

Anatomical Variabilities In The Number Of Roots In Permanent Mandibular First Molar In Kashmiri (North Indian) Population.

¹Dr. Hafsah Hafiz , ²Dr. Sakshi Sharma

¹Mds Conservative dentistry and endodontics private practitioner India. (Corresponding author)

²Mds conservative dentistry and endodontics private practitioner India.

Abstract:

Objective: Anatomical racial variations are an acknowledged characteristic in permanent molars. Generally, mandibular first molars have 2 roots; however, the presence of a third root, radix entomolaris /paramolaris, or even single root, are anatomic variants among many population groups. This study evaluated the prevalence of single rooted, two rooted and three rooted permanent mandibular first molars in a Kashmiri population.

Study design: Three hundred twenty patients of Kashmiri origin possessing bilateral mandibular first molars were selected. The radiographs of these patients were evaluated under optimal conditions. A total of six hundred forty mandibular first molars were screened and the incidence of one, two or 3-rooted mandibular first molars, the left and right-side occurrence and any gender propensity was recorded.

Results: After interpretation of radiographs of 320 patients (170 males and 150 females), 43 patients (20 males and 23 females) had radix entomolaris. The prevalence of this three rooted configuration in males and females was 11.7% (20/170) and 15.34% (23/150) respectively. while as single rooted configuration was found in only one female patient and none male patient, making an overall prevalence of single rooted mandibular first molar of 0.3%.

Conclusion: The prevalence of this three rooted configuration in males and females was 11.7% (20/170) and 15.34% (23/150) respectively. while as single rooted configuration was found in only one female patient and none male patient, making an overall prevalence of single rooted mandibular first molar of 0.3%.

Keywords: mandibular first molar, radiograph, anatomy.

Introduction

The prime objective of endodontic treatment is thorough cleaning and shaping of the root canal system followed by 3-dimensional obturation. One of the frequent causes of failure of nonsurgical endodontic treatment is the inability to identify and negotiate additional roots/canals. The mandibular first molar, as the earliest permanent posterior tooth to erupt, is considered to be the most frequently involved tooth in endodontic procedures. It displays considerable anatomic variation and abnormalities regarding the number of roots and root canals.¹ Clinicians/endodontists should possess sound knowledge of aberrant morphology and must meticulously perform a preoperative radiographic examination before initiation of endodontic therapy. Mandibular first molars typically have two roots placed mesiodistally, but they sometimes have an additional distolingual (DL) root a radix entomolaris (RE), usually on the distolingual aspect.^{2,3} An RE can be found in the first, second and third mandibular molars, occurring least frequently in the second molar⁴. This extra root is typically smaller than the distobuccal root and is usually curved, requiring special attention when root canal treatment is being considered for such a tooth. De Moor et al. (2004) classified the RE into three types according to the

buccolingual variations². Type I refers to a straight root, Type II to an initially curved entrance that continues as a straight root, and Type III to an initial curve in the coronal third of the root canal, followed by a second curve beginning in the middle and continuing to the apical third. Recently, Song et al. (2010) classified the RE into 5 types according to their morphological characteristics⁴. Two additional types are Type IV (small type), where root length less than half that of the distobuccal root, and Type V (conical type), which is a cone-shaped extension with no root canal. There are many studies in literature discussing the various variations of the mandibular first molars. These are not limited to the number of roots and root canals but also take into consideration the form and configuration of the root canals; studies of mandibular first molars with multiple canals, middle mesial canal, mid distal canal, radix entomolaris, paramolaris, and C-shaped canals have been reported.^{5,6} However, along with the knowledge on multiple canals, it is crucial to be aware of the possibility of lesser number of roots and canals. Root fusion is one of the major reasons for a decrease in the number of roots and root canals. Root fusion is mainly formed by the combining of roots because of cementum deposition with time or when there is a failure of the Hertwig epithelial root sheath to develop

or fuse in the furcation area. Different types of fusions have already been established for maxillary molars, but such is not recognized for mandibular molars. According to Hou et al., the prevalence of root fusion in mandibular second molars was found to be more than that in the mandibular first molars. Furthermore, in a similar study, he gave a classification of root fusion for mandibular molars as well⁷. Gopikrishna et al. have reported a case of a maxillary first molar with a single root and a single root canal⁸. Then, Krithikadatta et al. have reported a case of mandibular first molar with two roots and two root canals⁹. From a clinical standpoint, when an unusual anatomic form is encountered, multiple angled radiographs and careful inspection of the tooth under dental operating microscope will reveal more details of the anatomy of the root canal system.

Study design: This study was conducted in the Department of Conservative Dentistry and Endodontics, Government Dental College, Srinagar. Three hundred twenty patients of Kashmiri origin possessing bilateral mandibular first molars were selected. Among them one hundred seventy were males and one hundred fifty were females who were scheduled for their endodontic treatment. A total of six hundred forty mandibular first molars were screened. Two periapical radiographs were taken from different horizontal angles for each tooth as given in figures 1, 2 and 3. The radiographs were evaluated by three endodontists for the prevalence of variability in number of roots and the inclination of any anomaly to a specific gender was also noted. 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.

Figure 1: Radiographs showing mandibular molars with two rooted configuration.

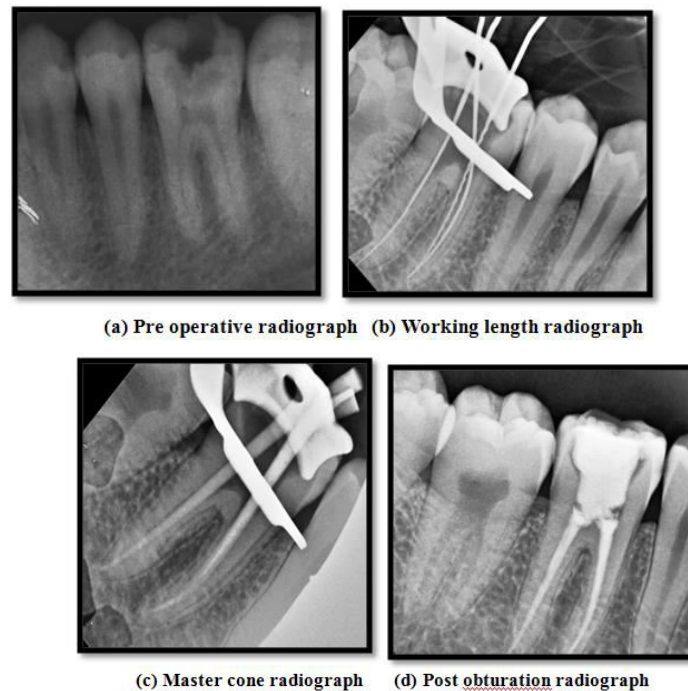
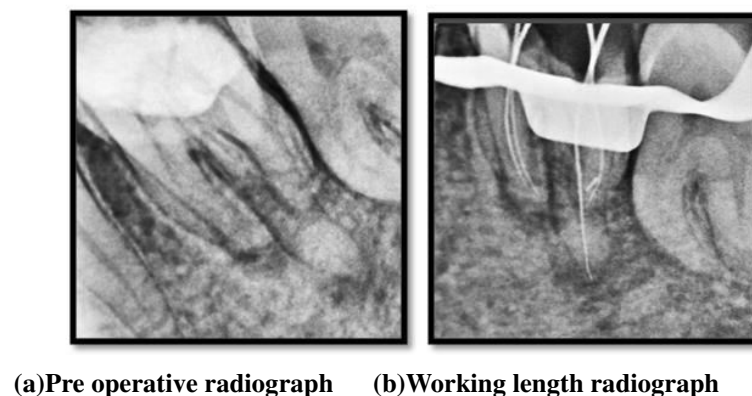
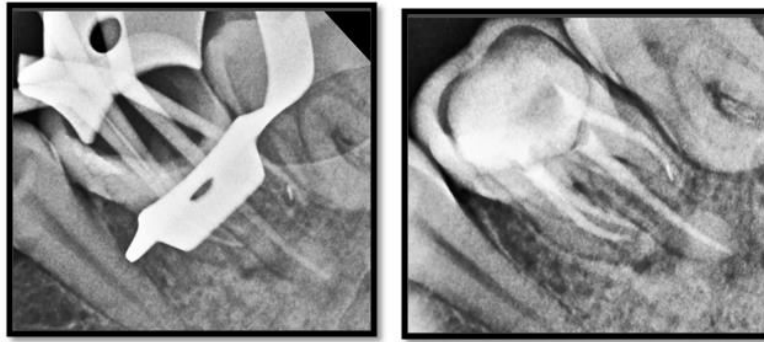


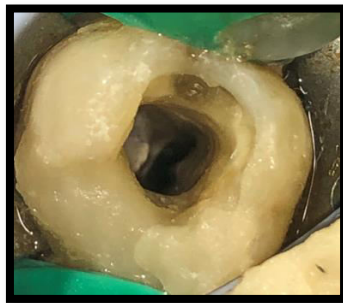
Figure 2: Radiographs of mandibular first molar showing three rooted configuration.



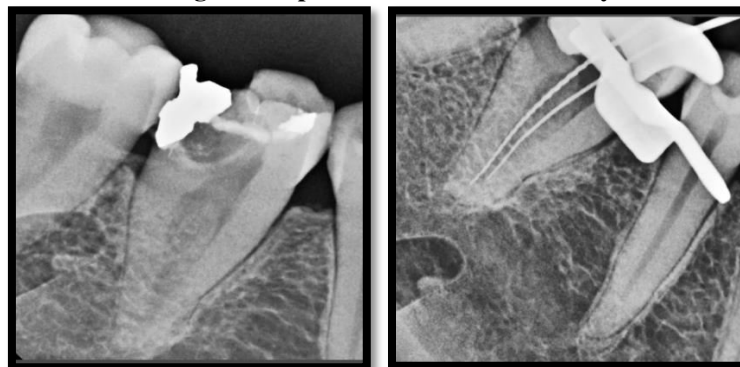


(c) Master cone radiograph (d) post obturation radiograph

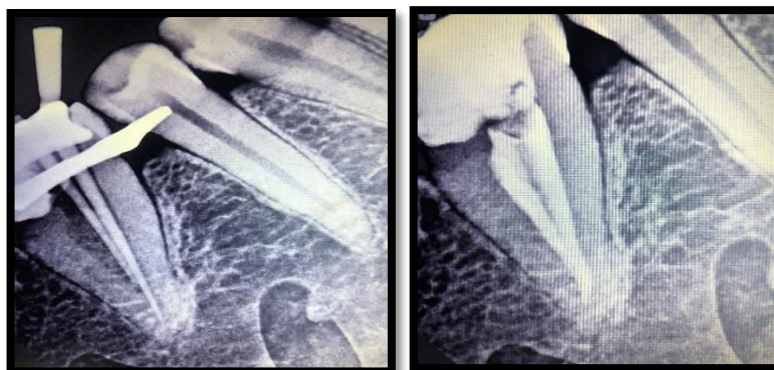
Figure 3: Showing radiographs of mandibular first molar with single rooted configuration.



Single C shaped orifice located centrally



(a) Pre operative radiograph (b) Working length radiograph



(c) Master cone radiograph (d) Post obturation radiograph

Results

Table 1: Gender-wise distribution of subjects.

Gender	Number of subjects
Males	170
Females	150
Total	320

After interpretation of radiographs of 320 patients (170 males and 150 females), 43 patients (20 males and 23 females) had radix entomolaris. The prevalence of this three rooted configuration in males and females was 11.7% (20/170) and 15.34% (23/150) respectively. while as single rooted configuration was found in only one female patient and none male patient, making an overall prevalence of single rooted mandibular first molar of 0.3%.

Discussion

Successful outcome of endodontic treatment largely depends on proper cleaning and shaping of the entire root canal system. Thorough understanding of the root canal morphology and configuration is mandatory.¹⁰ Mandibular first molars are amongst the most commonly teeth requiring endodontic treatment due to their early emergence in the oral cavity and subsequent caries.¹¹ Like any other tooth, a clear and thorough knowledge of the root canal morphology and anatomy of mandibular first molars, will help the clinician with conducting a proper and standard treatment through enabling to foresee possible variations that potentially challenge the treatment outcome.¹²⁻¹⁵ Mandibular first molars commonly have two roots and three root canals. However, due to genetic, ethnic and gender varieties, a wide range of anatomic and morphological variations can be encountered.¹⁶ In this study, after interpretation of radiographs of 320 patients (170 males and 150 females), 43 patients (20 males and 23 females) had radix entomolaris. The prevalence of this three rooted configuration in males and females was 11.7% (20/170) and 15.34% (23/150) respectively. while as single rooted configuration was found in only one female patient and none male patient, making an overall prevalence of single rooted mandibular first molar of 0.3%. Ahmed et al.¹⁷ stated that 59% of the mandibular first molars in Sudanese population had four canals with 3% having a third distolingual root. Also the most common canal configurations were Vertucci's type IV (73%) and type II (14%) and the prevalence of isthmii was reported to be 65%. Al-Qudah and Awawdeh¹⁸ conducted a similar study on Jordanian population and reported the majority of mandibular first molars to have three (48%) or four (46%) canals, whilst 4% had a third distolingual root. The most common configuration in the mesial root was type IV (53%) and in distal root was type I (54%). Schäfer et al.¹⁹ stated that the overall incidence of three-rooted mandibular first molars in a selected German population was rare (1.35%). Moreover, all three-rooted molars occurred unilaterally (0.80% in

left and 0.57% in right side). Zhang et al.²⁰ reported the majority of mandibular first molars (70%) had two separate roots and three roots were identified in 29% of first molars. Three canals were found in 56% of teeth and most distal roots had a simple type I configuration.

Conclusion

The prevalence of this three rooted configuration in males and females was 11.7% (20/170) and 15.34% (23/150) respectively. while as single rooted configuration was found in only one female patient and none male patient, making an overall prevalence of single rooted mandibular first molar of 0.3%.

References

1. Vertucci JF, Haddix EJ, Britto RL. Tooth morphology and access cavity preparation. In: Cohen S, Hargreaves MK, editors. *Pathways of the pulp*. 9th ed. St. Louis (MO): Mosby; 2006. p. 149-232.
2. R. J. G. De Moor, C. A. J. G. Deroose, and F. L. G. Calberson, "The radix entomolaris in mandibular first molars: an endodontic challenge," *International Endodontic Journal*, vol. 37, no. 11, pp. 789–799, 2004.
3. F. L. Calberson, R. J. De Moor, and C. A. Deroose, "The radix entomolaris and paramolaris: clinical approach in endodontics," *Journal of Endodontics*, vol. 33, no. 1, pp. 58–63, 2007.
4. J. S. Song, H.-J. Choi, I.-Y. Jung, H.-S. Jung, and S.-O. Kim, "The prevalence and morphologic classification of distolingual roots in the mandibular molars in a Korean population," *Journal of Endodontics*, vol. 36, no. 4, pp. 653–657, 2010.
5. R. G. Beatty and C. M. Interian, "A mandibular first molar with five canals: report of case," *The Journal of the American Dental Association*, vol. 111, no. 5, pp. 769–771, 1985.
6. W. L. Bolger and W. G. Schindler, "A mandibular first molar with a C-shaped root configuration," *Journal of Endodontics*, vol. 14, no. 10, pp. 515–519, 1988.
7. G.-L. Hou and C.-C. Tsai, "The morphology of root fusion in Chinese adults (I). Grades, types, location and distribution," *Journal of Clinical Periodontology*, vol. 21, no. 4, pp. 260–264, 1994.
8. V. Gopikrishna, N. Bhargavi, and D. Kandaswamy, "Endodontic management of a maxillary first molar with a single root and a single canal diagnosed with the aid of spiral CT:

- a case report,” *Journal of Endodontics*, vol. 32, no. 7, pp. 687–691, 2006.
9. J. Krithikadatta, J. Kottoor, C. S. Karumaran, and G. Rajan, “Mandibular first molar having an unusual mesial root canal morphology with contradictory cone-beam computed tomography findings: a case report,” *Journal of Endodontics*, vol. 36, no. 10, pp. 1712–1716, 2010.
 10. Vertucci FJ. Root canal morphology and its relationship to endodontic procedures. *Endodontic Topics*. 2005;10(1):3–29.
 11. Razmi H, Shokouhinejad N, Hooshyar M. An In Vitro Study of the Number of Distal Roots and Canals in mandibular First Molars in Iranian Population. *Iran Endod J*. 2008;2(4):126–30.
 12. Nixdorf DR, Moana-Filho EJ, Law AS, McGuire LA, Hodges JS, John MT. Frequency of persistent tooth pain after root canal therapy: a systematic review and meta-analysis. *J Endod*. 2010;36(2):224–30.
 13. de Pablo ÓV, Estevez R, Péix Sánchez M, Heilborn C, Cohenca N. Root Anatomy and Canal Configuration of the Permanent Mandibular First Molar: A Systematic Review. *J Endod*. 36(12):1919–31.
 14. Song JS, Choi H-J, Jung I-Y, Jung H-S, Kim S-O. The Prevalence and Morphologic Classification of Distolingual Roots in the Mandibular Molars in a Korean Population. *J Endod*. 36(4):653–7.
 15. Chandra SS, Chandra S, Shankar P, Indira R. Prevalence of radix entomolaris in mandibular permanent first molars: a study in a South Indian population. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 112(3):e77–e82.
 16. Skidmore AE, Bjorndal AM. Root canal morphology of the human mandibular first molar. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 1971;32(5):778–84.
 17. Ahmed HA, Abu-bakr NH, Yahia NA, Ibrahim YE. Root and canal morphology of permanent mandibular molars in a Sudanese population. *Int Endod J*. 2007;40(10):766–71
 18. Al-Qudah AA, Awawdeh LA. Root and canal morphology of mandibular first and second molar teeth in a Jordanian population. *Int Endod J*. 2009;42(9):775–84.
 19. Schafer E, Breuer D, Janzen S. The prevalence of three-rooted mandibular permanent first molars in a German population. *J Endod*. 2009;35(2):202–5.
 20. Zhang R, Wang H, Tian YY, Yu X, Hu T, Dummer PM. Use of cone-beam computed tomography to evaluate root and canal morphology of mandibular molars in Chinese individuals. *Int Endod J*. 2011;44(11):990–9.