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Radix Entomolaris in permanent mandibular first molars in population of Rajouri district of Jammu and Kashmir

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Abstract
Aim: The present study aimed to assess any gender predilections along with the side (right or left) predominance.
Material and method: The study was conducted in the Dental section of Sub district Hospital Nowshera among 384 patients (220 males & 164 females) with age between 18-60 years. 768 mandibular first molars present in these subjects were evaluated using periapical radiographs one in orthoradial and the other taken either 30 degree mesially or distally. The radiographs were separately inspected by two end odontists after placing them over a viewing box under optimal conditions using magnifying glasses (2X). The criteria used to indicate the presence of RE were clear distinction of an extra root, indicated by the crossing of translucent lines defining the pulp space and periodontal ligaments, originating in the upper half of the distal root.
Results: Four point ninety five percent of the subjected were having Radix Entomolaris (RE). Radix Entomolaris (RE) was revealed more in females as compared to males. Equal distribution of RE was found among in relation to its side.
Conclusion: Clinicians must be well aware of RE and should have knowledge about their prevalence and take every possible measure using the advanced diagnostic and imaging modalities to avoid any endodontic failure leading to high rate of treatment success and patient satisfaction.

Keywords: radix Entomolaris, gender, imaging

Introduction

Barret in 1925 said that "of all the phases of anatomic study in the human system, one of the most complex is that of the pulp cavity morphology" [1]. Failure to recognize the presence of an additional canal may result in unsuccessful treatment and may be the origin of acute flare ups during and after treatment. An awareness and understanding of the presence of unusual root canal morphology can thus contribute to the successful outcome of root canal treatment.

Mandibular first molar can display several anatomical variations. The majorities of permanent mandibular first molars usually have 2 roots placed mesially and distally and 3 root canals [2, 3], but variations in the number of roots and in canal morphology are not uncommon [4]. The additional root in these variants which have 3 roots is typically distributed distolingually, which is also known as Radix Entomolaris (RE), as first described in literature by Carabelli [5].

Anatomical studies have reported a relation between the presence of RE in the first Mandibular molar and certain races. In Mongoloid population, such as Chinese, Eskimos, and American-Indians, frequency is of 5 to more than 30% [6, 7]. In African population, a maximum frequency of 3% was found [8, 9], in Europeans the incidence was even less in German population the frequency was 1.35% [10]. In Indian population reported 5.97% of occurrence of RE in mandibular first molars [11]. The same method was used by Karale *et al.* who reported a higher incidence (6.67%) of RE [12].

RE can be seen in all mandibular molars, with fewer occurrences in second molars [13, 14], Frequency of RE on the right side is more commonly reported as compared to the left side with no gender variations. Bilateral occurrence of the RE ranges from 50% to 67% [13, 15]. Tratman surveyed the incidence (0.2%) of RE in Indians in 1938, [16] but no study so far has been conducted in Jammu & Kashmir, a North Indian state particularly. Hence, the objective of this study was to evaluate the prevalence of RE in permanent mandibular first molars in J&K (North India). The study also aimed at assessing any gender predilections along with the side (right or left) predominance.

Material and methods

The study was conducted in the Dental section of Sub district Hospital Nowshera, which comes under the Rajouri district of Jammu & Kashmir, a north Indian state. 384 patients (220 males & 164 females) with age between 18-60 years, who visited the Dental section for endodontic treatment between May 2017 and January 2019 were screened. The subject had to have atleast one Mandibular molar to be considered for the study. Age, sex & race of the subjects were recorded to rule out non-Indian origin. All the selected patients were explained about the proposed treatment and its criteria for evaluation with written consent. 768 mandibular first molars present in these subjects were evaluated using periapical radiographs one in ortho radial and the other taken either 30 degree mesially or distally.

The radiographs were separately inspected by two endodontists after placing them over a viewing box under optimal conditions using magnifying glasses (2X). The criteria used to indicate the presence of RE were clear distinction of an extra root, indicated by the crossing of translucent lines defining the pulp space and periodontal ligaments, originating in the upper half of the distal root. Any disagreement between the observers was jointly re-evaluated

until a consensus was reached. The overall incidence and occurrence of the extra root in relation to sex and quadrant were then analyzed using SPSS software for chi squared test and p values (the level of significance set at $p<0.05$).

Results

The present study comprised of 384 subjects, out of which 57.29% were males and 42.71% were females. Maximum subjects were in the age group of 31-40 years (34.38%) as shown in table 1.

Four point ninety five percent of the subjected were having Radix Entomolaris (RE). Radix Entomolaris (RE) was revealed more in females as compared to males with statistically insignificant difference as $p>0.05$ (table 2).

Equal distribution of RE was found among in relation to its side (table 3). Bilateral distribution of RE was found to be 57.90% while unilateral distribution was 42.10% (graph 1).

Table 1: Demographic characteristics of the study population

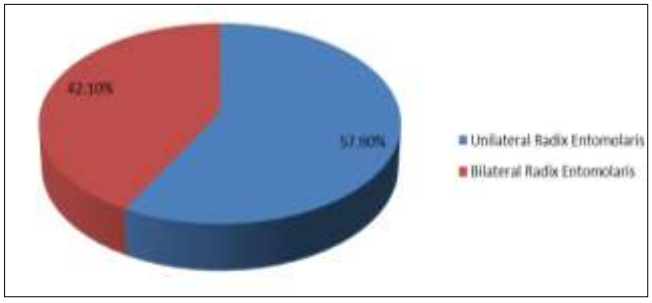
Variables	N	%
Gender		
Male	220	57.29
Female	164	42.71
Age Group (in years)		
18-30	83	21.61
31-40	132	34.38
41-50	89	23.18
>50	80	20.83
Total	384	100

Table 2: Comparison of prevalence of Radix Entomolaris (RE) according to gender

Gender	RE	%	Chi Square	p value
Male	7	1.82	3.78	0.17
Female	12	3.13		
Total	19	4.95		

Table 3: Comparison of prevalence of Radix Entomolaris (RE) according to side

Side	RE	%	Chi Square	p value
Right	10	2.60	0.22	0.76
Left	9	2.35		
Total	19	4.95		



Graph 1: Occurrence of unilateral and bilateral Radix Entomolaris

Discussion

In our study the overall prevalence of patients with radix was approximately 5% which is in accordance with the previous studies in Indian populations [11, 12] and also with the studies conducted in Middle East [8, 9]. On the contrary, these figures are lesser than the result of a study by Chandra *et al.* [17] in South Indian population, where the prevalence of RE among patients was 18.6%. However, it was considerably low when compared with data reported for Asian races; 24.5% in Korean [18], 32% in Chinese [19] and 25.6% in Taiwanese [20].The differences could be because of genuinely lower RE prevalence in the Indian race, though variations in sample size and methodology may account for the differences. In the present study, there was no significant difference according to side occurrence which is similar to recent studies [10, 11] but some authors have reported more frequency of three rooted mandibular first molars on the right side [20] and others have reported a higher frequency on the left side [21]. The females showed higher frequency of RE than the males in our study, but most of the recent studies have shown the difference between genders to be non-significant [11, 18-20]. In conformance with the previous studies on RE on Asians, was the high incidence of bilateral occurrences recorded as 57.90% in this study [13, 15].

De Moor *et al.* [22] stated that it is important to find all the roots of the mandibular first molars because of the presence of third root in some cases. So, it is convenient to do the x-rays from different horizontal angulations so as to find out the third root even in cases of superimposition and that would also help to identify anatomy of chamber and root canal as done in our study. Three-dimensional imaging techniques based on computed tomography (CT) and cone beam computed tomography (CBCT) are useful for visualizing or studying the true morphology of an RE in a noninvasive manner using less radiation. However, cost and access to them are said to be the limiting factors in the present study [20]. Future research on RE in North Indians could study a more large & varied population, utilizing computed tomography images.

Conclusion

Not knowing the anatomy of tooth we are treating is like setting out on an unknown journey without a road map. Thus, a skilled endodontist should always properly evaluate the radiographs to interpret the root canal anatomy & its variations or suspects the abnormalities. This study revealed that the incidence of Radix entomolaris in the north Indian population was less than reported in the other Asian populations and had the higher occurrence in females without any side predilection. Bilateral occurrence of RE was found to be 57.90%. Therefore, the clinicians should be well aware of this fact and should have knowledge about their prevalence and take every possible measure using the advanced diagnostic and imaging modalities to avoid any endodontic failure leading to high rate of treatment success and patient satisfaction.

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