

# Prevalence of Three-Rooted Mandibular First and Second Molars in an Indian Population

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## ABSTRACT

**Objective:** To know the prevalence of three-rooted mandibular first and second molars in an Indian population.

**Material and Methods:** Intraoral periapical radiographs of 511 patients (299 male, 212 female) were screened. In total, 941 mandibular first molars and 833 mandibular second molars were interpreted to identify the presence of an additional root. The categorical variables obtained were represented as percentages. Fisher's exact test and Chi square test were applied for categorical variables.

**Results:** In the present study, third root was seen in 40 (4.2%) mandibular first molars and 24 (2.8%) mandibular second molars out of 941 and 833 teeth examined respectively. An additional root was seen more often on the right side and was seen more in females.

**Conclusion:** Consideration and identification of presence of an additional root in mandibular first and second molar teeth is significant to assure successful accomplishment of various dental treatment procedures.

## KEY WORDS

mandibular first molar, mandibular second molar, radix entomolaris, developmental anomaly, additional root

## INTRODUCTION

Different developmental anomalies affecting the dentition are often experienced in the routine dental practice<sup>1)</sup>. The permanent lower first and second molars may present with variations in the number, location of roots and root canal morphology. Lower molar teeth usually have two roots, however, the presence of an additional or third root is a compelling anatomic variant and this additional root in permanent lower molars can be seen on the lingual aspect, which is called as radix entomolaris or on the buccal surface which is called as radix paramolaris<sup>2)</sup>. Variations in the normal anatomy of roots in the lower molar may be identified by careful radiographic interpretation. The accurate diagnosis of the presence of an additional root is essential to overcome any treatment complications. Interpretation of definitive characteristics like presence of a non clear layout of the distal or mesial root delineation or the root canal

can suggest the presence of an additional root<sup>3)</sup>.

Presence of an extra root in mandibular molars poses a diagnostic and treatment challenge, especially during root canal treatment, periodontal therapy and during extraction procedures. It may lead to failure of endodontic therapy if not recognized before or during treatment procedure. In addition, complications may be seen while biomechanical preparation of a severely curved root canal in the additional root. On the other hand, the additional root may serve as a local factor contributing to the progression of periodontal pathologies. During the extraction of a tooth an additional root can be easily fractured because of its apical gracility and curvature<sup>4,5)</sup>.

Given that the frequency of an additional root in the mandibular molar teeth in the Indian population has not yet been evaluated in detail, a study on the prevalence of the presence of additional root in mandibular molars in this population helps dental practitioners improve treatment outcomes in these patients.

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**Table 1: Prevalence of three-rooted mandibular first molars in accordance to gender**

Gender	n	Right		Left		Bilateral		Total	
		n	%	n	%	n	%	n	%
Female	416	16	3.8	2	0.4	5	1.2	23	5.5
Male	525	10	1.9	2	0.3	5	0.9	17	3.2
P value		0.366		0.544		0.572		0.036*	

\* Significant  $p < 0.05$ .

**Table 2: Prevalence of three-rooted mandibular second molars in accordance to gender**

Gender	n	Right		Left		Bilateral		Total	
		n	%	n	%	n	%	n	%
Female	392	8	2	1	0.2	1	0.2	10	2.5
Male	441	10	2.2	3	0.6	1	0.2	14	3.1
P value		0.674		0.243		0.394		0.512	

**Table 3: Prevalence of three-rooted mandibular first and second molars in accordance to side**

Teeth examined	n	Right		Left		P value
		n	%	n	%	
All first molars	941	26	2.7	4	0.4	0.012*
All second molars	833	18	2.1	4	0.4	0.014*

\* Significant  $p < 0.05$ .

## MATERIALS AND METHODS

The present study design was reviewed and ethical clearance obtained from the institutional review board. The intraoral periapical radiographs of bilateral permanent mandibular first and second molars obtained for specific diagnostic or treatment requirements were interpreted in the present study.

The radiographs were obtained using the standardized paralleling cone technique with the aid of a position indicator device to reduce error and to obtain images of desired quality. Two calibrated investigators examined the radiographs. Inter-examiner calibration was performed before the interpretation to ensure reliability of the data by choosing 50 radiographs and asking each examiner to read their data individually and compare the results.

The inclusion criterion was availability of periapical radiographs confirming the presence of at least one permanent mandibular first or second molar; and complete apex formation. The patients whose radiographs were not clear or did not reveal the complete tooth were not interpreted. The criteria for the presence of an extra root were based on the crossing of radiolucent lines that defined the pulp space and the periodontal ligaments in the permanent mandibular first and molar teeth.

## STATISTICAL ANALYSIS

Data analysis was carried out using SPSS version 21.0 (IBM Corp., New York, NY, USA). The categorical variables obtained were represented as percentages. Fisher's exact test and Chi square test were applied for categorical variables. A  $p$  value of  $< 0.05$  was considered as statistically significant.

## RESULTS

In the present study, radiographs of 511 patients (299 male, 212 female) were screened. In total, 941 mandibular first molars and 833 mandibular second molars were interpreted.

In the present study, third root was seen in 40 (4.2%) mandibular first molars and 24 (2.8%) mandibular second molars out of 941 and

833 teeth examined respectively.

A total of 23 (5.5%) mandibular first molars with three roots were seen in females where as 17 (3.2%) three rooted mandibular first molars were seen among males and the difference between two gender was statistically significant ( $p = 0.036$ ) (Table 1).

Similarly, a total of 10 (2.5%) mandibular second molars with three roots were seen in females where as 14 (3.1%) three rooted mandibular second molars were seen among males and the difference between two gender was statistically non significant ( $p = 0.512$ ) (Table 2).

Upon sidewise comparison, 26 (2.7%) of three rooted mandibular first molars were seen on right side whereas 4 (0.4%) of three rooted mandibular first molars were seen on left side and the difference between right and left side was statistically significant ( $p = 0.012$ ). Eighteen (2.1%) of three rooted mandibular second molars were seen on right side whereas 4 (0.4%) of three rooted mandibular second molars were seen on left side and the difference between right and left side was statistically significant ( $p = 0.014$ ) (Table 3).

## DISCUSSION

Presence of an additional root in the lower molar may be identified by interpreting radiographs carefully along with precise evaluation of the cervical morphology of roots by periodontal probing, presence of an additional cusp or more prominent distolingual lobe along with a cervical prominence<sup>6</sup>.

The extra root in the lower first molar is known to be located in the same bucco-lingual plane as of the other two roots, and due to overlapping the additional root cannot be recognized in routine intraoral periapical radiographs. Usually, a second radiograph is required with different horizontal angulation (tube shift technique) to locate the additional root<sup>6</sup>.

Apart from conventional intraoral radiographs, advanced imaging modalities like cone beam computed tomography (CBCT) and spiral computed tomography (SCT) have been used to identify the presence of and additional root among molars<sup>7-10</sup>.

In the present study, third root was seen in 4.2% of mandibular first molars, which was almost in accordance with the Garg *et al.*, who reported that prevalence of lower first molars with three roots to be 4.55% in their study<sup>11</sup>. In contrast to this Gupta *et al.*, found a higher prevalence (8.3%) of three rooted molars in a North Indian population<sup>12</sup>.

When compared with global population, a higher prevalence (21.4%) of third root in lower first molars in Malaysian subpopulation was reported by Pan *et al.*<sup>13</sup> and 27.06% was reported in a study by Yang *et al.*, in the Chinese population. A lower prevalence of 0.7% was reported in a study by Schafer *et al.*, in the German population<sup>14</sup> and 2.58% in Brazilian population by Rodrigues *et al.*<sup>15</sup>

In this study, an additional root in the mandibular first and second molars was located more often on the right side, this observation was in line with that of Jayasinghe and Li, who noticed that an additional root was observed more commonly on the right side of the mandibular first molars.<sup>16</sup> Where as Loh HS found the prevalence rate of extra root in mandibular first molars was more on the left side<sup>17</sup>.

In the present study the presence of the additional root was

observed more among female patients at the first molar as compared with males, this observation was similar with the findings of Riyahi *et al.*<sup>18)</sup> In contrast to this, other studies in the literature reported that there was no significant difference in the gender distribution<sup>3,14,19)</sup>.

The differences between the observations of the present study and other global studies might be attributed to racial, ethnic and methodological differences.

The present study was carried among an Indian of single centre; future multicenter studies with a larger sample size using advanced imaging modalities like CBCT and SCT may provide a better estimation of the frequency of additional roots in molars among Indian population.

## CONCLUSION

Dental practitioners should know about the fact that though it is rare, an additional root can be seen in lower first and second molar teeth. Thorough interpretation of radiographs obtained at different angulations is required before starting endodontic therapy to enhance the probability of identifying presence of an additional root in molar teeth.

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