

Incidence of three rooted mandibular permanent first molars in north Gujarat population -A prospective study

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Abstract

Background: The morphological knowledge of root canals is important for successful treatment.

Aim: The aim of the study is to evaluate Radiographically the percentage of permanent mandibular first molar with three roots amongst north Gujarat population.

Material and method: Total 320 mandibular first molar of 320 patients were screened using x-ray and the incidence of 3-rooted mandibular first molars for both lower quadrants were compared and the correlation between either genders was recorded.

Statistical analysis used: chi square test

Result: The prevalence of 3-rooted mandibular first molars was 3.13% of the teeth examined. Among them 3.51% were of left side and 2.68% were of right side.

There was no statistically significant difference between genders.

Conclusion: The high frequency of an extra root in mandibular first molars makes it essential to anticipate and find all canals during primary endodontic treatment.

Keywords: Mandibular first molar, radix Entomolaris, north Gujarat, IOPA

Introduction

The success of endodontic treatment relies on thorough cleaning and shaping of the root canal system followed by 3-dimensional obturation. One of the frequent causes of failure of endodontic treatment is the inability to identify additional roots/canals. Clinicians should possess sound knowledge of unusual morphology and must accurately perform a preoperative radiographic examination before initiation of endodontic therapy. The mandibular first

molar is considered to be the most frequently involved tooth in endodontic procedures. It displays considerable anatomic variation regarding the number of roots and root canals.¹

Mandibular molars with an extra third root located distolingually was reported for the first time in the literature by Carabelli in 1844 and was termed “radix entomolaris” (RE)². It is typically smaller and usually curved, requiring special attention when endodontic intervention is considered.

Therefore, the purpose of this investigation was to study the incidence of RE in permanent mandibular first molar in north Gujarat sub-population.

Material And Method

North Gujarat population of 15-60 years coming to the department of conservative dentistry and endodontics, at narsinhbhaipatel dental college and hospital, Visnagar, Gujarat, were evaluated for this study. Total 320 subjects having atleast 1 fully erupted mandibular first molar were included in the study. 320 mandibular 1st molar with complete root apex on radiograph and with no root canal filling, post or crown restoration were selected for this study. Patients having pacemaker or any systemic disorder, were excluded. Lactating females were also not included. Patients were informed about the study, and written consent was taken to participate in the study.

Each subject was digitally radiographed using the Satelec RVG (Aceton, France) system or IOPA. Two periapical radiographs were taken from 2 different horizontal angles: one was taken in the orthoradial position and the other was taken 30° mesially. The stored digital radiographs were displayed on a 19-inch LCD monitor (LG Electronics, South Korea) and were investigated. The total incidence of 3-rooted mandibular first molars and the ratio of the occurrence in gender of such teeth were

assessed. Comparison of the occurrence of such 3-rooted mandibular first molars according to gender was analyzed. Comparison of the occurrence of 3 rooted mandibular first molars according to different quadrants were also assessed and analyzed.

Result

Table1: Distribution of study subjects based on gender.

Gender	N	%
Male	142	44.37
Female	178	55.63
Total	320	100

Table1: Shows the genderwise distribution of study sample. The total study population enumerated and assessed was 320, comprising of 142 (44.37%) males and 178 (55.63%) females.

Table2: Distribution of study subjects based on gender and prevalence of radix.

Gender	Present N (%)	Absent N (%)	Total N (%)	P value
Male	4(2.82%)	138 (97.18%)	142(100%)	>0.05**
Female	6(3.37%)	172 (96.63%)	178(100%)	
Total	10(3.13%)	310 (96.87%)	320(100%)	

Level of significance ≤0.05,*Significant Result,**Non-significant Result

Table 2: Shows distribution of study subjects based on gender and prevalence of Radix. Out of the total study population, 142 (44.37%) were males. Among them, the prevalence of radix was found among 4 (2.82%) study subjects. Total 178 (55.63%) study subjects were females. Among them, the prevalence of radix was found among 6 (3.37%) study. Statistically no significant

difference was observed among genders with regard to prevalence of radix.

Table 3: Distribution of study subjects based on quadrant and prevalence of radix

Quadrant	Present N (%)	Absent N (%)	Total N (%)	P value
Right Molars	4(2.68%)	145 (97.32%)	149(100%)	< 0.05*
Left Molars	6(3.51%)	155 (96.49%)	171(100%)	
Total	10(3.13%)	310 (96.87%)	320(100%)	

Level of significance ≤ 0.05 , *Significant Result, **Non-significant Result

Table 3: Shows distribution of study subjects based on quadrant and prevalence of Radix. Out of the total study population, 149 (46.56%) study subjects had right molars. Among them, the prevalence of radix was found among 4 (2.82%) study subjects. Total 171 (53.44%) study subjects had left molars. Among them, the prevalence of radix was found among 6 (3.51%) study subjects. Statistically, significant result was observed in relation of quadrant with prevalence of radix.

Table 4: Distribution of study subjects based on gender with right or left molar.

Gender	Right N (%)	Left N (%)	Total N (%)	Pvalue
Male	67(47.2%)	75(52.8%)	142(100%)	>0.05**
Female	82(46.1%)	96(53.9%)	178(100%)	
Total	10(3.13%)	310 (96.87%)	320(100%)	

Level of significance ≤ 0.05 , *Significant Result, **Non-significant Result

Table 4: Shows distribution of study subjects based on gender and prevalence of molar on right or left quadrant. Out of the total study population, 142(44.37%) were

males. Among them, the prevalence of right molars was 67 (47.2%) and left molars were 75(42.8%). Total 178(55.63%) study subjects were females. Among them, the prevalence of right molars was 82 (46.1%) and of left molars were 96(53.9%). Statistically no significant difference was observed among genders with regard to presence of right or left molars.

Table 5: Distribution of study subjects based on gender and presence of radix in right quadrant.

Gender	Present N (%)	Absent N (%)	Total N (%)	Pvalue
Male	2(1.41%)	140(98.59%)	142(100%)	>0.05**
Female	2(1.12%)	176(98.88%)	178(100%)	
Total	4(1.25%)	316(98.75%)	320(100%)	

Level of significance ≤ 0.05 , *Significant Result, **Non-significant Result

Table 5 : Shows distribution of study subjects based on gender and presence of Radix on right quadrant. Out of the total study population, 142 (44.37%) were males. Among them 1.41% study subject had presence of radix on right quadrant and 178 (55.63%) study subjects were females. Among them 1.12% study subjects had presence of radix on right quadrant. Statistically no significant difference was observed among genders with regard to presence of radix on right quadrant.

Table 6: Distribution of study subjects based on gender and presence of radix in left quadrant.

Gender	Present N (%)	Absent N (%)	Total N (%)	Pvalue
Male	2(1.41%)	140(98.59%)	142(100%)	>0.05**
Female	4(2.25%)	174(97.75%)	178(100%)	
Total	6(1.88%)	314(98.12%)	320(100%)	

Level of significance ≤ 0.05 , *Significant Result, **Non-significant Result

Table 6: Shows distribution of study subjects based on gender and presence of Radix on left quadrant. Out of the total study population, 142 (44.37%) were males. Among them 2 (1.41%) study subjects had presence of radix on left quadrant and 178(55.63%) study subjects were female. Among them 4 (2.25%) study subjects had presence of radix on left quadrant. Statistically no significant difference was observed among genders with regard to presence of radix on left quadrant.

Discussion

Knowledge about both normal and abnormal anatomy of teeth is important for execution of root canal therapy and can directly affect the success of treatment. Therefore, practitioners should have thorough knowledge about existence as well as the prevalence of teeth abnormalities.¹⁴ Mandibular first molars seem to be the most common teeth in need of root canal treatment as they are the first permanent teeth to erupt in the oral cavity. While treating mandibular first molars, clinicians should be aware of morphological abnormality such as Radix Entomolaris that may complicate the endodontic treatment and lead to failure as a result of missed canal. It does not affect only endodontic treatment but also leads to periodontal disease. Although the thorough etiology is uncertain, the unique morphologic features of the distolingual root may lead to increased pocket depth and solemn periodontal destruction. Evidence suggests that the presence of RE contributes to the formation of distal furcation, which can be intricate. Thus, it is important to identify such abnormality before initiation of treatment.

Radix Entomolaris (RE) is one of the anatomical variant found in permanent mandibular molar and was first described by Carabelli. It is considered by the presence of an additional or extra third root, which is classically found distolingual.

De Moor et al.⁶ have classified RE evaluated from extracted teeth into three types. Type I refers to straight root or canal. Type II refers to an initially curved entrance that lasts as a straight root/root canal. Type III refers to an initial curve in the coronal third of the root canal and a second curve beginning in the middle and continues to the apical third.

Accurate clinical and radiographic examination should be performed before initiating an endodontic treatment. Thorough visual inspection of the tooth crown can facilitate identification of an additional root.⁵

Careful radiographic diagnosis plays an important role in root canal treatment. Radiographs taken at different angulations help to reveal presence of a “hidden” third root (RE). When the outline of the distal root or the root canal seems unclear on the preoperative radiograph, a second radiograph should be taken from a more mesial or distal angle (30 degrees) which could probably reveal the presence of RE.¹⁵

The presence of RE when established by preoperative radiographs, a modification of classic triangular opening cavity to a trapezoidal form is required to locate and access the root canal system in a better way. A severe root inclination or canal curvature, chiefly in the apical third of the root (as in a type III RE), can cause shaping aberrations such as straightening of the root canal or a ledge, with root canal rotary files, which permits a more centered preparation shape with restricted enlargement of the coronal canal third and orifice relocation. An angled view of IOPA should must be taken.

The radiographs continue to be the crucial tool and seem to be quite consistent in detecting the presence of RE. Periapical radiographs were used in this study because they are noninvasive and inexpensive and allows for inter study comparisons for three-rooted mandibular first

molars. On the other hand, this method has some known limitations which include anatomical noise, two-dimensional images, and geometric distortion. As radix Entomolaris is mostly located in the same buccolingual plane as the Distobuccal root, a superimposition of both roots can give the impression on the radiograph resulting in an imprecise diagnosis.³ CBCT overcomes these drawbacks by reducing superimposition and permitting better view of three-dimensional structures. CBCT was not used as it is expensive.

Al-Nazhan¹⁶ has examined 251 mandibular first molars of Saudi patients (clinically and radiographically). He reported an incidence of 6% of RE amongst Saudi population. In the clinical investigation conducted on Chinese population, Yu et al.¹⁷ screened 378 cases of mandibular first molars with root canal therapy and reported an incidence of 27% of teeth with RE.

In this study, the overall incidence of patients with three rooted mandibular first molars was 3.13%. This finding was in accordance with the previous reports on Middle Easterners.^{16,18} It was also close to reports from India.^{12,13} However, it was low when compared with data reported for Asian races: 24.5% in Koreans¹⁹, 32% in Chinese²⁰, and 25.6% in Taiwanese²¹.

In the present study, among 10 subjects with RE, 4 were male and 6 were female, which shows no significant difference in the incidence of RE between different genders. The same result was reported by other studies.^{11, 12, 20, 22.}

When considering the right and left sides of the mandible, RE occurred more frequently on the left side than on the right side. Out of 10 molars 6 were left. E. Schafer et al¹¹ and M. E. Curzon⁸ found similar results as this study. But the findings were not in accordance with some previous studies done by A. K. Garg et al¹² and Y. Gu et al²⁰, they

reported that RE can occur more on the left side. Cloak et al.²² and Yang et al.²³ found no significant difference between both sides.

Conclusion

The prevalence of RE in the north Gujarat population was less than reported for Asian population. It occurred more on left side and in female subjects. But the difference was not statistically significant between genders. The frequency of third root and fourth canal in mandibular first molar makes it necessary to carefully identify anatomical variation on the radiograph and alter the access opening of cavity to prevent “missing” a canal.

Refinement in endodontic cavity preparation and radicular inclination should be considered in teeth presenting with radix Entomolaris, so as to avoid failure of procedures. Knowledge of anatomical variation, training and competency in selecting the best technique are keys of successful instrumentation and for the long term success of the treatment.

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