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EVALUATION OF MORPHOLOGY AND MORPHOMETRIC OF MENTAL FORAMEN IN ADULT HUMAN MANDIBLES OF WEST BENGAL, REGION"

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ABSTRACT The position of mental foramen and its morphological variations help to localize the mental nerve and thus prevent complications during surgical procedures. My aim was to study the morphological and morphometric analysis of mental foramen in adult human mandibles. This would help immensely in ascertaining the accurate location of the MF because of its great variability and thus avoid any unforeseen injury.

KEYWORDS : Human Mandible, Mental foramen (MF), Morphometric, Morphological, Office pin and Measurements.

Introduction:

The mental foramen is located on the anterolateral aspect of the body of mandible, somewhat midway between the superior (alveolar) and inferior borders.[1] It gives path to mental nerve and vessels.[2-4] Inferior alveolar nerve enters the mandibular foramen and after passing through the body exits at the mental foramen as mental nerve.[5] The mental nerve emerges at the mental foramen and divided into four branches-angular, medial lateral inferior labial and mental branch.[6] Mental foramen is regarded as a highly suitable model to study bone remodelling activity in the presence of different osteoneurovascular components.[7] Also important in local anaesthesia and surgical procedures for effective nerve blocks and to avoid injuries to the neurovascular bundles.[8] A number of variations are there regarding position of mental foramen.[9] It's position is important in osteotomy procedures so that the altered lip sensations can be avoided.[10] Any foramen in addition to the mental foramen is known as the accessory mental foramen. Most common position is below the first molar tooth.[11] Both the mental and accessory mental foramen show ethnic variations. So the knowledge of mental foramen morphometry can help the dental surgeons to apply for nerve blocks in surgeries related to the lower jaw. Accessory mental foramen morphometry will help preventing accessory nerve injury during periapical surgery. If it is not blocked, the paraesthesia will be less.[12] The aim of this study was to analyse the morphology and morphometry of the mental foramen in adult mandibles in West Bengal, Durgapur Region.

Material and methods:

The present study was conducted in the Department of Anatomy, I Q city Medical College and Hospital, Durgapur, West Bengal during the period from December 2013 to April 2014. Randomly selected, 35 dry adult human mandibles of unknown sex obtained from the Anatomy Department of I Q city Medical College and Hospital, Durgapur formed the material for study. We observed the location of the mental as well accessory mental foramina in relation to the mandibular teeth along with following-

- We noticed the incidences and shape of the mental & accessory mental foramina(fig.1,2,4&5)
- The distances from the sagittal midline to the centre of the mental foramen.
- Distance from the lower border to the centre of the mental foramen.
- Also noticed the distance from the alveolar crest and distance from the posterior border of the ramus of the mandible to the centre of the mental foramen.

Results and Discussion:

The present study was conducted in the Department of Anatomy, I Q city Medical College and Hospital, Durgapur, West Bengal. The average size of the mental foramen was 2.56mm. The minimum diameter was 0.8mm and maximum was 4.7mm. The average size of the accessory mental foramen was 1mm about which not much literature is available for comparison. The minimum diameter was 0.53mm and maximum was 1.64mm. The horizontal diameter of the mental foramen was 2.62mm on right side and 2.50mm on left side. This was less than Oguz and Bozkir18 (2.93 on right side and 3.14mm on the left side) and was more than Chung et al19(2.4mm). Our study indicated the situational variability of the Mental Foramen (MF) as well its morphological parameters. The MF was present bilaterally in all the mandibles. It was predominantly present as an oval opening 68.6%.This opening was observed as horizontal as well as vertical in disposition. Rounded openings were also observed in 31.4% of the bones examined in Table-1.

Fig.1

Fig.2

Table 1: Shape of the Mental Foramen (MF) (Comparison with Other Studies) (Fig. 1&2)

Shape	Present Study 2014, West Bengal India (n=35)	Parmar[13] 2012, Eastern India (n=50)	Siddiqui[14] 2010, Western India (n=93)	Ilayperuma[15] 2009, Sri Lanka (n=51)	Fabian[16] 2007, Tanzania (n=100)	Prabodha[17] 2006, Sri Lanka (n=24)
Oval	48(68.6%)	69(69%)	65(70%)	30(59%)	54(54%)	16(66.67 %)
Rounded	22(31.4%)	31(31%)	28(30%)	21(41%)	46(46%)	8(33.33%)

Table 2: Incidence and shape of mental foramen (MF) (Fig. 4&5)

Incidence	Shape	Right (35)	Left (35)	Bilateral (35)
Mental Foramen (MF)	Oval	21(60.0%)	27(77.14%)	5(14.3%)
	Round	14(40.0%)	8(22.8%)	2(5.7%)
Accessory Mental Foramen (AMF)	4(11.4%)	1(2.8%)	Nil	

Table-2 showed the mental foramen was present in all the thirty five mandibles and is bilateral which is similar to Oliveria et al.20 The most common shape was Oval shape in both right and left sides. In this study the Oval mental foramen was 60.0% and round in 40.0% on the right side. Similarly on the left side, it was oval in 77.14% & round in 22.8% which was similar to that of Al-Khateeb et al.[21] Oval mental foramen was present bilaterally in 14.3% cases and Round in 5.7% cases. The accessory mental foramen was found in 11.4 % on the right side and 2.8% on the left side. It was higher than Asian population,[22] North Americans[23] and Thais24 but similar to that found by different workers as 2.8% in Israeli, 1.8% in American whites and 12.5% in Polinesians.[25] No specimen showed bilateral accessory mental foramen.

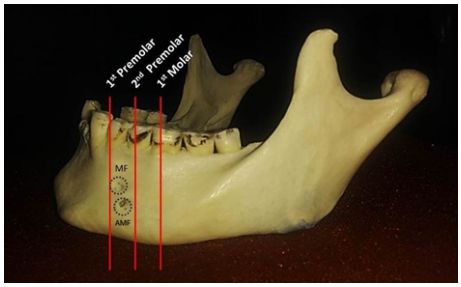

Fig.3. MF and AMF present between 1st & 2nd premolars

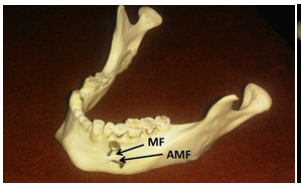

Fig. 4.

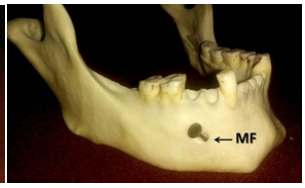

Fig. 5.

Table 3: Position of mental foramen (MF) (Fig. 3):

Position	Right (35)	Left (35)	Bilateral (35)
Anterior to the 1st premolar	Nil	1(4.44%)	Nil
Below 1st premolar	Nil	Nil	Nil
Between 1st & 2nd premolar	11(22.22%)	15(40.00%)	2(6.66%)
Below the 2nd premolar	2(6.66%)	5(17.77%)	1(4.44%)
Between 2nd premolar & 1st molar	22(71.11%)	14(37.77%)	4(11.11%)
Below the 1st molar	Nil	Nil	Nil

Table-3 showed the most prevalent position was between 1st & 2nd premolar teeth in case of left side mandibular foramen which is found in North Americans[26] & British[9] and between 2nd premolar & 1st molar teeth for right side mental foramen which is found in Negroid[27] & Kenyan subjects.[28] The next common position was second premolar tooth of the mental foramen which is similar to that seen in Caucasians[27], in Thais[24] and in Malayans23. Position of the accessory mental foramen was most commonly below the apex of the 1st molar tooth which was similar to Cagiranbaya and Kansu.[11]

Table 4: Direction of mental foramen (MF):

Direction	Right (35)	Left (35)	Bilateral (35)
Anteriorly	22(62.8%)	26(74.3%)	5(14.3%)
Anterosuperiorly	Nil	Nil	Nil
Posteriorly	11(31.4%)	9(25.7%)	2(5.7%)
Posterosuperiorly	2(5.7%)	Nil	Nil
Superiorly	Nil	Nil	Nil

The direction of the mental foramen was measured by inserting an office pin into the foramen from the lateral part of the mandible. The direction to which the office pin pointed was visually inspected. The results of the different directions or courses of the foramen were then grouped in table-4. The distance between the mental and accessory mental foramen was 0.64mm which was similar to Toh et al.[30]

Table 5: Distance of mental foramen from various parts of mandible:

Landmarks	Mean Distances on Right Sides	Mean Distances on Left Sides
Symphysis menti	2.75	2.93
Posterior border of ramus of mandible	7.04	8.12
Alveolar crest	1.69	1.05
Base of mandible	1.63	1.26

The restoration and form and function without violating important anatomic structures are the fundamental goal in the surgical management of any patient. One of these is the Mental Foramen. Its identification and preservation in periapical surgery, implant surgery, maxillofacial surgery and orthographic procedures is of utmost importance.[31] Moreover, it also aids in interpreting landmarks in oral pathology and forensics.[32] To avoid nerve injury during surgery in the foraminal area, guidelines should be developed based on the literature with respect to verification of the position of the MF.[33]

Conclusion:

These findings suggest that the morphometric measurements of mental foramen in West Bengal, Region may be useful for the surgeons, anaesthetists, neurosurgeons and dentists to carry out nerve block and surgical procedures preventing injury to the related neurovascular structures. This would help immensely in ascertaining the accurate location of the MF because of its great vari ability and thus avoid any unforeseen injury.

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