Assessment of mental foramen position in dentate subjects

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Submit: 15/4/2021 | Accepted: 11/6/2021 | Published: 6/7/2021

Abstract

Mental foramen shares its significance in various fields of dentistry. Being a strategically eminent landmark, an understanding of the variation of its position is important. Aim: To evaluate frequently occurring position of mental foramen and its distance with reference to the lower premolars using panoramic image. Method: Total 215 panoramic image of patients taken for different diagnostic purpose, using Planmeca X-ray unit ProMax. The position of the mental foramen was recorded according to the categories which were put forward by Jasser and Nwoku. Result: The most common position was found to be between the two premolars approximately 60.5% for both gender, followed by below the second premolar approximately 34.9%. Conclusion: The most common location was reported to be between the two premolars, with a definite bilateral symmetry on both left and right sides. No gender preferences were observed.

Key words: Mental foramen, panoramic image, Position.
Introduction
The mental foramen (MF) is a bilateral opening localized on an anterior surface of the mandible. The mental nerve a branch of the inferior alveolar nerve together with corresponding arteries and veins exit through the MF\(^1\)\(^-\)\(^2\). The mental foramen is a funnel-like opening located on the surface of the anterolateral aspect of mandible\(^3\). The inferior alveolar nerve conducts unilaterally the sensory stimuli to the lower lip, labial mucosa, lower canine, and premolar, whereas blood vessels supply soft tissues of the lower jaw\(^3\),\(^4\). Successful and complication-free dental procedures such as curettage, root canal treatment, periapical surgery, orthognathic surgery, and effective anesthesia during nerve blocks depend on knowledge of an operator\(^5\).

An implant placement in an inter foramina area is strictly related to the location of the MF, because it determines a position of most distal implants. Many studies indicate that a minimum distance between MF and an implant should amount up to 6 mm\(^6\),\(^7\). Any invasive procedure performed in this region may damage the neurovascular bundles and cause serious complications such as parenthesis\(^8\).

In our retrospective study on the variability of mental foramen position using 215 digital panoramic image to compare the results with those reported for other population.

Material and Method
Total 215 panoramic image of patients taken for different diagnostic purpose at AlMahmodia specialized dental center, and examined by two well-practiced examiner. The range age of the selected patients was between 18 - 45 years old.

All of the sample matches the inclusion criteria which include the presence of minimum 22 teeth, including lower canine, premolars, and first molar, panoramic image with high resolution which clearly showed the mental foramen, and no pathological lesion in the area of interest Fig 1.

All panoramic image were taken by using Planmeca X-ray unit ProMax 3D (tube potential: 84 KV, tube current: 16mA, exposure time: 14.5S) Fig 2. Long axes of the premolars served as the vertical references. The position of the mental foramen was recorded according to the categories which were put forward by Jasser and Nwoku\(^22\), which were as follows:

Position 1: Anterior to the first premolar, Position 2: Below the first premolar, Position 3: Between the premolars, Position 4: Below the second premolar, Position 5: Posterior to the second premolar.

In our retrospective study on the variability of mental foramen position using 215 digital panoramic image and
**Results and Discussion**

The 215 panoramic image which were evaluated, were grouped into those 99 male, and 116 female. The most common position was found to be between the two premolars position 3 approximately 60.5% for both gender, followed by the position 4 below the second premolar approximately 34.9%.

(Table 1): Demonstrate means , Std, median, for right and left MF positioning in both gender and total.

| Gender | right mental foramen | left mental foramen |
|--------|----------------------|---------------------|
| male   | Mean                 | 3.48                |
|        | N                    | 99                  |
|        | Std. Deviation       | .629                |
|        | Median               | 3.00                |
| female | Mean                 | 3.31                |
|        | N                    | 116                 |
|        | Std. Deviation       | .566                |
|        | Median               | 3.00                |
| Total  | Mean                 | 3.39                |
|        | N                    | 215                 |
|        | Std. Deviation       | .601                |
|        | Median               | 3.00                |

(Table 2): Demonstrate percentage of right foramen position in both gender.

| right mental foramen position | Gender | Total |
|-------------------------------|--------|-------|
|                               | male   | female|
| 1                             | Count  | 0     | 1     | 1     |
| % within Gender               | 0.0%   | 0.9%  | 0.5%  |
| 2                             | Count  | 1     | 2     | 3     |
| % within Gender               | 1.0%   | 1.7%  | 1.4%  |
| 3                             | Count  | 55    | 74    | 129   |
| % within Gender               | 55.6%  | 63.8% | 60.0% |
| 4                             | Count  | 37    | 38    | 75    |
| % within Gender               | 37.4%  | 32.8% | 34.9% |
| 5                             | Count  | 6     | 1     | 7     |
| % within Gender               | 6.1%   | 0.9%  | 3.3%  |
| Total                         | Count  | 99    | 116   | 215   |
| % within Gender               | 100.0% | 100.0%| 100.0%|

(Chart 1): Demonstrate percentage of right mental foramen position in both gender.
(Table 3): Demonstrate percentage of left mental foramen position in both gender

| left mental foramen | Gender |
|---------------------|--------|
|                     | male   | female |
| Count               | 0      | 1      |
| % of Total          | 0.0%   | 0.5%   | 0.5%   |
| Count               | 1      | 2      |
| % of Total          | 0.5%   | 0.9%   | 1.4%   |
| Count               | 58     | 72     |
| % of Total          | 27.0%  | 33.5%  | 60.5%  |
| Count               | 34     | 39     |
| % of Total          | 15.8%  | 18.1%  | 34.0%  |
| Count               | 6      | 2      |
| % of Total          | 2.8%   | 0.9%   | 3.7%   |
| Count               | 99     | 116    |
| % of Total          | 46.0%  | 54.0%  | 100.0% |

(Chart 2): Demonstrate percentage of left mental foramen position in both gender

(Table 4): Demonstrate right & left mental foramen positioning percentage

| right mental foramen * left mental foramen | left mental foramen | Total |
|-------------------------------------------|---------------------|-------|
|                                           | 1  | 2  | 3  | 4  | 5  |
| Count                                     | 0  | 0  | 1  | 0  | 0  |
| % of Total                                | 0.0% | 0.0% | 0.5% | 0.0% | 0.0% |
| Count                                     | 0  | 3  | 0  | 0  | 0  |
| % of Total                                | 0.0% | 1.4% | 0.0% | 0.0% | 0.0% |
| Count                                     | 1  | 0  | 122 | 5  | 1  |
| % of Total                                | 0.5% | 0.0% | 56.7% | 2.3% | 0.5% |
| Count                                     | 0  | 0  | 6  | 67 | 2  |
| % of Total                                | 0.0% | 0.0% | 2.8% | 31.2% | 0.9% |
| Count                                     | 0  | 0  | 1  | 1  | 5  |
| % of Total                                | 0.0% | 0.0% | 0.5% | 0.5% | 2.3% |
| Count                                     | 1  | 3  | 130 | 73 | 8  |
| % of Total                                | 0.5% | 1.4% | 60.5% | 34.0% | 3.7% |

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DISCUSSION

Mental foramen is considered an imperative anatomical landmark, the position of which assists surgical, local anesthetic, and other invasive procedures for maxillofacial surgeries. Its location should be taken into account before any surgery in this region to avoid any injury to the neurovascular bundles passing through these foramina. Occasionally, mental foramen is misdiagnosed as a radiolucent lesion situated in the apical area of the mandibular premolar teeth. Therefore, knowledge of accurate anatomical position of mental foramen is of paramount importance in periodontal surgery or flap surgery, especially in mandibular premolars, surgical orthodontics, and retrograde amalgam fillings. There are significant differences reported in the location of MF among different ethnic groups Igbigbi and Lebona in Malawians and Mbajiorgu et al. in Zimbabweans mandibles reported position IV as the commonest followed by position V; however, Santini and Land in British and Green in Chinese mandibles observed position III being the commonest followed by position IV. In other studies Ngeow and Y. Yuzawati in Malay populations found the most common position was IV followed by position III, AL-SHAYYAB et al found that The most common horizontal location and shape of the mental foramen on panoramic image in Iraqi population are between the two premolars, in our study The most common position was found position III followed by position IV, so we agree with Santini and Land in British and Green in Chinese AL-SHAYYAB et al, and disagree with Igbigbi and Lebona in Malawians, Mbajiorgu et al. in Zimbabweans mandibles and Ngeow and Y. Yuzawati in Malay population. Variability in MF position may be related to different feeding habits subsequently affecting mandibular development. Prior knowledge of common positions in local populations may be helpful in effective nerve blocks and surgeries in those regions. Thus, the position of the mental foramen attributes to variations in different population.

Conclusion

The most common location was reported to be between the two premolars, with a definite bilateral symmetry on both left and right sides. No gender preferences were observed.

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