International Journal of Medical and Health Research
ISSN: 2454-9142
Received: 21-02-2020; Accepted: 14-03-2020; Published: 20-04-2020
www.medicalsciencejournal.com
Volume 6; Issue 4; 2020; Page No. 19-22

Study on morphological study of mental foramen in dry adult human mandible

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Abstract
Background: Many of dental treatment need location of mental foramen and presence of accessory mental foramen because it is very useful in anaesthetists in nerve block for any surgical procedures. It also prevent nerve from injury
Objectives: To determine the shape and orientation of the mental foramen by a visual examination.
Material and Methods: The present study was conducted using 100 dried human mandibles of both unknown sexes. Shape and position of mental foramen and accessory mental foramen from tooth number
Results: In present study 64 mandibles having round shape and rest 36 are oval in shape. Accessory mental foramen was present in 4 mandibles and was unilateral in position.
Conclusion: The knowledge about variation in, shape and position of mental foramen and presence of accessory mental foramen may be helpful to the dental surgeons to achieve full anaesthesia after nerve block**.**

Keywords: mental foramen, mandible, premolar tooth

Introduction
Mental foramen (MF) is a small foramen found in anterolateral aspect of the body of the mandible. It is the very important landmark present in the body of the mandible. Knowing the location of mental foramen is very important for dental surgeons for various surgical processes. It lies below either the interval between the premolar teeth or below the second premolar tooth, from mental foramen mental nerve and vessels passage. It mainly supplies labial gingiva, chin of lower teeth.
In the various age groups the position of mental foramen varies. In infant the position of mental foramen is found at the lower border of the mandible while in adult mental foramen found at the middle body of mandible. At old age mental foramen found at the upper border of the mandible. Along with the position of mental foramen the gonial angle also change at different age. Any extra foramen along with mental foramen know as accessory mental foramen [1]. Knowledge of accessory mental foramen and position of mental foramen is very important for dental surgeons to achieve complete anaesthesia for treatment purpose.

Material and Methods
Study Population
This was a retrospective observational study conducted in the Department of Human Anatomy in Rama Medical College and Research Centre, Kanpur over a period of six months from January 2018 to June 2018.The study was carried out on 100 dry adult complete human mandibles which were available in our college.

Inclusion criteria
Complete unbreakable mandibles

Exclusion criteria
Broken mandibles

Methodology
The number, shape and the orientation of the mental foramen were determined by a visual examination. The positions of the mental foramens were measured with respect to the teeth, for which we followed the Tebo and Telford

Results
Our study indicated the situational variability of the Mental Foramen as well as its morphological parameters. The Mental foramen was present bilaterally in all the mandibles. It was predominantly present as a Round opening (64%). This opening was observed as horizontal as well as vertical indisposition. Oval openings were also observed in (36%) of the bones examined.

Table 1: Distribution of the shape of mental foramen

Shape	Number	Percentage
Round	64	64%
Oval	36	36%
Total	100	100%

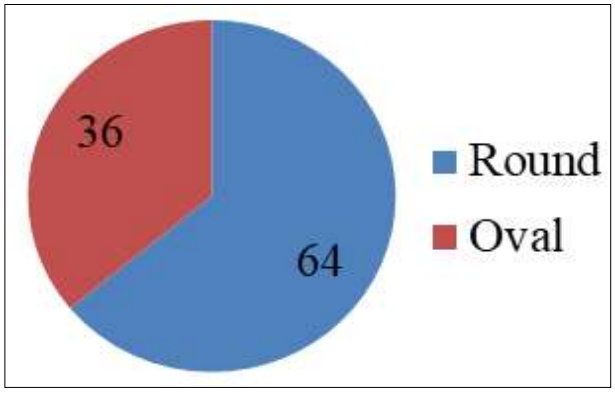

Fig 1: Pie chart showing percentage of mental foramen

Accessory Mental Foramen

During the study on shape of mental foramen, we found with accessory mental foramen in 4 mandibles. There were 3 accessory mental foramen on left and 1 on right side.

Fig 2: showing present of mental foramen on left side

The position of mental foramen

The most commonly present position of the mental foramen as related to the lower set of teeth was in line with the second premolar. This position was present in 43% cases on the right and 33% cases on the left side.

Table 2: Position of the mental foramen in relation to lower tooth left side

Left side		
Tooth	**Frequency**	**Percentage**
1st pre-Molar	6	8%
1st pre-Molar / 2nd Pre-Molar	19	19%
2nd Pre-Molar	74	74%
2nd pre-Molar / 1 Molar	1	1%
Total	100	100%

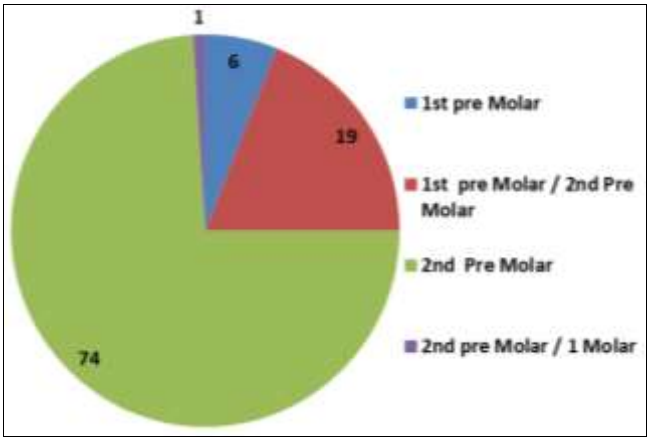

Fig 3: Pie chart showing distributing position of mental foramen of left side

Table 3: Position of the mental foramen in relation to lower tooth right side

Right side		
S. N	**Frequency**	**Percentage**
1st pre-Molar	5	5 %
1st pre-Molar / 2nd Pre-Molar	22	22%
2nd Pre-Molar	70	70%
2nd pre-Molar / 1 Molar	3	3%
Total	100	100%

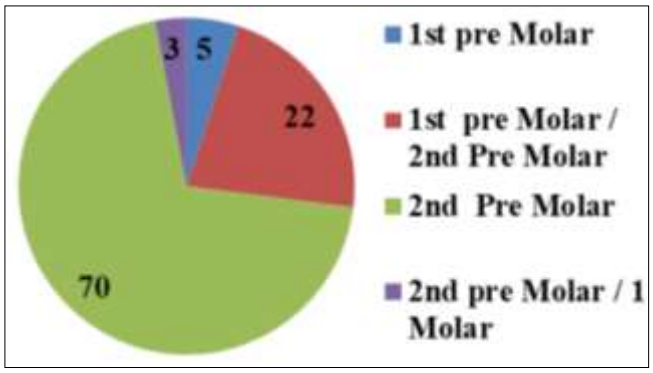

Fig 4: Pie chart showing distributing position of mental foramen of right side

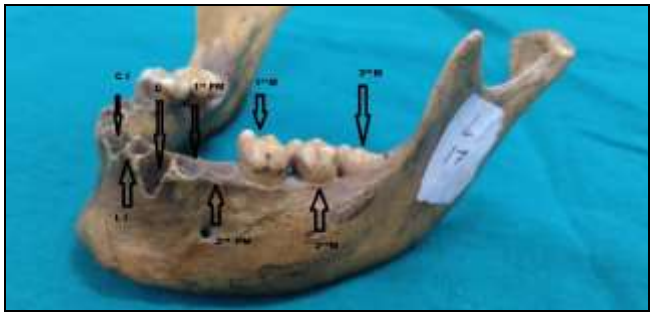

Fig 5: showing position of mental foramen

Discussion

Shape of mental foramen

In the present study, 200 sides of the 100 mandibles were studied; the most commonly encountered shape of mental foramen was round in shape which was found in 64% cases. Our findings are concordant with Sumit Gupta *et al.* [2], Rahul Rai *et al.* [3], who also observed that most of the shape of the mental foramen was round, i.e. 89%, 75% respectively. study also similar with Srinivas Moogala *et al.* [4], They found that shape of mental foramen was round in 87 cases and oval in 40 in the dentate mandible and in edentate mandibles, 56 were round and rest were oval in shape on the right side. On the left side, it was round in 99 cases and oval in 28 cases in the dentate mandible and in edentulous it was round in 57 cases and oval in 35 cases.

Our results are conflicted with the survey of Abu Ubaida Siddiqui *et al.* [5] and Ajay Parmar *et al.* [6] who found that the shape of mental foramen was oval in 70% cases and 69% of cases respectively. In another study K. Udhaya & K.V. Saraladevi *et al.* [7] studied on 90 mandibles and found that the most common shape was oval, i.e., in 75 mandibles and rest were round on both sides. Our study conflicted from Rakesh Kumar Shukla *et al.* [8]. who studied on 70 mandibles and observed that the shape of mental foramen was oval in 87.1% on the right side and 88.6% on the left side, round mental foramen was seen to be in 12.9% on the right side and 11.4% on the left side. Also, with Mohammad H. Al- Shayad *et al.* [9], performed a study on six hundred panoramic radiology of mandibles and observed that the most common shape of the mental foramen in the Iraqi sample was oval in 61% of the mandibles and it was round in 39% of the mandibles on the right side. Similarly, on the left side, it was oval in 50% and round in 50% of the mandibles. Rajshekar Talwar*et al.* [10] studied 300 dry mandibles and found that the most common shape was oval which was present in 216 mandibles while rest were round in shape which was not similar with my study

Accessory Mental Foramen

In the present study, 30 mandibles are studied with 60 sides, and we found that the four mandibles have accessory mental foramen, two on the left side, i.e., 6.66% and two on the right side, i.e., 6.66% of the mandible. K. Udhaya*et al*. [7]. Studied 90 mandibles and found accessory mental foramen was 3.33% on the right side and 2.22% on the left side. Hence, our study findings are higher compared to K. Udhaya study made on accessory mental foramen.

Rakesh Kumar Shukla *et al*. [8] studied 70 mandibles and found that there are three accessory mental foramina on the left side, i.e., 4.28% and two on the right side, i.e., 2.85 %. The findings of the accessory mental foramen, in this case, are close to our study.

Position of mental foramen

In the present study, the common position of mental foramen was found below the second premolar tooth on the left side in 74% of the mandible and on the right side 70% of the mandibles, and second most common position was between first and second premolar which was about in 19% cases left side and on the right side, it was 22% cases. Our study was similar with Abu Ubaida Siddiqui *et al*. [5], Ajay Parmar *et al*. [6] who also found that the common position for mental foramen concerning lower teeth was below the second premolar in 44.08% cases on the right side and 46.23 % on the left side respectively. He also found the position of mental foramen was below the second premolar in 64.7% cases on the right side and in 66.7% on the left side.

Another study conducted by K. Udhaya *et al*. [7] and Raj Kumar Ajita *et al*. [11] found that the most common position of the mental foramen was below the second premolar which is 52.2% on the longitudinal axis. The second most common position lies between the second premolar and first molar which is 27.78% on the longitudinal axis. The rare common location was between the first and second premolar which is 15.56% on the longitudinal axis. The most unusual position was on the first premolar which is 4.44% on the longitudinal axis. On the right side, the location of mental foramen was below the second premolar which is 51.11% on the longitudinal axis. The next most common position was between the first premolar and second premolar which is 16.67% on the longitudinal axis. The second rare common position lies between the second premolar and first molar which is 27.78% on the longitudinal axis. The most unusual location was on the first premolar which is 4.44% on the longitudinal axis. Respectively in 50 dry mandibles and obtained the location of mental foramen which was mostly below the second premolar which was informed in 39 mandibles and the second position was between the first and second premolar observed in 12 mandibles.

Our findings was also similar with Kasat PA *et al*. [12] who observed that the position of mental foramen was found below at the apex of second premolar tooth in 46.5% mandibles whereas the second position was between second premolar and first molar in 27.5% mandibles. The third position was between the first and second premolar observed in 11% of the mandibles. The rarest was seen below the apex of the first premolar and at the first molar equally 2% each of the mandibles. However Srinivas Moogal *et al*. [13] and Rahul Rai *et al*. [3] notice that the most common site of the mental foramen was between first and second premolar, and that was 42.5% of the mandibles on right side and 40.9% of the mandibles on left side of the dentate mandibles and 18.1% of the mandible it was below the second premolar respectively. Rahul Rai *et al*. [3] observed that on the left side, the most common position of mental foramen was between second premolar and first molar in 16 mandibles. The second most common position lies between first & second premolar in 12 mandibles. The third most common position was lying at second premolar in 9 mandibles, and the rarest position was lying at first premolar in 3 mandibles. On the right side, the most common area of the mental foramen was between the second premolar and first molar in 26 mandibles. The second most common position lies between first & second premolar in 9 mandibles. The third most common position lies below the second premolar in 5 mandibles.

Conclusion

It is very important in diagnosing radiographic periodical area, it is very sensitive area for periodontal and endodontic surgery. Pre-operative radiograph should be taken to located mental foramen or any accessory mental foramen for avoiding any unforeseen injury. The knowledge of the variations of the mental foramen is important for dental surgeons while they perform endodontic and periodontal surgeries, dental implantations and orthogenetic surgeries.

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