



Prevalence of Radix Entomolaris in Permanent Mandibular First Molars in Kashmiri (North Indian) Population

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Abstract

Introduction: The aim of this study was to evaluate the prevalence of permanent mandibular first molar teeth with three roots among Kashmiri (North Indian) population and to assess any gender predilections along with the side (right or left) predominance. **Materials and methods:** This study was conducted in the Department of Conservative Dentistry and Endodontics, Government Dental College and Hospital, Srinagar (Jammu and Kashmir). A total of 280 patients (160 males and 120 females) were included in the study. Periapical radiographs were taken and evaluated for the presence of third root (Radix Entomolaris) in mandibular first molar. The prevalence of radix entomolaris was compared between male and female patients and predominance was compared on the right and the left sides. The results were then statistically analyzed using the Chi-square test. **Result:** The overall prevalence of individuals with radix entomolaris was 12.14%. There was statistically no significant difference in the prevalence of three rooted mandibular first permanent molars between males and females ($p > 0.05$). Mandibular first molars on right side showed higher incidence of third root as compared to the left side but the difference was not statistically significant. **Conclusion:** The clinician should be familiar with the ethnic variations in root morphology while treating the mandibular first molars so as to reduce failures caused by missed canals and roots. A careful clinical and radiologic evaluation is needed to ensure long term success of endodontic treatment of permanent molars.

Keywords: Radix Entomolaris, Mandibular first molars, Anatomic Variations, Root canal treatment

INTRODUCTION

The primary objective of root canal therapy, i.e., proper cleaning and debridement of the root canal, followed by three-dimensional obturation largely depends on the familiarity of the clinician with the complexities of the root canal system.^[1] Thus, a thorough knowledge of the root and root canal morphology and their variations is important. It is known that the mandibular first molar can display several anatomical variations. The majority of Caucasian first molars are two-rooted with two mesial and one distal canal.^[2,3] One of the major anatomical variations in mandibular first molars is the presence of an additional third root also called as radix entomolaris (RE) which is located distolingually and in very rare cases when this additional root is located mesiobuccally, it is called as radix paramolaris (RP).^[4,5] This major anatomic variation was first identified by Carabelli in 1844. The term RE was coined by Michaly Lenhossek in 1922, while as RP also known as mesiobuccal root was first described by Bolk in 1915.^[6]

RE can be found on the first, second, and third mandibular molar, occurring least frequently on the second molar.^[7] Studies have shown that this supernumerary root can be separate from or partially fused to other roots. It is typically smaller than the mesial and distobuccal roots and is usually curved, requiring special attention when endodontic intervention is considered.^[4,8]

Its dimension can vary from short conical to a root of normal length.^[8]

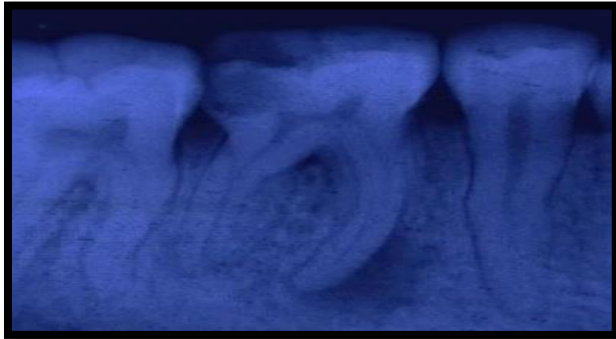
De Moor et al have classified RE evaluated from extracted teeth into three types based on the curvature of the separate RE variants in bucco-lingual orientation. Type I refers to straight root or canal. Type II refers to an initially curved entrance which continues as a straight root/rootcanal. Type III refers to an initial curve in the coronal third of the root canal and a second curve beginning in the middle and continuing to the apical third.^[9] The reason for the formation of this extra root is still not clear. This can be attributed to some external factors during tooth formation or to penetrance of an atavistic gene or polygenetic system.^[8]

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 ranges from 5% to more than 30%.^[10,11] In African population, a maximum frequency of 3% was found,^[12,13] the frequency was 1.35% in German population whereas in Eurasian and Indian populations the frequency was less than 5%.^[14,15] In Indian population, Garg et al reported 5.97% of occurrence of RE in mandibular first molars.^[16] The objective of the present study was to evaluate the prevalence of radix entomolaris in Kashmiri population (North India).

MATERIALS & METHODS

This study was conducted in the Department of Conservative Dentistry and Endodontics, Government Dental College, Srinagar. 280 patients comprising of 160 males and 120 females within the age group of 15 - 60 years who were scheduled for endodontic treatment

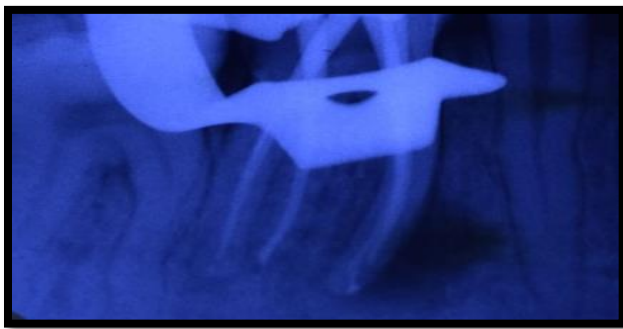
were included in this study. Two periapical radiographs were taken from different horizontal angles for each tooth undergoing root canal treatment. The radiographs were



Diagnostic radiograph



Working Length Radiograph



Master cone radiograph



Post obturation radiograph

The incidence of RE was recorded. Occurrence between males and females and between the right and left sides of the mandible was also recorded. Comparison of the incidence and the correlations was done by using the Pearson chi-square test with SPSS (version 16, Chicago, IL, USA). $P < 0.05$ was considered statistically significant.

RESULTS

After interpretation of radiographs of 280 patients (160 males and 120 females), 34 patients (16 males and 18 females) had radix entomolaris. The prevalence in males and females was 10 % (16/160) and 15% (18/120) respectively. Statistically no significant difference in the prevalence of RE was present between males and females ($P > .05$) (Table 1). Among these 20 were found on right side and 14 on the left side. There was no significant difference between the right side (20/34) and the left side (14/34) ($P < 0.05$) (Table 2).

Table 1: Prevalence of Radix Entomolaris (RE) in the mandibular molar teeth of Kashmiri population according to gender

Gender	No. of patients examined	Patients with RE	Percentage (%)	p-value
Male	160	16 (10%)	10%	0.15 (Non-Significant)
Female	120	18 (15%)	15%	
Total	280	34 (12.14%)	12.14%	

Table 2: Prevalence of Radix Entomolaris (RE) according to side

Side	Patients with RE	Percentage (%)	p-value
Right	20/34	58.8%	0.157 (Non-Significant)
Left	14/34	41.1%	

DISCUSSION

Anatomical variations of mandibular molars have been documented in the literature. Radix entomolaris is one of the major variants observed in human permanent mandibular molars and failure to recognize this variant may jeopardize the prognosis of root canal therapy.^[17] In the present study, the prevalence of patients with RE in mandibular first molar was 12.14% (34 of 280), 10% for males (16 out of 160) and 15% for females (18 out of 120). This figure is lesser than the result of study by Chandra et al in South Indian population, where the prevalence of RE among patients was 18.6%.^[18] On the contrary these figures are higher than the results of study by Garg et al and Bains et al in North Indian population where the prevalence of RE was 5.97% and 7.58% of all the patients examined respectively.^[16,19]

In the present study there was statistically no significant difference between left and right

sided occurrence of RE which is similar to the recent studies by Bains et al and Chandra et al. However some studies reported more predilection on right side and few others on the left side.^[20,21,22,23] The females showed higher frequency of RE than the males in our study but statistically no significant difference was found between both the genders. This was in accordance with the recent studies by Tu et al and Wang et al.^[24,25]

Successful endodontic treatment in a tooth with radix entomolaris requires detailed radiographic and clinical examination. Intra-oral periapical radiographs may serve as an important aid in identifying RE. Because RE is mostly situated in the same buccolingual plane as the distobuccal root, a superimposition of both roots can appear on the preoperative radiograph, resulting in an inaccurate diagnosis. To reveal the RE, a second radiograph should be taken from a more mesial or distal angle (30 degrees). Computed tomography (CT) or cone beam computed

tomography (CBCT) might be a more beneficial tool in this respect but cost and access to them is a limiting factor.^[26]

Clinically, the possibilities of detecting and managing RE can be enhanced by obtaining straight line access and modifying typical triangular shape of access preparation to a trapezoidal form. Further, good illumination and the use of additional aids like DG 16 probe, micro-opener, methylene blue dye, long shank burs, ultrasonic instruments, magnifying loupes, microscopes etc. are also valuable in locating and managing RE.^[27]

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CONCLUSION

The prevalence of radix entomolaris in the population of Kashmir region of Jammu and Kashmir was observed to be 12.14 % in our study. Clinicians should be aware of these unusual root morphologies in the mandibular first molars and before initiating root canal treatment an accurate diagnosis is important to avoid any endodontic failure due to missed canals and roots and for the long term success of root canal treatment.



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