



## CBCT Evaluation of Three Rooted Mandibular First and Second Molar in Gujarat State Population

Dr. Maulik G. Darji<sup>1</sup>, Dr. Shraddha Chokshi<sup>2</sup>, Dr. Zarana Sanghvi<sup>3</sup>, Dr. Nishit Patel<sup>4</sup>

<sup>1</sup>Post graduate student, Department of Conservative and Endodontics, Ahmedabad Dental College and Hospital, Ahmedabad,

<sup>2</sup>Professor and Head of the Department, Department of Conservative and Endodontics, Ahmedabad Dental College and Hospital, Ahmedabad,

<sup>3</sup>Professor, Department of Conservative and Endodontics, Ahmedabad Dental College and Hospital, Ahmedabad,

<sup>4</sup>Reader, Department of Conservative and Endodontics, Ahmedabad Dental College and Hospital, Ahmedabad

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**ABSTRACT:** Mandibular molars tend to exhibit anatomic variations regarding number of root canals and roots. The majority of first and second mandibular molars are two rooted with two mesial and one distal canals. A major variant in this group is the mandibular first molar which has three roots. It is essential for a clinician to have a thorough knowledge about the anatomy of the tooth for successful outcome of the endodontic treatment. The aim of the present study is to assess the prevalence of an extra root in lower first and second permanent molars in Gujarat population. 100 CBCT scans of adult patients were assessed with CS 3D software for presence of an extra root in 1<sup>st</sup> and 2<sup>nd</sup> permanent mandibular molars. Unilateral and bilateral presence and correlation between left and right-side occurrence was also assessed. Chi square test was used to analyse the data collected. Prevalence of three rooted teeth were 5.72% in total scanned teeth in which prevalence of three rooted teeth was more i.e., 9.47% in 1<sup>st</sup> molar scanned teeth then 2<sup>nd</sup> molar scanned teeth i.e., 1.84. This difference is statistically significant. In 1<sup>st</sup> molars, 54.55% scans had unilateral occurrence while 45.45% had bilateral occurrence. 2<sup>nd</sup> molars were present unilaterally. Three rooted 1<sup>st</sup> molars were more on right side while 2<sup>nd</sup> molars were more on left side. Presence of an extra root is an Asiatic trait. And overall prevalence in Gujarat population was found to be 5.72% and a thorough pre – operative radiographic examination is essential before initiating endodontic treatment.

**KEYWORDS:** Cone Beam Computed Tomography, Radix Endomolaris, three – rooted mandibular molars, Gujarat population,

### I. INTRODUCTION

The main objective of root canal treatment is proper mechanical and chemical debridement of all root canals and their complete obturation with an inert filling material followed by coronal restoration, preventing the ingress of microorganisms.

For these goals to be fulfilled, it is essential for a clinician to have a thorough knowledge about the anatomy of the tooth.

Mandibular molars tend to exhibit anatomic variations regarding number of root canals and roots. The majority of first and second mandibular molars are two rooted with two mesial and one distal canals. A major variant in this group is the mandibular first molar which has three roots. This has a frequency of less than 5% in white Caucasian (UK, Dutch, Finnish, German), African (Bantu Bushmen), Eurasian and Indian populations. In those with Mongoloid traits, such as the Chinese, Eskimos, and native American populations, it occurs with a frequency of 5 to more than 30%. This third lingual root, first mentioned in the literature by Carabelli, is called the radix entomolaris (RE).<sup>[1]</sup> Radix entomolaris can be found on the first, second, and third mandibular molar, occurring least frequently on the second molar.<sup>[2]</sup>

Conventional and digital radiographic techniques depict three-dimensional objects in two-dimensional images, and thus, they are limited for accurate assessment of the root morphology or for detection of an extra root. Therefore, cone beam computed tomography (CBCT) would be a more reliable technique for identifying the presence of such anatomic variations since it allows the three-dimensional evaluation.<sup>[3]</sup> It generates a 3D image of the tooth from different levels and form a single image. Also, it has high contrast resolution and



eliminates superimposition. One can view image in all the planes i.e., coronal, sagittal, or even an oblique or curved image planes.<sup>[1]</sup>

A very few studies have been conducted in the context of the Indian population and that to region specific i.e., Gujarat population. This retrospective study was done to evaluate the incidence of three-rooted mandibular permanent first and second molars, unilateral and bilateral prevalence and side related differences by using cone beam computed tomography.

The aim of this study is to explore the prevalence of an extra root in the lower first and second permanent molars in the Gujarat population (West India).

## II. MATERIAL AND METHOD

Retrospective CBCT scans of 150 patients were collected in the time duration of November 2021 to February 2022. Of which, 100 scans were assessed for presence of three rooted permanent 1<sup>st</sup> and 2<sup>nd</sup> molars. All CBCT images were acquired using Carestream CBCT machine. The scans which met following inclusion criteria were evaluated; residents of Gujarat state; scans confirming the presence of at least one permanent lower first or second molar; and complete apex formation. The patients whose radiographs were unclear or did not show the entire tooth were excluded.

Total 332 teeth were scanned out of which 169 were 1<sup>st</sup> molars and 163 were 2<sup>nd</sup> molars. Images were examined in an axial section in CS 3D software. Data on the total prevalence, side determination (right or left) and unilateral or bilateral prevalence were recorded.(Fig 1& 2)

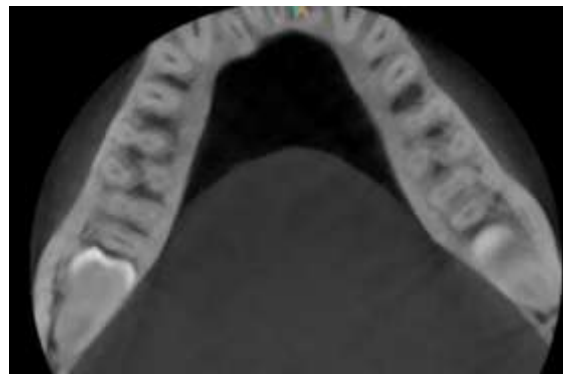


Fig 1. Bilateral prevalence of three rooted molar

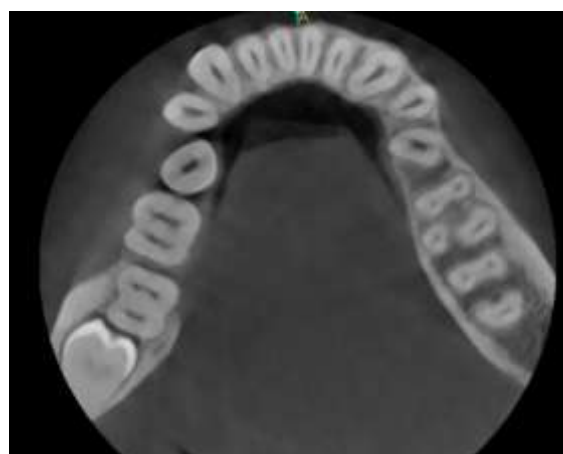


Fig 2. Unilateral prevalence of three rooted molar

Data analysis was carried out using SPSS software. The variables obtained were expressed as percentages. Chi square test was performed and p

value of  $< 0.001$  was considered statistically significant.



### III. RESULTS

1. Out of Total 332 Scanned teeth, almost equal number i.e., 50.90% 1<sup>st</sup> Molar teeth & 49.10% 2<sup>nd</sup> Molar teeth were scanned. Prevalence of Three rooted teeth were 5.72% in total scanned teeth in which prevalence of three rooted teeth was more i.e., 9.47% in 1<sup>st</sup> molar scanned teeth then 2<sup>nd</sup> molar scanned teeth i.e., 1.84. This difference is statistically significant ( $p < 0.001$ ). (TABLE 1)
2. Out of Total 169 1<sup>st</sup> Molar teeth scanned, 85 right side 1<sup>st</sup> Molar & 84 left side 1<sup>st</sup> Molar. Prevalence of Three rooted teeth were 9.47% in 1<sup>st</sup> Molar teeth in which 10.59% in right side

1<sup>st</sup> Molar & 8.33% in left side 1<sup>st</sup> Molar. (TABLE 2)

3. Out of Total 163 2<sup>nd</sup> Molar teeth scanned, 84 right side 2<sup>nd</sup> Molar & 79 left side 2<sup>nd</sup> Molar. Prevalence of Three rooted teeth were 1.84% in 2<sup>nd</sup> Molar teeth in which 1.19% in right side 2<sup>nd</sup> Molar & 2.53% in left side 2<sup>nd</sup> Molar. (TABLE 3)
4. Out of 100 patients' scans, a total 11 Three rooted teeth were seen in 1<sup>st</sup> Molar teeth, with 6 (54.55%) scans showing unilateral occurrence, while 5(45.45%) scans showing bilateral occurrence. In 2<sup>nd</sup> Molar, all 3 scans showed unilateral occurrence.(TABLE 4)

TABLE 1	Scanned teeth		Three rooted teeth	
	No	%	No	%
1 <sup>st</sup> Molar	169	50.90	16	9.47
2 <sup>nd</sup> Molar	163	49.10	3	1.84
Total	332	100.00	19	5.72

TABLE 2	Scanned teeth	Three rooted teeth	
		No	Prevalence %
1 <sup>st</sup> Molar Right side	85	9	10.59
1 <sup>st</sup> Molar Left side	84	7	8.33
1 <sup>st</sup> Molar Total	169	16	9.47

TABLE 3	Scanned teeth	Three rooted teeth	
		No	Prevalence %
2 <sup>nd</sup> Molar Right side	84	1	1.19
2 <sup>nd</sup> Molar Left side	79	2	2.53
2 <sup>nd</sup> Molar Total	163	3	1.84

TABLE 4 Three rooted teeth	Unilateral		Bilateral	
	No.	%	No.	%
1 <sup>st</sup> Molar Teeth	6	54.55	5	45.45
2 <sup>nd</sup> Molar Teeth	3	100.00	0	00.00

### IV. DISCUSSION

Anatomical variations are an acknowledged characteristic of mandibular permanent molars. Although a majority of the mandibular molars are two rooted with a mesial

and distal root, an extra disto-lingual root may occasionally be encountered.<sup>[1]</sup>

It has been suggested that these "three-rooted molar" traits are commonly found in pure Eskimo and Eskimo/Caucasian mixed-race individuals with a similar prevalence rate. While it



may be a normal morphological variant in ethnic groups of mongoloid origin (>30%), it has rather low prevalence (<5%) in other people such as Indian population.<sup>[4,5]</sup>

In current study, the prevalence of three rooted mandibular molars is 5.72 %, while for mandibular 1<sup>st</sup> molars, it is 9.47% which had similar results to that of other studies conducted.

Abella et al. (2012) in their study stated that 14.4% prevalence was found in 1<sup>st</sup> molar having radix entomolaris.<sup>[6, 7]</sup> Garg et al. (2010) and Chandra et al. (2011) in their prevalence study in Indian population found presence of radix entomolaris to be 4.5% and 13.3% respectively.<sup>[8,2]</sup> Also, in a study conducted by Gupta et al. (2017) the occurrence of radix entomolaris was found to be 8.3% in North Indian population.<sup>[6]</sup>

In a study conducted on Saudi population by Riyahi et al. (2019), the prevalence of an extra-root was 3.05% in the first lower molar and 1.48% in the second lower molar.<sup>[3]</sup>

While Song et al. (2010), in their study on Korean population found 24.5% and 0.7% of prevalence in 1<sup>st</sup> molar and 2<sup>nd</sup> molar respectively.<sup>[9]</sup>

In the present study, Prevalence of Three rooted 1<sup>st</sup> Molar teeth was 10.59% in right side & 8.33% in left side.

Prevalence of Three rooted 2<sup>nd</sup> Molar teeth was 1.19% in right side & 2.53% in left side.

However, in studies conducted by Garg et al. and Chandra et al., they concluded that there was no significant difference according to the side occurrence.

In a study by Tu MG et al. (2007) in Taiwanese population to detect the prevalence of three rooted mandibular 1<sup>st</sup> molars, they found that it occurred more frequently on the right side than on the left side.<sup>[10]</sup>

However, in the study by Curzon ME (1973) in English Caucasians and a study by Gulabivala K et al. (2001) in Burmese population they concluded that three-rooted mandibular first molars occurred more frequently on the left side.<sup>[11, 12]</sup>

In the present study, out of 100 patients' scans, a total 11 Three rooted teeth were seen in 1<sup>st</sup> Molar teeth, with 6 (54.55%) scans showing unilateral occurrence, while 5 (45.45%) scans showing bilateral occurrence. In 2<sup>nd</sup> Molar, all 3 scans showed unilateral occurrence.

This result was similar to few other studies conducted on Asiatic populations which had about an average bilateral occurrence of three rooted molars of 56.6%–67%.

Gupta et al. (2017) in their study found bilateral occurrence to be 37.7%. However, in a study conducted by Schafer E. et al. (2009), German population had no bilateral occurrence of three rooted molars.<sup>[13]</sup>

These contradictory variations might be explained by marked differences in the sample size, case selection, and the methods used. The formation of an extra root could be related to extrinsic factors during tooth formation or due to inclusion of atavistic gene in genetic makeup of an individual. Also, it demonstrates higher levels of genetic predominance. And, the prevalence of three rooted molars shows wide range of demographic variations amongst population of different regions. An affirmative relation exists between geography of certain population and occurrence of radix entomolaris.<sup>[14,15]</sup>

## V. CONCLUSION

Presence of an extra root is an Asiatic trait. As almost 5.72% of occurrence of three rooted molars is prevalent in Gujarat population, the clinician must be aware regarding this variation in root morphology and should assess the radiographs thoroughly before commencing the endodontic treatment to achieve successful clinical outcomes.

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