

# MORPHOMETRY AND MORPHOLOGIC ANALYSIS OF MENTAL FORAMEN IN INDIAN ADULT POPULATION SKULLS.

CHETNA THAKUR<sup>1</sup>, PRERNA CHANDRA<sup>2</sup>, TEJENDRA SINGH<sup>3</sup>, BHAWANI SHANKAR MODI<sup>\*3</sup>, SHIKHA SHARMA<sup>5</sup>

<sup>1</sup>Associate Professor, Department of Anatomy, FH Medical College, Agra, Uttar Pradesh

<sup>2</sup>Assistant Professor, Department of Anatomy, ASMC, Shahjahanpur, Uttar Pradesh

<sup>3</sup>Associate Professor, Department of Anatomy, FH Medical College, Agra, Uttar Pradesh

<sup>4</sup>\*Assistant Professor, Department of Anatomy, FH Medical College, Agra, Uttar Pradesh

<sup>5</sup>Professor, Department of Anatomy, FH Medical College, Agra, Uttar Pradesh

Corresponding Author: Dr Bhawani Shankar Modi

E-Mail: bhawanimodi.dr@gmail.com

## **Abstract**

**Background:** Mental foramen present on anterolateral surface of mandible & provide passage for nerve and vessels.

**Methods:** Present study was carried out in department of anatomy on 50 dry adult mandibles from F.H. medical college Agra & Autonomous state medical college Shahjahanpur.

**Results:** Position of mental foramen in the line with second premolar 64% on right side & 70% on left side, between second premolar & first molar 10% right side & 14% on left side, between first and second premolar 18% right side & 4% left side and in the line with first premolar absent on right side & 4% on left side.

**Key words:** Mental foramen, Mandible, Premolar, Molar.

## **Introduction**

Mental foramen present on the anterolateral surface of body of mandible at the end of mental canal and it provide passage for the mental nerve & vessels. The mental nerve and vessels pass through the mental foramen and supply sensory innervations and blood supply to the soft tissues of chin, lower lip and gingival on the ipsilateral side of the mandible [1]

Adjacent to mental foramen anaesthetic solution injected so incisor canine & premolar anaesthetized that is possible to avoid inferior nerve block. [2] So, the mental foramen is very important foramen for diagnostic, surgical, local anaesthetic and other invasive procedure of the oral and maxillofacial area. [3]

This study has been carried out to access the position, size, shape and number of mental foramen with respect to the surgically encountered anatomical landmarks.

### Material and methods

Total of 50 dry adult mandibles obtained from Department of Anatomy F.H. medical college Agra & Autonomous state medical college Shahjahanpur. The position, size, shape and number of mental foramina, were measured on both sides of mandible by using digital Vernier caliper.

Position of MF was identified by using following parameters: (1) Distance from mental foramen to symphysis menti. (2) Distance from mental foramen to base of mandible. (3) Distance from mental foramen to alveolar margin. (4) Distance from mental foramen to posterior margin of ramus of mandible. The position of MF was noted in relation to mandibular teeth and the incidence of double mental foramina were checked. Maximum transverse and vertical diameters of mental foramen were measured. The shape of MF observed was either oval or rounded.

### Results

The mental foramina (MF) were present both sides in all the mandibles. Frequencies of the position of MF in relation to lower teeth are shown in Table 1. MF was situated in the line on with second premolar 64% on right side and 70% on left side, between second premolar & first molar 10% on right side and 14% on left side, between first & second premolar 18% on right side 4% on left side, in line with first premolar 0% on right and 4% on left side.

**Table-1 Frequency of position of mental foramen in relation to mandibular teeth between the two sides**

Location	Right side	Left side
In the line with the second premolar	64%	70%
Between second premolar and first molar	10%	14%
Between first and second premolar	18%	12%
In the line with first molar	18%	4%
In the line with first premolar	0%	4%

Position of mental foramen in relation to symphysis menti, base of mandible, alveolar margin and posterior margin of ramus of mandible by using digital Vernier caliper have been described in Table 2.

**Table- 2 Morphometric measurements of position of mental foramen from various parameter: in mm**

Parameters	Mean of distances of MF from parameters in right side	Mean of distances of MF from parameters in left side
Symphysimententi	25.63	25.62
Base of mandible	13.4	14.22
Alveolar margin	12.4	12.4
Posterior margin of ramus of mandible	60.53	60.54

The maximum horizontal and vertical diameters of mental foramen also measured by using digital Vernier caliper have been describes in Table 3.

**Table-3 Morphometric measurements of size of mental foramen: in mm**

Size of MF	Right side (Mean±SD) mm	Left side (Mean±SD) mm
Horizontal diameter	2.72±.55	2.5±.43
Vertical diameter	2.1±.38	1.8±.43

In most of cases mental foramens were oval in shape 76% on right side and 62% on left side. Table-4.

**Table-4 Morphologic analysis of shape of mental foramen**

Shape of mental foramen	Right side	Left side
Oval	76%	62%
Round	24%	38%

Double mental foramen or Accessory mental foramen (AMF) was observed in 3 out of 50 mandibles. AMF was present in 1 on right side and 2 on left side. So, AMF was found in 2% on right side and 4% on left side

## Discussion

In the present study most common position of the mental foramen in the line with second premolar is 64% cases on rt. side & 70% on the lt. side.of Indian mandibles.

In 1992phillips et al studied the most common position of mental foramen was inferior to crown of second premolar that is similar to present study[4].

In 2009 radiological study of MF Haghani Far & Rokowi, the most common position of MF was between two premolar i.e. 47.2%. [5] Other study from Turkey by Yesilyurt H, Aydinlioglu A, et al in 2008 that most common position of MF was between the two premolar that is not similar of present study. [6]

The literature shows that MF shows racial & ethnic variation. Variation indicate towards the variational mandibular dynamics of population under consideration. Many of differences can also be attributes to variability in chewing habits of different population leading to different development of mandible. [7]

In the present study observed distances between MF from symphysis menti was 25.63, between MF and base of mandible 13.4 mm, between MF and alveolar margin 12.4 mm between MF and posterior margin of ramus of mandible 60.53.

According to Singh R & Srivastav AK (2010) MF was 29.3 mm from symphysis menti, 17.3 from base of mandible, 17 from alveolar crest and 71.8 from post. margin of mandible [8]. According to Souaga et al. (2004) studied 61 dry mandible and found MF has 14.89 mm above the base of mandible and 16.16 mm below the alveolar ridge in males while in females MF was 14.21 mm above the base of mandible and 15.66 below the alveolar ridge. [9]

In the present study mean value of horizontal diameter 2.72 mm rt. side and 2.5 mm on lt. side and vertical diameter 2.16 mm rt side, 1.89 mm on lt. side. According to chung et al (1995), horizontal diameter of MF was 2.4 mm. [10] and Apinhasmil et al, reported horizontal diameter was 2.8 mm. [11] Oguz & Bozkir (2002) did measurement in 34 dry mandibles. The horizontal diameter of MF 2.93 on rt. side & 3.14 on lt. side. The vertical dimension was 2.38 mm & 2.64 mm on rt. and lt. side. [12]

Our study showed also that in mental foramen oval on rt. side 76% & on lt. side 62% and mental foramen rounded in 24% on rt. side & 38% on lt. side. Oliveira Junior et al (2009) reported that the shape was oval in 73% on rt. side & 71.3% on lt. side. [13]

In the present study accessory mental foramen were located more on left side (4%) than on right side (2%). This is accordance to Singh R, Srivastav AK studies and Rajkohila J, Daniel P studies. [8] [14] AMF are a rare anatomical variation and reported to have a prevalence ranging from 1.4% to 10%. [15]

Presurgical imaging of AMF is recommended to enable accurate planning, prevent iatrogenic injury, and contribute to successful treatment. Three-dimensional evaluation with computed tomography (CT) and cone beam CT could demonstrate the presence and course of AMF. [16]

Failure to do peripheral neurectomy of accessory mental nerve in case of trigeminal neuralgia has resulted in recurrence of neuralgic pain and eventually failure of this procedure. [15] It could also play a role in interpretation of anatomical landmarks in forensic medicine. [17]

### **Conclusion:**

Knowledge of morphometry & morphologic study of mental foramen that help to accurate anaesthetic procedure & avoid repeated failure to mental nerve block. The present study suggests

that many variations related to mental foramen which carries along with-it importance in diagnosing radiographic periapical area from canine to medial root of first molar.

It is suggested that preoperative radiographs from different angles if necessary should be taken to locate the MF prior to surgery. This would help immensely in ascertaining the accurate location of MF because of its great variability & avoid any injury.

### References:

1. Sinnathamby, C. S. Last's anatomy Regional and Applied. 10th Ed. Edinburgh, Churchill Livingstone, 1999.
2. Rowe AHR. In: Clinical Dentistry. 3rd edi. Oxford: Blackwell Scientific Publications 1986. P. 372- 382.
3. Zide, B. & Swift, R. How to block and tackle the face. Plastic. Recon. Surg. 1998 101:2018.
4. Phillips,J.L.;Weller, R.N.&kulild,J.C. The mental foramen: 2. Radiographic position in relation to the mandibular second premolar. J. Endod1992;18:271-4.
5. Haghanifar S, Rokouei M. Radiographic evaluation of the mental foramen in a selected Iranian population. Indian J Dent Res2009;20(2):150-2.
6. Yesilyurt H, Aydinlioglu A, Kavakli A, Ekinçi N, Eroglu C, Hacialiogullari M, Diyarbakirli S. Local differences in the position of the mental foramen. Folia Morphol2008;67(1):32-5.
7. Parmar A, Shah K, Patel B, et al. Morphological and morphometric analysis of mental foramen in dry human mandibles. International journal of medical science and public health2013;2(3):654-6.
8. Singh R, Srivastav AK. Study of position, shape, Size and incidence of mental foramen and accessory mental foramen in Indian adult human skulls. Int. J Morphol2010;28(4):1141-6.
9. Souaga K, Adou A &Angoh Y. Topographical and morphological study of the mandibular foramen in black Africans from the Ivory Coast. Odontostomatol. Trop2004;27:17-21.
10. Chung MS, Kim HJ, Kang HS & Chung IH. Locational relationship of the supraorbital notch or foramen and infraorbital and mental foramina in Koreans. Acta Anat. (Basel)1995;154:162-5.
11. ApinhasmitW, MethathrathipD, Chompoopong S & Sangvichlen S. Mental foramen in Thais: an anatomical variation related to gender and side. Surg. Radiol. Anat2006;28:529-33.
12. Oguz O & Bozkir MG. Evaluation of location of mandibular and mental foramina in dry, young, adult human male, dentulous mandibles. West Indian Med. J.2002;51:14-6.
13. Oliveira junior EM, Araujo ALD. et al. Morphological and morphometric study of the mental foramen on the M-CP-18 Jiachenjiang point. Int. J. Morphol2009;27:231-8.

14. Rajkohila J, Dianiel P, Ambikaipakan S, Rabi S. Morphological & morphometric analysis of accessory mental forame in dry human mandibles of south Indian population. *Indian J of dental research* 2018; 29(1):56-60.
15. Thakur G, Thomas S, Thayil SC, Nair PP. Accessory mental foramen: A rare anatomical finding. *BMJ Case Reports* 2011. DOI:10.1136/bcr.09.2010.3326.
16. Sekerci AE, Sisman Y. Bilateral accessory mental foramina and canals: Report of an extremely rare anatomical variation. *J Dent Implant* 2014; 4:101-4.
17. Khojastepour L, Mirbeigi S, Mirhadi S, Safaee A. Location of mental foramen in a selected Iranian population: A CBCT assessment. *Iran Endod J* 2015;10:117-21.