

## Original Research

### Position and symmetry of mental foramen

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#### ABSTRACT:

**Background:** To study the position and symmetry of mental foramen. **Materials & methods:** A total of 40 subjects were enrolled. The age of subjects was 20 to 40 years. The panoramic radiographs were taken to study the position and symmetry of MF visible on both sides of the mandible, all mandibular premolar teeth present, premolar region clearly visible on the panoramic radiographs. Scoring system was taken under consideration. Data was collected and result was analysed using SPSS software. **Results:** A total of 40 panoramic radiographs were taken under consideration. MF was located most frequently between the first and second premolar, with the second most frequent position being below the second premolar for apex scores. **Conclusion:** The most common position of MF is between 1st and 2nd premolar teeth.

**Keywords:** mental foramen, position, anatomy, radiographs.

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#### INTRODUCTION

The mental nerve is a key factor in many of the surgical and clinical procedures in routine clinical practice. <sup>1</sup> This nerve together with its accompanying vessels passes through the mental foramen which is described as a funnel like opening on the anterolateral surface of the mandible at the terminus of the mental canal. <sup>2</sup> The inferior alveolar nerve and vessels after being conveyed through the mandibular canal exit the mental foramen as the mental nerve and vessels which innervates the lower lip, labial mucoperiosteum of the ipsilateral lower incisors, canine and premolars as well as the mentum. <sup>3</sup>

A strategically eminent landmark, the mental foramen (MF) shares its significance in various fields of dentistry. <sup>4</sup> Accurate identification of the mental foramen is important for both diagnostic and clinical procedures. Repeated failures which are witnessed during mental nerve blocks indicate its variability of location in a given population. <sup>5</sup> Its radiographic misdiagnosis as a radiolucent lesion in the apical area of the mandibular premolars can lead to iatrogenic injuries. Treatment concepts for dental implant patients identify mental foramen and its anterior loop as a critical surgical landmark and essential reference point during treatment planning. It has also been

acknowledged through various studies, that surgical trauma caused to the mental nerve bundle as a result of inappropriate prior assessment, would result in altered sensation from 8.5% to 24% during periods of upto 3-16 months post-operatively following implant surgeries. <sup>6,7</sup>

Panoramic radiography is a curved plane topographic technique which allows broad coverage of oral structures with low radiation exposures (about 10% of full-mouth radiographs). However, major drawbacks include low image resolution, high distortion, and presence of phantom images. Despite developmental advancements in radiological examinations such as computed tomography, conventional panoramic radiographs are more commonly used, since advances in imaging techniques not only expose the patient to higher doses of radiation, but also are an expensive affair. <sup>8,9</sup> Hence, this study was conducted to study the position and symmetry of mental foramen.

#### MATERIALS & METHODS

This study was carried out in patients who visited to the PostGraduate Department of Oral Medicine and Radiology, Government Dental College and Hospital Srinagar, during time period of (Oct 2020 -July 2021). The age of subjects was 20 to 40 years. The

panoramic radiographs were taken for the study, Radiological evaluation of the patient was done using OPG model Orthoralix DDE (GENDEX, USA) digital panoramic system (Tube Potential: 60–90 kv, Tube Current: 2–15 mA, Total Filtration: >2.5 mm, time: 13.9 s). with MF visible on both sides of the

mandible, all mandibular premolar teeth present, premolar region clearly visible on the panoramic radiographs. Scoring system was taken under consideration. Data was collected and result was analysed using SPSS software.

**Table 1: Scoring system used to assess position of mental foramen**  
**Mental foramen position score**

Apex score	
1	Mesial to first premolar apex
2	Directly below the first premolar apex
3	distal to the first premolar apex and mesial to the second premolar apex
4	Directly below the second premolar apex
5	distal to the second premolar apex

**The radiographs were chosen according to the following criteria:**

- High quality with respect to angulations and contrast
- All mandibular teeth from the right first molar to the left first molar were present
- Radiographs in which the lower teeth (between 36 and 46) were missing, had deep caries, root canal treatment, or various restorations were eliminated because of possible associated periapical radiolucency
- Radiographs not having any radiolucent or radiopaque lesion in the lower arch and showing no radiographic exposure or processing artefacts
- Radiographs that showed the lower canine was missing were excluded because of the possibility of mesial premolar drift.

The positions of the mental foramen were recorded in line with the longitudinal axis of a tooth using software tool. If the mental foramen was too large or was between two teeth, the position of the foramen was indicated by drawing a line parallel to the long axis of the teeth using digital software. In addition, the side that showed more radiolucency was designated the side of the mental foramen analysis.

**RESULTS**

A total of 40 panoramic radiographs were taken under consideration. MF was located most frequently between the first and second premolar, with the second most frequent position being below the second premolar for apex scores.

**Table 2: Position of mental foramen in relation to premolar apex**

Position	Right	Left
Anterior to first premolar apex (Score 1)	0	0
Below the first premolar apex (score 2)	1	2
Between first and second premolar apices (score 3)	23	24
Below the second premolar apex (score 4)	14	13
Posterior to the second premolar apex (score 5)	2	1

**Table 3: Distribution of symmetry of mental foramen in vertical plane in relation to apices of teeth**

Location	Number	Percentage
At apex of 1st premolar	1	2.5
In between the apex of 1st and 2nd premolar	30	75
At apex of 2nd premolar	7	17.5
Inferior to the apex of 2nd premolar	2	5
Total	40	100

Symmetry of mental foramen in relation to apices of teeth in vertical plane was more at the position of in between the apex of 1st and 2nd premolar comprising of 75% whereas inferior to the apex of 2nd premolar was 5%. In majority of the subjects, the MF was symmetrical.

**DISCUSSION**

The accurate identification of the mental foramen is important for both diagnostic and clinical procedures. The mental foramen has been reported to vary in position in horizontal as well as vertical planes in different ethnic groups. Repeated failures during

injections and operative procedures involving the mental foramen suggest the presence of local differences in a given population.<sup>10</sup>

The location of the mental foramen has been studied by using radiographs of patients or by means of direct measurement on dry mandibles.<sup>11</sup> In this study,

digital panoramic radiographs were used because they have certain advantages over conventional panoramic as well as intra-oral radiographs. It offers greater clarity of the mental foramen with less intra-observer difference in calculations. Further, it includes a greater area of hard and soft tissues and also the visualized area in continuity, thus allowing for a more accurate localization of the mental foramen in both the horizontal and vertical dimensions. On the other hand, periapical radiographs may not reveal the position of the mental foramen if it is below the edge of the film.<sup>12</sup> In this study, a total of 40 panoramic radiographs were taken under consideration. MF was located most frequently between the first and second premolar, with the second most frequent position being below the second premolar for apex scores.

A study by Parnami P et al, six hundred digital panoramic radiographs were selected and studied regarding the location and symmetry of mental foramen. They were also compared with the other studies in the literature. Certain modifications were carried out in Fishal's criteria for vertical position assessment. The commonest position of the mental foramen in horizontal plane was in line with the longitudinal axis of the second premolar (61.0%) while in vertical plane it was found to be located inferior to the apex of second premolar (72.2%). Mental foramen exists in different locations and possesses many variations. They suggests that the clinicians should carefully identify these anatomical landmarks, by analyzing all influencing factors, prior to their diagnostic or the other dental, surgical and implant operation.<sup>13</sup> In our study, symmetry of mental foramen in relation to apices of teeth in vertical plane was more at the position of in between the apex of 1st and 2nd premolar comprising of 75% whereas inferior to the apex of 2nd premolar was 5%. In majority of the subjects, the MF was symmetrical.

Another study by Currie CC et al, determine the radiographic position and reliability of assessing mental foramen (MF) position in relation to premolar crowns in an 18- to 30-year-old UK-based population. Substantial to almost perfect agreement was achieved by consensus, demonstrating the most common position for the MF to be between the first and second premolar teeth when using both premolar crowns (51%) and apices (76%) as reference points. There was a significant difference in the position of the foramen between the left and right sides ( $p < 0.05$ ), with only 62% of cases showing symmetry. The most common position for the MF was between the first and second premolar teeth; however, anatomical variation was seen. Use of pre-operative radiographs to relate the position of the MF to premolar crowns may not be reliable.<sup>14</sup>

In jaws in which the mental foramen is not exposed on the top of the alveolar crest, the anatomical foramen is situated higher than the radiographically detectable foramen. This is actually an image of a part of the rising terminal part of the mental canal. The

differences in the position of the anatomical foramina between the dentulous and the edentulous are thus in fact greater than the radiographic values reported here, because the mental canal was not present in the majority of the edentulous due to alveolar atrophy.<sup>15</sup>

## CONCLUSION

The most common position of MF is between 1st and 2nd premolar teeth.

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