



A Morphometric Analysis of Shape, Size and Position of Mental Foramen in Dry Human Mandibles

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KEYWORDS

Mental Foramen, Postero-Superior Direction, Periapical Surgery, Dental Procedures, Morphometry.

ABSTRACT:

The anterolateral part of the mandible includes the Mental Foramen, which is responsible for transmitting mental blood vessels and nerves. When conducting surgical procedures in the mental area of the mandible and delivering localised anaesthesia, operators must possess an understanding of the anatomical morphology of mental foramen. Anaesthesia is used during dental treatments, such as suturing soft tissue lacerations in the mouth and biopsy, hence to prevent injury to mental nerve from exiting the foramen sound knowledge of variations in the morphology is must. The study's objective was to elucidate, in an adult sample from department of anatomy—a region with little available information—the morphological characteristics and exact anatomical location of the mental foramen in relation to nearby anatomical markers. A total of 100 dry human mandibles of undetermined gender were employed in this research. They were acquired from Krishna institute of medical sciences, department of anatomy. The characteristics of the mental foramen, such as their dimension, form, quantity, placement, and measurements in relation to the anatomical landmarks encountered during an examination. The foramen was typically oval in form and positioned parallel to the second premolar tooth's lengthwise line. It often opened in the general direction of the postero-superior.

INTRODUCTION

An aperture called the mental foramen is located on the mandibular lateral surface. There are one on the left and two on the right [1]. The mandibular and mental nerves converge here, where they might go on as the sharp nerve [1, 2]. Mental foramen varies in location according on the individual and age group. Several authors have categorised the location of the mental foramen in both vertical and horizontal directions [2, 3].

It is observed upward into six spots as indicated by its commonness inside 2 mm of the first and second premolar roots [4]. Accessory mental foramens are relatively rare, and when they do exist, they often occur below the primary molar [4, 5].

Numerous authors have noted variations in the MF's location across distinct ethnic groups, as well as varying forms [6].

An Accessory Mental Foramen (AMF), [7], which is any foramen beyond the MF, is often seen under the first molar teeth. Multiple branches of the cerebral nerve may be transmitted via this auxiliary mental foramen.

Dental surgeons who perform procedures on the mandible, which such as cauterization of the premolars, fillings, implant-supported teeth, [8], Root Canal Therapies (RCT), orthognathic surgeries, etc., would enormously profit from having exact information on the differences in the position, shape, and size of the psychological foramen as well as the presence of extra mental foramen [8, 9].



The fragile tissues of the jaw get tactile feeling and blood stream from the psychological nerve and supply routes, [10, 11] which arise by means of the psychological foramen. Be that as it may, different ethnic and orientation groupings have various perspectives about MF. This study has been done to investigate the number, size, shape, [12], aspects, and area of MF when contrasted with the carefully went over physical markers in light of the fact that, notwithstanding the significance of MF, [13], little thought has been dedicated to the investigation of the morphology, most normal the area of foramen, and related physical elements [13, 14].

I. METHOD AND MATERIAL

For the purpose of this study, One hundred dry human mandibles with complete alveolar edges, entire teeth, and mandibles from various genders were obtained from the anatomy department of the Krishna Institute of Medical Sciences. Using a computerised Vernier calliper, measurements were taken of the mental foramen's form, size, position, number of MF, and the direction of opening on every side of the jaw.

MF was either spherical or oval in form when it was spotted. Both the mean vertical and horizontal diameters were measured. The following characteristics were used to locate MF:

- (1) The separation between mental symphysis and mental foramen;
- (2) Alveolar margin to mental foramen distance and
- (3) Distance separating the medial border of the jaw and the mental foramen.

It was observed where MF was with regard to the mandibular teeth. Antero-superior, lateral, posterior, anterior, postero-superior, and superior were the directions in which the MF opened. The mean difference across the sides were compared using the t-test, and a p-value of less than 0.05 was considered statistically significant.

Table 1 Measurement of the mental foramen comparing two sides using morphometric methods.

Characteristic	Right side (mean/SD)	Left side (mean/SD)
100 dried grown-up human mandibles of obscure sex that had	25.69±26.66	26.9±16.36
The separation of the Mf alveolar margin	45.69±25.36	46.98±36.36
The separation between the mandibular base and the MF	96.37±69.61	25.36±97.61

1.1 Statements

As shown in Fig. 1, morphometric characteristics of 100 dried human jaws showed that the total amount of MF on both sides were single in 97.4% of instances and double in 2.6% of cases. As seen in Fig. 2, the shape of the foramen was oval in ninety-two of instances and rounded in 8% of cases.

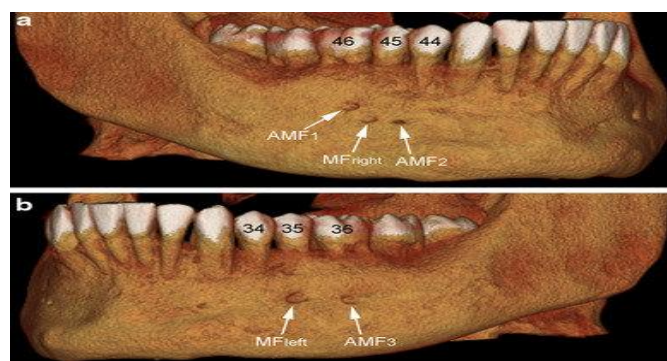


Fig. 1 Displaying Two Mental Foramen.



Fig. 2 Displaying a rounded mental foramen and aligning with the teeth of the first molar.

II. RESULTS

The average horizontally width was 3.25 mm on the left and 3.33 mm on the right, with a range of 2.1-6.2 mm, while the average vertical dimensions was 2.15 mm on the right and 2.13 mm on the left, with a spectrum of 1.8-3.1 mm. One of the nonlinear measures of MF in relation to landmarks in the body is shown in Table 1.



Table 2 displays the location of the mental foramen with respect to the mandibular teeth on each side.

Table 2 The frequency with which the two sides' mandibular teeth are positioned in respect to the mental foramen.

Location	Right side	Left side
corresponding to the second premolar	93.36%	78.6%
In between the first and second premolars	46.3%	5.69%
in between the molar and the first	5.69%	4.69%
Alongside the first molar	8.69%	5.69%
Alongside the first premolar	0%	0%

On both the right (93.36%) & left (78.6%) sides of the jaws, the foramen of the tooth was most frequently oriented with the longitudinal axis of the second premolar. According to Fig. 2, the second most frequent location was in the line of first molars (right 46.3%; left 5.69%), which was followed by the line among first and second premolar teeth (right 5.69%; left 4.69%), while the least prevalent location was in the line among two premolar & first molar teeth (right 2.7%; left 3.1%).

In 92% of the mandibles, the MF exited poster superior, then anterior superior in 3.3%, laterally in 3.3%, and posteriorly in 1.4%.

III. DISCUSSION

For clinical and forensic mandibular surgeries, it is essential to precisely locate the foramen of the mental cortex [15]. Clinically, during surgical operations, damage to the mental nerve bundle that emerges from the mental foramen may occur, resulting in feeling paraesthesia or anaesthesia along its sensory distribution [16, 17]. Anatomically speaking, the mental foramen is the opening to the mental canal. According to conventional textbooks, the mental foramen is normally located between both ends of the first and second bottom premolars [18].

While certain European people may agree with this, other populations may not share this viewpoint [19]. It is evident that there is racial heterogeneity in the location of the mental foramen. In Bruisers, The median placement of the mental foramen was above the first and middle premolars in Chinese, it aligned with the second premolar [20]. It was also intriguing to see that Black people had a more posteriorly located brain foramen than White people. According to the results of the current research, [21] the mental foramen most often occurred in alignment with the longitudinal plane of the

lower premolar that followed it and the first molar tooth. This was consistent with earlier research on other Asian groups, such as those of Asian Indian, Thai, and Malay descent [22].

The research found that there was a mean distance of 25.55 ± 5.07 millimeters on the right side and 25.05 ± 5.07 mm in the left side between the mental foramen and the symphysis mentioned in the study. In people from South Gujarat, [23], there was no discernible variation in the morphometry or location of the mental foramen. Information on the average distance in a particular group between the mention of symphysis and the mental foramen has important implications from a therapeutic standpoint. The mental foramen is often hard to locate since there are no clear anatomical features to go on [24].

Since the mental foramen cannot be objectively described or palpated, it is accurately found in relation to the lower jaws in clinical situations. Clinically, those with crooked teeth or those without a distinctive jaw may be unable to detect the mental foramen in its natural location [25]. If the distance between the mental foramen and the symphysis mentis is known under these circumstances, the mental foramen may be accurately situated.

IV. CONCLUSION

The current research conducted by the department of anatomy at the Krishna Institute of Medical Sciences provides important new information on the nature of the mental foramen. Knowing the distances from the anatomical markers used in this study will be very helpful to dental surgeons as it will allow them to effectively localise the bundle of neurovascular tissue through the mental foramen, avoiding issues from local anaesthesia, surgical, or other invasive surgeries.



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