

Original Article



A Evaluation of Radiographic Measurement of Mental Foramen in Selected Urban Population

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Abstract

Background: To determine the most common position of both mental foramen in selected Bangladeshi population. **Materials and Methods:** This was a cross sectional study. Convenient sampling technique was used. For this seventy five panoramic radiographs of Bangladeshi population were taken from Out Patient Department of MH Samorita dental unit, Dhaka, Bangladesh. **Result:** The most common Horizontal position of the mental foramen was in line with second premolar (position 4). In vertical axis, the location of MF in lower half of body of mandible was found in all OPGs (100%). **Conclusion:** The knowledge about the position of the mental foramen may be helpful to the dental surgeons to achieve full anesthesia after nerve block.

Keywords: Orthopantomogram (OPG), Mental foramen (MF), Mandible, Premolar teeth .

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Introduction

Mental foramen is an important anatomical landmark located on the anteriolateral aspect of the body of mandible, lateral to and above the mental tubercle. It is felt as a slight depression. It gives passage to the mental nerve and vessels.^{1,2,3}

Mental foramen is located about 2.8-4 cm from the median fusion of the two halves of the mandible (Symphysis menti) and lies in lower half of the mandible in vertical axis. Mean diameter of mental foramen is reported to be 3.8mm.^{4,5,6} In horizontal plane it opens in a higher position to the inferior alveolar canal. It is entire funnel-like opening in the lateral surface of the mandible at the terminus of the mental canal.⁷ Anatomically there is one mental foramen each on each side of mandible. Variation in number of mental foramina also been reported. More than one mental foramina in one side ranges from 2% to 10%.^{8,9} where as up to 0.06% incidence of

absence of mental foramen is also reported.¹⁰

The shape of mental foramen is round or round to oval. It is described as being round in 34.48% with an average diameter of 1.68 mm and oval in 65.52% with an average long diameter of 2.37 mm in a cadaveric study.¹¹

The aim of this study was to identify the accurate anatomical location of the MF helps in endodontic treatment, peri apical surgery, implant surgery, management of trauma and fractures in mandibular body and nerve block anesthesia.

Materials and Methods

This was a non-probability convenient sampling, cross sectional study design. This study was based on seventy five (OPGs) of adult patients with the presence of both permanent 1st molar tooth in permanent dentition. The study was conducted during a period of six months from July 2017

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to December 2017 at Outpatient Department (OPD), MH Samorita Medical College and Dental unit, Dhaka, Bangladesh. OPG were done at different Radiology centers in Dhaka. All OPG were examined multiple times in a dark room on an X-ray viewer. Here the mental foramen, was located as radiolucency traced by following the inferior alveolar canal. The radiographs were chosen according to the following inclusion & Exclusion Criteria was used.¹²⁻¹⁴

Inclusion criteria

- (1) Age 15 and above.
- (2) Film should show no radiographic exposure and processing artifacts.
- (3) OPG of adult patient of both sexes with permanent dentition at least having first molar teeth bilaterally.
- (4) Radiographs having bilaterally visible mental foramina taking by same machine.

Exclusion criteria

- (1) Age 15 and above.
- (2) Film should show no radiographic exposure and processing artifacts.
- (3) OPG of adult patient of both sexes with permanent dentition at least having first molar teeth bilaterally.
- (4) Radiographs having bilaterally visible mental foramina taking by same machine.

Exclusion criteria

- (1) Radiograph of edentulous patients.
- (2) Radiograph showing mixed dentition
- (3) Presence of supernumerary teeth in mandibular dentition.
- (4) Missing teeth, especially missing lower canine must be excluded when Mesial premolar drift occur.
- (5) Patients with previous and current orthodontic treatment.
- (6) Presence of deep caries or root canal treatment for the teeth located within mental foramen area.
- (7) Radiograph with pathological lesion.

There both horizontal and vertical positions are described. The horizontal position in relation to the apices of adjacent teeth is more emphasized in different clinical procedures .commonest position of mental foramen is described to be apical to the second premolar tooth.^{15,16} and between the roots of two mandibular premolar teeth.¹⁸

Most of the researchers classify the position of mental foramen in following position.¹²⁻¹⁸

- Position 1: Situated anterior to the first premolar.
- Position 2: In line with the first premolar.
- Position 3: Between the first and second premolar.
- Position 4: In line with second premolar.
- Position 5: Between the second premolar and first molar.
- Position 6: In line with the first molar.

The vertical position of mental foreman was viewed by vertical axis. In vertical axis

Position 1: The location of MF in lower half of body of mandible.

Position 2: The location of MF in upper half of body of mandible^{12,15-18}.

Results

Table I: Distribution of the respondent according to their age

| Age | Frequency | Percent(%) | Mean age | St. deviation |
|-----------|-----------|------------|----------|---------------|
| 15-30 Yrs | 28 | 37.3 | | |
| 31-45 Yrs | 29 | 38.7 | 35.88 | 11.256 |
| >45 Yrs | 18 | 24.0 | | |
| Total | 75 | 100 | | |

Table-I showed 38.7% respondent were from 31-45 years' age group. Followed by 37.3% from 15-30 years' and 24% from >45 years' age group. Mean age was 35.88 years.

Table II: Distribution of the respondent according to their gender

| Gender | Frequency | Percent(%) |
|--------|-----------|------------|
| Male | 40 | 53.33 |
| Female | 35 | 46.67 |
| Total | 75 | 100 |

Table-II showed Distribution of the respondent according to their gender were shown in table-II. Among the respondents 53.33% were male and 46.67% were female.

Table III: Distribution of the respondents according to their horizontal position of Mental Foramen.

| Horizontal position | Right | | Left | |
|---------------------|-----------|------------|-----------|------------|
| | Frequency | Percent(%) | Frequency | Percent(%) |
| Position 1 | 00 | 00 | 00 | 00 |
| Position 2 | 1 | 1.33 | 1 | 1.33 |
| Position 3 | 21 | 28 | 19 | 25.33 |
| Position 4 | 44 | 58.67 | 48 | 64 |
| Position 5 | 7 | 9.33 | 4 | 5.34 |
| Position 6 | 2 | 2.67 | 3 | 4 |
| Total | 75 | 100 | 75 | 100 |

Table-III showed the radiographic horizontal position of mental foramen of the respondents. Position-4 (In line with second premolar) was more common on both sides. At right side the percentage was 58.67% and at left side it was 64%. There were no founding about position-1.

Table IV. Distribution of the respondents according to their position of Mental Foramen in perspective of vertical axis

| Vertical Axis | Right | | Left | |
|---------------|-----------|------------|-----------|------------|
| | Frequency | Percent(%) | Frequency | Percent(%) |
| Position 1 | 75 | 100 | 75 | 100 |
| Position 2 | 00 | 00 | 00 | 00 |
| Total | 75 | 100 | 75 | 100 |

Table-IV showed the measurement of vertical axis of mental foramen. Position-1 is common in all cases.

Out of seventy five panoramic radiograph showed 38.7% respondent were from 31-45 years' age group. Followed by 37.3% from 15-30 years' and 24% from >45 years' age group. Mean age was 35.88 years. Among the respondents 53.33% were male and 46.67% were female (Shown in Table -I, Table-II)

In horizontal position of Mental Foramen, position-4 (In line with second premolar) was more common on both sides. At right side the percentage was 58.67% and at left side it was 64%. There were no founding about position-1. The second most common location was between the first and second premolar (Position -3) . At right side the percentage was 28% and at left side it was 25.33% .In vertical axis position of Mental foramen position-1 is common in all OPGs. location of MF in lower half of body of mandible is totally absent with 0% frequency (shown in Table -III, Table -IV)

Discussion

Anatomically, the mental foramen is the opening of the short mental canal, a branch of the mandibular canal. The rate of morphological and anatomical changes in the mental foramen is very low as compared to the surrounding tissues. Therefore, it is considered an important land mark of mandible.¹⁹ Determination of position of mental foramen has been a topic of great interest for the investigators emphasizing on important anatomical land marks of the maxillofacial region.²⁰ Radiography is the only available non-invasive method for diagnosis and treatment planning of major surgical procedure of the mandible.^{21, 22}

In the present study, most common position of MF is below the apex of second premolar Right-58.67%, Left- 64 % (position-4), followed by position-3 Left-(25.33%) and Right-(28%) of Bangladeshi population. We found the position of MF anywhere from below the root apex of first premolar below the apex of mesial root apex of first molar tooth. Its position below the apex of second premolar was 49% by Te and Telford (1950), 58.98% BY Wang et al (1986) and 52.9% Santini & Land (1990).^{23, 24}

Santini & Land, lockhar et al. (1983) and Aktebin et al. (2003) mentioned that MF is located between the apices of two premolars 25 26.27 But ,according to Gender et al. (1988) Bennet (1989), Dangelo and Fattini (1991), usual position of foramen is below crown of second premolar.^{28 29 30}

As we included the OPGs from different radiology centers

obtained from different OPGs machines, presented to our reporting center. This could be prevailed in future by selecting a sample size from a specific OPG machine of one center to make the quality and standard constant.

Conclusion

The anatomical variability of the position of the mental foramen should always be considered when performing periodontal or endodontic surgery in the area from canine to root of first molar tooth.

The knowledge about variability in position of mental foramen and presence of accessory mental foramen is important in order to avoid nerve damage in connection with surgical procedure and to achieve complete effect of anesthesia after mental nerve block.

The prevalence of location of mental foramen among Bangladeshi population is in position 4 and majority of cases there was bilateral symmetry in the position. Clinician must always take into consideration the location of the mental foramen and should not be determined based on races. Therefore, precautions should be taken if there is need for any surgical procedure to be carried out on the mental foramen area.

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