

Prevalence of Three-rooted Primary Mandibular Second Molars in Karnataka (South Indian) Population

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Abstract

Background: The occurrence of an extra distal root in primary mandibular first molars is relevant clinically for the delivery of optimal care. However, there have been no studies conducted for establishing the prevalence of same in South Indian population. **Aim:** The aim of the study was to evaluate the prevalence of three-rooted primary mandibular second molars in South Indian children. **Materials and Methods:** Intraoral periapical radiographs of bilateral primary mandibular second molars, obtained from 77 patients, were investigated for the presence of additional root. A total of 154 primary mandibular second molars were examined. **Results:** The total occurrence of three-rooted primary mandibular second molar among the study participants was 6.5%. A male:female ratio of 1.5:1 was noted. Three-rooted primary first molar occurrence on the right side was noted to be higher than on the left, with 2.6% having a bilateral occurrence. **Conclusion:** 6.5% of children have an additional root making it a rare entity.

Keywords: Additional root, primary second mandibular molars, radix entomolaris, radix paramolaris, South India, three-rooted molars

INTRODUCTION

Pediatric endodontics is an integral part of dental practice that aims to preserve fully functional primary teeth in the dental arch. Pulpectomy of primary molar presents a unique challenge to dental practitioners with their bizarre and tortuous canals encased in roots programmed for physiological resorption.^[1] Hence, to obtain the treatment objectives, an adequate knowledge and understanding of the dental anatomy of roots and root canal systems is imperative.

Primary mandibular second molars usually have two roots and three root canals, with the formation of accessory roots being uncommon.^[2,3] The prevalence of dental anomalies is lower in the primary dentition than in permanent dentition.^[4] The occurrence of an extra distal root in these molars is rather considered a racial characteristic of certain native Indian and Mongoloid populations.^[5,6] There have been several case reports on the occurrence of three-rooted primary mandibular second molar variants, but research activities on their prevalence in South Indian population are rare. Therefore, the purpose of this study was to evaluate the prevalence of three-rooted primary mandibular second molars in South Indian population.

MATERIALS AND METHODS

Sample

The study was conducted in the Department of Pedodontics and Preventive Dentistry, College of Dental Sciences, Davangere. Approval for the study was obtained from the Institutional Ethical Committee. Seventy-seven patients (41 males and 36 females) visiting the Department of Pedodontics and Preventive Dentistry were enrolled in the study. Parents were informed about the study and written consent to participate in the study was acquired from each patient. The inclusion criteria were (1) patients of Karnataka origin (South India); (2) patients with bilateral primary mandibular second molars; and (3) patients aged 3–10 years. Patients from other states and patients having primary mandibular second molar on one side were excluded from the study. Personal details, including age, sex, and ethnicity of patients, were recorded.

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Identification of additional root

A clearly distinguishable independent additional root justified by the crossing of translucent lines defining the pulp and periodontal ligament spaces, according to previous studies was followed in the investigation. The total prevalence, sex ratio, and prevalence of bilateral and unilateral and right- and left-sided three-rooted primary mandibular second molars were evaluated.

Statistical analysis

The obtained data were subjected to descriptive analysis.

RESULTS

A total of 77 patients (41 males and 36 females) were examined, giving a total of 154 molars between the age groups of 4–10 years. The results are tabulated in Table 1. The total occurrence of three-rooted primary second molar among the study participants was 6.5% (10/154). A comparatively higher prevalence among boys than in girls, with six boys (1.5:1) was noted. Three-rooted primary first molar occurrence on the right side was noted to be higher than on left, with 2.6% having a bilateral occurrence. Statistically no significant difference ($P \geq 0.05$) was found as related to sides or genders using Chi-square test.

DISCUSSION

Root anatomy of primary mandibular second molar usually presents with two roots, one mesial, and the other distal, with generally three root canals (two in mesial root and one in distal root). Very rarely an additional third root (supernumerary root) is seen and its occurrence is fewer in the primary molars than in the permanent molars.^[7-9]

Radix endomolaris (RE), an additional third root, was first mentioned in the literature by Carabelli in 1844 and is described by various other terms such as “extra third root” or “distolingual root” or “extra distolingual root.”^[10] Radix paramolaris (RP) is known as the additional “mesiobuccal root” and was first described by Bolk in 1915.^[11] Clinicians must be familiar with root anatomy and its variations as exodontic or endodontic procedure involving the primary second molars with this anomalous root configuration may render clinical complications, especially when they are not anticipated.^[12]

Table 1: Numbers and percentages of study participants with three-rooted primary mandibular second molars by gender, unilateral and bilateral status, and total occurrence

	Number of patients	Unilateral		Bilateral, n (%)	Total, n (%)
		Right, n (%)	Left, n (%)		
Male	41	3 (7.3)	1 (2.4)	1 (2.4)	5 (12.2)
Female	36	2 (5.6)	0	1 (2.8)	3 (8.3)
Total	77	5 (6.5)	1 (1.3)	2 (2.6)	8 (10.4)
Number of total teeth examined	154	5 (3.2)	1 (0.7)	4 (2.6)	10 (6.5)

There exists limited literature on the exact etiology behind the development of RE/RP. Studies have attributed to causes such as external factors during odontogenesis or penetrance of an atavistic gene or polygenetic system or racial genetic factors that result in the more pronounced phenotypic manifestation.^[13]

The reports on prevalence of additional root in primary molars vary in different populations. Literature search revealed a high degree of occurrence of three-rooted lower molars in Native Americans, pure Eskimo, Eskimo/Caucasian mixes, Indian, and Mongoloid populations.^[5,14-17] Tratman^[15] found no additional root in samples collected from Europe and India but found an additional root in 3 of 42 primary molars from Japanese participants. Jorgensen^[18] reported 1% incidence of additional root in 1041 primary mandibular second molars extracted from Danish population. Amiri Tehrani and Heydari^[19] investigated the prevalence of three-rooted primary mandibular molars retrospectively in registered pediatric patients in Zahedan city, Iran and reported a prevalence of 7.2%. Liu *et al.*,^[20] by means of vertical bitewing radiographs, evaluated retrospectively the prevalence of three-rooted second molars among Chinese patients and found an overall prevalence of 10%. The author also reported a 28% bilateral incidence or symmetrical distribution of three-rooted second molars. Analysis of the prevalence of three-rooted primary second molars, using cone-beam computed tomography, by Yang *et al.*^[21] found a 27.52% prevalence in Chinese children. A recent study done by Srivathsa,^[22] using intraoral periapical radiographs, shows the prevalence of 5.6% three-rooted primary molars in Indian children. The present study reported an overall prevalence of 6.5% (10/154) in South Indian children, which is similar to few other studies. However, the literature in terms of prevalence of the condition among different population and racial groups is still inadequate.

The results of previous studies did not differ significantly between the right and left sides or with gender.^[17,20,21] However, many case reports have reported the presence of additional roots in male patients and on the right side^[3,12,23] or the presence of bilateral symmetric occurrence.^[24-26]

Mayhall^[6] suggested that if a primary second molar has an accessory root, there is a high probability that the permanent first molar will also have one. Song *et al.*^[23] determined the incidence of additional root in mandibular primary and permanent molars and their relationship. Additional roots were present in 33.1%, 27.8%, and 9.7% of the first permanent, second primary, and first primary molars, respectively. Furthermore, he stated that when an additional root was present in a primary molar, the probability of the posterior adjacent molar also having an additional root was >94.3%. This may be explained by the field theory of tooth development, initially proposed by Butler.^[27] Primary mandibular molars and permanent mandibular first molars belong to the same molar field and have a similar time of development and morphology. Hence, the occurrence of three-rooted primary molars can be

used to predict the presence of an additional root in permanent molars posterior to it.^[28,29]

Root anatomy of primary mandibular second molars may sometimes be associated with various other anomalies. Acs *et al.*^[30] reported a case of a 7-year-old Hispanic male patient with a combination of shovel incisors, three-rooted primary molars, talon cusp, and supernumerary tooth. The skull of a 5-year-old Native American exhibited macrodontia, shovel-shaped maxillary central incisors, three-rooted mandibular primary molars, dens invaginatus, agenesis of maxillary canines, and crenulated occlusal surfaces of the first permanent and second primary molars in an archaeological exploration study done by Mann *et al.* in 1990.^[31]

An additional root has endodontic, exodontic, and periodontal implications in clinical pediatric dentistry. Apart from these, it also has a role as a genetic marker and in forensic odontology. The same caution should be followed in the treatment of primary mandibular molars with accessory roots as with permanent mandibular molars.

CONCLUSION

The results obtained in the current study indicate that around 6.5% of South Indian children may possess an additional root in primary second molars. Hence, adequate knowledge of root anatomy and the practice of initial radiographic examination are important so as to avoid untoward complications and deliver optimal care. However, further studies with larger sample size are needed to establish the definitive prevalence of same in South Indian population.

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Conflicts of interest

There are no conflicts of interest.

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