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A panoramic radiographic study to evaluate the position of mental foramen in Kashmiri population

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Abstract

Background: The mental foramen is the termination of the inferior alveolar canal through which inferior alveolar nerve continues as mental nerve that supplies the lower lip, labial mucosa, premolars and canines. It varies in position and shape with age, gender and race. Its location is important for mental nerve block, implant insertion, maxillofacial surgeries and complete denture

Aims and Objectives: This study was conducted to evaluate the position, shape, and appearance of the mental foramen, when seen on panoramic radiographs of Kashmiri population.

Materials and Methods: The randomly selected 120 panoramic radiographs of Kashmiri patients were analysed for radiographic appearance and position of mental foramen.

Results: The mental foramen was located between the long axis of premolars in 48.3% on right side and 49.16% on left side of the mandible. The most common shape of the mental foramen was found to be round 58.3% on left side and 55.8% on the right side of the mandible.

Conclusion: The most common site of the mental foramen is the interpremolar space and the most common morphology is round shape.

Keywords: Mental foramen, inferior canal, mandibular foramen, mental nerve block

Introduction

The inferior alveolar canal originates as mandibular foramen on the medial aspect of ramus and terminates as mental foramen at the anterolateral aspect of the body of mandible. The neurovascular bundle after travelling through inferior alveolar canal emits through mental foramen as mental nerve, mental artery and mental vein. The mental nerve carries the sensations from lower lip, labial mucosa, canine and premolars. The inferior alveolar block is the most useful for anesthetizing the mandibular teeth. Mental nerve block is an alternative to the inferior alveolar block for anaesthetizing the canines, premolars.

Mental foramen's anatomical position is of significant importance in giving local anesthesia, treatments of fractures related to parasymphysis area, osteotomies required for orthognathic and implant placement, giving complete denture in mandible, implant placement etc.

So, the study regarding the variation in position and morphology of mental foramen is very important to be helpful to localize the important neurovascular bundle passing through the mental foramen.

Aims and objectives: This study was conducted to evaluate the position, shape, and appearance of the mental foramen, when seen on panoramic radiographs of Kashmiri population.

Materials and methods: One hundred twenty digital panoramic radiograph images were randomly selected from the records of dental Kashmiri patients attending the Postgraduate Department of Prosthodontics, Government Dental college and Hospital Srinagar from 2013-2017. The radiographs were studied by direct observational method for the following parameters as under:

- i. The shape of mental foramen (Oval, round and irregular) refers to table no. 1.
- ii. The antero-posterior position of mental foramen with respect to the teeth of the lower jaw as it was classified according to the method of Tebo HG and Telford IR, 1950 refer to table no. 2.

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Inclusion criteria

- i. Age >18years
- ii. Patients of Kashmiri origin
- iii. Film should show no radiographic exposure and processing artifacts
- iv. Bilaterally visible mental foramen on panoramic radiograph.
- v. Panoramic radiograph of both the genders with atleast first molar erupted.
- vi. The two premolars and the first molar should exist on each side of the mandible.

Exclusion Criteria

- i. Age <18 years
- ii. poor film quality
- iii. orthodontic treatment with extraction of premolar for extra space
- iv. Presence of periodontal lesions in the mandibular area between 36–46 (distance from the right to the left first mandibular molar)
- v. Presence of periapical cysts in the mandibular area between 36–46.
- vi. Radiographs showing supernumerary teeth in the mental foramen region, and
- vii. Radiographs showing processing or exposure errors and artifacts obscuring visibility of structures in the mandible.

Table 1: Radiographic appearance of mental foramen

Category	Features
Continuous	Foramen has continuity with the mandibular canal
Separated	Foramen distinctly separated from the canal
Diffuse	Foramen has indistinct border
Unidentified	Foramen cannot be identified

Table 2: Mental foramen position in relation to mandibular teeth

Classification	Description
i.	Foramen lying on a long axis of passing between the canine and first premolar.
ii.	Foramen lying on the long axis of the first premolar
iii.	Foramen lying on the long axis passing between first and second premolar
iv.	Foramen lying on the long axis of the second premolar
v.	Foramen lying on the long axis passing between the second premolar and first molar
vi.	Foramen lying on the long axis of first molar

The data collected was analysed statistically and subjected to chi-square test to perform analyses of the mental foramina’s anterior-posterior position, shape and symmetry. P-value of <0.05 was considered statistically significant. Results: The study revealed that mental foramen was located between the long axis of premolars in 48.3% on right side and 49.16% on left side of the mandible. It was seen lying on the long axis of second premolar in 41.6% on left side and 40.8% on right side of the mandible. The distribution of mental foramen’s anteroposterior position in relation to mandibular teeth is shown in the table no.3. The most common position of mental foramen in relation to mandibular teeth is seen between first and second premolar and the least common position is on the long axis of the first molar.

The most common shape of the mental foramen was found to be round 58.3% on left side and 55.8% on the right side of the mandible followed by irregular shape in 33.3% on right side and 29.16% on left side of the mandible. The least common shape of the mental foramen is oval. The table no. 4 shows the distribution of mental foramen’s shape.

Table 3: Mental Foramen’s anteroposterior position in relation to mandibular teeth

Shape	Right		Left	
	n	%	n	%
i.	2	1.66%	1	0.3%
ii.	8	6.6%	9	7.5%
iii.	58	48.3%	59	49.16%
iv.	49	40.8%	50	41.6%
v.	3	2.5%	1	0.3%
vi.	none		none	
Total	120		120	

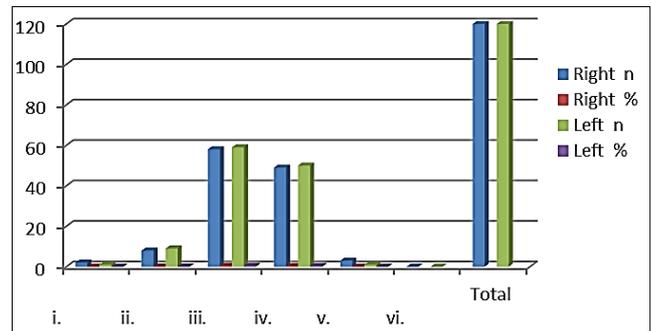


Fig 1: Graphical representation of Mental Foramen’s anteroposterior position in relation to mandibular teeth

Table 4: Mental Foramen’s Shape

Shape	Right		Left	
	n	%	n	%
Round	67	55.8%	70	58.3%
Oval	13	10.8%	15	12.5%
Irregular	40	33.3%	35	29.16%
Total	120		120	

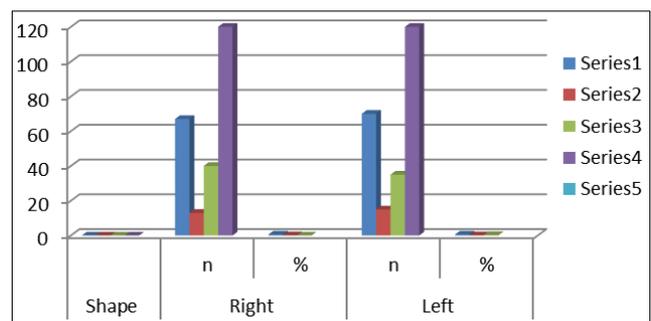


Fig 2: Graphical representation of Mental Foramen’s Shape

Discussion

Olasoji *et al.* (2004) conducted a study on one hundred and fifty seven panoramic radiographs randomly selected from Nigerian adults of known sex. The mental foramen was most commonly found along the interdental space between the first and second mandibular premolars in 34% of the cases, followed by the position apical to the second premolars in 25.5% of the cases. There were no significant differences in the distribution between sexes and sides in most cases.

Kim *et al.* (2006) conducted a study on one hundred and twelve mental foramina of a Korean population of seventy two males and forty females. All patients had fully erupted lower premolars, the age ranged from 12 to 69 years old. The horizontal and vertical locations were evaluated both directly and by radiographic measurements. The mental foramen is most commonly in line with the second premolar in 64.3% and 62.5% of cases respectively.

Rupesh *et al.* (2011) reported on the most common position and symmetry of the mental foramen in a randomly selected Asian Indian population using digital panoramic radiographs of five hundred cases there being two hundred and fifty males and two hundred and fifty females. The age of subjects ranged from 18 to 79 years old. The results revealed that the modal position of the mental foramen relative to the teeth was in a line between the first and second premolars in 47.6% of cases. The second most common position was in line with the second premolar in 33.5% of cases. The mental foramen was symmetrical in 57%, and asymmetrical in 43% of radiographs. The study concluded that the sex and symmetry did not influence the position of the mental foramen in this population.

AL-Khateeb *et al.* (2007)^[4], conducted a study using eight hundred and sixty panoramic radiographs of Jordanians, with a female to male ratio of 1:1.4 and age range of 12 to 77 years old. The anterior-posterior position of mental foramen was along the space between the mandibular premolar teeth in 47% of cases, followed by the position along the apex of the second premolar in 40% of cases. There was a significant difference between male and female. AL-Khateeb *et al.* (2007)^[4] conducted a study using eight hundred and sixty panoramic radiographs of Jordanians and reported that majority of mental foramen was round in shape and bilaterally symmetrical and this result is similar with the result in Jordanian population.

The majority of the studies revealed that the most common shape was oval in other populations.

Conclusion: Within the limitations of the study, it can be concluded that the mental foramen is most commonly found in the interpremolar space bilaterally and the most common shape is round.

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