Original Research Article

A Preliminary Study on Permanent Teeth with a Specific Focus on Third Molaramong Medical Students

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Abstract

Age estimation is an important tool in the identification of the person in different civil & criminal scenarios like eligibilityforjobs, property inheritance, and sportsselection, attainment of majorityand examination of decomposed & mutilated bodies, fragmentary remains & bones. Narrowing down the age determination in simple methods will help all sections of society and majorly law competent authorities for better execution of law. In our study, majority of people got full eruption of permanent 3rd molar teeth in less than 22 years.

Keywords: 3rd molar, permanent teeth, Age estimation.

Introduction

Teeth, which provide the life history of an individual, contribute as a reliable means of determining age approximatelyfrom 10 weeks of intrauterine life to old age[1]. Age estimation is an important tool in the identification of the person in different civil & criminal scenarios like eligibilityforjobs, property inheritance, sports selection, attainment of majority, examination of decomposed & mutilated bodies, Fragmentary remains & bones. The age of an individual, especially in earlier years can be determined from (1) Teeth (2) ossification centers of bones (3) secondary sexual characters and (4) general development[2].

In a young individual below 25 years, age can be determined by the eruption of teeth. Development of the tooth begins with the formation of cellular tooth germ in the alveolar bone in the shape of the crown. Root formation begins after completion of the crown and as the root becomes longer, the crown erupts through the bone. Mineralization of teeth begins at the crown and progresses towards the root. The formation of the root is completed sometimes after the eruption of the crown[3].

Milk teeth are 20 in number; 4 incisors, 2canines and 4 molars in each jaw. In a normal child, the temporary teeth will erupt between 6 months and 2.5 years[3].Period of mixed dentition starts from the eruption of first molar. It is usually 6-11 years and may extend to 12-13 years[3].

Permanent teeth are 32 in number: 4 incisors, 2canines, 4 premolars and 6 molars in each jaw. First permanent tooth to erupt is the first molar by 6 to 7 years and last tooth to erupt is third molar between 17 to 25 years.After eruption of the second molar, the jaw bone increases in length to give space

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for the third molar to erupt is called spacing. Time of eruption of the third molar depends upon the spacing. In some individuals the third molar will not erupt at all due to the lack of spacing. Most common tooth to be impacted is the 3rd molar of the lower jaw[3]. The 3rd molar is very variable in position, anatomy, and timing of development; sometimes it doesn't exist at all. It may be larger than the first and second molar with the roots fused and delineated by vertical grooves. The maxillary molar generally consists of 3 cusps, whereas some exhibit 4 cusps. In the mandible, the variability is between 4 or 5 cusps[1].

Factors that have been shown to exert an influence on eruption patterns include Sex, Ethnicity, Geography, Hereditary and Hormonal factors, socioeconomic status, Nutrition and Caries status.[5]

Materials and Methods

A prospective study was conducted on medical students by studying the permanent dentition with a special focus on 3rd Molar. The study was conducted in Great Eastern Medical school hospital in the month of February 2022, on 129 final year part-I medical students. A standard Proforma was prepared and the data was collected by manual clinical examinations of oral cavity by inspection and palpation. Basic information including name, date of birth, gender and address were recorded on case history form. Clinical oral examination was performed and details are collected and analysed on excel sheet.

Student's chronological age was obtained from their original date of births from birth certificate, driving license etc. and it is correlated with dental age according to eruption of permanent dentition including 3rd molar. Each tooth was classified as either "not erupted" or "erupted."Even therapeutic or pathological extraction is considered under "erupted" in this study. Impacted tooth are marked when the 3rd molar was not erupted externally/not palpated in our study.As this is a preliminary study and to avoid unwanted exposure to the radiation, radiographs of students were not taken.Written consent was taken from each student before starting of study.

Results and Discussion

All the students have permanent dentition. No temporary or mixed dentition was observed in the study.Permanent teeth eruption is a complex process that can be influenced by a number of general factors: genetics, nutrition, preterm birth, socioeconomic factors, body height and weight, craniofacial morphology, hormonal factors and various systemic diseases[6].

The age group of persons studied is between 19 to 24 years based on their original date of birth. As per the National Medical Commissionnorms, students get admitted into medical courses after completion of 17years only.By the time they reach part-1 MBBS, the minimum age they acquire is 19 years. So, we can study the minimum age group from 19 years only.

In our study, 81 were females and 48 were males. Sex ratio in this study is 1.68:1, indicating a greater number of female students getting admission in undergraduate medicine course than males.

Third molar is seen in all quadrants in 45 students (Table- 3). Among the 45 students, 36 were females, 9 were males with female: male ratio of 4:1 against 1.68:1, indicating more number of female students got teeth earlier than males[6]. This may be due to hormones, smaller teeth size in females, and anatomy of jaw.The difference in puberty timing between male and female affects skeletal maturity. Female growth peak is earlier than that of male. The pattern of female skeletal growth is rapid and brief, while the pattern of male skeletal is slow and long[7]. Our study correlates with Saleem et al[8], Virtanen et al[9]and Mahanta Putul et al[10].

Third molar is not seen in all quadrants in 46 out of 129 students (35.65%). Among the 46 students, 24 were females and 22 were males indicating a ratio of 1.09:1 against 1.68:1. Third molar is not seen in oral cavity might be due to distal direction of tooth development, space discrepancy, retardation of facial growth, disturbance of tooth bud at early stage, malnutrition, mechanical and physical barriers such as compact bone, thick operculum, fibromatosis, unattached mucosa, scar tissue and also odontogenic cysts and tumors, and the pathological conditions like pericoronitis, infection, caries, food lodgment, pocket formation, periodontal bone loss, root resorption of adjacent teeth.

By the age of 22yrs, 3rd molar in any one quadrant of oral cavity has erupted in 83 students

(64.34%),which can be explained based on good nutrition, favorable oral conditionsetc.Among the 83 students, 57 females got 3rd molars in any quadrant compared to 26 males with a ratio of 2.19:1 vs. 1.68:1 of this study, which can be explained due to female hormones, early loss of primary teeth in girlsetc. Third molar was present in three quadrants in 14 persons (10.80 %), 2 quadrants in 11 persons (08.52%) and in single quadrant in 13 persons (10.07 %). 3rd molar is seen in any one quadrant in 38 persons out of 129 (14 +11+13) (29 .4 %).

Even though the study age group of these persons is 19 -24 years, 3rd molar eruption in oral cavity is prominently seen in between 19 -22 years (64.34%), which is an important step in determination of age by inspection/palpation of oral cavity alone.

In our study,Mandible has earlier chances of eruption when compared to maxilla(Table-6), which might be due to-the mandibular growth which is a dynamic process that is regulated by genetic and environmental factors[7]. In both deciduous and permanent teeth, dentition occurs earlier in lower jaw except for the lateral incisors which erupt earlier in upper jaw. The sequence of tooth eruption differed in both jaws but was the same in both genders[5].

Right quadrants showed earlier eruption than left quadrants(Table-6). The average mandibular length of the right mandible is relatively greater than that of the left mandible in both male and female. The difference between the right and left mandibular lengths is 1-2mm[7]. Some researches reveal that facial asymmetry is more common to occur on the right side with same distribution between males and females[7].Some researches reveal that neural crest cells migration occurs earlier on the right side, resulting in the delay in the development on the left side[7].

According to our study, infemales, by the age of 20 years all quadrants have an equal chance of the eruption of 3rd molar.3rd Molar eruption was earlier in lower Jaw in the right quadrant at the age of 21years,whereas by the age of 22 years left lower quadrant has showed more eruption than any other quadrants.

In Males,by the age of 20 years all quadrants haveequal chances of the eruption of 3rd molar.In males, by the age of 21 years, lower Jaw has showed more eruption of 3rd molar with equal chances of eruption in the both quadrants. By 22 years, lower Jaw has showed more eruption of 3rd molar with more inclination towards right lower quadrant.

Limitations:

The present study was carried out using only the clinical dental examination method. Radiological methods like X-rays and orthopantomograms were not used to assess the degree of calcification or the stage of development of third molar. A broader study with advanced radiological techniques may help to find the age at which the eruption of 3rd molar starts occurring and the completion of the process, thus helping the investigators get a more accurate estimation of the age.Most of the parts of the Indiadon't have a facility for dental x-ray. In these areas studying 3rd molar by routine clinical dental examination maybe more useful.

Table 1: Age wise distribution of sample

Age of students in years	% of Students
19 yrs	7.75%
20 yrs	20.93%
21 yrs	37.20%
22 yrs	29.45%
23 yrs	3.87%
24 yrs	0.77%

Table 2: Eruption of 3rd molar teeth by Gender

	Male(n)	**Female(n)**
All quadrants	09(6.97%)	36(27.90%)
Unerupted all quadrants	22(17.05%)	24(18.60%)
3 quadrants	7(5.42%)	7(5.42%)
2 quadrants	6(4.65%)	5(3.87%)
1 quadrant	4(3.10%)	9(6.97%)

Table 3: Eruption of Permanent teeth

No. of the students with teeth up to 2nd permanent molars	129(100%)
No. of students with Unerupted 3rd molars in all quadrants	46 (35.65%)
No. of students with Erupted 3rd molars in all quadrants	45 (34.88%)
No. of students with one to three 3rd molars in any quadrant excluding complete presence & complete absence	38 (29.45%)

Table 4: Presence of 3rd Molar in upper jaw and lower jaw (full eruption and absence excluded)

Age in years	Third molar presence n=38	Upper jaw	Lower jaw
19	0	0	0
20	6	3	3
21	14	2	12
22	16	6	10
23	2	1	1
24	0	0	0

Table 5 Sex distribution of sample (n=129)

Age of students in years	Total no. of students	Male vs Female
19yrs	10	4 Vs 6
20yrs	27	7 Vs 20
21yrs	48	16 Vs 32
22yrs	38	17 Vs 21
23yrs	5	3 Vs 2
24yrs	1	1 Vs 0

Table 6: Presence/absence of 3rd Molar in any quadrant including full eruption and full absence (n=129)

					Upper Jaw				Lower Jaw			
					RT		LT		RT		LT	
Age	Total No. of Students				M	F	M	F	M	F	M	F
	19 yrs	10 7.7%	M=4 F=6	P4=1 M4=9	0	1	0	1	0	1	0	1
	20 yrs	27 20.9%	M=7 F=20	P4=12 M4=9	3	12	3	12	4	12	4	12
	21 yrs	48 37.2%	M=16 F=32	P4=18 M4=16	7	16	3	16	9	20	10	18
	22 yrs	38 29.4%	M=17 F=20	P4=12 M4=10	5	13	4	12	7	14	4	16
	23 yrs	5 3.8%	M=3 F=2	P4=1 M4=2	0	2	1	2	1	1	0	2
	24 yrs	1 0.7%	M=1 F=0	P4=1 M4=0	1	0	1	0	1	0	1	0

Table 7: Age wise distribution of eruption and unerupted of teeth

Age	Full eruption of 3rd molars	Unerupted 3rd molars
19yrs	01	09
20yrs	12	09
21yrs	18	16
22yrs	12	10
23yrs	01	02
24yrs	01	00
Total	n = 45	n = 46

Table 8: No. of 3rd Molars visible in oral cavity

Age (inyears)													
		Presence of 3rd molar in all quadrants		Absence of 3rd molar in all quadrants		Presence of 3rd molar in any 3 quadrants		Presence of 3rd molar in any 2 quadrants		Presence of 3rd molar in any 1 quadrant		Total No. of Students	
	Gender	M	F	M	F	M	F	M	F	M	F		
	19yrs	0	1	4	5	0	0	0	0	0	0	M=4 F=6	10 7.7%
	20yrs	2	10	3	6	2	1	0	2	0	1	M=7 F=20	27 20.9%
	21yrs	4	14	6	10	5	2	1	1	0	6	M=15 F=33	48 37.2%
	22yrs	2	10	7	3	0	3	4	2	4	2	M=18 F=20	38 29.4%
	23yrs	0	1	2	0	0	1	1	0	0	0	M=3 F=2	5 3.8%
	24yrs	1	0	0	0	0	0	0	0	0	0	M=1 F=0	1 0.7%
Total no. of students in each gender		9 20%	36 80%	22 47.6%	24 52%	7 50%	7 50%	6 54.5%	5 45.5%	4 30.7%	9 69.2%	129	
Total No. of students in each category (%)		45 (34.8%)		46 (35.65%)		14 (10.8%)		11 (8.52%)		13 (10.07%)			

Conclusions

1. The eruption of permanent teeth and 3rd molars was earlier in females than males.
2. Majority of the students got their 3rd molar eruption between 19-22years.
3. In lower jaw (mandible) teeth eruption was earlier than upper jaw (maxilla).
4. Right & left lower quadrants has more chances of eruption in females.
5. Right lower quadrant has more chances of eruption among all the other quadrants.

Since the deviations are high, this cannot serve as the sole method to rely upon in medico-legal cases. Nevertheless, under circumstances where other valid and reliable tests are absent, third molars can serve as a diagnostic tool and also as an adjunct to the other methods of age estimation[11].

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