

## MORPHOMETRIC AND MORPHOLOGICAL STUDY OF HUMAN DRY MANDIBLE

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### ABSTRACT

**Background:** Mental foramen is a small foramen situated in anterolateral aspect of the body of the mandible. Normally, mental foramen is located below the interval between the premolars. It transmits mental nerve, artery and vein. Mental nerve is a branch of inferior alveolar nerve which supplies sensation to lower lip and the labial mucosa and lower canines and premolars. The most useful injection for anaesthetizing the mandibular teeth is the inferior alveolar nerve block. To anaesthetize the anterior teeth, including the premolars and canines, it is possible to avoid giving inferior alveolar nerve block by injecting anesthetic solution adjacent to the mental foramen.

**Materials and Methods:** Totally 300 mandibles were used for this study, from different medical teaching Institutes. The following measurements were measured and recorded. The results were expressed in the form of Mean  $\pm$ SD.

**Results:** The shape of foramen was oval in 72%. The knowledge of mental foramen is very important for blockage of mental nerve. The location of mental foramen was found 78.65% in line with the longitudinal axis of the second molar teeth, 13.52% was present in between first and second molar teeth. There was no significance difference between the mean distance between mental foramen and alveolar margin of right and left side.

**Conclusion:** The knowledge about variation in size, shape and position of mental foramen may be helpful to the dental surgeons to achieve full anesthesia after nerve block.

**KEY WORD:** Mental foramen, Symphysis menti, Nerve block, Anesthesia.

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### BACKGROUND

The mental foramen is defined as the entire funnel-like opening in the lateral surface of the mandible at the terminus of the mental canal. This foramen is contained entirely within the buccal cortical plate of bone. The average size of the foramen is 4.6 mm horizontally and 3.4 mm vertically on the lateral surface of the mandible. The foramen is usually larger on the left side of the mandible. The mental foramen marks the termination of the mandibular canal

in the mandible, through which the inferior alveolar nerve and vessels pass. At this point, the mandibular canal bifurcates and forms the mental and incisive canals. The mental bundle passes through the mental foramen and supplies sensory innervation and blood supply to the soft tissues of the chin, lower lip and gingiva on the ipsilateral side of the mandible [1-3].

Mental foramen transmits mental nerve and vessels providing sensory innervation and blood

supply, respectively. It is the front opening of mandibular canal on the body of the mandible and above the tubercle of chin. Mental nerve passes through MF and supplies the chin, lower lip, buccal mucosa of incisors, canines and premolars [4-6].

Mental foramen is situated on the anterolateral aspect of the body of mandible. It gives path to mental nerve and vessels. Variations of the mental foramen are encountered ranging from difference in shape and positions to presence of accessory foramen or even complete absence in some cases. Knowledge of its position, shape, and size is important for performing anesthetic block prior to clinical procedures in lower anterior teeth and to preserve integrity of the mental nerve trunk in surgical interventions. As the mental foramen is an important anatomical landmark to facilitate surgical, local anesthetic, and other invasive procedures, the present study is aimed at assessing morphological and morphometric features of mental foramen with reference to surrounding landmarks [7-9]. The present study is conducted to see the morphometric and morphological parameters in adult dry mandibles.

## MATERIALS AND METHODS

300 mandibles were used for this study, from different medical institutes. The following measurements were measured and recorded. The mean transverse diameter, mean longitudinal diameter, the mean distance between symphysis menti and foramen on right and left side, the mean distance between mental foramen and alveolar margin was on right and left side, the mean distance between mental foramen and lower border of mandible on right and left side were measured. The results were expressed in the form of Mean $\pm$ SD.

## RESULTS

The shape of foramen was oval in 72%. The knowledge of mental foramen is very important for blockage of mental nerve. The location of mental foramen was found 78.65% in line with the longitudinal axis of the second molar teeth, 13.52% was present in between first and second molar teeth. The mean distance between mental foramen and alveolar margin was 14.33 $\pm$ 3.31mm

on right side and 12.76 $\pm$ 3.64mm on left. The mean distance between mental foramen and lower border of mandible was 11.20 $\pm$ 2.52mm on right side and 13.65 $\pm$  2.16mm on left. It was found that, the mean transverse diameter was 3.15 $\pm$ 0.92mm and the mean longitudinal diameter 2.62 $\pm$ 0.76mm. In relation with location the mean distance between symphysis menti and foramen was 25.26 $\pm$ 5.23mm on right side and left side it was 29.21 $\pm$ 3.95mm.

## DISCUSSION

The mandibular canal, through which the inferior alveolar nerve and vessels pass, bifurcates and forms the mental and incisive canals [10]. The mental foramen is an important anatomical landmark and is a funnel-like opening located on the anterolateral aspect of the mandible which marks the termination of the mental canal, to facilitate diagnostic, surgical, local anesthetic and other invasive procedures of the oral and maxillofacial region. The mental nerve and vessels radiate through the mental foramen and supply sensory innervation and blood supply to the soft tissues of the chin, lower lip and gingiva on the ipsilateral side of the mandible. Knowledge of the precise location of mental foramen is important in performing effective mental nerve block and which in turn will invariably reduce the relative risks during these procedures. The standard anatomy text books states that the mental foramen is most commonly found between the apices of the first and second lower premolar. As the mental foramen cannot be clinically visualized or palpated in clinical situations, it is localized in relation to the lower teeth. In such cases, mental foramen can be accurately localized if the distance from the symphysis menti is known [11].

In present study it was found that, the mean transverse diameter was 3.15 $\pm$ 0.92mm and the mean longitudinal diameter 2.62 $\pm$ 0.76mm. The location of mental foramen was found 78.65% in line with the longitudinal axis of the second molar teeth, 13.52% was present in between first and second molar teeth. In relation with location the mean distance between symphysis menti and foramen was 25.26 $\pm$ 5.23mm on right side and left side it was 29.21 $\pm$ 3.95mm. The mean

distance between mental foramen and alveolar margin was  $14.33 \pm 3.31$  mm on right side and  $12.76 \pm 3.64$  mm on left. The mean distance between mental foramen and lower border of mandible was  $11.20 \pm 2.52$  mm on right side and  $13.65 \pm 2.16$  mm on left. The shape of foramen was oval in 72%. The knowledge of mental foramen is very important for blockage of mental nerve. Our results are in correlation with previous studies.

The study of Sumit Gupta is in agreement with our study, they studied the 240 sides of 120 mandibles. Round shape of mental foramen was observed in 89% of sides while rest was oval in shape. Average size of mental foramen was 2.62 mm maximum diameter. Mental foramen was situated below the apex of 2nd premolar tooth in 75.8% of mandibles, whereas in 12.2% of mandibles it was situated between 1st and 2nd premolars. In 8.3% of mandibles it was situated below the apex of 1st premolar tooth and in 3.33% of mandibles it was situated below the 1st molar tooth [12]. The study of Wei Cheong Ngeow study results are in correlation with present study results. In their study the most common position for the mental foramen relative to the teeth in this sample was in line with the second premolar for both the right and left side (69.24%). The second most common location was between the first and the second premolar (19.57%) [13].

Rajani Singh & A. K. Srivastav study shown similar results in position of the mental foramen. In the present study, most common position of MF is below the apex of second premolar tooth in 68.8% of Indian mandibles. In British mandibles, it was between first and second premolars in 65% mandibles [14].

According to Aktekin et al [15] normally mental foramen is located under and between the apexes of the two premolars, at a little angle towards the back. Wang et al. [16] showed that the location of the mental foramen under the apex of the lower first premolar was the most common location in 58.98% cases, on the average the distance of the most anterior portion of the anterior border of the foramen to the mandibular symphysis was 28.06 mm, between the most anterior portion of the anterior

border of the foramen to the posterior border of the mandible was 74.14 mm, between the inferior portion of the foramen to the inferior border of the mandible was 14.70 mm and between the superior portion of the foramen to the crown of the second lower premolar was 2.50 mm. The most common position of the foramen was inferior to the crown of the second premolar and of approximately 60% of the distance from the point of the vestibular cuspid of this tooth to the inferior border of the mandible, confirming also some of our findings. Santini & Land [17] studied the anterior-posterior portion of the mental foramen in 68 Chinese mandibles and in 44 British mandibles. The position of the mental foramen in Chinese mandibles was the longest on the longitudinal axis of the second pre molar while in the British mandibles it was located between the apexes of the first and the second premolars. According to Mbajjorgu et al [18] by the anatomical transverse sectional study in 32 mandibles of black adults from Zimbabwe the mental foramen was found to be a round shape in 14 of the 32 mandibles (43.8%) and of an oval shape in 18 mandibles (56.3%).

The distance to the upper border was 13.6 mm on the right side and 14.62 mm on the left side. The horizontal dimension of the mental foramen was 2.93 mm on the right side and 3.14 mm on the left side. The vertical dimension was 2.38 mm and 2.64 mm on the right and left sides respectively. Souaga et al [19] studied 61 dry mandibles in which, for the male sex, the mental foramen was found 14.89 mm above the lower border of the mandible and 16.16 mm below the alveolar ridge. In the feminine mandibles the foramen was located 14.21 mm above the lower mandible border and 15.66 mm below the alveolar ridge. The precise identification of position of the mental foramen is important in both diagnostic and clinical procedures of the mandible. Clinically, mental nerve bundle emerging from the mental foramen may get injured during surgical procedures with resulting anesthesia along its sensory distribution [20]. The present study results are in correlating with our previous study results [4, 6]. The knowledge of mental foramen location and measurements are very helpful for blockage of mental nerve in facial and dental surgeries.

**Conflicts of Interests: None**

**REFERENCES**

- [1]. Phillips JL, Weller RN, Kulild JC. The mental foramen: Radiographic position in relation to the mandibular second premolar. *J Endod* 1992;18:271-274.
- [2]. Shankland WE 2<sup>nd</sup>. The position of mental foramen in Asian Indians. *J Oral Implantol.* 1994;68:118-123.
- [3]. Phillips JL, Weller RN, Kulild JC. The mental foramen: 1. Size, orientation and positional relationship to the mandibular second premolar. *J Endod.* 1990;16:221-223.
- [4]. Shaik H.S., Shepur M P., Desai S., Thomas S., Maavishettar G., Haseena S. Morphological and morphometric study of mental foramen South Indian mandibles. *Indian J Med Res,* 2012 ; ( 3): 64-66.
- [5]. Neves F.S., Torres M.G., Oliveira C., Campos P.S., Crusoé-Rebello I. Lingual accessory mental foramen: A report of an extremely rare anatomical variation. *J Oral Sci.* 2010;52 (3): 501-503.
- [6]. Vikas.C.Desai, Hussain Saheb Shaik. A Study on Mental Foramen of South Indian Adult Dry Mandibles. *J. Pharm. Sci. & Res.* 2015;7(12):1103-1104.
- [7]. S. Agthong, T. Huanmanop, and V. Chentanez, Anatomical variations of the supraorbital, infraorbital, and mental foramina related to gender and side. *Journal of Oral and Maxillofacial Surgery.* 2005;63(6):800–804.
- [8]. P. S. Igbigbi and S. Lebona, "The position and dimensions of the mental foramen in adult Malawian mandibles," *West African Journal of Medicine,* 2005;24(3):184–189.
- [9]. T. Hasan, M. Fauzi, and D. Hasan, "Bilateral absence of mental foramen, a rare Variation," *International Journal of Anatomical Variations,* 2010;3:167-169.
- [10]. Shankland WE. The position of the mental foramen in Asian Indians. *J. Oral Implantol.* 1994;20(2):118-123.
- [11]. Williams PL, Bannister LH, Berry MM, Collins P, Dyson M and Dussek JE *Gray's Anatomy: The anatomical basis of medicine and surgery.* 38th Edn. NY, Churchill Livingstone. 2000.
- [12]. Sumit Gupta, Jagdish S. Soni. Study of Anatomical Variations and Incidence of Mental Foramen and Accessory Mental Foramen In Dry Human Mandibles. 2012;2(1);28-30.
- [13]. Wei Cheong Ngeow, Yusof Yuzawati. The location of the mental foramen in a selected Malay population. *Journal of Oral Science,* 2003;45(3):171-175.
- [14]. Rajani Singh & A. K. Srivastav. Study of Position, Shape, Size and Incidence of Mental Foramen and Accessory Mental Foramen in Indian Adult Human Skulls. *Int. J. Morphol.,* 2010;28(4):1141-1146.
- [15]. Aktekin M, Celik HM, Celik HH, Aldur MM and Aksit MD. Studies on the location of the mental foramen in Turkish mandibles. *Morphologie,* 2003;87(277):17- 19.
- [16]. Wang TM, Shih C, Liu JC and Kuo KJ. A clinical and anatomical study of the location of the mental foramen in adult Chinese mandibles. *Acta Anat. (Basel).* 1986;126(1):29-33.
- [17]. Santini A and Land MA. Comparison of the position of the mental foramen in Chinese and British mandibles. *Acta. Anat.* 1990;137:208-212.
- [18]. Mbajjorgu EF, Mawera G, Asala SA and Zivanovic S. Position of the mental foramen in adult black Zimbabwean mandibles: a clinical anatomical study. *Cent. Afr. J. Med.* 1988; 44(2):24-30.
- [19]. Souaga K, Adou A and Angoh Y. Topographical and morphological study of the mandibular foramen in black Africans from the Ivory Coast. *Odontostomatol. Trop.* 2004; 27(105):17-21.
- [20]. Phillips JL, Weller RN and Kulild JC. The mental foramen: Size, orientation and positional relationship to the mandibular second premolar. *J. Endod.* 1990;16:221-223.

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