

CORRELATION BETWEEN THE MATURATION STAGES OF MANDIBULAR THIRD MOLARS AND CHRONOLOGICAL AGE IN PATIENTS VISITING SARDAR BEGUM DENTAL COLLEGE, PESHAWAR

Muhammad Ilyas¹, Asma Khan¹, Syed Murad Ali Shah¹, Salman Khan¹, Junaid Nadeem Malik¹,
1. Sardar Begum Dental College Peshawar

ABSTRACT:

OBJECTIVES:

The objective of this study was to determine the correlation of chronological age with the maturation stages of mandibular third molar.

METHODOLOGY:

This descriptive, cross-sectional study was conducted at Sardar Begum Dental College, Gandhara University Peshawar on 384 patients from January 2018 to June 2018 and included patients having age 11-26 years with good quality Orthopantomogram showing mandibular third molar tooth germs bilaterally. Data were analyzed using SPSS version 22 p-value ≤ 0.05 was considered as statistically significant.

RESULTS:

Females 286 (74.5%) were predominant than males 98 (25.5%) with mean age presentation of 18.12 ± 3.03 years. The most frequent stage of Demirjian's stages of mandibular third molar was stage F (24.7%). Pearson correlation showed that maturation stages of mandibular third molars were significantly related to the chronological age ($r=0.446$, p value=0.00).

CONCLUSION:

A correlation between maturation stages of mandibular third molars and chronological age existed.

KEYWORDS:

Age Estimation, Dental Age, Forensic Medicine, Tooth Development, Mandibular Third Molars

INTRODUCTION:

Forensic age estimation is used to facilitate the authorities in detecting unidentified victims, differentiation of cluster victims, establishing the

Correspondence
Muhammad Ilyas
Department of Oral and Maxillofacial
Surgery
Sardar Begum Dental College,
Peshawar Email:
ilyas_khan526@yahoo.com
Phone: 0302-8809637

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age of the dead, deciding entitlement for social benefits and helping the immigration authorities in dealing out undocumented refugees^{1,2}. A number of methods are used to determine the chronological age of children and adults³. These methods are mainly divided into two main groups: (a) bone maturation and (b) tooth development⁴.

The bone maturation method is primarily based on radiographs of specific structures such as

epiphysis-diaphysis fusion of long bones, medial extremity of the clavicle, epiphyseal head of the first rib, anterior iliac crest at the epiphyseal union and fusion of the sphenoid bone with basilar part of the occipital bone. However, the drawback of bone maturation method is that these processes are completed roughly around the age of eighteen years which is quite early as compared to the third molar development and maturation, which continues until the early twenties^{3,5}. Therefore, stages of calcification of third molar is one of the tools that can be used as predictor of the chronological age^{3,6,7}.

A variety of classifications mainly based on numerical values and grading systems have been put forward by different authors but they were difficult to distinguish from one another^{2,8,9}. Demirjian et al.¹⁰ proposed a classification that involves, identifying only four stages for development of crown (stages A-D) and four root developmental stages (E-H) thus avoids numeric

identification of stages and minimizing the possibility of suggesting more than one stage representing the processes of the same duration. Third molars have large variation in the development, calcification and eruption timings. Calcification of third molar starts at about seven years, formation of enamel ranges from 12-18 years and completion of root formation between 18-25 years. Development and eruption of mandibular third molar varies with the ethnicity of individuals. In Western countries, eruption of third molars range 17 to 21 years, in Africans 15 to 19 years and in Asian 21.49 to 23.34 years of ages^{8,11}. However, there is scarcity of research in Pakistan in which correlation of the maturation stages of mandibular third molar with the chronological age was demonstrated. Therefore, a research may require correlating maturation stages of mandibular third molar with chronological age that will help in the assessment of age in our population for forensics and medico-legal purposes. The aim of this study was to determine the correlation of the maturation stages of mandibular third molar with the chronological age.

METHODOLOGY:

A descriptive cross-sectional study was carried out in the Department of Orthodontics, Sardar Begum Dental College and Hospital, Peshawar from January 2018 to June 2018. A total of 384 patients were selected through convenience sampling technique using WHO formula for sample selection.

$$N = Z^2(P) \{1-P\} / d^2$$

Z=Z statistic for level of confidence (95%)=1.96,
P=Prevalence / frequency, D = Precision=5%,

P is taken 50% as the population statistic could not be found. This study included patients having age 11-26 years with good quality Orthopantomogram showing mandibular third molar tooth germs bilaterally. Hypodontia / oligodontia / amelogenesis imperfecta / dentinogenesis imperfecta, history of trauma / fracture in third molar region and patients with any systemic disease were excluded from this study. After the approval of Ethical Review Committee of Gandhara University, a well-documented proforma was used in which patient's bio-data and informed consent was taken. OPG radiograph was examined over the radiograph illuminator and stage of maturation of mandibular third molar tooth germ was determined and charted down on a proforma. The stages of maturation according to Demirjian's method¹⁰ is given in Figure 1. Data were analyzed using SPSS version 22. Descriptive statistics were applied for gender, age and Demirjian's stages. Pearson correlation was used for the correlation between the chronological age and stages of maturation of mandibular third molars. The level of significance was kept at $p \leq 0.05$.

RESULTS:

The mean age presentation was 18.12 ± 3.03 years. Out of total of 384 patients, 286 (74.5%) were females and 98 (25.5%) were males with ratio of 2.9:1. The percentage of Demirjian's stages of mandibular third molar development is

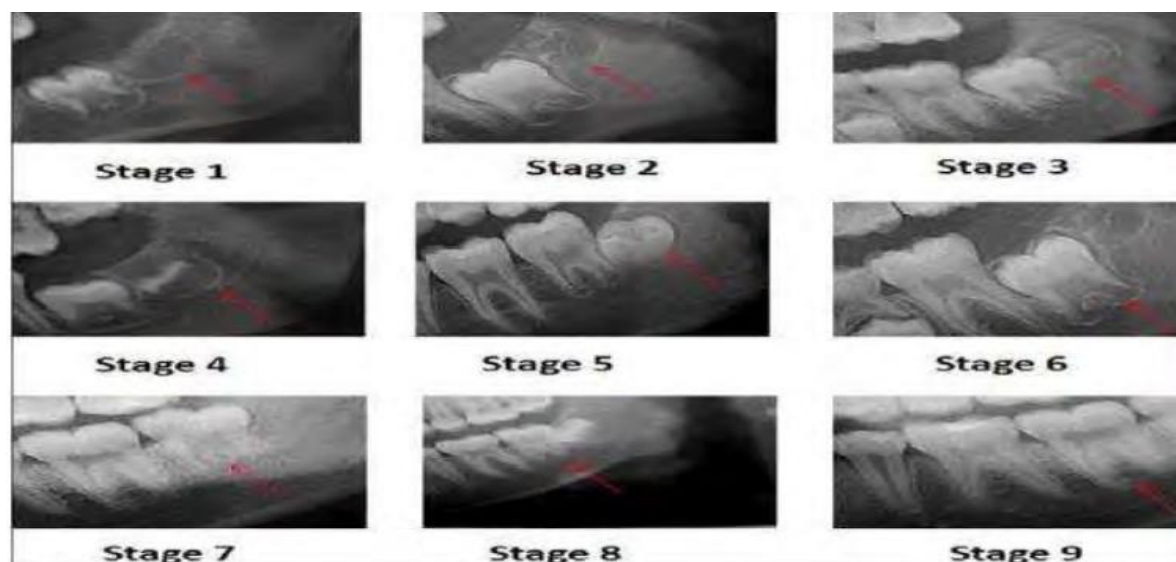


Figure 1: Stages of Demirjian's Method Based on the Development of Mandibular Third Molar¹⁰

shown in figure 2 while frequency is given in Table 1. The Pearson correlation showed that there was correlation between Demirjian's stage

of third molar and chronologic age ($r=0.446$) which were statistically significant (p value= 0.00).

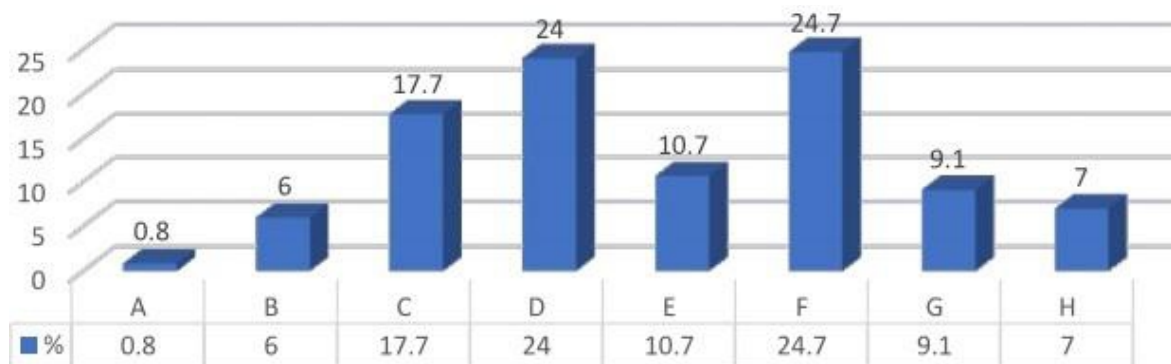


Figure 2: Percentage of Demirjian's Stages of Mandibular Third Molar

Table 1: Frequency of Demirjian's Stages of Mandibular Third Molar Stratified by Age

Age	Demirjian's Stage of Mandibular Third Molar								Total
	A	B	C	D	E	F	G	H	
11.00	0	0	4	0	0	0	0	0	4
13.00	0	0	0	0	0	4	0	0	4
14.00	0	0	0	0	0	4	0	0	4
15.00	0	12	19	16	0	11	4	0	62
16.00	3	4	25	32	12	8	0	0	84
17.00	0	3	8	12	8	12	0	0	43
18.00	0	0	0	11	7	7	0	3	28
19.00	0	0	8	7	0	16	3	8	42
20.00	0	0	0	3	0	8	0	0	11
21.00	0	4	0	0	6	10	3	16	39
22.00	0	0	0	7	0	11	7	0	25
23.00	0	0	0	0	0	4	11	0	15
24.00	0	0	4	0	4	0	4	0	12
25.00	0	0	0	4	4	0	0	0	8
26.00	0	0	0	0	0	0	3	0	3
Total	3	23	68	92	41	95	35	27	384

DISCUSSION:

In the current study the age range was set at 11 to 26 years in order to do full estimation of each mineralization stage. Ajmal et al¹², conducted a study in which age estimation using third molar teeth on Southern Saudi population was used. They took age range of 13 to 23 years in their study which is consistent with this study. Solari and Abramovitch¹³, reported that the mean age for "Stage H" was 20.5 years. However, the mean age could be lower if the population

sample age range was limited to a younger age less than 24 years. Thus, they suggested that the upper age limit for population samples in future studies should not be greater than 22 years. According to Robetti et al¹⁴ at 18 years of age, all permanent teeth have completed their root formation with closed apices, except the third molars. Third molar teeth offer the only possibility for dental age estimation between 16 and 22 years of age. In the present study females were more in number than males. The

reasons may be religious, and males have a higher education than females so they are more cautious about their oral hygiene. In this study, consecutive sampling was done which can be another reason. A study by Pnyadharshini et al⁴, reported a sample of 848 subjects, of which 471 (55.4%) were males and 377 (44.5%) were females in South Indian population in which age estimation using development of third molars was used. These results contradict this study results. This study showed no specific age for particular tooth stages were present. In the present study, "Stages D & E" were in range from 15 to 25 years. "Stage F" was extended from 13 to 23 years of age. "Stage G" was extended from 15 to 26 years of age. "Stage H" was from 18 to 21 years. Therefore, age is a good indicator of biologic when assessed based on Demirjian's method. This is in agreement with other studies¹⁵⁻¹⁸.

CONCLUSION:

The maturation stages of mandibular third molars were significantly related to the chronological age.

LIMITATIONS:

The limitation of this study was its sample size with no equal gender proportions. The patients selected were from one department only and may not predict the sample size of the community. Moreover, the stages of the Demirjian's method of mandibular third molar maturation showed a range of chronological age. Apart from these, this study thoroughly demonstrated the stages of mandibular third molar maturation, age range with maturation stage and correlation of age with maturation stage is uniqueness to our study.

CONFLICT OF INTEREST:

Conflict of interest is declared with research topic and not among authors.

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CONTRIBUTORS

1. **Muhammad Ilyas** - Concept & Design; Data Acquisition; Drafting Manuscript; Critical Revision
2. **Asma Khan** - Concept & Design; Data Acquisition; Data Analysis/Interpretation
3. **Syed Murad Ali Shah** - Critical Revision; Supervision; Final Approval
4. **Salman Khan** - Data Acquisition
5. **Junaid Nadeem Malik** - Data Acquisition

