

Assessment of Chronological Age by Lower Third Molar Eruption

Fulwaria Mukesh¹, Bijaraniya Kuldeep², Kumar Ravindra³

¹Dental surgeon, Ratna Dental Hospital, Bikaner, Rajasthan, India.

²Senior demonstrator, Department of Physiology, S.P. Medical College, Bikaner, Rajasthan, India

³Senior demonstrator, Department of Microbiology, S.P. Medical College, Bikaner, Rajasthan, India.

Original Research Article

*Corresponding author

Dr. Kuldeep Bijaraniya

Article History

Received: 10.10.2017

Accepted: 20.10.2017

Published: 30.10.2017



Abstract: 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 failure of third molar eruption is a quite common condition and the extraction of impacted third molar teeth is carried out as routine surgical procedure in dental departments. The present study was aimed to determine the number of third molars per person with their eruption status. The present study was carried out at ratna dental hospital and included sample of 210 subjects in the age range 17-30 years, for subject orthopantomograph or Intra oral Periapical Radiograph was taken. To assess the developmental stages of third molars; the staging system described by Nolla CM was used. The results showed that 36.36% of third molars are completely erupted, 47.27% partially erupted, and 16.36% are unerupted in male while 35% of third molars are completely erupted, 43% partially erupted, and 22% are unerupted in Female.

Keywords: Third molar, tooth eruption, mandible

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].

Age assessment in young children is more precise as multiple teeth are in their various stages of development and even other skeletal maturity factors can be utilized, whereas in case of adolescents and young adults, third molars are the only teeth developing and all other methods to assess age are of questionable value as the fusion of sutures, fusion of epiphysis of bones, and attainment of secondary sex characteristics have already been taken place by middle teens and early twenties. In a nutshell, there is no biological criterion to estimate the chronological age of a person in adolescence and adults [2, 3].

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 [4].

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 [5].

Age estimation is one of the vital criteria in establishing the identity of person. In forensic odontology, there is a need to estimate the chronological age in living individuals and in cadavers for various reasons. It is observed that the number of cases lacking age documentation and the number of

unidentified cadavers and the human remains are increasing. In view of this, the need for age estimation is increasing day by day [6]. Difficulty in human age estimation after 14 years of age has greatly shifted the focus on development of third molar, also commonly referred to as wisdom teeth. Durability of dental structure makes it one of the materials of choice in age estimation as compare to skeletal method, which is influenced by exogenous factors [7, 8].

MATERIALS AND METHODS

The subjects were recruited from Ratna dental hospital Bikaner Rajasthan between 1 March 2014 and June end of 2017. Two hundred ten subjects (100 female, 110 male) in the 18–30 years old range, without history of systemic disease and extraction with normal BP ($\leq 140/80$) were selected for this study. 13 groups were made according to age (in completed years) with class interval of one year. The purpose of study was explained to each participant and informed consent was taken. Only those subjects who had full complement of teeth and had exact date of birth were included. Clinical examination was done to see the status of third molar and based upon the status they were classified as completely erupted, partially erupted and unerupted. The eruption status was assessed by using visual method and with the aid of mirror, probe and XRays. The teeth which were partially erupted and unerupted were subjected for radiographic examination. The intra-oral peripheral X-rays and OPG of subjects were taken.

An unerupted tooth: An unerupted tooth is a tooth lying within the jaws, entirely covered by soft tissue, and partially or completely covered by bone.

A partially erupted tooth: A partially erupted tooth is a tooth that has failed to erupt fully into a

normal position. The term implies that the tooth is partly visible or in communication with the oral cavity.

An impacted tooth: An impacted tooth is a tooth which is prevented from completely erupting into a normal functional position. This may be due to lack of space, obstruction by another tooth, or an abnormal eruption path.

The eruption stages were evaluated using the classification of stages by Olze *et al.* [9].

- Stage A Occlusal plane covered with alveolar bone.
- Stage B Alveolar eruption; complete resorption of alveolar bone over occlusal plane.
- Stage C Gingival emergence; penetration of gingiva by at least one dental cusp.
- Stage D Complete emergence in occlusal plane.

Impacted third molars were excluded from the analysis. Mesially, distally and vestibulo-orally angulated third molars were classified as impacted as recommended by Archer [10] and Wolf and Haunfelder [11]. Wisdom teeth with an unclear direction of eruption also were not included in the analysis.

Analysis of Observations

Analysis was done by statistical analysis. Students ‘t’ test (two tailed) has been used to find the significance. P=0.05 was considered as statistically significant.

RESULT

Table no. 1 shows that total no. of male subjects are 110 and total no. of female subjects are 100.

Table-1: Sex wise distribution of subjects

AGE	NUMBER OF CASES		TOATAL
	MALE	FEMALE	
17-18	5	9	14
18-19	23	11	34
19-20	15	19	34
20-21	18	12	30
21-22	7	9	16
22-23	5	5	10
23-24	10	5	15
24-25	3	4	7
25-26	8	7	15
26-27	5	5	10
27-28	6	4	10
28-29	3	8	11
29-30	2	2	4
TOTAL	110	100	210

Table no. 2 showed that 36.36% of third molars are completely erupted, 47.27% partially erupted, and 16.36% are unerupted in male while 35%

of third molars are completely erupted, 43% partially erupted, and 22% are unerupted in Female.

Table-2: Showing status of eruption of mandibular third molars

STATUS OF ERUPTION IN LOWER TIRD MOLAR	COMPLETELY ERUPTED (%)	PARTIALLY ERUPTED (%)	UNERUPTED (%)	TOTAL (N=210)
MALE	40(36.36%)	52(47.27%)	18(16.36%)	110
FEMALE	35(35%)	43(43%)	22(22%)	100

DISCUSSION

Within the human dentition, consisting of 20 deciduous teeth followed by 32 permanent teeth, the two upper third molars and two lower third molars are the last formed teeth, within a large chronological distance to all other teeth. Compared to all the other permanent teeth, whose formation and eruption are completed by 12–13 years of age, the development timeline of the third molar is as follows [12]:

- tooth bud formation – 4–5 years of age ;
- initial mineralization – 7–9 years of age ;
- end of crown mineralization – 12–15 years of age;
- tooth eruption – 17–21 years of age;
- root formation completed – 18–25 years of age.

There is a gender distinction in third molar formation, this being more precocious in female subjects: – the average age for third molar appearance is 9 years and 3 months in girls and 9 years and 10 months in boys.

Tooth eruption is a parameter of developmental morphology which, unlike tooth mineralization, can be determined in two ways: by clinical examination and/or by evaluation of dental radiographs. While ‘eruption’ incorporates the entire journey of the tooth from its formation in the alveolar crypts to full occlusion, ‘emergence’ is restricted to the time when any part of the tooth finally clears the gingival margin and becomes visible in the mouth until the stage when the tooth finally comes into occlusion with its partner tooth from the opposing jaw [13].

Most authors affirm that third molars have the highest variability in terms of form, dimensions and eruption pattern. Most frequently, the upper third molar's crown is undersized and the upper third molar's crown is oversized, while roots are short and insufficiently developed, more or less malformed. The frequency of third molar microdontia in the studied sample is 2, 72%, 95% of the teeth involved being located in the upper jaw [14].

In present study, about 33.62 % of the third molars were found to be completely erupted and remaining 66.38% of the teeth were in various stages of eruption. Almost same results were found in Byahatti S *et al.* [15] study while in Sandhu *et al.* [16] study, 24% of the teeth were found to be erupted and 76% were in various stages of eruption.

The proportion of students having all 4 third molars was higher (93.88%) than a study by Sandhu *et al.* [16] (76%) but lower than Byahatti S *et al.* [17] (94.66%) in Indian population.

The proportion of agenesis of third molars in boys (2.22%) was higher than girls (1.11%) findings were similar to the findings of Levesque *et al.* [18] and Hattab *et al.* [19] but differ from those of Sandhu *et al.* [16] and Shah *et al.* [20].

Wheeler RC and associates [21] have done extensive work on the dimensions, development and eruption of deciduous and permanent dentitions. Knowing the average size of crown and root [21], it was quite easier to assess the stages of development of crown and root of third molars as given by Nolla [22]. Kullman *et al.* [23] studied the third molar development using two approaches; one is described as subjective, using the typical determination of developmental stages, and the objective, based on different digital measurements of root length and other third molar parameters. It was shown the objective methods do not improve the accuracy of age estimations over subjective methods.

Numerous reports [24] have been published on the age estimation issue concerning adolescents and young adults in whom the assessment of third molar development was frequently investigated. Although the reliability of third molars in age estimation has been evaluated by several research groups, consensus on the usefulness of these teeth has not been reached. As concluded by Mincer *et al.* [25] inthe A.B.F.O study, the examination of third molars may provide reasonable accuracy for the likelihood that a person is at least, e.g., 18 years old, instead of the estimation of exact chronological age.

CONCLUSION

Our study shows that 36.36% of third molars are completely erupted, 47.27% partially erupted, and 16.36% are unerupted in male while 35% of third molars are completely erupted, 43% partially erupted, and 22% are unerupted in Female in between age group of 17 to 30 yrs.

REFERENCE

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. Narnbiar P. Age estimation using third molar development. *Malaysian J Pathol* 1995;17:31-4.
3. Bhat VJ, Kamath GP. Age estimation from root development of mandibular third molars in comparison with skeletal age of wrist joint. *Am J Forensic Med Pathol* 2007;28:238-41.
4. 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.
5. Gonzales TA, Vance M, Helpem M, Umberger CJ. *Legal medicine pathology and toxicology*. 2nd ed. NY, USA: Appleton Century Crofts, Inc; 1954. p. 46
6. Arany S, Iino M, Yoshioka N. Radiographic survey of third molar development in relation to chronological age among Japanese juveniles. *J Forensic Sci*, 2004; 49: 534-538.
7. Gunst K, Mesotten K, Carbonez A, Willems G. Third molar root development in relation to chronological age: a large sample sized retrospective study. *Forensic Sci Int*, 2003; 136: 52-57.
8. Ciapparelli L. The chronology of dental development and age assessment. In: Clark DH, (ed). *Practical forensic odontology*. Oxford: Wright Butterworth-Heinemann Ltd, 1992; 22-42.
9. Olze A, van Niekerk P, Ishikawa T, Zhu BL, Schulz R, Madea H, Schmeling A. Comparative study on the effect of ethnicity on wisdom tooth eruption. *Int J Legal Med*. 2007;121:445-448.
10. Archer WH. *Die Chirurgie des Mundes und der Zähne*. Stuttgart: Medica, 1955.
11. Wolf H, Haunfelder D. *Zahnärztliche Mundchirurgie für Studierende der Zahnheilkunde*. Berlin: Berlinische Verlagsanstalt, 1960, pp. 59-67.
12. Mugnier, A., *Embryologie et Developpement buccofacial*, Ed. Masson et C-ie, Julien Prellat, Paris, 1964, 206-210.
13. Rantanen AV. The age of eruption of the third molar teeth. *Acta Odontol Scand* 1967;25(Suppl):1-86.
14. Lautrou, A., *Abrégé d'anatomie dentaire* (2ème édition), Ed. Masson, Paris, 1986.
15. Byahatti S, Ingafou MSH. Prevalence of eruption status of third molars in Libyan students. *Dent Res J (Isfahan)*. 2012 Mar-Apr; 9(2):152-157.
16. Sandhu S, Kaur T. Radiographic evaluation of the status of third molars in the Asian-Indian students. *J Oral Maxillofac Surg*. 2005; 63(5):640-645.
17. Byahatti SM, Nayak R, Jayade B. Eruption status of third molars in south Indian city. *J Indian Acad Oral Med Radiol*. July-Sep. 2011; 23(3):S328-332.
18. Levesque GY, Demirjian A, Tanguay R. Sexual dimorphism in the development, emergence, and agenesis of the mandibular third molar. *J Dent Res*. 1981; 60:1735-41.
19. Hattab FN, Fahmy MS, Rawashdeh MA. Impaction status of third molars in Jordanian students. *Oral Surg Oral Med Oral Pathol Radiol Endod*. 1995; 79:24-29.
20. Shah RM, Boyd MA, Vakil TF. Studies of permanent tooth anomalies in 7886 Canadian individuals. *J Can Dent Assoc*. 1978; 44:262-4.
21. Ash MM, Nelson SJ. *Chronology of permanent teeth*. *Wheeler's Dental Anatomy, Physiology and Occlusion*, 8th ed., Missouri: Saunders, 2003;15-18, 29-64.
22. Nolla CM. The development of permanent teeth. *Journal Dentistry for Children*, 1960; 27: 254-266.
23. Kullman L. Accuracy of two dental and one skeletal age estimation method in Swedish adolescents. *Forensic Sci Int*, 1995; 75: 225-236.
24. Gunst K, Mesotten K, Carbonez A, Willems G. Third molar root development in relation to chronological age: A large sample sized retrospective study. *Forensic Sci Int* 2003;136:52-7.
25. Mincer JJ, Harris EF, Berryman HE. The A.B.F.O. study of third molar development and its use as an estimator of chronological age. *J Forensic Sci* 1993;38:379-90.