study on 928 children from four to eight years of age in Plovdiv for the eruption of first permanent molars from randomly selected kindergartens and schools and found no statistically significant difference in the eruption age of first permanent molars between the two genders, as well as between the upper and lower jaw. They also found the initial eruption age of first permanent molars is five to six years, the mean age is six to seven years and the latest age is seven to eight years [9].

Aims and Objectives

1. To find out average age from eruption of teeth in general.
2. To find out age separately in both sexes from eruption of teeth.
3. To find out the difference in age of eruption of teeth in upper and lower jaw.

Material and Methods

In this study 578 children of age group 4 years to 25 years were studied for the eruption of permanent teeth. Their teeth were examined visually in good light using probe, spatula and mouth mirror for eruption. The teeth were examined either in good daylight or by using a torch having a very fine focusing of light. A tooth was considered erupted, if it has pierced through gums and unerupted if not present in oral cavity.

Only those cases were considered whose records were available for date of birth from school records, ration cards, horoscope, birth certificates, identity cards, driving licence and immunisation card.

After examination of teeth, statically tables are prepared for mean age, range and S.D. for eruption of each tooth in the upper and lower jaw and also for right and left sides of the same jaw. The statically analysis also done for comparison of both sexes.

OBSERVATIONS

The study was conducted during the period of September 2002 to September 2004 and 578 cases were studied which were taken randomly

from various schools, colleges and OPDs of Dental Hospital and Rajindra Hospital, Patiala.

Table 1

showing distribution of group according to age

groups and Sex

Age group	Male	Female	Total no. of cases
4.1- 9 years	81	68	149
9.1-14 years	71	90	161
14.1-19 years	64	59	123
19.1-25 years	74	71	145
Total	290	288	578

Eruption of various permanent teeth were noted in both jaws and and both sides and mean eruption was calculated and is tabulated below.

DISCUSSION

We took 578 random cases from different schools and colleges and OPDs of Rajindra Hospital and Government Dental College Patiala. Out of these 290 were males and 288 were females. We noted eruption of permanent teeth in the various age groups.

In our study we found that first permanent

Table 2

showing eruption of Permanent Teeth in both jaws and sides

Type of Tooth	Jaw	Side	No.of cases	Range	Mean ± S.D.	
Central Incisor	UJ	R	28	6.08 – 8.71	7.28 ± 0.54	
		L	27	6.08 – 8.71	7.30 ± 0.55	
	LJ	R	38	6.08 – 8.71	7.20 ± 0.55	
		L	38	6.08 – 8.71	7.20 ± 0.55	
Lateral Incisor	UJ	R	32	7.64 – 9.98	8.92 ± 0.56	
		L	32	7.64 – 9.98	8.92 ± 0.56	
	LJ	R	37	7.64 – 9.98	8.88 ± 0.57	
		L	37	7.64 – 9.98	8.88 ± 0.57	
Canine	UJ	R	17	10.61– 11.96	11.23 ± 0.35	
		L	18	10.61– 11.96	11.26 ± 0.37	
	LJ	R	23	10.61– 11.96	11.32 ± 0.44	
		L	23	10.61– 11.96	11.32 ± 0.44	
	PM ₁	UJ	R	40	9.38 – 11.20	10.16 ± 0.44
		L	39	9.38 – 11.20	10.17 ± 0.44	
LJ	R	40	9.25 – 11.20	10.14 ± 0.46		
	L	40	9.25 – 11.20	10.14 ± 0.46		
PM ₂	UJ	R	19	10.01 – 11.36	10.69 ± 0.39	
		L	19	10.01 – 11.36	10.69 ± 0.39	
	LJ	R	19	10.01 – 11.36	10.63 ± 0.37	
		L	19	10.01 – 11.36	10.63 ± 0.37	
M ₁	UJ	R	24	5.81 – 7.91	6.60 ± 0.50	
		L	24	5.81 – 7.91	6.60 ± 0.50	
	LJ	R	27	5.81 – 7.91	6.58 ± 0.59	
		L	27	5.81 – 7.91	6.58 ± 0.59	
M ₂	UJ	R	212	12.01 – 14.15	13.32 ± 0.60	
		L	211	12.01 – 14.14	13.30 ± 0.59	
	LJ	R	226	12.01 – 14.14	13.19 ± 0.63	
		L	226	12.01 – 14.14	13.19 ± 0.63	
M ₃	UJ	R	75	17.02 -24.96	21.56 ± 2.28	
		L	78	17.00 -24.96	21.39 ± 2.35	
	LJ	R	89	17.02 -24.96	21.39 ± 2.35	
		L	91	17.00 -24.96	21.29 ± 2.35	

molars were first to erupt at the age between 5.81 to 7.91 years in both jaws and on both right and left sides with the mean age of eruption at 6.58 ± 0.59 years in lower jaw and 6.60 ± 0.50 years in upper jaw.

We found next permanent teeth to erupt were central incisors which erupted between 6.08 to 8.71 years in both halves of upper and lower jaws. Next teeth found to erupt was found to be second premolars at the age of 10.01 to 11.36 years in both halves of upper and lower jaws with the mean age of eruption 10.63 ± 0.37 years for the lower jaw and 10.69 ± 0.39 years for the upper jaw. We found that canines erupted at the age between 10.61 to 11.96 years for both halves of the upper and lower jaws with the mean age of eruption 11.32 ± 0.44 years for the lower jaw and 11.26 ± 0.37 years for the left half and 11.23 ± 0.35 years for the right half of upper jaw.

In our study, we found that M2 was next to erupt between 12.01 to 14.15 years for upper jaws and 11.94 to 14.14 years in both halves of lower jaws with the mean age of eruption 13.19 ± 0.63 years for the lower jaw and 13.32 ± 0.60 years for upper jaw.

M3 was the last permanent teeth to erupt and was found to erupt at the age between 17.02 to 24.96 years for both upper and lower with the mean age of eruption 21.29 ± 2.35 years for the left and 21.35 ± 2.28 for the right half of lower jaw while mean age of eruption of left half of upper jaw was 21.39 ± 2.35 years and for right half 21.56 ± 2.28 years.

These findings were similar to the finding of Grewal who in his study found that first permanent teeth to erupt was M1 and erupts at the age between 6 to 7 years, central permanent incisors erupt between 7 to 8 years, lateral incisors in between 8 to 9 years, first premolars between 9 to 10 years, second premolars between 10 to 12 years, canine to erupt at the age between 11 to 12 years, age of eruption of M2 as 12 to 14 years and that third molar erupted mostly between 17 to 25 years [6].

We also studied the co-relation of eruption of teeth with sex of the person. There was also no significant difference in eruption between mandibular and maxillary first molars. These findings were similar to the study done by Illieva et

al in 2002 who also found no significant difference in eruption and sex of the person as well as no difference in eruption in two jaws.

In our study, we found mostly the permanent teeth erupted earlier in the females than males and that the eruption teeth was earlier in mandible (lower jaw) than in maxilla (upper jaw), were consistent with the findings of Sharma and Mittal (2001) who also found that eruption is earlier in females and that too in mandible.

Wisdom teeth in females erupted earlier in lower jaw as compared to that in males with mean of eruption in females at 21.27 ± 2.32 years on right side and 21.19 ± 2.38 years on left side of the lower jaw while in males the mean age of eruption was 21.39 ± 2.30 years on the right side and 21.33 ± 2.37 years. These findings were corroborative with the finding of Sharma and Mittal's study. It was seen that third molar erupted later in maxilla than in mandible in both females and males, with mean age of eruption in males at 21.51 ± 2.22 years on right side and 21.38 ± 2.33 years on the left side similarly in females these erupted at the mean age of 21.63 ± 2.41 years on the right side and 21.41 ± 2.42 years on the left side of the maxilla. These earlier eruptions of mandibular teeth from their maxillary counter part were the similar to the results of the study done by Sharma and Mittal in 2001.

SUMMARY AND CONCLUSION

1. First permanent teeth to erupt were first molars at the age between 5.81 to 7.91 years in both the jaws
2. Permanent central incisors erupted between the age of 6.08 to 8.71 years for both halves of upper as well as lower jaw
3. Permanent lateral incisors erupt at the age of 7.64 to 9.98 years in both halves of both jaws.
4. First permanent premolars erupts between 9.28 to 11.2 years with mean age of 10.14 ± 0.46 years
5. Second permanent premolars erupts between 10.01 to 11.36 years for the both halves of upper and lower jaw
6. Next permanent teeth to erupt is canines at the age between 10.61 to 11.96 years for both halves of upper and lower jaw
7. Second permanent molars erupts between

the age of 11.94 to 14.14 years for the both halves of lower jaw and 12.01 to 14.15 years for the right half of upper jaw with the mean 13.32 ± 0.60 years while 12.01 to 14.14 years for left half of the upper jaw with the mean age of eruption 13.30 ± 0.59 year.

8. Third permanent molars erupts between the age of 17.02 to 24.96 years for the right halves of both the jaws with mean of 21.56 ± 2.28 years for the upper and 21.35 ± 2.28 years for the lower jaw. On the left of both the jaws third molars erupt at the age between 17.0 to 24.96 years with the mean 21.39 ± 2.35 years for the upper and 21.29 ± 2.35 years for the lower jaw.

9. Eruption of permanent teeth were earlier in the mandible than that of their maxillary counterpart.

10. Co-relation of eruption of permanent teeth with the sex was variable. Eruption of central incisors, lateral incisors, canines and first premolars were earlier in female while second premolars and all the three molars erupted earlier in males as compared to females although difference was not significant.

References

1. Swami D, Mishra VK, Bahal L and Rao CM. Age estimation from eruption of temporary teeth in himachal pradesh. *Journal of Forensic Medicine and Toxicology* 1992;9:3-7.
2. Pathak SK, Mathur PN, Jain S., Saini OP. A

- study of eruption of 3rd molar in relation to estimation of age in people of thirteen to twenty-five years age group. *Journal of Forensic Medicine and Toxicology* 1999;16(1):17-9.
3. Gonzales TA, Vance M, Helpem M, Umberger CJ. *Legal medicine pathology and toxicology*. 2nd ed. NY, USA: Appleton Century Crofts, Inc; 1954. p. 46
4. Polson CJ. *The essential of forensic medicine*. London: English Universities Press; Limited; 1955. p. 51.
5. Smith SS, Fiddes FS. *Forensic medicine. A text book for students and practioners*. 10th ed. London. . J. and A. Churchill Ltd. 1955. p 88-89
6. Grewal RS. *Medical jurisprudence and toxicology*. 1st ed. Calcutta, India: Scientific Book Agency; 1973. p. 40-41.
7. Billewicz WZ, McGregor IA. Eruption of permanent teeth in west African (Gambian) children in relation to age, sex and physique. *Ann Hum Biol* 1975;2(2):117-28.
8. Sharma K, Mittal S. Permanent tooth emergence in gujjars of punjab, india. *Anthropol Anz* 2001;59(2):165-78.
9. Ilieva EL, Veleganova VK, Belcheva AB. Eruption of first permanent molar in four to eight years old children in Plovdiv. *Folia Med (Plovdiv)* 2002;44(1-2):70-3.