ORIGINAL ARTICLE

A morphological study of Mental Foramen in adult human mandibles of unknown age and sex in Pakistani population

MUHAMMAD HABIB UR REHMAN[1], ARUNA BASHIR[2], HUMARA GULNAZ[3]

ABSTRACT

Aim: To enlighten the morphological features of mental foramen in Pakistani population to provide guidelines for forensic scientists and dentists.
Methods: 50 dry adult male and female human mandibles were obtained. Size, incidence, shape, location and number of mental foramina were recorded. Incidence of accessory mental foramina was also noticed. Distance from anatomical landmarks and size was recorded using vernier caliper.
Results: Shape of mental foramen was oval in 6% of mandibles and rounded in 94% on the right side and on left it was oval in 13% of mandibles and rounded in 87%. The average size of mental foramen was 2.79 mm on right side and 2.7 mm on the left side. Mental foramen was most commonly found below the apex of second premolar tooth i.e. in 70% of the mandibles. The mean distances of mental foramina from upper border were 1.3 cm and 1.2 cm and from lower border were 1.4cm and 1.5 cm on right and left sides respectively. The average distances from symphysis menti were 2.9cm and 3 cm and 7.2cm and 7.3cm from posterior margin of ramus of mandible on the right and left sides respectively.
Conclusion: Comprehensive knowledge of the mental foramen and it's variations in different population is essential for dental surgeons, anesthetists, anatomists and forensic scientists.
Keywords: Mental Foramen, Vernier Caliper, ethnicity

INTRODUCTION

Mental foramen, an important anatomical land mark, is located on the outer surface of the body of mandible beneath the premolars teeth[1]. It has been reported that mental foramen lies at approximately an equal distance from the upper and lower borders of mandible in majority of people[2,3]. On the inner surface of the body of mandible lies mandibular foramen that leads into the mandibular canal, which opens on the outer surface of the mandible as mental foramen[4]. The inferior alveolar vessels and nerve enter the mandibular canal by passing through mandibular foramen and exit from mental foramen as mental vessels and nerve respectively[5].

Variations in the position of mental foramen have been studied in many parts of world and it has been reported that there are differences in anatomical position of mental foramen in various ethnic and cultural groups. It has been found to be located in the middle of the apices of lower premolars[6,7]. Researchers have reported that there are morphological and morphometric variations regarding mental foramen among various ethnic groups like British, Tanzanian, Saudi Arabian, Chinese, Thai, and Indian population[8,9]. Mental foramen is an important anatomical landmark to aid different invasive procedures such as giving local anesthetic for dental procedures. It is also of significant importance for forensic experts. The knowledge regarding position, shape, and size is important for anesthetists to block mental nerve during dental and lower jaw surgeries[10,11].

There is no extensive research regarding morphological and morphometric variations of mental foramen in our country. Therefore, the current study is aimed to determine morphological characteristics of mental foramen with reference to neighboring landmarks.

MATERIALS AND METHODS

This study was conducted in the Anatomy Department of Nawaz Sharif Medical College, University of Gujrat. Data were collected from 50 dry adult human mandibles of unknown sex. The size, shape, position and distance of Mental Foramen from various landmarks i.e., "symphysis menti, alveolar crest; posterior border of the ramus of mandible, and lower border of mandible" was recorded. The digital vernier caliper was used for measuring the size and distance of Mental Foramen from various anatomical land marks. For statistical analysis SPSS version 22 was used.

[1]*Associate Professor, Department of Anatomy, Nawaz Sharif Medical College, University of Gujrat*
[2]*Associate Professor, Department of Anatomy, Lahore Medical & Dental College, Lahore*
[3]*Assistant Professor, Department of Anatomy, Shalamar Medical & Dental College, Lahore*
Correspondence to Dr. Aruna Bashir, Associate Professor: E mail: bashir_a25@hotmail.com Tel: 0336-4359625

RESULTS

Size of Mental Foramina: On the right side average size was 2.79 mm, whereas, it was 2.70 mm on the left side.
Shape of Mental Foramina: On right side it was oval in 6% of mandibles and rounded in 94% of mandibles. On left side it was oval in 8% of mandibles while it was rounded in 92% of mandibles.

Table 1: Shape of Mental Foramina

Shape	Right Side	Left Side	Total
Oval	4	3	7
Rounded	46	47	93
Total	50	50	100

Position of Mental Foramina in relation to lower teeth: Mental Foramen was situated below the apex of second premolar tooth in 70% mandibles whereas in18% of mandibles it was observed between first and second premolars and in 12% it was found between second premolar and first molar.

Table 2: Position of mental foramina.

Position of mandible	No. of mandibles
Below the apex of second premolar tooth	35
Between first and second premolars	9
Between second premolar and first molar	8

Distance of Mental Foramina from various landmarks has been described in Table 3.

Table 3: Mean of distances of Mental Foramina from various Anatomical Land marks.

Anatomical Land marks	Mean of distances of Mental Foramina from Land mark on right side. (cm)	Mean of distances of Mental Foramina from Land mark on left side (cm)
Upper border	1.3	1.2
Lower border	1.4	1.5
Symphysis Menti	2.9	3
Posterior margin of ramus of mandible	7.2	7.3

Incidences of Mental Foramina. Mental Foramen was present bilaterally in all the 50 mandibles.
Incidences of Accessory Mental Foramina. No Accessory Mental Foramen was present in all the 50 mandibles which were observed.

Fig. 1: Mental Foramen below second premolar teeth on the left side.

Fig. 2: Bilateral Mental Foramen.

Fig. 3: Mental Foramen in the interval between 1st and 2nd premolars.

DISCUSSION

Morphological features of mental foramen have been studied in various parts of the world but this study has not been done extensively in Pakistan. However, its morphology is of significant importance for forensic experts as well as dental surgeons. According to various studies done in different ethnic groups average size of mental foramen was 2.4 mm[12]

2.8mm[13] and 3.97 mm[14] whereas, in our study the average size of mental foramen was 2.79mm on right side and 2.7 mm on the left side.

In our study, shape of mental foramen was oval in 6% of mandibles and rounded in 94% on the right side and on left it was oval in 13% of mandibles and rounded in 87%. According to another study done in 2007[15], the majority of foramina were rounded in shape; these findings are similar to our observations. Another study[16] done in Zimbabwe in 1998 on 32 mandibles of black adults revealed that mental foramen was rounded in 43.8% and oval in 56.3% of the mandibles. One study[17] reported in 2009 that the shape of mental foramen was oval in 73.8% and rounded in 26.2% mandibles. These observations are not in accordance with our findings and the differences may be due to different ethnicity.

According to our study, mental foramen was most commonly found below the apex of second premolar tooth i.e. in 70% of the mandibles, whereas, in a study done in 2003[7] it was recorded that mental foramen was located between the apices of two premolars in majority of the mandibles. Another study[18] showed that the most common position was below crown of second premolar. These findings are not consistent with our study.

A study[19] done in China in 1986 showed that the average distance of mental foramen from symphysis menti was 28 mm, whereas, it was approximately 74 mm from posterior border of ramus of mandible. They also recorded the average distance of mental foramen from base of mandible which was 14.70mm. According to another study[20], the average distance of mental foramen from symphysis menti was approximately 19 mm on both right and left sides. In our study, the mean distances of mental foramina from upper border were 1.3 cm and 1.2 cm and from lower border were 1.4 cm and 1.5 cm on right and left sides respectively. These differences may suggest that the mandibles that were used in our study were probably from older age group. The average distances from symphysis menti were 2.9 cm and 3 cm and 7.2 cm and 7.3 cm from posterior margin of ramus of mandible on the right and left sides respectively.

CONCLUSION

The present study reveals average size, shape, position and distance of mental foramina from neighboring anatomical landmarks among Pakistani population. Comprehensive knowledge of the mental foramen and it's variations in different population is essential for dental surgeons, anesthetists, anatomists and forensic experts.

REFERENCES

1. Budhiraja V, Rastogi R, Lalwani R et al. Study of Position, Shape, and Size of Mental Foramen Utilizing Various Parameters in Dry Adult Human Mandibles from North India. ISRN Anatomy. 2013; 2013.
2. Udhaya, K, Saraladevi KV, Sridhar J. The Morphometric Analysis of the Mental Foramen in Adult Dry Human Mandibles: A Study on the South Indian Population. J Clin Diagn Res. 2013; 7(8): 1547–51.
3. Khojastepour L, Mirbeigi S, Mirhadi S, Safaee A. Location of Mental Foramen in a Selected Iranian Population: A CBCT Assessment . Iranian Endodontic Journal. 2015; 10(2): 117.
4. Samanta, Paramita P, Kharb P. Morphometric analysis of mandibular foramen and incidence of accessory mandibular foramina in adult human mandibles of an Indian population. Rev Arg de Anat Clin. 2013; 5(2): 60-6.
5. Juodzbalys G, Wang HL, Sabalys G. Anatomy of mandibular vital structures. part i: mandibular canal and inferior alveolar neurovascular bundle in relation with dental implantology. J Oral Maxillofac Res. 2010; 1(1): e2.
6. Gershenson A, Nathan H, Luchansky E. Mental Foramen and Mental Nerve: Changes with Age. Acta Anatomica. 1986; 126: 21–8.
7. Santini A, Land M. A comparison of the position of the mental foramen in Chinese and British mandibles. Acta Anatomica. 1990; 137(3): 208–12.
8. Green RM. The position of the mental foramen: a comparison between the southern (Hong Kong) Chinese and other ethnic and racial groups. Oral Surg. Oral Med. Oral Pathol. 1987; 63: 281-90.
9. Shukla RK, Gupta P, Hussein M, et al. Morphometric measurements of Mental Foramen in dry Humans Mandibles in North Indian population. Int J Anat Res. 2015; 3(1):899-905.
10. Lopes PTC, Pereira GAM, Santos AMPV. Location of the mental foramen in dry mandibles of adult individuals in Southern Brazil. J Morphol Sci. 2010; 27(1): 23-5.
11. Ukoha, UkohaUkoha, et al. "Position, shape and direction of the mental foramen in mandibles in South-Eastern Nigeria." International journal of biomedical research 4.9 (2013): 499-503.
12. Chung MS, Kim HJ, Kang HS et al. Locational relationship of the supraorbital notch or foramen and infraorbital and mental foramina in Koreans. Acta Anat (Basel). 1995; 154:162.
13. Apinhasmit W, Chompoopong S, Methathrathip D, et al. Supraorbital Notch/Foramen, Infraorbital Foramen and Mental Foramen in Thais: anthropometric measurements and surgical relevance. J Med Assoc Thai. 2006; 89(5): 675-82.
14. Souaga K, Adou A, Angoh Y. Topographical and morphological study of the mandibular foramen in black Africans from the Ivory Coast. Odontostomatol Trop. 2004; 27(105): 17-21.
15. Al-Khateeb T, Al-HadiHamasha A, Ababneh KT. Position of the mental foramen in a northern regional Jordanian population. Surg Radiol Anat; 2007; 29:231-7.
16. Mbajiorgu EF, Mawera G, Asala SA, et al. Position of the mental foramen in adult black Zimbabwean mandibles: a clinical anatomical study. Cent Afr J Med. 1998; 44:24-30.
17. Oliveira JEM, Araujo ALD, Da Silva CMF, et al. Morphological and morphometric study of the mental foramen on the M-CP-18 Jiachenjiang point. Int J Morphol. 2009; 27: 231-8.
18. Aktekin M, Celik HMt al. Studies on the location of the mental foramen in Turkish mandibles. Morphologie. 2003; 87:17-9.
19. Wang TM, Shih C, Liu JC, et al. A clinical and anatomical study of the location of the mental foramen in adult Chinese mandibles. Acta Anat (Basel). 1986; 126: 29-33.
20. Yesilyurt H, Aydinlioglu A, Kavakli A et al. Local differences in the position of the mental foramen. Folia Morphol. 2008; 67: 32-5.