

A STUDY OF MENTAL FORAMINA IN SOUTH INDIAN DRY MANDIBLES

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ABSTRACT

Background: The mental foramen is a small foramen situated on the anterolateral aspect of the body of mandible, through which the mental nerve and blood vessels pass. The mental nerve innervates the lower canines and premolars.

Purpose of study: As the mental foramen is an important landmark to facilitate surgical, local anaesthetic, and other invasive procedures, the present study was aimed to elucidate its morphologic and morphometric features.

Results: The shape of the mental foramen was round in 40 right sides (44.9%) and 44 left sides (49.4%). The longitudinally oval foramen was found in 49 right sides (55.1%) and 45 left sides (50.6%). The direction of opening of the foramen was posterosuperior in most of the cases (77.5% on the right side and 83.15% on the left side). The study measured an average vertical diameter of 2.72mm and 2.75mm whereas the horizontal diameter was 3.66mm and 3.54mm on right and left foramina respectively.

Conclusions: Variations exist in the position, shape, and size of mental foramen in different population groups. It is essential to be aware of the possibility of these anatomical variations while planning surgery in that region to avoid nerve damage and also to enable effective mental nerve block anaesthesia.

KEY WORDS: Mental foramen, Shape, Diameter, Direction of opening.

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INTRODUCTION

The mental foramen is a small foramen situated on the anterolateral aspect of the body of mandible, through which the mental nerve and blood vessels pass together to the buccal gingiva in front of the second premolars to the lower lip and chin. The mental nerve, is primarily a sensory nerve and after leaving the foramen innervates the lower canines and premolars and

therefore play an important role in procedures in this area such as administration of local anesthesia and surgical intervention [1]. As the mental foramen is an important landmark to facilitate surgical, local anaesthetic, and other invasive procedures, the present study was aimed to elucidate its morphologic and morphometric features. The present study thus documents the shape, diameters and direction

of opening of the mental foramen in South Indian population.

MATERIALS AND METHODS

The study was done in the Department of Anatomy, Bangalore Medical College and Research Institute, Bangalore on a total of 89 dry mandibles (178 sides). The sex of the mandibles was not taken into consideration. Dry mandibles of children were excluded.

The following parameters of the mental foramen were analysed on both sides:

- A) Shape
- B) Direction of opening
- C) Mean vertical and horizontal diameters

The diameters of the mental foramina were measured using vernier callipers and the statistical analysis done using Microsoft excel worksheet.

RESULTS

Shape: The shape of the mental foramen was round in 40 right sides (44.9%) and 44 left sides (49.4%). The longitudinally oval foramen was found in 49 right sides (55.1%) and 45 left sides (50.6%).

Direction of the opening: The direction of exit of the mental foramen was noted down. Figures 1, 2, 3 & 4 show the different directions of the opening. The following table (Table 1) gives the percentage of the direction of the opening of mental foramina.

The vertical and horizontal diameters of the mental foramen: were recorded and average calculated. Table 2 tabulates the mean diameters of the foramina, on right and left sides.

Fig. 1: Shows posterosuperior direction of opening of the mental foramen.



Fig. 2: Shows anterosuperior direction of opening of the mental foramen.



Fig. 3: Shows lateral direction of opening of the mental foramen.



Fig. 4: Shows superior direction of opening of the mental foramen.



Table 1: Percentage of direction of opening of the mental foramina.

Direction of opening	Right Side	Left Side	Total
Posterosuperior	69 (77.5%)	74 (83.15%)	143 (80.34%)
Anterosuperior	2 (2.25%)	3 (3.37%)	5 (2.8%)
Lateral	5 (5.6%)	4 (4.49%)	9 (5.06%)
Superior	13 (14.61%)	8 (8.99%)	21 (11.8%)

Table 2: Average vertical and horizontal diameters of the mental foramina.

Diameter (in mm)	Right side	Left side
Vertical	2.72	2.75
Horizontal	3.66	3.54

DISCUSSION

Variations of mental foramen have been reported in dry human mandibles and on radiographs. The mental foramen morphology varies not only according to age, sex and ethnicity, but even within the same race, in different geographic populations. Different anatomy and radiology textbooks give contradicting statements regarding the morphometric characteristics of the mental foramen; thereby depicting variable racial trends [2].

Shape: The mental foramen may be oval or round [3]. It was predominantly oval in Tanzanians [4], Brazilians [5], Srilankans [6], Zimbabweans [7], Indians [8] and Malawians [9]. Table 3, compares the percentages of oval and round foramina recorded in present study with that of earlier authors.

Table 3: Comparison of the results of earlier studies with the present study with respect to the shape of the mental foramen.

Study/Shape	Right side		Left side	
	Oval	Round	Oval	Round
Budhiraja (North Indian) [15]	74.30%	25.70%	74.30%	25.70%
Singh & Srivastav (North Indian) [10]	6%	94%	13%	87%
Junior (Brazilian) [5]	73.80%	21.20%	71.30%	28.70%
Souaga (African) [14]	73.80%	26.20%	100%	0%
Present study (South Indian)	55.10%	44.90%	50.60%	49.40%

Results of earlier studies in the above table show a predominantly oval shape of the mental foramen. Singh & Srivastav however give an entirely different result from their study on Indian mandibles [10]. This result is similar to that of Gupta (oval 11%) who also studied Indian mandibles [11]. The present study on South Indian mandibles projects an almost equal presence of oval and round mental foramina.

Direction of opening of the mental foramen:

The mental foramen is usually located on the anterolateral aspect of the body of mandible. According to Agarwal, the direction of exit of

mental foramen was posterosuperior in 92%, followed by superior in 3.3%, laterally in 3.3%, and posterior in 1.4% of mandible [8]. The direction was mostly superior and posterosuperior and rarely labial, medial or posterior in Tanzanians [4]; and usually posterosuperior in Srilankans [12] and Malawians [9]. Sivavadivel reported 90% opening towards posterior in south Indian mandible [13]. The present study showed the direction to be posterosuperior in most of the cases (77.5% on the right side and 83.15% on the left side).

Vertical and horizontal diameters of the foramina: The mean vertical and horizontal diameters of the mental foramen measured in the present study was compared with that of earlier studies (Table 4).

Table 4: Comparison of the average vertical and horizontal diameters of mental foramen in present study with other studies.

Name of the Study	Vertical Diameter (mm)		Horizontal Diameter (mm)	
	Right	Left	Left	Left
Agarwal & Gupta (Indian) [8]	2.15	2.13	2.13	3.25
Junior (Brazil) [5]	2.38	2.39	2.39	3.25
Oguz & Boskir (Turkish) [16]	2.38	2.64	2.64	3.14
Ilayaperuma (Srilanka) [12]	2.5		3.31	
Prabodha (Sri Lanka) [6]	2.11		2.97	
Present study (South Indians)	2.72	2.75	3.66	3.54

Singh and Srivastav measured an average diameter of 2.79 mm while Gupta recorded 2.62 mm [10, 11]. Mean width of 3.5mm was found by Sivavadivel [13].

In Africans, the average length and breadth was 5.66 mm and 3.97 mm respectively in males and 4.99 mm and 3.87 mm respectively in females [14].

The measurements according to present study show a slightly larger average of both vertical and horizontal diameters compared to the other studies. The average diameters of the African mandibles are very much larger than that of Indian, Sri Lankan, Brazilian and Turkish mandibles.

The differences observed among various studies may be due to different races or different methodology or variant sample size.

CONCLUSION

Prior knowledge of mental foramen variations helps surgeons in planning surgery in that region to avoid nerve damage and also enable effective mental nerve block anesthesia, with adequate preoperative radiological examination in clinical situation especially when closed surgery is planned [3].

Paralysis of the mental nerve is one of the principal complications of surgery of the mandibular canal and mental foramen regions. Therefore, identification of mental foramen in its various positions and its morphometric analysis is important for dental surgeons in nerve block and surgical procedures like apical curettage of mandibular premolars and periodontal surgery, to avoid injury to neurovascular bundle. However, variations do exist in the position, shape, and size of mental foramen in different population groups. It is essential to be aware of the possibility of these anatomical variations while planning surgery in that region to avoid nerve damage anatomical variations while planning surgery in that region to avoid nerve damage and also to enable effective mental nerve block anaesthesia.

Conflicts of Interests: None

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