



ORIGINAL RESEARCH PAPER

Anatomy

MORPHOMETRIC ANALYSIS OF MENTAL FORAMEN AND INCIDENCE OF ACCESSORY MENTAL FORAMEN IN DRY MANDIBLES IN MAHAKAUSHAL REGION OF MADHYA PRADESH.

KEY WORDS: Accessory mental foramen, Symphysis menti, Vernier calipers.

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ABSTRACT

Introduction: Knowledge of variations in the position, shape, and the size of the mental foramen and the presence of the accessory mental foramen is important for dental surgeons. It is also essential to have effective and successful anaesthetic nerve blocks, prior to the surgical procedure.

Materials and Methods: 100 human mandibles obtained from NSCB Medical College, Jabalpur were used for the study. Various parameters were measured. The location shape, and presence of accessory foramen were noted.

Result: 10% of the mandibles showed accessory mental foramen. Most of mental foramina were round shape. The most common position was on the longitudinal axis of the second premolar. Mean distance (in mm) between (1) symphysis menti and MF was 25.41±3.30 & 26.15±2.19 (2) MF and posterior border of ramus was 64.79± 5.08 & 64.51± 5.53 (3) vertical distance between MF and base of mandible was 13.68± 1.65 & 13.66±1.80 (4) alveolar crest and MF was 12.18± 3.33 & 11.48±3.66 on right & left side respectively.

INTRODUCTION:

The mental foramen is an opening located on the external surface of body of mandible in the region of the mandibular premolars. Mental neurovascular bundle emerges from mental foramen. Normally, mental foramen lies below the interval between the premolars teeth or second premolar tooth, midway between the inferior and the alveolar margins of the body [1].

Variations in the position of the Mental foramen have been reported by many authors in different ethnic groups e.g. Tanzanian, Thai, Chinese, British, Saudi Arabian [2,3] and variation in shapes of mental foramen have also been noticed by Agarwal [4].

Any foramen which is in addition to MF is considered as an Accessory Mental Foramen [5] (AMF) and it is usually located below the 1st molar teeth according to Cag'irankaya & Kansu (2008) [6]. This accessory mental foramen may transmit the branches of the mental nerve.

Toh et al [7] described That accessory mental nerve innervate mucus membranes, skin of the corner of the mouth, and the median labial region.

The group indicated the possible occurrence of pain caused by injury of the nerves emerging from the accessory mental foramina by an injection via the mucous membrane.

Boronat López et al. [8] mentioned the double or accessory mental foramen as one of the factors implicated in locoregional anesthesia failure.

Knowledge of the variations in the position, shape, and the size of the mental foramen and the presence of the accessory mental foramen is important for dental surgeons while they performing surgical procedures on the mandible, such as the Curettage of the premolars, Filling procedures, Dental implants, Root Canal Treatments (RCT), Orthognatic surgeries, etc. It is also essential to have effective and successful anaesthetic nerve blocks, prior to the surgical procedure (9).

Many studies have been reported by various authors, which were done in different ethnic groups and on populations of different races, but such studies which have been reported in the in Mahakausal region are sparse. Hence, an attempt was made in our present study, to determine the most common position, location and size, shape of the mental foramen in Mahakausal region, which may be useful for the future implications in our in Mahakausal region.

MATERIALS AND METHODS:

The material used for the study contained 100 human mandibles of undetermine age and unknown sex (as they were not recorded at the time of acquisition) belonging to the Indian population was obtained from NSCB Medical College, Jabalpur,(M.P.). Various parameters were measured by using Digital Vernier caliper, metallic wire and metallic scale on both the right and left sides.

The different parameters recorded by a visual examination were:

1. The number of mental foramina
2. The shape of mental foramina whether oval or round
3. The position of mental foramen in relation to the roots of mandibular teeth.

The position of MF was classified in relation to teeth of the lower jaw according to Tebo and Telford classification (1950) as.

- I – between the canine and the first premolar
- II – beneath the first premolar
- III – between the premolars
- IV – beneath the second premolar
- V – between the second premolar and first molar
- VI – beneath the mesial root of the first molar

Location of MF was identified on both the right and left sides by using following parameters:

- (1) Distance from mental foramen to mental symphysis;
- (2) Distance from mental foramen to alveolar margin and
- (3) Distance from mental foramen to inferior border of the mandible.



Visual examination of mental foramen

Measurements by Vernier callipers

RESULT

Incidences of Mental Foramen: Mental foramen was present in all one hundred observed mandibles and it was bilateral.

Incidences of Accessory Mental Foramen: AMF is observed in 10 mandibles out of 100 mandibles. One mandible show triple mental foramen on right side and other 9 mandible show double mental foramen. AMF was situated in 4 out of 10 mandibles on right side and in 6 out of the 10 mandibles in left side. Thus out of total population of 100 mandibles, AMF was found in right side of the body of mandibles in 4 % while in left side it was present in 6 % of the population under study and 1% mandible show Triple mental foramen.

None of the mandibles presented with bilateral accessory mental foramen.

Shape of MF. On right side it is oval in 35% of mandibles and round in 65% of mandibles. On left side it is oval in 38% of mandibles while it is round in 62% of mandibles. On both right and left sides, mental foramen was oval in 47 % of mandibles and round in 53 % of mandibles.

Table 1 -Shape of Mental foramen On Right side

	Frequency	Percent	Valid %	Cumulative %
Right side				
Round	65	65.0	65.0	65.0
Oval	35	35.0	35.0	100.0
Total	100	100.0	100.0	

On Left side

	Frequency	Percent	Valid %	Cumulative %
Round	62	62.0	62.0	62.0
Oval	38	38.0	38.0	100.0
Total	100	100.0	100.0	

Size of MF. On right side: Mean size was found **2.80±0.80 mm**.

Minimum size is 1.10mm and Maximum size is 4.70 mm.

On left side: Mean size was found **2.88±0.74 mm**. Minimum size is 1.10mm and Maximum size is 4.50 mm.

Position of mental foramen in relation to lower teeth The most frequent position of foramen in relation to the mandibular teeth was in line with the longitudinal axis of 2nd premolar for both right (66.0%) and left (67%) sides (position I V). The second common position was in line between 1st & 2nd premolar (right 17 %; left 20 %) (position III); followed by line between 2nd premolar & 1st molar teeth (right 17 %; left 9 %)(position V). least common position was in the line of 1st molar teeth (right 0.0%; left 4%) (position VI).

The mental foramen was not observed in between canine and first premolar (position I) in any mandible.

Location of MF was identified by using various parameters: Position of MF in relation to various parameters has been described

in Table 2

Table 2 - Location of mental foramen from various parameters -On right side

Parameters	N	Minimum	Maximum	Mean	SD
Symphysis menti	100	7.00	30.20	25.41	3.30
Posterior margin of ramus of mandible	100	53.20	79.40	64.79	5.08
Alveolar crest	100	1.00	19.20	12.18	3.33
Base of mandible	100	10.40	16.90	13.68	1.65

On left side- DISCUSSION-

Parameters	N	Minimum	Maximum	Mean	SD
Symphysis menti	100	22.10	32.80	26.15	2.19
Posterior margin of ramus of mandible	100	53.80	84.10	65.51	5.54
Alveolar crest	100	0.00	18.50	11.49	3.66
Base of mandible	100	10.00	17.80	13.66	1.80

The location of the MF is an important factor when considering the mental incisive anaesthetic block and surgery in the outer premolar mandibular region. There are significant differences reported in the location of MF among different ethnic groups.

Number of mental foramina: the number of mental foramen found in the present study resembled with the findings of **Al-Khateeb T et al. [2007]** reported multiple mental foramina in 10 % of the sides [11].

Jaffar et al. reported multiple mental foramina in 30 % of the mandibles on either side. Only 4 % of the mandibles showed bilateral multiple mental foramina [12].

Gershenson et al. (1986) conducted a study on 525 dry mandibles and dissections in 50 cadavers, the mental foramen (MF) was found: single in 94.67% of the cases and multiple in 5.1% cases in which 4.3% mandibles had double mental foramina, and 0.7% mandibles had triple mental foramina. Finally they found one mandible that had four mental foramina on one side (0.1%). [13].

Wandee Apinhasmit et al. (2006) conducted a study on One hundred and six Thai adult skulls and found Multiple mental foramen (MF) 3.3% in Thai subjects. Two foramina exhibited in 2.8% of the cases and 0.5% of MF exhibited three foramina.

Katakami et al. (2008) examined 150 patients retrospectively with limited cone-beam computed tomography and depicted 16 double foramina (10.6%) and triple mental foramina on one side (0.6%)[15].

Comparison of Shape of mental foramen: The round shaped foramen was the common shape compared to oval shape on both right and left sided in our study. Which is similar to findings of, Singh and Srivastav, Devi K Sankar, Rastogi et al and Gupta and Soni, Kasat et al. Al-khateeb et al. (2007) studied 860 radiographs, also found that majority of mental foramen were round in shape. According to Mbajjorgu et al. (1998), in 32 mandibles of black adults from Zimbabwe, mental foramen was round in 14 mandibles (43.8%) and oval in 18 mandibles (56.3%).

Comparison of Size of the mental foramen. According to Chung et al. (1995), horizontal opening of MF was 2.4 mm and Apinhasmit et al. reported the average horizontal opening was 2.8mm. A study was done by Oguz O, Bozkir MG. on a Turkey population reported the HD to be 2.93 mm on the right side and to be 3.14 mm on the left side; the Vertical Diameter (VD) was 2.38 mm on the right side and it was 2.64 mm on the left side. Rakhi Rastogi et al., described the VD to be 3.58 mm ± 0.17 mm on the right side and to be 3.55 mm ± 0.18 mm on the left side; the horizontal diameter as 4.57 ± 0.19 mm on the right side and it was 4.61 ± 0.17 mm on the left side.

The present observations brought out on right side mean size of MF was 2.80 ± 0.80 mm and on left side mean size of MF was 2.89 ± 0.74 mm.

Comparison of Position of mental foramen in relation to lower teeth- The present study shows, the position of mental foramen below the second premolar as the most common position (right side 66% ,left side 67%). This result is in consistence with that of Wang et al. Jaffar et al. Azaz & Lustmann Phillips et al. Apinhasmit et al. Mwaniki & Hassanali Ari et al. Oguz & Bozkir, Cutright et al. and Green This shows that this is the most common finding in the majority of the ethnic groups.

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