

**RADIOGRAPHIC ASSESSMENT OF MENTAL FORAMEN POSITION IN THE  
POPULATION OF THE DISTRICT, ALIGARH UTTAR PRADESH: A DIGITAL  
PANORAMIC STUDY**<sup>1</sup>**Dr. Rati Goyal** and <sup>2</sup>**Prof. Anshul Aggarwal**<sup>1</sup>Tutor, B.D.S. M.Sc., (Medical Anatomy), Dept. of Anatomy, JNMC and Hospital, AMU, Aligarh, Uttar Pradesh.<sup>2</sup>Professor, M.D.S.(oral medicine and radiology), Dept. of Oral Medicine and Radiology, Dr. ZADC and Hospital, AMU, Aligarh Uttar Pradesh.**\*Corresponding Author: Dr. Rati Goyal**

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**ABSTRACT**

**Background:** Knowledge of the mental foramen's position is crucial for dental professionals, as variations in its location can lead to complications during local anaesthesia or surgical procedures. However, the typical position of the mental foramen in the Indian population has not been extensively documented. **Aims:** This study aimed to determine the most common location of the mental foramen in an Indian population, while also analysing potential gender differences and symmetry within individuals. **Materials and Methods:** A total of 50 panoramic radiographs were assessed to evaluate the location and symmetry of the mental foramen in both male and female subjects. **Results:** The mental foramen was found between the first and second premolars in 46% of patients and aligned with the second premolar in 45.2% of cases. In males, 47.2% had the mental foramen aligned with the second premolar, while in females, 49.9% had it located between the first and second premolars. Symmetry of the mental foramen was observed bilaterally in 81% of individuals. **Conclusions:** The findings suggest that the most common positions of the mental foramen in this population are either between the two premolars or in line with the second premolar, which aligns with previous studies.

**KEYWORDS:** Mandible, mental foramen, mental nerve, panoramic radiography.**INTRODUCTION**

The Mental Foramen (MF) is a critical anatomical structure located in the body of the mandible. On each side, it is found on the buccal cortex of the mandibular bone, typically near the apices of the premolars. Studies have shown that the mental foramen is usually positioned at a similar level in most individuals, approximately 13-15 mm superior to the inferior border of the mandible. Its opening is directed outward, upward, and posterior when viewed from the inside out, and it serves as a passage for the mental vessels and nerves.<sup>[1]</sup>

The mental nerve, a terminal branch of the inferior alveolar nerve, provides sensory innervation to the lower lip, the buccal vestibule, and the gingival tissues mesial to the first mandibular molar. Local anaesthesia targeting the terminal penetrating branches of the inferior alveolar nerve often involves injections near the mental foramen. Accurate identification of the mental foramen is crucial for both diagnostic and clinical purposes. Failures in mental nerve blocks, often due to the variability in the foramen's location within a population, highlight the importance of this identification.<sup>[2,3]</sup>

Misidentification of the mental foramen on radiographs can sometimes lead to its being mistaken for a radiolucent lesion in the apical area of the mandibular premolars, which can result in iatrogenic injuries. In dental implant treatments, recognizing the location of the mental foramen and its anterior loop is essential, as these are critical landmarks during surgical planning. Studies have shown that failure to properly assess the mental nerve bundle can lead to altered sensation in 8.5% to 24% of patients for up to 3-16 months following implant surgeries.<sup>[4,5]</sup>

As bone density increases, identifying the mental foramen on radiographs becomes more challenging. In such cases, when the foramen is not visible under ordinary panoramic radiograph exposure and viewing conditions, it is classified as the "un-identified type" by Yosue and Brooks.<sup>[6]</sup> Although the location of the mental foramen has been studied across various populations, specific data on its position in an Indian population has been lacking.<sup>[3]</sup>

The aim of this study is to report the most common position of the mental foramen in a Northern Indian population, contributing to a better understanding of this anatomical landmark in clinical practice.

### MATERIALS AND METHODS

This study involved the evaluation of 50 panoramic radiographs of patients who visited the Department of Oral Pathology/Oral Medicine & Radiology at Dr. Z. A. Dental College & Hospital, A.M.U. Aligarh (U.P.) over the past six months. Each patient underwent a clinical examination, followed by the acquisition of a panoramic radiograph using the Orthophos XG Sivona system. The radiographic films (Eastman Kodak, Rochester, NY) were processed using an automatic processor (Konica Minolta, Dry Pro) preset to the manufacturer's specifications for the processing cycle.

### INCLUSION CRITERIA

The following criteria were used for inclusion in the study.

- None of the patients presented with any significant deformity or pathology.
- Patients with a full set of teeth, who had not undergone orthodontic treatment, were selected.
- Only new orthopantomograms (OPGs) of the patients were included; older OPGs were excluded from the study.

- Excellent angulation and contrast in the radiographs.

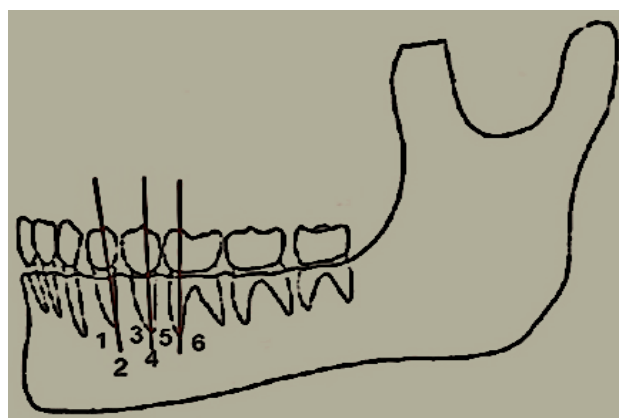
### EXCLUSION CRITERIA

Were applied to ensure the accuracy and consistency of the data collected. Patients were excluded if they had

1. A radiolucent lesion in the lower jaw anywhere from the right first molar to the left first molar.
2. Missing teeth in the lower jaw (between 36 and 46).
3. No bilateral visualization of the mental foramen.
4. Incomplete eruption of permanent teeth.
5. An age under 18
6. Previous orthodontic treatment.
7. Crowding or spacing in the lower arch.

The position of the mental foramen was recorded using the classification by Jasser and Nwoku<sup>[7]</sup>, with the following positional categories: (Figure-1).

- **Position 1:** Anterior to the first premolar.
- **Position 2:** In line with the first premolar.
- **Position 3:** Between the first and second premolars. (Picture 1)
- **Position 4:** In line with the second premolar. (Picture 2)
- **Position 5:** Between the second premolar and first molar.
- **Position 6:** In line with the first molar.



**Figure 1:** Schematic representation of the mental foramen position relative to the teeth. Imaginary lines using ACDSeePro3 software were drawn with the long access of the teeth. Numbers, 1, 2, 3, 4, 5 & 6 represent Class I, Class II, Class III, Class V, Class IV & Class VI, respectively.



**Picture 1:** Position 3: Between the first and second premolars.



**Picture 2: Position 4: In line with the second premolar.**

For each panoramic radiograph, the location of the mental foramen on both sides was recorded. The data collected included the position of the mental foramen based on gender, as well as whether the foramen's location was symmetrical or asymmetrical between the left and right sides. The results were then subjected to statistical analysis for further evaluation.

## RESULT

A total of 50 panoramic radiographs were analysed, comprising 25 males and 25 females. The most common position of the mental foramen in this sample was Position 3, found in 47.2% of cases. No cases were identified in Position 1 (anterior to the first premolar). On the right side, the most frequent location was Position 3 (22%); on the left, it was Position 4 (21.6%). Among males, Position 4 was the most prevalent (47.2%), whereas Position 3 was the most common in females (49%).

Symmetry of the mental foramen was observed in 41 cases (81%). For the symmetrically located foramina, the most common position was Position 3 (41.5%), followed by Position 4 (39.6%). No cases were found in Position 1 or Position 6.

There were no statistically significant differences between males and females in the symmetry or asymmetry of mental foramen location on either side ( $P < 0.05$  was taken to indicate statistical significance).

## DISCUSSION

The position of the mental foramen has been a subject of considerable debate, with its location varying across different populations. In this study of 50 panoramic radiographs, the mental foramen was found to be positioned between the root of the first premolar and the roots of the first molar. This variability aligns with findings from previous studies. Specifically, in 47.2% of cases, the mental foramen was located between the first and second premolars, while in 47% of cases; it was aligned with the second premolar. Together, these two positions accounted for 93.2% of the cases.

Similar results were reported by Moiseiwtsch<sup>[8]</sup> in a study on a North American white population, as well as by Fichel *et al.*<sup>[7]</sup> and Olasoji *et al.*<sup>[9]</sup> in Northern Nigerian adults, where the most common location of the mental foramen was between the two premolars. These findings are consistent with the results of the present study. However, studies conducted in other populations, such as Malays, Iranians, Kenyan Africans, and Saudis, as well as the study by Phillips *et al.*<sup>[10]</sup>, indicated that the mental foramen was most frequently positioned in line with the second premolar tooth.

A review of the literature revealed that, according to most authors, the mental foramen is typically located between the lower premolars. Some studies, however, reported that the foramen most commonly lies near the apex of the second premolar, while others found both positions to be common. The findings of this study support the conclusion that the mental foramen is most often located either between the first and second premolars or in line with the second premolar, consistent with the results of studies conducted in various populations.<sup>[11,12]</sup>

Panoramic radiographs were used in this study because the mental foramen is more consistently visible in the wide-field view provided by panoramic imaging compared to periapical radiographs. Only patients over the age of 18 were included, ensuring that skeletal growth was complete. Additionally, cases with periodontal lesions or previous orthodontic treatment were excluded to eliminate the possibility of tooth migration affecting the mental foramen's location.

In conclusion, the two most common locations of the mental foramen are between the premolars and in line with the second premolar. These findings are in agreement with previous research conducted on different populations. Furthermore, the mental foramina were typically found to be bilaterally symmetrical on both sides.<sup>[13]</sup>

**Conflict of Interest:** None.

**Source of Support:** Nil.

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