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Morphological variation in shape position and direction of mental foramen with clinical importance in dry human mandible

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Abstract
Aim: To study the most common shape position direction of mental foramen in dry mandible with clinical importance in Jharkhand region.
Material and Methods: 46 dry mandible were collected from the Department of Anatomy, Mahatma Gandhi Memorial Medical College, Jamshedpur, Jharkhand and were investigated for the shape position and direction of mental foramen
Result: Mental foramen was present in all 46 mandibles (45 bilateral and 1 unilateral)**.** Most common shape was oval (58.69%). The most frequent position of mental foramen was in line with the longitudinal axis of the 2nd premolar tooth (64.82%), and the most common direction was postero-superiorly (91.30%). An accessory mental foramen was present in 2 mandibles.

Keywords: mandible, shape position, morphological variation, mental foramen

Introduction

Mandible is the largest and strongest bone of face having two very important foramina mandibular and mental. They are connected through mandibular canal. Mandibular foramen is situated on the internal surface of ramus while the mental foramen is situated on antero-lateral aspect of body of mandible. Mandibular foramen marks the termination of mandibular canal in the mandible and transmits mental nerve and vessels, which innervate the lower teeth, lip, gingiva and soft tissues of chin area. It is of great important landmark for dental surgeons to perform surgery and local anesthetic procedure of dental region. Variations of the mental foramen are often seen from difference in shape and positions to presence of accessory foramen. The orientation and position of the mental foramen is important in both diagnostic and clinical procedures of the mandible. During surgery mental nerve may get injured resulting paraesthesia or anesthesia along its sensory distribution (Phillips *et al*, 1990). Thus it is important to have knowledge of the probable location of the mental foramen for a safe surgical procedure.

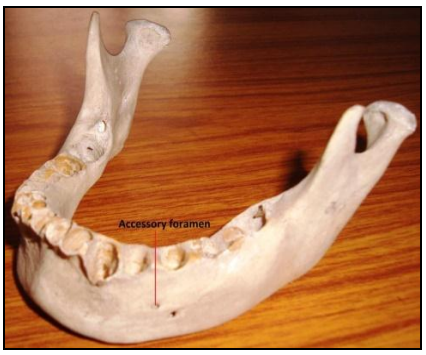

Fig 1: Presence of accessory foramen

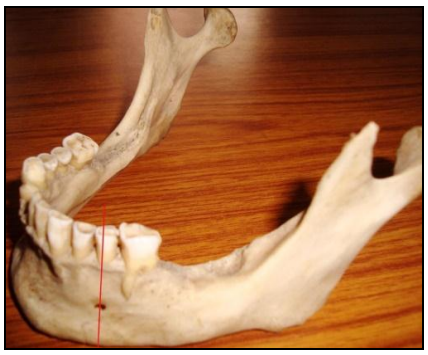

Fig 2: MF with the longitudinal axis of the 2nd premolar

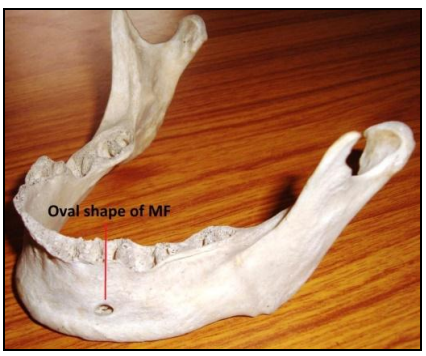

Fig 3: Oval shape MF

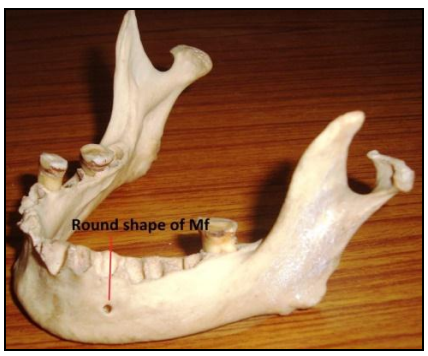

Fig 4: Round shape MF

Material and Methods

46 dry mandible of unknown sex were collected from the Department of Anatomy, Mahatma Gandhi Memorial Medical College, Jamshedpur, and Jharkhand. Mental foramen was assessed by visual inspection in all mandibles and their shape, situation, size, and direction for both halves in each mandible were recorded with the help of digital vernier caliper. The shape of mental foramen was either rounded or oval. The direction of opening of mental foramen was recorded as postero-superior or antero-superior. Location of mental foramen was expressed in relation with lower jaw teeth from beneath the 1st premolar to beneath the 1st molar and the data were recorded.

Result

46 mandible were studied for shape, situation and direction of mental foramen and recorded. The most common shape observed was oval with 58.69% and round in 41.31%. The most common position of mental foramen in relation to teeth was in line with the longitudinal axis of 2nd premolar (64.82%). The second common position was between 1st and 2nd premolar (26.37%). The last position was between 2nd premolar and 1st molar (8.78%). Position was bilaterally similar in 91.23% of mandibles. The direction for exit of mental foramen was postero-superiorly (91.30%) followed by antero-superiorly (6.67%). The linear distance from symphysis menti and anterior most point was 25.95 mm on right side and 26.46 mm on left. Mean horizontal diameter was 3.04 mm on right side and 3.24 mm on left side whereas mean vertical diameter was 2.19 mm and 2.17 mm for right and left side respectively.

Table 1: Shape of mental foramen

Shape	Right side (%)	Left side (%)
Oval	57.78	59.60
Round	42.22	40.40

Table 2: Position of mental foramen

Position	Right side	Left side	Bilateral	Total
Between 1st & 2nd premolar	0	0	24	24
Beneath 2nd premolar	0	1	58	59
Between 2nd premolar & 1st molar	0	0	8	8

Discussion

The location of the mental foramen is an important factor when considering the mental incisive anesthetic block and surgery in the outer premolar mandibular region. There are significantly differences reported in the location of among different ethnic groups. The results of our study about position shape and direction were compared with that of other authors. The most common location of the mental foramen in our study was in a longitudinal axis of second premolar. It matches with the result of previous studies in other Asian countries like Sri Lanka and Thailand. Similar results were observed by other authors, where the mental foramen was found mostly in the longitudinal axis of the second premolar. However in northern Nigerian it was reported that most common position of mental foramen was in line with interdental space between the 1st and 2nd premolar. Shape of mental foramen in present study also agree with most of the authors except Singh and Srivastav. In present study accessory mental foramen was present in 4.34% similar to Gershenson *et al.*, who examined 525 dry mandibles and reported that 4.3% mandibles had a double mental foramen. Serman reported the incidence of accessory mental foramen to be 2.7% while Singh and Srivastav observed the presence of accessory foramen in 13%.

Table 3: Comparison of shape of mental foramen between the present study and other studies

Authors	Shape	
	Oval	Round
Agarwal and Gupta	92.0%	8.0%
Mbajiorgu *et al*.	56.3%	43.8%
Singh and Srivastav	6.0%	94.0%
Gershenson *et al.*	65.5%	34.5%
Prabodra and Nanayakkara	66.7%	33.3%
Present study	58.69%	41.31%

Table 4: Comparison of position of present study with similar studies by different groups

		Position			
Authors	Side	Between 1st & 2nd premolar	Beneath 2nd premolar	Between 2nd premolar & 1st molar	Population
Amorin *et al*	Right	19.8	71.4	8.8	Brazilian
	Left	23.1	68.1	8.8	
Yeşilyurt *et al.*	Right	34.3	55.7	4.3	Turkish
	Left	25.7	61.4	5.7	
Agarwal and Gupta	Right	7.8	81.55	2.7	North Indian
	Left	7.6	81.50	3.1	
Present study	Right	26.66	64.44	8.88	Jharkhand region
	Left	26.08	65.21	8.69	

Conclusion

Variations do exist in the position, shape, and size and direction of mental foramen in different population. Present study may assist dental surgeons in avoiding injury of mental nerve while doing surgery of that region like dental implant, apico-curettage, endodontic treatment etc. In cases of fractured mandible of para symphysis region the position of mental foramen and its involvement in to the fracture site is very important. Para symphysis fracture passing through the mental foramen generally shows hematoma formation and neurosensory loss after trauma. Mental foramen variation often remains unnoticed and undiagnosed. The knowledge about direction of opening and morphometry is important for surgeons, anaesthetists, neurosurgeons and dentist in mental nerve block.

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