Evaluation of root development of mandibular first molar of children (6-12) years old visiting P.O.P department college of dentistry/ hawler medical university

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Background and objective: With FPMs between the ages of 6 and 12, the detection of open apex in some children at age 12 underlines the necessity for investigation prior to treating a deep carious lesion.Pulpal involvement was considered before the surgery began. The genesis of the roots is complete. Dentists are urged to conduct a comprehensive clinical examination, get diagnostic radiographs, and adhere to case-specific treatment protocols before attempting to treat FPMs in children, even those as young as 12 years old. This would reduce the likelihood of treatment mistakes, which might hinder the extraction of FPMs or cause unacceptable damage.

Method: Dentists in the Paediatric dentistry Department at Hawler Medical University saw all the children in the sample, and they were all in good health condition. This research evaluated the crown and root development stages of lower FPMs on both sides, as found by Demirjian et al. (1973). Information was collected in Excel 2017 for use in making charts and tables. Mean and standard deviation values. The T-test, either paired or unpaired, with a p-value of 0.05 serving as the threshold for statistical significance.

Results: The findings showed that there were a total of 250 OPGs, with 130 belonging to females and 120 belonging to boys. The ages of the children that were considered for inclusion in the sample varied anywhere from six to twelve years old. In a sample of 12, the first molar in the mandibular region had the greatest percentage of AC (84.4%).

Keywords: tooth root, important tooth, root development, pediatric Department, Demirjian technique.

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INTRODUCTION

The first permanent molar (FPM) is the most important tooth in terms of both occlusion and overall tooth development. It's important that the tooth spends as much time as possible within the oral cavity. On the other side, it's the one people often associate with having their first cavity. The early phases of its eruption, when hygiene is difficult and poorly managed, make it particularly vulnerable to carious sickness. [1]

The tooth's root plays a crucial role in the overall framework of our teeth. Root formation relies on epithelial- mesenchymal interactions as well as integration with the jaw bone, blood supply, and nerve innervations. Hence, looking at organogenesis via the lens of root development is a fruitful line of inquiry. Regenerative medicine has a major interest in bioengineering applications of research on root growth. [2]

After the process of making enamel is complete, roots may then sprout. Hertwig's epithelial root sheath regulates root development and shape by stimulating cell proliferation around the cervical loop created when cells from the inner and outer enamel epithelia merge in the tan area. [3]

Special care should be used while treating deep caries lesions in the first permanent molar in children between the ages of 7 and 12, since this is the period when the risk of caries and pulpal involvement are both at their highest. As the first signs of the FPM appear between the ages of 6 and 7, we may extrapolate that peak maturity will occur between the ages of 9 and 10. At this age, root growth may not be com-

plete. [4]

Teeth with an open apex, which may happen in developing teeth or teeth with apical root resorption, are a serious clinical disease that need immediate care. Open apices provide challenges to root canal treatment because of the greater risk of irrigating solution and/or sealer extravasation into peri radicular tissues. Apical tooth development problems or inflammatory apical root resorption are the most prevalent causes of this problem in young adults (Magro et al, 2017).[2] Based on a large random study of Canadian youngsters, the Demirjian et al (Demirjianet .'s al, 1973, 1993-1994; Demirjian and Goldstein 1976) methodology is the most widely used method for assessing dental maturity. The seven permanent mandibular teeth are used to calculate an individual's dental age, which is then compared to the person's actual age. The apparent dental development of certain populations worldwide compared to the average has been attributed to demographic variances and/or a secular tendency. [5]

This kind of study is necessary in Iraq in order to evaluate the increasing average age of AC of FPMs in children.

Methods

Orthopantomogram: the Instrument (OPG)

X-rays capture photographs of bones and other internal body components using radiation. A panoramic X-ray of the teeth and jaws, (OPG) shows the full extent of the upper and lower jaws. What the OPG is manufactured to spin around the patient's head when a scan is performed. About 20 seconds is the average time for an OPG. For diagnostic purposes, an OPG may be employed. [6]

the OPG machine used to collect study sample which manufactured by the Italian firm (FONA XPan DG Plus) Focus-skin distance 20 cm (optional 30 cm), exposure time of FONA 0.01-3.2 s, patient size programs (adult, child), Preset Detector Programs, direct current (DC) generator, tube voltage 60 kV

/ 70 kV (selectable), line voltage 100 / 230 V, 50 / 60 Hz, tube current 7 mA. (Film, Phosphor Plate, Sensor).

OPG COLLECTION

Two hundred and fifty ophthalmoscope picture guides (OPGs) were culled from the pedodontics department of dentistry at Hawler Medical University (right & left).

The Criteria for Selection

The OPGs we collected showed only healthy permanent molars (FPMs) or carious lesions of varying degrees (mild to moderate) that had not spread to the pulp.

Most of the OPGs showed a normal-looking pulp chamber with no signs of deformation, missing FPM, or FPM that had been endodontically treated.

EXAMPLE USED

Researchers from HMU's College of Dentistry sampled 250 OPG from 120 male and 130 female participants across 7 age groups (6 years, 12 years)

A total of 32 children aged 6 were used for this study.

There were a total of 36 samples from 7-year-olds.

Thirty-two children aged eight were used as samples.

Among the 9-year-olds, there were 46 samples.

There were 36 kids aged 10 as samples. The 11-year-olds accounted for 36 of the total samples.

There were 32 children aged 12 analyzed. Our research uses the Demirjian technique, which divides FPMs into 8 phases to assess their level of development (A, B, C, D, E, F, G and H). [7]

SLEUTHS IN THE OPG

Age was used to split the sample into seven groups ranging from 6 to 12 years old.

This study was conducted to assess the degree of development of both the right and left mandibular FPM. According to the Demirjian technique (Figure 1), there are many phases of tooth development, beginning with the A stage and ending with the H stage (8).

The Demirjian Approach

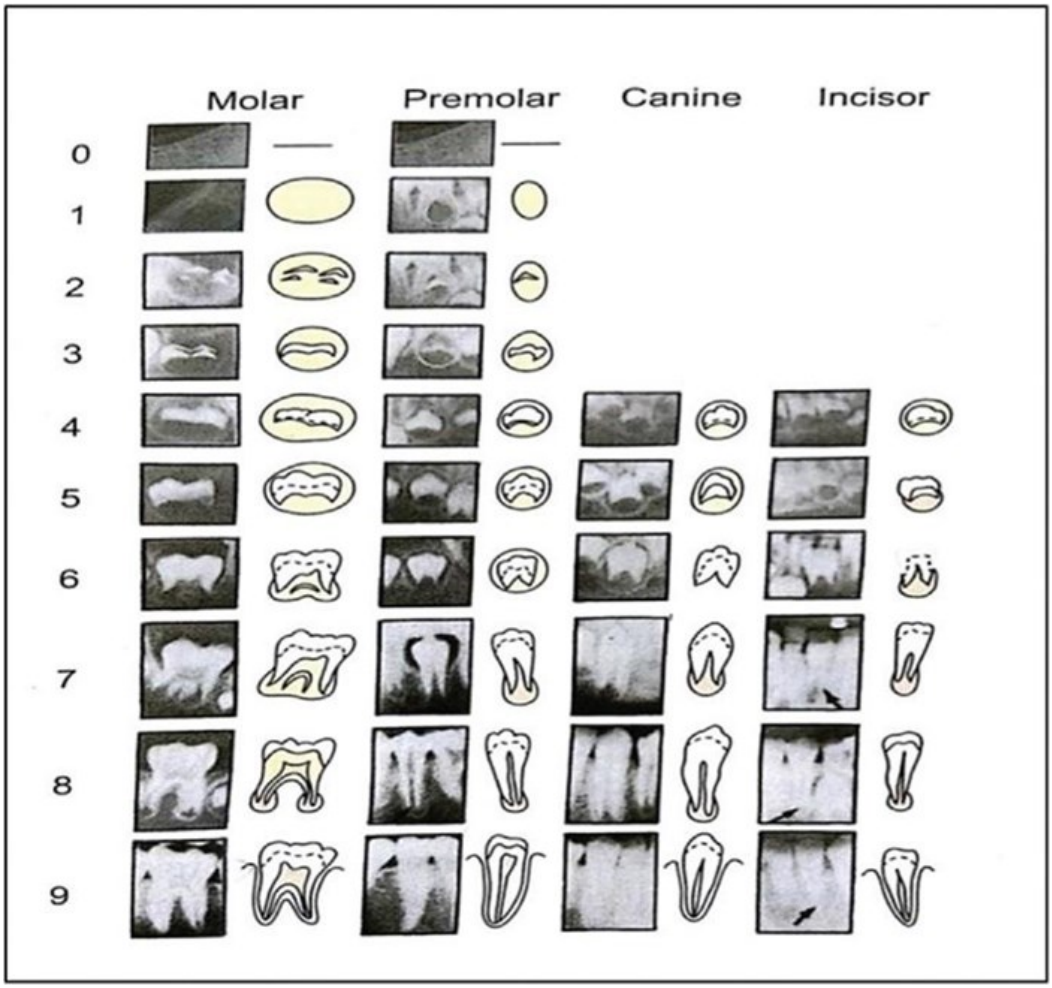

Figure 1: The Demirjian approach is conceptually based on eight phases of development, from crown and root creation through apex closure of the permanent mandibular first molar teeth.

After assigning points for each developmental milestone, we may have a comprehensive picture of the subject's dental development. The Demirjian Method: The Different Steps

Stage A: Single-occlusal point calcification without merging of multiple calcifications.[7] Fusion of mineralization sites Stage B: The occlusal surface's contour is recognizable.

Stage C: At the occlusal surface, enamel development is complete, dentine production has started, the pulp chamber is curved, and there are no pulp horns visible.

Stage D: The pulp chamber's walls are still curved, but crown creation has been completed to the level of the cementoenamel junction, root formation has started, and the pulp horns are beginning to distinguish.

Stage E: In molars, the radicular bifurcation has started to calcify; the root length continues to be lower than the crown height; the walls of the pulp chamber are straight; and the pulp horns have grown more distinct than in stage D.

Stage F: In the case of molars, the bifurcation has sufficiently developed to give the roots a distinct shape. The walls of the chamber now form an isosceles triangle, and the root length is equal to or larger than the crown height.

Stage G: In molars, only the distal root is graded; the walls of the root canal are now parallel, but the apical end is still somewhat open.

Stage H: The periodontal membrane around the root and apex is uniformly wide throughout, and the root apex is fully closed (distal root in molars).

Data analysis

Data entry using a Microsoft Excel spread-

sheet on a computer was the first step in the statistical analysis (Excel 2017). SPSS, or the Statistical Package for Social Sciences, Version 26) was used to analyze the data. Frequency distribution, Chi-square, or Fisher's exact tests were used to examine the data; p-values under 0.05 were regarded as statistically significant.

RESULTS

Two hundred fifty kids in all, 52% of whom were girls, participated in the research. The majority of the kids were 9 years old, then 7, 10, and 11 years old. On the right side of the mouth, half of the initial permanent molar as seen roots formed and on the left jaw, Table (1). According to the Demirjian approach, class G made up more than half of the participants, followed by classes H and F as seen in figure (2) and (3), (24.4% and 14.4%, respectively).

Table 1: frequency of distribution

Variables	Categories	Frequency	Percent
Age groups of the children	6 year old	32	12.8
	7 year old	36	14.4
	8 year old	32	12.8
	9 year old	46	18.4
	10 year old	36	14.4
	11 year old	36	14.4
	12 year old	32	12.8
Gender	male	120	48
	female	130	52
Demirjian method	D	4	1.6
	E	12	4.8
	F	36	14.4
	G	137	54.8
	H	61	24.4
Total		250	100

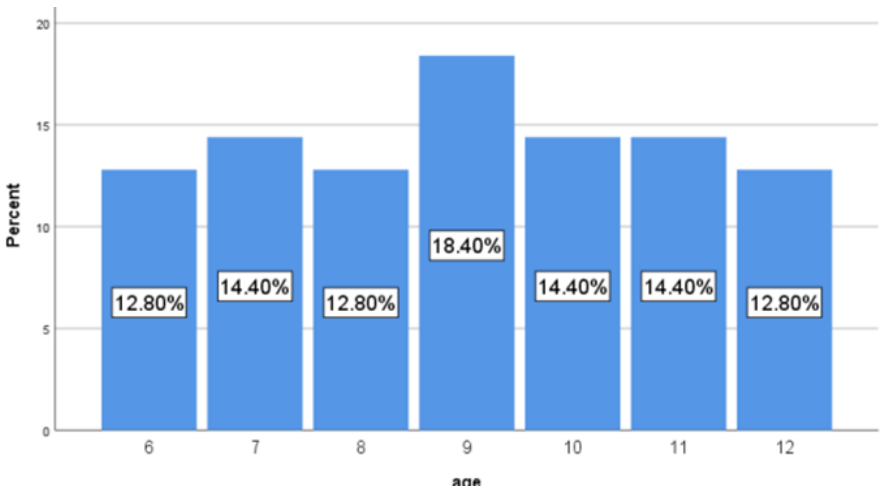

Figure 2: percentage of data

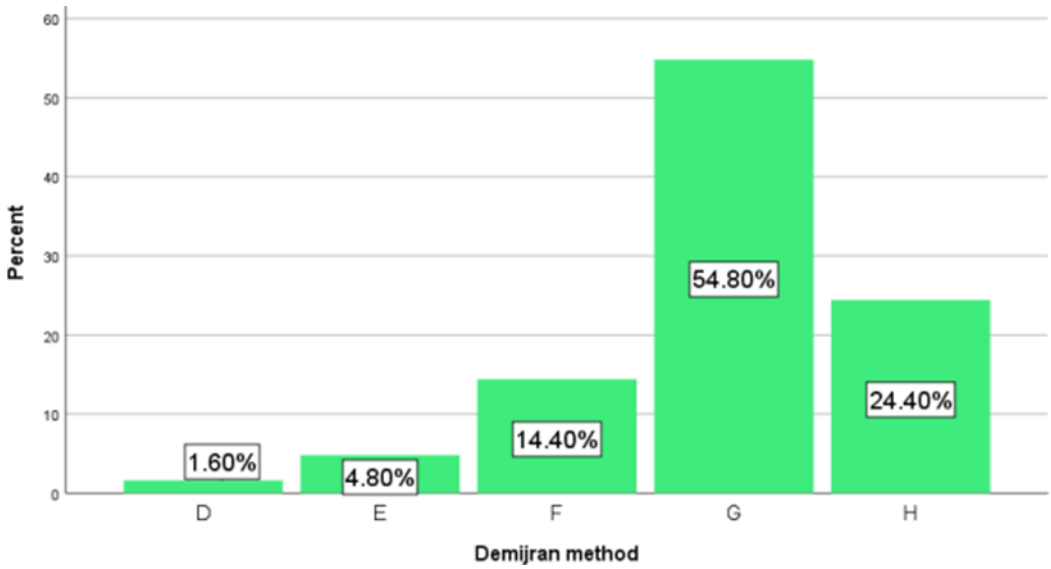

Figure 3:percentage of demirjan.

demonstrate that there was no statistically significant relationship between the children's gender and the Demirjian approach. According to the Demirjian technique, the majority of the male (50.8%) and female (58.5%) youngsters had class G root development. The p-value for the Pearson Chi-square test was 0.145.

Table 2: distribution of males and females

		Demirjian method					
		D	E	F	G	H	Total
gender	male	0	8	18	61	33	120
		0%	6.7%	15%	50.8%	27.5%	100%
	female	4	4	18	76	28	130
		3.1%	3.1%	13.8%	58.5%	21.5%	100%
Total		4	12	36	137	61	250
		1.6%	4.8%	14.4%	54.8%	24.4%	100%

The results show that the association between the Demirjian technique and the side of permanent root formation was not statistically significant. According to the Demirjian technique, the majority of the right side (52%) and left side (57.6%) root developments were in class G root development. The p-value for the chi- square-test was 0.889, as seen in Table (3) .

Table (3) chi square test results

		Demirjian method					
side of root development		D	E	F	G	H	Total
	right	2	6	18	65	34	125
		1.6%	4.8%	14.4%	52.0%	27.2%	100.0%
	left	2	6	18	72	27	125
		1.6%	4.8%	14.4%	57.6%	21.6%	100.0%
Total		4	12	36	137	61	250
		1.6%	4.8%	14.4%	54.8%	24.4%	100.0%

		Demirjian method					
		D	E	F	G	H	Total
age	6	4	8	8	12	0	32
		12.5%	25.	25.0%	37.5%	0%	100%
	7	0	4	8	24	0	36
		0%	11.1%	22.2%	66.7%	0%	100%
	8	0	0	14	15	3	32
		0%	0%	43.8%	46.9%	9.4%	100%
	9	0	0	4	32	10	46
		0%	0%	8.7%	69.6%	21.7%	100%
	10	0	0	2	30	4	36
		0%	0%	5.6%	83.3%	11.1%	100%
	11	0	0	0	19	17	36
		0%	0%	0%	52.8%	47.2%	100%
	12	0	0	0	5	27	32
		0%	0%	0%	15.6%	84.4%	100%
Total		4	12	36	137	61	250
		1.6%	4.8%	14.4%	54.8%	24.4%	100%

Discussion

In terms of occlusion and general tooth development, the first permanent molar (FPM) is the most crucial tooth. It's crucial that the tooth be kept in the mouth for as long as possible. Contrarily, it's the tooth most often associated with a first cavity. It is especially susceptible to carious illness during the early stages of its eruption, when hygiene is difficult and poorly controlled. [9]The root of the tooth is an integral part of the tooth's overall structure. Many factors, including epithelial-mesenchymal interactions, integration with the jaw bone, blood supply, and nerve innervations, and ultimately root development, are required. Hence, studying organogenesis by examining root growth provides useful insight. The bioengineering implications of studies of root

development are of great interest to the field of regenerative medicine. [10]

It is possible for roots to grow after the process of creating enamel has been completed. By encouraging cell proliferation around the cervical loop formed when cells from the inner and outer enamel epithelia combine in the tan region, Hertwig's epithelial root sheath controls root growth and morphology. [11]

Children between the ages of 7 and 12 have an increased risk of developing caries and having caries extend into the pulp, thus it is crucial that they get extra attention while receiving treatment for deep caries lesions in the FP. As the first FPM symptoms usually develop between the ages of 6 and 7, we may estimate that peak maturity will occur between the ages of 9 and 10. Perhaps incomplete root development at this age. [12]

Open apices, which may occur in growing teeth or teeth with apical root resorption, are a significant clinical illness that need rapid treatment. It is more difficult to perform root canal therapy on teeth with open apices because of the increased likelihood of irrigating solution and/or sealer extravasation into peri radicular tissues. This condition often manifests in young adults due to issues with tooth growth or inflammation of the apex of the root The most popular approach for determining dental maturity is the one developed by Demirjian et al. (Demirjianetal, .'s 1973, 1993-1994; Demirjian and Goldstein 1976) and based on a large random study of Canadian children. Each person's dental age is determined by examining their set of seven permanent mandibular teeth and comparing that number to their actual age. Demographic variations and/or a secular trend have been blamed for the seemingly uneven dental development across various people throughout the globe. [5] Research of this kind is required in Iraq to assess the rising average age of AC of FPMs in children.

With FPMs between the ages of 6 and 12, the detection of open apex in some children at age 12 underlines the necessity for investigation prior to treating a deep carious lesion.

The present study calculated the possibility of pulpal involvement prior to the surgery.

The genesis of the roots is complete.

Dentists are urged to conduct a comprehensive clinical examination, get diagnostic radiographs, and adhere to case- specific treatment protocols before attempting to treat FPMs in children, even

those as young as 12 years old. This would reduce the likelihood of mistakes being made during therapy, which might avoid unwanted FPM extraction or damage. [13]

Conclusion

The discovery of open apex in some children at 12 confirms the need for inquiry before treating a deep carious lesion in FPMs between the ages of 6 and 12.

we evaluated the potential risk of pulpal involvement during this period.

Before treating FPMs in children, even those as young as 12, the dentists were advised to do a thorough clinical examination, get diagnostic radiographs, and follow specific treatment procedures based on clinical instances. By doing this, treatment errors would be less likely to occur, which might prevent FPMs from being extracted or causing unacceptable damage.

Conflicts of interest

The authors reported no conflicts of interests

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