

Study of Number, Shape, Size and Position of Mental Foramen in Bangladeshi Dry Adult Human Mandible

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Abstract

Context: Paralysis of the mental nerve is one of the principal complications of surgery of the mandibular canal and mental foramen region. Therefore, identification of mental foramen is important for dental surgeons in nerve block and surgical procedures like apico curettage of mandibular premolars, amalgam filling, periodontal surgery etc. to avoid injury to neurovascular bundle. Verification of the existence of accessory mental foramina would prevent accessory mental nerve injury during periapical surgery. Therefore, prior knowledge of morphology and morphometry of mental and accessory mental foramen to particular block may cause effective mental block anaesthesia. Besides this, mental foramen and accessory mental foramen have been found to vary in position in different ethnic groups. So, it is important to study the morphology and morphometry of mental foramen.

Materials and Methods: A cross-sectional, analytical type of study was conducted in the Department of Anatomy, Dhaka Medical College using dried adult human mandibles of unknown sexes. Number and shapes of mental foramen and accessory mental foramen were observed. Size and position were determined by using digital sliding calipers.

Result: Mental foramen was present in all one hundred and eighty five (185) observed mandibles and it was bilateral. Accessory mental foramen was present in 1.62% on left side while on right side, it was 0.54%. None of the mandibles presented with bilateral accessory mental foramen. Shape was predominantly oval with 55.7% on right side and 53.5% on left side while it was round in 44.3% on right side and 46.5% on left side. Mental foramen was commonly located between 1st and 2nd premolar, below 2nd premolar and between 2nd premolar and 1st molar.

Conclusion: Prior knowledge of mental foramen variations helps surgeon in planning surgery in that region to avoid nerve damage and also for effective mental nerve block anaesthesia.

Key words: Mental foramen, accessory mental foramen.

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Introduction:

Mental Foramen (MF) is an important anatomical landmark to facilitate surgical, local anesthetic and other invasive procedures for dental surgeons performing periapical surgery in the mental region of mandible. Prior knowledge of morphology and morphometry of mental foramen and accessory mental foramen (AMF) needs to be considered before any surgery in the foramina area in order to avoid any nerve damage. The MF is situated

bilaterally on the anterolateral aspect of the mandible, down to alveolar margin. The mental nerve and vessels emerges through the mental foramen and supply sensory innervation and blood supply to the soft tissues of the chin, lower lip and gingiva^{1, 2}. But the position of MF varies among racial groups and genders^{3, 4}. Any foramen in addition to MF is known as accessory mental foramen in the body of the mandible. A branch of mental nerve passes through the AMF. Hence size, shape, position and number of MF and AMF would facilitate the dental surgeon to apply nerve block in different surgical procedures involving lower jaw. In addition to this, if this nerve is not blocked, in the structures supplied by it, parasthesia will be less. Despite the significance of MF, little attention has been given to the study of the morphology, most common position of foramen and associated anatomical characteristics in Bangladesh; hence this study has been conducted to investigate the number, size, shape, and position of MF with respect to surgically encountered anatomical landmarks.

Materials and Methods:

One hundred and eighty five (185) dried adult human mandibles with complete dentition and intact alveolar margin of unknown sex obtained from the Department of Anatomy of Dhaka Medical College, Sir Salimullah Medical College and Shaheed Suhrawardy Medical College, Dhaka were used for this study. The number, shape and position of mental foramen were observed on the both sides of mandible. Mean horizontal and vertical diameters were measured by using digital sliding caliper. Position of MF was identified by using following parameters: (1) Distance from the mental foramen to alveolar margin and (2) Distance from mental foramen to inferior border of the mandible. The position of MF was noted in relation to mandibular teeth. A comparison of the mean values between sides was performed using the paired 't'-test and Chi-square test, p-value >0.05 was considered statistically significant.

Results:

Morphometric features of 185 (one hundred and eighty five) dried human mandibles revealed that the single number of MF on right side present was

in 99.46% cases and on left side in 98.38% cases, whereas double in 0.54% cases and 1.62% cases on right side and left side (Table-I). The shape of foramen was oval in 55.7% cases and round in 44.3% cases on right side and 53.5% cases oval and 46.5% cases round on left side (Table-II). The linear measurements of MF with respect to anatomical landmarks are given in table-III. The positions of mental foramen in relation to mandibular teeth on both two sides are shown in table-IV. The most frequent position of mental foramen in relation to the teeth was between 1st and 2nd premolar for right side in 42.2% and for left side in 42.7% cases. The second common position was below 2nd premolar for right side in 35.6% and for left side in 36.2% cases. The third common position was between 2nd premolar and 1st molar for right side in 22.2% cases and for left side in 21.1% cases.

Table-I

Number of Mental foramen on right and left side of the mandible

Side	No. of foramen		
	Single (%)	Double (%)	Total
Right	184 (99.46%)	01 (0.54%)	185
Left	182 (98.38%)	03 (1.62%)	185

Table-II

Shape of the mental foramen at the right and left side of the mandible

Side\ Shape	Total (N=185)		P value
	No	(%)	
Right side			
Oval	103	(55.7)	>0.50 ^{ns}
Round	82	(44.3)	
Left side			
Oval	99	(53.5)	>0.50 ^{ns}
Round	86	(46.5)	

Comparison of shape between right and left side done by Chi square test, ns = not significant

Table-III
Morphometric measurements of mental foramen

Characteristics	Right side (mean±SD) mm	Left side (mean±SD) mm	P value
Horizontal diameter of MF	2.56±0.67	2.49±0.50	Ã0.05 ^{ns}
Vertical diameter of MF	1.99±0.47	1.93±0.39	Â0.05*
Distance between MF and alveolar margin of mandible	13.84±2.25	13.61±2.24	Â0.05*
Distance between MF and lower border of mandible	13.44±1.47	13.57±1.66	Ã0.10 ^{ns}

Comparison between right and left side done by paired Student's 't' test, ns= not significant, *= significant.

Table-IV
Position of mental foramen in relation to teeth socket of the mandible

Location	Right side	Left side
Between 1 st and 2 nd premolar	42.2%	42.7%
Below 2 nd premolar	35.6%	36.2%
Between 1 st molar and 2 nd premolar	22.2%	21.1%

Comparison among location within right and left side done by Chi- square test, but statistically not significant

Discussion:

In the present study, single mental foramen was most common. But double mental foramen was found in 0.54% on right side and in 1.62% on left side of the mandible. According to Oliveira et al.⁵ the single mental foramen was found in 97.5% and double mental foramen in 25% out of 80 total mandible.

In our study, on right side it was oval in 55.7% cases and round in 44.3% cases. On left side it was oval in 53.5% cases and round in 46.5% cases. This was similar to Mbajjorgu et al.⁶ due to same race but differed from Oliveira et al.⁵ where oval and round shaped mental foramen were found in 73.8% and 26.2% mandible respectively due to racial variation.

In the present study, the mean (±SD) horizontal diameter of mental foramen on right side was slightly greater than that on left side of the mandible which was consistent with Oliveira et al.⁵ and Wang et al.⁷ but not consistent with Oguz and Bozkir⁸, where

the horizontal diameter of mental foramen was 2.93 mm on the right side and 3.14 mm on the left side.

The mean (±SD) vertical diameter of mental foramen was same on right and left side of the mandible which was similar with previous studies of Wang et al.⁷, Oguz and Bozkir⁸, Oliveira et al.⁵.

Position in relation to distance from alveolar ridge or inferior margin of mandible.

The mean (±SD) distance between mental foramen and alveolar ridge was greater on right side than that on left side of the total mandibles. In other studies such as Wang et al.⁷, Oguz and Bozkir⁸, Oliveira et al.⁵ Agarwal and Gupta⁹ also showed that the distance was greater on right side than that on left side of the mandible.

The mean (±SD) distance between mental foramen and inferior margin of the mandible was lower on right side than that on left side of the total mandibles. The result of this variable was similar to Wang et al.⁷ and Oliveira et al.⁵ but differed from Oguz and Bozkir⁸ Agarwal and Gupta⁹, where this distance was slightly greater on right side (14.61 mm) than that on left side (14.29 mm) which might be due to technical error.

In the present study, the mental foramen was commonly located between 1st and 2nd premolar teeth sockets which was consistent with Oguz and Bozkir⁸ but differed from Simonton¹⁰, Wang et al.⁷, Oliveira et al.⁵ Agarwal and Gupta⁹, where the most common location was at the root of the 2nd premolar teeth which might be due to racial variations and researchers' observational error.

Conclusion

The present analysis revealed variations in number, shape, size and position of MF and AMF. The variability of the position of MF and AMF should alert the dental surgeons while performing periodontal or endodontic surgery. Morphology and morphometry of MF and AMF when studied on larger sample size can be used as anthropological tool by anthropologists to identify deceased.

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