

Section **Dentistry**

Original Article

The Symmetry and Position of Mental Foramen in Population of Jaipur City Using Digital Panoramic Radiograph

Rakesh Garg¹, Aaditya Harsh^{2*}

¹Associate Professor, Department of Periodontics, Mahatma Gandhi Dental College, Jaipur, Rajasthan, India.

²Resident, Department of Oral & Maxillofacial Surgery, Mahatma Gandhi Dental College, Jaipur, Rajasthan, India.

ABSTRACT

Background: The mental foramen may be round or oval in shape, it may be absent, unilateral, bilateral and in some cases may be multiple on one or both sides of the mandible. It is also often reported to open with a posterosuperior orientation. Thus it is important to have knowledge of the probable location the mental foramen on the basis of age gender and symmetry of the mental triangle.

Methods: The present study was conducted in Department of oral & maxillofacial surgery in Mahatma Gandhi Dental College And Hospital, Jaipur, Rajasthan. The study comprised of 400 digital panoramic radiographs of age group ranging from 18-60 years of both sex (200 male and 200 female), from the database of oral medicine and radiology department, which satisfied inclusion criteria.

Results: The present study showed that the maximal percentage of mental foramen as oval shaped seen in right side (87.5% & 98.0% in male and female respectively) and in left side (75.0% & 96.0% in male and female respectively). The maximum number of mental foramen was seen between first and second premolar (109 in right side & 110 in left side), followed by 79 in right side & 72 in left side mental foramen situated in line with second premolar in male

and in female, the maximum number of mental foramen was seen between first and second premolar 96 in right side & 108 in left side, followed by 92 in right side & 79 in left side mental foramen situated in line with second premolar in panoramic view in radiograph. **Conclusions:** An accurate assessment of position of mental foramen is very useful for the prevention of postsurgical neurovascular complications and also holds the potential of contributing as an aid for forensic identification. Multicenter studies within different populations would help in establishing its role in forensic odontology.

Key words: Mental Foramen, Symmetry, Location, Shape & Size.

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Corresponding Author

Dr. Aaditya Harsh, Resident, Department of Oral & Maxillofacial Surgery, Mahatma Gandhi Dental College, Jaipur, Rajasthan, India.

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INTRODUCTION

The mental foramen (MF) is a funnel-like opening in the lateral surface of the mandible at the terminus of the mental canal. The mental foramen has been reported to vary in position in different ethnic groups.^[1] The mental foramen may be round or oval in shape, it may be absent, unilateral,

bilateral and in some cases may be multiple on one or both sides of the mandible. It is also often reported to open with a postero-superior orientation. In most cases, however, there is one mental foramen in each side of the mandible, but the number differs in different races and generally varies from one to three. In 82% of the cases the shape of mental foramen is oval and in the rest it has a rounded form, its diameter is 3-7mm. Also in most cases of normal adult mandibles with teeth, the mental foramen is located halfway between the lower margins of the mandible and alveolar crest in a vertical

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line with the supraorbital notch; in 50% of cases it is located at the edge of the second premolar root; in 20-25% it is between the first and second premolar, and in 24%, it is behind the second premolar.^[2]

These altered sensations are preventable if the mental foramen is located and this knowledge is employed when performing surgical procedures in the foramen area. Based on its radiographic appearance, the mental foramen has been classified into four types:

Type 1: mental canal is continuous with the mandibular canal.

Type 2: foramen is distinctly separated from the mandibular canal.

Type 3: diffuse with a distinct border of the foramen.

Type 4: unidentified type, in which the mental foramen cannot be identified on panoramic radiographs under ordinary exposure and viewing conditions.^[3]

Panoramic radiography generates a two-dimensional (2D) image that lacks information in the bucco-lingual direction and magnification in both the vertical and horizontal directions. Computed tomography (CT) provides more precise visualization of the anatomical structures in the oral region.^[4] However, panoramic radiographs are more economical and easier to perform and interpret. The image quality of panoramic radiography can be increased using digital panoramic radiography. Visualization of the mental foramina can be further enhanced by evaluating digital panoramic radiographs with software programs.^[5] Mental foramen's anatomical position is of significant importance in giving anesthesia, treatments of fractures related to parasymphysis area, osteotomies required for orthognathic and implant placement, giving complete denture in mandible etc. There can be neurosensory disturbances encountered if this important landmark is ignored while doing any invasive treatment in this region. Thus, it is important to have knowledge of the probable location the mental foramen on the basis of age gender and symmetry of the mental triangle.^[6]

METHODS

The present study was conducted in Department of oral & maxillofacial surgery in Mahatma Gandhi Dental College and Hospital, Jaipur, Rajasthan.

The study comprised of 400 digital panoramic radiographs of age group ranging from 18-60 years of both sex (200 male and 200 female), from the database of oral medicine and radiology department, which satisfied inclusion criteria.

RESULTS

The present study showed that the maximal percentage of mental foramen as oval shaped seen in right side (87.5% & 98.0% in male and female respectively) and in left side (75.0% & 96.0% in male and female respectively). Round shape of mental foramen seen maximum in male (20% & 10% in left & right side respectively) as compare to female (2.5% & 2% in left & right side respectively) (Table 1).

The maximum percentage of participants was (35.25%) seen in 40-50 years of age, followed by 28.75% in 29-39 years (Table 2). The maximum number of mental foramen was seen between first and second premolar (109 in right side & 110 in left side), followed by 79 in right side & 72 in left side mental foramen situated in line with second premolar in male and In female, the maximum number of mental foramen was seen between first and second premolar 96 in right side & 108 in left side, followed by 92 in right side & 79 in left side mental foramen situated in line with second premolar in panoramic view in radiograph (Table 3).

Table 1: Shows the variation of shape of mental foramen according to gender

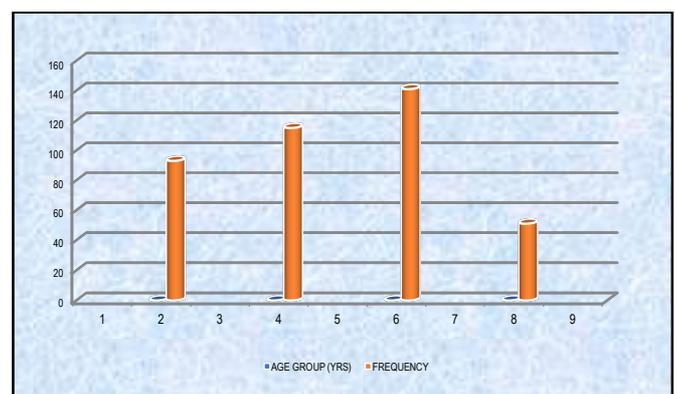
Shape	Male		Female	
	Left (%)	Right (%)	Left (%)	Right (%)
Round	40(20%)	20(10%)	5(2.5%)	4(2%)
Oval	150(75%)	175(87.5%)	192(96%)	196(98%)
Other	10(5%)	5(2.5%)	3(1.5%)	0
Total	200 (100%)	200 (100%)	200 (100%)	200 (100%)

Table 2: Distribution of participants according to age group

Age Group (Yrs)	Frequency	Percentage
Group 1(18-28)	93	23.25%
Group 2(29-39)	115	28.75%
Group 3(40-50)	141	35.25%
Group 4(51-60)	51	12.75%
Total	400	100%

Table 3: Distribution of location of mental foramen on right and left side by gender

Location	Male frequency (%)		Female frequency (%)	
	Right	Left	Right	Left
1	0	0	0	0
2	3	4	2	4
3	109	110	96	108
4	79	72	92	79
5	9	13	10	9
6	0	0	0	0
Total	130	140	70	60



Graph 1: Distribution of participants according to age group

DISCUSSION

Mental foramen is a key factor in many of the surgical as well as clinical procedures in routine clinical practice.^[7] Knowing the site of the mental foramen allows for accurate delivery of local anesthesia of terminal incisive branches of the inferior alveolar nerve. The mental bundle can be traumatized during surgical procedures, such as periapical surgery, extraction of impacted teeth, enucleation of cyst or tumor, and so on, resulting in paresthesia or anesthesia in the area innervated by the nerve.^[8] It also aids in interpreting anatomical landmarks in oral pathology and forensics.^[9] Although it is often possible to identify the mental foramen radiographically, knowing the normal range of possible locations is essential. The location of the mental foramen has been studied in different populations.

In our study showed the maximal percentage of mental foramen as oval shaped seen in right side (87.5% & 98.0% in male and female respectively) and in left side (75.0% & 96.0% in male and female respectively) & highly significant in both side ($P < 0.0001$ and $p = 0.0002$ in left & right side respectively). Similar study done by P.S. Lgbigbi and S. Lebona (2005)^[2] they found that majority of mental foramen are oval in shape. Another study done by Isurani Ilayperuma (2009)^[10] shows a majority of cases, the mental foramen was oval in shape (59%) and its usual direction of opening was in a postero-superior direction (49.01%). A conflict our results by Rajani Singh, Ajay Kumar Srivastav (2010)^[11] found that mental foramina were predominantly rounded. Average diameters of mental were measured as 2.68 mm.

In present study showed the maximal percentage of mental foramen (40% & 42.5% respectively) seen between first and second premolar in panoramic view radiograph in male and female, followed by 37.5% & 35% mental foramen situated in line with second premolar, 20% & 21.5% between the second premolar and mesio-buccal root of first molar respectively in male and female.

A similar results found by various authors such as Kahraman Gungor, Mustafa Ozturket al (2006)^[12] found 71.5%, Sina Haghanifar, Mehrak Rokouei (2009)^[13] found 47.2% of patients, most common location of mental foramen was in between the 1st and 2nd premolar followed by in line with 2nd premolar.

The present study shows the maximum percentage (35.25%) seen in group 3 (40-50 yrs), followed by 28.75% in group 2 (29-39 yrs), 23.25% in group 1 (18-28 yrs) and 12.75% in group 4 (51-60 yrs).

Saritha Maloth, Shrinivas TR, et al (2015)^[14] found that radiographically in 48.96% of cases, the mental foramen was located in line with the second premolar and was common in age group of 25- 35 years and in 40.83% was in between the first and second premolars. They concluded that the knowledge of the most common position of the mental foramen among Indian population may enable effective regional anesthesia during dental procedures. In a study

conducted by Gershenson in 1986^[15], 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 half way between the margins and in adults with the teeth preserved, the mental foramen is somewhat closer to the inferior border. With loss of teeth and bone resorption, the mental foramen moves upward closer to the alveolar border.

CONCLUSION

An accurate assessment of position of mental foramen is very useful for the prevention of postsurgical neurovascular complications and also holds the potential of contributing as an aid for forensic identification. Multicenter studies within different populations would help in establishing its role in forensic odontology.

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