

Position of Mental Foramen: A Radiographic Study in a Population of Bhopal

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ABSTRACT

Background: The mental foramen is generally located in the apical region of the mandibular premolars. Variations in its position can be a cause of complications during local anaesthesia or surgical procedures as well as in the diagnosis of periapical lesions.

Materials and Methods: The study was carried out in the Department of Oral Medicine and Radiology. 600 panoramic radiographs were selected for evaluation of the position of the mental foramen. The criteria given by Wei Cheong Ngeow and Yusof Yuzawati was used for the same. Statistical Analysis: Data subjected to Pearson Chi-Square Analysis and Statistical analysis carried out using the SPSS release 22 packages.

Results: 74.4% of the radiographs showed that mental foramen was located below the second premolar, followed by 19.3% of the images showing the location between two premolars. The foramen were symmetrical in 81.7% of the population.

Conclusion: The most common position of the mental foramen in this study population was below the second premolar, followed by between two premolars in both sexes.

Keywords: Mental foramen, Panoramic Radiography, Premolar.

INTRODUCTION

The accurate identification of the mental foramen is important for both diagnostic and clinical procedures. Lack of knowledge regarding the correct position of mental foramen leads to repeated failure during injections and operative procedures.^[1] The radiographic appearance of the mental foramen may result in the misdiagnosis of a radiolucent lesion in the apical area of the mandibular premolar teeth. Various events affecting these teeth, such as odontogenic infection and orthodontic, endodontic, periodontal, or surgical misadventure, may result in neurosensory disturbance of the mental nerve.^[2] There are no absolute anatomical landmarks for reference, and

the foramen cannot be clinically visualized or palpated.^[3]

An orthopantomogram (OPG) allows a more or less accurate location of the mental foramen in both the horizontal and vertical dimensions. The reported anatomical position of the mental foramen has been variable, with the most common location being below the apex of the second premolar or between the apices of first and second premolars. ^[1] The position of the mental foramen varies among races and genders. There have been variations in the mental foramen ranging from differences in the shape and position to presence of accessory foramen or even complete absence.^[4]

Received: Jan. 11, 2020; Accepted: Mar. 24, 2020

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MATERIAL & METHOD

The present research study was conducted in the department of Oral Medicine and Radiology, People's College of Dental Science and Research Centre Bhopal, Madhya Pradesh. It was designed for the visibility of mental foramen and its position on digital panoramic radiographs.

Source of data-The study subjects constituted the radiographs from the archives of the computer that was attached to the Kodak 8000C OPG. The surnames of the individuals were verified for their ethnicity from Madhya Pradesh.

Method of collection of data: The study sample comprised of radiographs of 600 subjects, selected randomly.

The sample size was categorized into 3 groups on the basis of age: 25-35 years belonged to Group 1 and 36 -55 years belonged to Group 2 and 56-75 years belonged to Group 3 and gender as males and females.

Study groups	Age group	Males	Females
Group 1	25-35	179	184
Group 2	36-55	99	99
Group 3	56-75	19	20

INCLUSION CRITERIA

- Images of good quality.
- The age of the patient must be within 25 to 75 years.
- Patients are indigenous to Madhya Pradesh.

EXCLUSION CRITERIA

- Poor quality radiograph.
- Pathology of premolars and first molar.
- Edentulous patients.
- Fracture of the mandible.

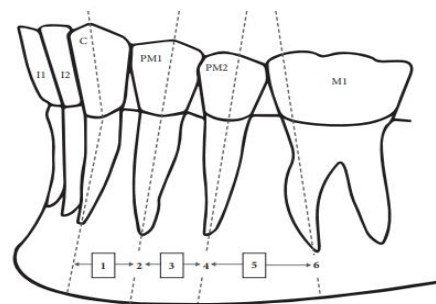
The images were evaluated under standard viewing conditions.

APPARATUS AND MATERIAL:

1. Panoramic machine (KODAK 8000C Digital Panoramic and Cephalometric system).
2. Computer system with inbuilt software for annotations.

METHODOLOGY:

The positions of the mental foramen were recorded in the horizontal dimension of a tooth using a software tool.



Schematic representation of the position of the mental foramen in the horizontal plane(I1, central incisor; I2, lateral incisor; C, canine; PM1, first premolar; PM2, second premolar; M1, first molar). Position (1) between the C and PM1, (2) in line with the long axis of the PM1, (3) between the long axes of the PM1 and PM2, (4) in line with the long axis of the PM2, (5) between the long axes of the PM2 and M1 and, (6) in line with the long axis of the mesial root of the first lower molar.

INTER-OBSERVER VARIABILITY

Two observers independently recorded the observations, 1 week apart. Kappa statistics was established, and it was in a substantial agreement (0.61).

STATISTICAL METHODS

The data collected were subjected to statistical analysis using the Chi-Square test.

RESULTS

a. Position of mental foramen

The present study shows that, in the horizontal dimension, the mental foramen was located in different positions ranging from the long axis of mandibular first premolar to the long axis of the mesial root of the first molar. 200 (33.3%) were in position 4, 107(17.9%) were in position 3, 79

(13.2%) were in position 5, 16 (2.6%) were in position 6, 11 (1.8%) radiographs showed that MF were in position 2, and none were in position 1.

b. Position of right and left mental foramen according to age group

The most common position in all 3 age Groups was position 4. There was statistically no significant

difference was found between the right (**P= 0.94**) and left (**P=0.50**) mental foramen according to age group.

c. Position of mental foramen according to gender

The most common position in both genders was position 4. (p=0.01)

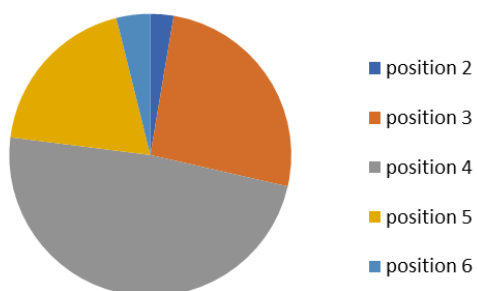
Table 1: Position right and left side of mental foramen according to age groups.

Position of mental foramen	25-35		36-55		56-75		Total	
	Right (%)	Left (%)	Right (%)	Left (%)	Right (%)	Left (%)	Right (%)	Left (%)
2	5 (1.4)	3 (0.8)	1 (0.5)	1 (0.5)	0 (0)	1 (2.6)	6 (1.0)	5 (0.8)
3	30 (8.3)	41 (11.3)	14 (7.1)	17 (8.6)	2 (5.1)	3 (7.7)	46 (7.7)	61 (10.2)
4	92 (25.3)	118 (32.5)	49 (24.7)	71 (35.9)	9 (23.1)	11 (28.2)	150 (25)	200 (33.3)
5	19 (5.2)	34 (9.4)	13 (6.6)	9 (4.5)	1 (2.6)	3 (7.7)	33 (5.5)	46 (7.7)
6	3 (0.8)	7 (1.9)	2 (1.0)	4 (2.0)	0 (0.0)	0 (0)	5 (0.8)	11 (1.8)
7	214 (59)	160 (44.1)	119 (60.1)	96 (48.5)	27 (69.2)	21 (53.8)	360 (60)	277 (46.2)
Total	363	363	198	198	39	39	600	600

Table 2: Position of right and left side of mental foramen according to gender.

Position of mental foramen	Male		Female		Total	
	Right (%)	Left (%)	Right (%)	Left (%)	Right (%)	Left (%)
2	3 (1.0)	4 (1.3)	3 (1.0)	1 (0.3)	6 (1.0)	5 (0.8)
3	21 (7.1)	25 (8.4)	25 (8.3)	36 (11.9)	46 (7.7)	61 (10.2)
4	76 (25.6)	95 (32.0)	74 (24.4)	105 (34.7)	150 (25)	200 (33.3)
5	14 (4.7)	26 (8.8)	19 (6.3)	20 (6.6)	33 (5.5)	46 (7.7)
6	1 (0.3)	4 (1.3)	4 (1.3)	7 (2.3)	5 (0.8)	11 (1.8)
7	182 (61.3)	143 (48.1)	178 (58.7)	134 (44.2)	360 (60)	277 (46.2)
Total	297	297	303	303	600	600

Position of Mental Foramen



Graph 1: Distribution of Position of Mental Foramen

DISCUSSION

The most common position of mental foramen in the horizontal dimension in the present study was in line with the long axis of 2nd premolar, i.e. position 4.^[5] This in agreement with many other studies conducted by different researchers. [6,7,8,9,10,11] This was in contrast with other researchers who found the most common position of mental foramen in between the first and second premolars i.e. position 3. [12,13,14] It is prudent to note that GerghitaOR et al. [15] in their comparative anthropometric study on three populations found that the most common location of mental foramen

for Indian population was between the first and second premolars which was in contrast to the present study.

There was no correlation between age and position of mental foramen in this study. This was in agreement with **Zmyslowska-Polakowska E.** [16] In contrast, **Ajmal M et al.** [17] found an apparent variation in the position of mental foramen with regard to age. In a study conducted by **Gershenson** in 1986, he found that in children before tooth eruption, the mental foramen is somewhat closer to the alveolar margin; during the eruption period, the mental foramen descends to halfway between the margins and in adults with the teeth preserved, the mental foramen is somewhat closer to the inferior border. With the loss of teeth and bone resorption, the mental foramen moves upward closer to the alveolar border.[18]

Proposed factors affecting the location of mental foramen could be race and ethnicity, muscle forces, dietary habits, size of the teeth and environmental, social-economic factors [19] and bone remodelling. [20]

CONCLUSION

The following conclusions can be drawn from the present study:

1. Mental foramen can be located anywhere from the long axis of mandibular first premolar to the long axis of the mesial root of a mandibular molar tooth.
2. The most common position for mental foramen in this study is along the long axis of a second mandibular premolar.
3. The mental foramen is visible more on the left side as compared to the right side.
4. No correlation was found between age and position of the mental foramen.

The present study can be used as a reference point for the visualization of the mental foramen in a group of the population from Bhopal. Multicentric studies in Central India would throw more light on strengthening or contradicting these results. The localization of these structures is crucial to prevent

post-procedural damage to the structures passing through them.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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