

International Journal of Dental Science and Innovative Research (IJDSIR)

IJDSIR : Dental Publication Service Available Online at: www.ijdsir.com

Volume - 3, Issue - 1, February - 2020, Page No. : 400 - 403

Relation between second molar developmental stages and MP3 as a growth indicator

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Citation of this Article: Joseph Abraham, Navneethan R, Subashree Rathi Selvan, Srirengalekshmi, "Relation between second molar developmental stages and MP3 as a growth indicator", IJDSIR- February - 2020, Vol. -3, Issue -1, P. No. 400 - 403.

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Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Aim: To assess the co-relation between second molar development stages and mp3 developmental stages

Materials and Methods: OPG and lateral handwrist of 25 male and 25 female patients were taken for the study. The second molar developmental stages were taken using Demirjian index and MP3 was assessed by the classification given by Hagg and Taranger. Pearson corelation test was done to assess the co-relation between the two.

Results: a co-relation of 0.69 in females and a co-relation of 0.64 in males were found using IBM SPSS software.

Conclusion: the growth status can be assessed from either the OPG or the hand wrist thus eliminating the need for taking two x-rays.

Keywords: Maturity Indicator, Molar Stages, Opg, hand wrist.

Introduction

Every individual matures according to his or her own biological clock. An understanding of growth events is of primary importance in the practice of clinical orthodontics. Maturational status can have considerable influence on diagnosis, treatment goals, treatment planning, and the eventual outcome of orthodontic

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treatment. Clinical decisions regarding the use of extra oral traction forces, functional appliances, extraction versus non-extraction treatment, or orthognathic surgeries are, at least partially, based on growth considerations. The age of the patient plays a major role in the treatment planning and outcome of an orthodontic case. So is the case of growth status of the individual.

Functional appliance redirects the growth of bones in the desired direction which can be best given during the growing phase of the individual. For example, in prepubertal stage, maxillary protraction and rapid maxillary expansion is more effective [1].

There are variation in growth among individuals of the same chronological age, thus the biological or physiological methods of age assessment has become more important [1]. The most common one are the somatic changes (changes in the general body of the individual) and radiological method (hand wrist radiographs, lateral cephalograms).

The hand wrist radiograph is considered to be the most standardized method of skeletal assessment. Assessment of skeletal maturation using hand wrist radiograph as an index based upon time and sequence of appearance of carpal bones and certain ossification events has been reported by many investigators. There are various methods to describe the skeletal maturity using hand-wrist radiographs.

However with the growing awareness of the harmful effects of x-ray exposure many dentists have re-evaluated the use of radiographic methods in their treatment planning. In a recent survey by McCabe and Rinchuse in a survey of orthodontic practitioners regarding the routine use of lateral cephalometric radiographs established that in orthodontic treatment 60.34% orthodontists reported always taking the pre-treatment lateral cephalometric radiographs and only 38.53% reported always performing

a cephalometric analysis on pre-treatment lateral cephalometric radiographs. They concluded that there is a current trend toward the decrease in the amount of practitioners routinely tracing lateral cephalometric radiographs [3].

This study was conducted to establish a correlation between second molar and MP3 developmental stages.

Methodology and Material

The radiographs were taken from patients who reported to the department of orthodontics and dento-facial orthopedics at Saveetha Dental College and Hospital, Chennai. 50 subjects were taken for the study. 25 radiographs were of male patients (GROUP A) and 25 radiographs were of female patients (GROUP B). The radiographs taken were lateral cephalogram and orthopantamogram (OPG).

The OPG was assessed for the developmental stages using the Demirjian index (DI).

The MP3 stages was determined by the classification given by Hagg and Taranger

All the data compiled are entered into an excel sheet (MICROSOFT EXCEL 2007) and is subjected to appropriate statistical analysis. For each stage a numerical coding was given in order to find the co-relation between the two parameters.

	Age/sex	Molar	coding	MP3	coding
		stage		stage	
Sample	15/M	Е	5	MP3-	1
1				F	
				stage	

Statistical Analysis

The data are entered into an excel sheet (MICROSOFT EXCEL 2007) and subjected to statistical analysis using IBM SPSS software. The Pearson co-relation test was done to assess the relation between DI of second molar and MP3 stages. Co-relation in females

Correlations

		cvmi	molarstage
	Pearson Correlation	1	.629**
Mp3	Sig. (2-tailed)		.001
	Ν	25	25
	Pearson Correlation	.629**	1
molarstage	Sig. (2-tailed)	.001	
	Ν	25	25

**. Correlation is significant at the 0.01 level (2-tailed).

Co-relation in males

Correlations

		cvmi	molarstage
	Pearson Correlation	1	.64**
Mp3	Sig. (2-tailed)		.000
	Ν	25	25
	Pearson Correlation	.64**	1
molarstage	Sig. (2-tailed)	.000	
	Ν	25	25

**. Correlation is significant at the 0.01 level (2-tailed).

Results

The study showed that there is a positive correlation of 0.64 in males and 0.69 in females.

Discussion

Assessment of the patient's puberty and developmental events is one of the most basic and important elements in orthodontic treatment. The pubertal growth spurt of the patients plays a significant role in the diagnosis, objectives, and selection of the treatment method [4]. The use of hand-wrist radiographs has been advocated in order to assess the skeletal age of individuals. The ease of distinguishing the stages of dental development and the availability of panoramic radiographs are practical reasons for attempting to assess the physiologic maturity without resorting to hand-wrist or lateral cephalometric radiographs [4].

In previous radiographic studies, authors have used either mandibular third molars [5] premolars [6] canine [7] or maxillary canine [8] for the assessment of skeletal maturation, which exhibited certain drawbacks. Root formation and apex closure of canines and premolars is usually completeted by the age of 12 to 14 years, however most of the children exhibit active growth up to the age of 16 to 17 years.

The current radiographic study, which has been conducted to evaluate the reliability of different developmental stages of mandibular second molars as an indicator of maturity. Mandibular second molar tooth offers an advantage over other teeth because of its developmental stages, which tends to continue over a longer period and later age. Apex closure of mandibular second molar generally extends up to the age of 16 years in normal children, which makes it more reliable in the assessment of growth

In the present study, mandibular second molar has been taken as a sample instead of maxillary molar and canine in order to eliminate the errors of estimation caused by roots of these teeth, which can overlap with the anatomic structures such as palate, inferior border of zygomatic arch, maxillary sinus septum etc. [9]

The study showed a positive correlation between calcification of second molars and MP3 stages both in males and females.

The current study revealed a positive correlation between mandibular permanent second molar and modified MP3 which was in accordance to studies done by Vijayashree et al.in a South Indian population, who found highly positive correlation between DI of mandibular second molars and CVMI modified method.

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The unique and significant findings from the present study imply that the stages of mandibular second molar calcification as observed on panoramic radiographs provide fairly accurate results and can be considered reliable indicators of skeletal maturity with the methodology suggested by Demirjian et al.

With more sample size and a detailed study a correlation between the MP3 stages and demirjian index for each age group can be established.

Conclusion

From this study we can conclude that:

- There is a positive correlation between second molar calcification stages and MP3 developmental stages.
- We can use either the OPG or the hand wrist radiographs to determine the growth status, thus eliminating the need for different x-rays.

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