Radiographic evaluation of 3rd molar Development in relation to Chronological Age among Rural population

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ABSTRACT

Background: Age assessment is one of the important parameters for establishing the identity of a person. Among the numerous methods developed over the years for estimation of age are, changes in the sternal end of ribs, analysis of cranial suture closure (ecto & endocranial closure), changes in the symphysis pubis, secondary changes in the vertebrae, appearance/fusion of various ossification centers and evaluation of various stages of development/eruption of permanent teeth. Evaluation of various stages of eruption of permanent teeth can be done radiologically and morphologicaly, and both give valuable data for assessment of age of an individual. **Material & Method:** The present study was conducted in the age group of 15-24 years in 252 subjects, in the Department of Periodontics, Rural Dental College, Loni from 4th May 2009 to 10th May 2010. Orthopantomograms of all the subjects were taken and the various stages of eruption of teeth which were evaluated by using Demirijian classification. The data generated was analyzed using SPSS software. **Results:** Total 252 cases selected for study out of which 147 were males and 105 were females. Orthopantomograms of all the subjects were taken and the various stages of eruption of teeth which were evaluated by using Demirijian classification

The data generated was analyzed using SPSS software and had a significant correlation with assessment of age.

Key words: Third molar, Eruption., Age.

INTRODUCTION

Establishing of Identity of an individual is an important aspect of a medico-legalists work. Age assessment is one of the important parameters for establishing the identity of an individual [1-4].

Age of an individual is essential data in cases of criminal responsibility, kidnapping, rape, juvenile offenders etc. Determination of age of an individual can be done using various methods which evaluate the morthological changes occurring in the various body tissues, e.g. bones (appearance/fusion of ossification centers, structural changes in the bones/articular surfaces), teeth, hair, skin, cornea etc [1-4].

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Development of teeth with reference to calcification of crown and rot, eruption, attrition and exfoliation provides an important yardstick for the assessment of chronological age with fair accuracy.

The relatively less variability of tooth formation with age, makes the evaluation of tooth formation an important indicator for age assessment [5-8]. Further age estimation becomes difficult after about 14 years of age, as all permanent teeth, except 3rd molar have completed their development rendering them to be the only available tool among the few, for age estimation between mid teens and early twenties. Genetic, environmental, dietary are some of the numerous factors will influence the third molar development and eruption, which leads to variability in the different populations.

As no concrete data existed, a need was felt to generate the data in respect to the local population [9]. The present study the chronological course of third molar eruption is evaluated based on the orthopantomograms obtained.

MATERIAL & METHODS

The study was carried out in the Department of Periodontics, Rural dental College, Loni. The study evaluated 252 subjects, of which 147 were males and 105 were females. All those in the age group of 15-24 years, consenting with good oral hygiene, having a valid age proof were included in the study. Orthopantmograms were taken for all the individuals and evaluated for eight different stages of development of third molar as per Demirijian classification [5] as tabulated below:

Those having third molar mesially, distally and vestibule-orally angulated were classified as impacted and excluded from the study. Also those having congenital anomalies or any disease affecting the skeletal growth and development were excluded.

S.No.	Stage	Distinctive feature	Appearance
1	A	Cusp tip are mineralized but have not yet coalesced	
2	B	Mineralized cusps are united so the mature coronal morphology is well defined	
3	C	The crown is about half formed; the pulp chamber is evident and dental deposition is occurring	
4	D	Crown formation is complete to the dentinoenamel junction. The pulp chamber has a trapezoidal form	
5	E	Formation of the inter-radicular bifurcation has begun. Root length is less than the crown length	
6	F	Root length is at least as great as crown length. Root have funnel shaped endings	
7	G	Root walls are parallel, but apices remain open	
8	H	Apical ends of the roots are completely closed	

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RESULTS AND DISCUSSION

The total number of subjects included in the study were 252 of which 147 were male and 105 female (male:female ratio being 1.4:1). The sample size of males in the various age groups ranged between 10-19, with least (10) in age 24 years, and maximum (19) being in age 22 years. Amongst the females the sample size in various age groups ranged between 9-13, with least (9) in age group 19, 21 and 23 years. **Table No 1.**

Table No 1. Age and sex wise distribution of the sample

S.No.	Age	Male	Female
1	15	13	10
2	16	14	12
3	17	11	10
4	18	16	13
5	19	18	9
6	20	15	11
7	21	14	9
8	22	19	10
9	23	17	9
10	24	10	12
Total		147	105

Third molar developmental stages as per the Demirjian classification was done in the representative sample of both the sexes. The analysis of orthopantomogrms revealed that the Demirjian stages A, B, C, D were absent in the representative samples, as these stages would have already developed by age 15 years which is the minimum age for inclusion of the subjects in the study.

The mean age of development for Stage 'D' in males was 16.14 collectively for both maxilla and mandible relatively less than females, where it was 17.57. For stage 'E' mean age was 16.705 years, 17.235 years for 'F', 18.905 years for stage 'G' and 22.38 years for stage 'H'. The data in females was comparable with mean age of 18.15 years for stage 'E', 18.275 years for stage 'F', 19.465 years for stage 'G' and 20.915 years for stage 'H'. The mean age of all the stages in males is less than females by an average of 1.118 years except for Stage 'H' where the mean age in males is more than female by 1.465 years.(**Table 2-5).**

Table No 2. Distribution of various stages of development in Maxilla (Gender wise)

Sex	Excluded		Stages of Development									
			D		E		F		G		H	
	Rt	Lt	Rt	Lt	Rt	Lt	Rt	Lt	Rt	Lt	Rt	Lt
F	00	00	6	6	9	12	18	15	33	33	39	39
M	27	27	6	3	12	15	9	12	48	51	45	42
Total	27	27	12	9	21	27	27	27	81	84	84	81

Table No 3. Distribution of various stages of development in Mandible (Gender wise)

Sex	Excluded		Stages of Development									
			D		E		F		G		H	
	Rt	Lt	Rt	Lt	Rt	Lt	Rt	Lt	Rt	Lt	Rt	Lt
F	12	12	12	12	9	9	24	24	18	15	30	36
M	30	18	6	9	12	15	24	33	36	39	36	36
Total	42	30	18	21	21	24	48	57	54	54	66	72

Table No 4. Mean age of appearance of various Demirijian Stages of third molar development in Maxilla (Gender wise)

Stage of Development	Male		Female	
	Mean age	SD	Mean Age	SD
D	16.17	0.59	17.17	1.53
E	16.58	0.92	17.33	2.21
F	16.6	0.12	18.20	2.11
G	18.54	1.77	19.68	1.65
H	22.26	2.68	20.90	2.21

Table No 5. Mean age of appearance of various Demirijian Stages of third molar development in Mandible (Gender wise)

Stage of Development	Male		Female	
	Mean age	SD	Mean Age	SD
D	16.11	0.38	17.98	2.23
E	16.83	1.10	18.97	4.13
F	17.87	1.92	18.35	1.91
G	19.27	2.15	19.25	.98
H	22.5	2.48	20.93	2.51

Similar finding have been reported in earlier studies carried out by Kullman et al [10], Yildiray Sisman et al [11], Mincer [12], Yungming et al [13], with earlier development of various stages in males as compared to female.

The finding were in contradiction to the studies conducted earlier by Engstorm [14], Levesque [15], Bhat Vrinda et al [16], were no significant difference was found among the various developmental stages.

The study corroborates the findings of Mincer [12], who reported that the maxillary 3rd Molars develop earlier then their mandibular counterparts, but differs with him on one aspect that the mean age of appearance of various stages is slightly late in our study.

CONCLUSIONS

The present study helps in categorically identifying if the individual (Male/Female) is less than or more than 18 years of age. Individuals with Demirijian stage 'A'-'C' can be distinctly identified to be less than 18 years of age, and those with Demirijian stage 'H' can be identified as of age 18 years and above. However the author feels that further research need to be done to corroborate the present findings.

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