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Position and Symmetry of Mental Foramen in Orthopantomogram (OPG) - A Retrospective Observational Study

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ABSTRACT

The mandible is one of the unique bones and is the only movable component of mastication. The mental foramen is a small round/oval structure present in the mandible. Determining the position of is important for both diagnostic and clinical procedure. The aim of the current study is to analyze the position and symmetry of mental foramen in orthopantomogram (OPG). This is a retrospective clinical study carried out at Private dental institution. This study involves the analysis of orthopantomogram (OPGs) that were taken over a period of one year, from June 2019 to March 2000. A total of 500 OPGs were reviewed and retrieved and the position and symmetry of mental foramen (right and left) were examined. The collected data were subsequently analyzed in SPSS with $p<0.05$ as statistically significant. In this study, the position of mental foramen in both males and females was found to be between the first and second premolar for both male and female. The mental foramen was mostly found to be asymmetrical for both male and female (68.29% and 56.61% respectively), p-value 0.08 > 0.05, negative correlation. Thus, identification of the mental foramen is important for both diagnostic and clinical procedures.

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INTRODUCTION

The mental foramen is a small round/oval structure present in the body of the mandible (Sridhar *et al.*, 2018; Sridharan *et al.*, 2017). It is a small foramen situated in the anterolateral aspect of the body of the mandible (Dave and Krishnan, 2019). It opens in a posterior direction and the mental nerve and vessels supplying sensation to the lower lip and the labial mucosa traverses via the mental foramen (D'dharan and Maheshwari, 2015). The foramen is contained entirely within the buccal cortical plate of bone (Umayal *et al.*, 2018). Studying the position and morphological variations of mental foramen is important because it is a critical and distinctive landmark for localizing the neuromuscular bundle passing through it. Human jaws have shrunk from its large ape size to a smaller one with evolution. Therefore, the third molars are most often impacted which may lead to various complications (Gupta and Ramani, 2016; Shanmugasundaram and Prasanthi, 2019). Oral squamous cell carcinoma (OSCC) is the major form of oral can-

cer and the sixth common malignancy in the world. Due to habits like areca nut chewing there is a high chance of oral squamous cell carcinoma formation. MDM-2 participates in the auto regulation of p53 function (Shree *et al.*, 2019; Sivaramakrishnan and Ramani, 2015; Swathy *et al.*, 2015; Thangaraj *et al.*, 2016). The accurate identification of the mental foramen is important for both diagnostic and clinical procedures (Bello *et al.*, 2018; Hannah *et al.*, 2018; Vasishta *et al.*, 2019).

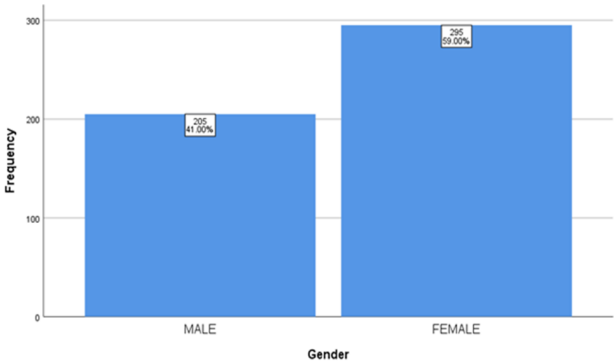

Figure 1: Bar graph depicting the frequency of gender distribution.

The knowledge of the position of the mental foramen is very important while administering local anesthesia. Anesthesia of this nerve could be effective only if the dental practitioners adequately locate the mental foramen (Jayaraj *et al.*, 2015a; Sunar and Thenmozhi, 2018; Viveka *et al.*, 2016).

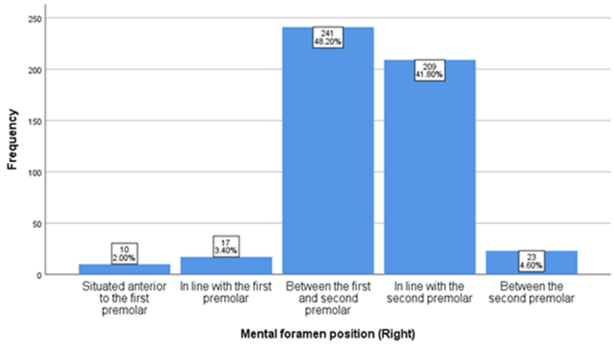

Figure 2: Bar graph shows the frequency of position of mental foramen on the right side.

Lack of knowledge regarding the correct position of mental foramen leads to repeated failure during injections and operation procedures (Chakraborty *et al.*, 2019; Ghimire and Gupta, 2018; Kumar *et al.*, 2015; Renjith *et al.*, 2019). The knowledge of the mental foramen also plays an important role in the endodontic procedure, especially those involving the premolars, fractures related to the parasymphysis region of the mandible, mandibular implant placement and construction of complete denture in the mandible (Jajashree *et al.*, 2018; Jangid *et al.*, 2015; Jayaraj *et al.*, 2015b). Invasion of squamous cell carcinoma to the mandible can progress through the residual alveolar occlusal ridge (Devi *et al.*, 2018; Sridharan *et al.*, 2019). The radio graphic appearance of the mental foramen could also lead to misdiagnosis of a radiolucent lesion such as osteolytic lesions in oral squamous cell carcinoma radiographically (Alok *et al.*, 2017; Bhagat *et al.*, 2018; Gheena and Ezhilarasan, 2019). Also in addition to it, there is a considerable variation in the shape, the position of the mental foramen. Literature evidence also supports the fact about the presence of accessory foramen or complete absence in a few cases. The aim of the current study is to analyze the position and symmetry of mental foramen in orthopantomogram (OPG).

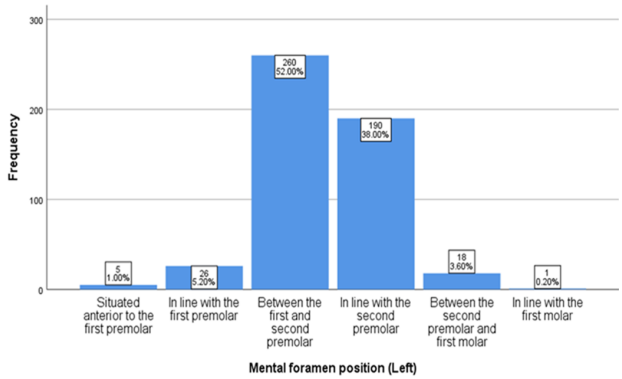

Figure 3: Bar graph shows the frequency of position of mental foramen on the left side.

MATERIALS AND METHODS

This is a University hospital-based retrospective clinical study, carried out at Private Dental Institution, Chennai. Ethical approval was obtained from the Institutional Review Board.

Study setting

This study involves the analysis of orthopantomogram (OPGs) that were taken over a period of one year, from June 2019 to March 2020. A total of 500 OPGs were collected and assessed for age, gender, the position of mental foramen (right and left) and symmetry of mental foramen. Collected data was tabulated in the excel sheet. Cross verified by two examiners. Incomplete dental records were excluded from the study. Randomization was done to minimize sampling bias.

Parameters Evaluated,

- Good quality OPG with respect to angulation and contrast.
- Presence of all mandibular teeth in both quadrant 3 and quadrant 4.

- Radiographs in which the mandibular teeth were absent, presence of caries, RCT or various restoration were eliminated due to associated periapical radiolucency.

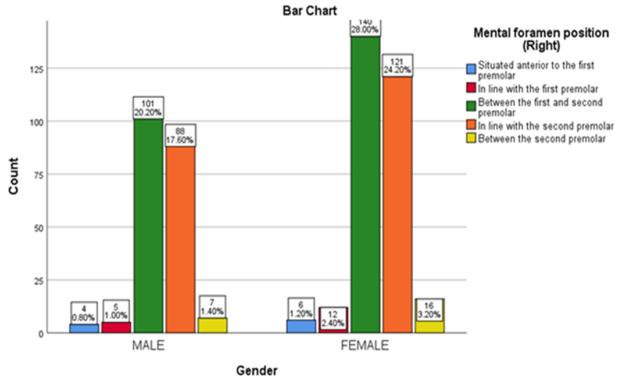

Figure 4: Bar graph shows the association between gender and position of mental foramen on the right side.

The position of the mental foramen on the OPGs was classified as

- Position 1: position of mental foramen anterior to the first premolar.
- Position 2: location of MF along the long axis of the first premolar.
- Position 3: MF situated between the first and second premolar.

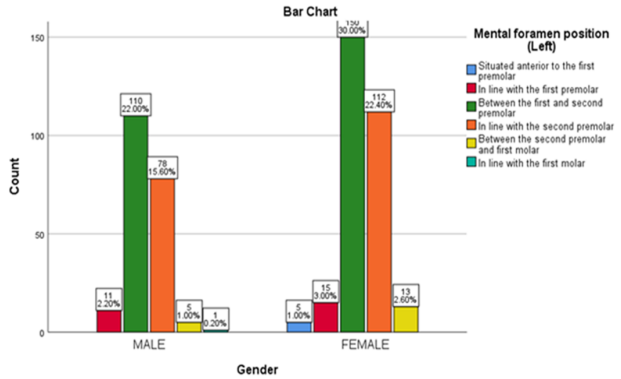

Figure 5: Bargraph shows the gender wise distribution of the position of mental foramen on the left side.

- Position 4: MF in line with the second premolar.
- Position 5: between the second premolar and the first molar.
- Position 6: MF in line with the first molar.

Statistical Analysis

The data was imported and transcribed in the statistical analyses package for social sciences version 20 (SPSS) IBM corporation. Independent variables include and gender. Descriptive analyses were applied, and frequencies were found for variables. The relationship between the dependent and independent variables was determined using Pearson correlation with P-value < 0.05 was considered statically significant.

RESULTS AND DISCUSSION

A total of 500 patients OPGs were evaluated in this study. Of the 500 patient's OPGs, 205 were males (41%), and 295 (59%) were females Figure 1. From the present study, the relative order of frequency of position of mental foramen on the right side was 48.20% Figure 2. Similarly, the prevalence of mental foramen on the left side was 52.00% Figure 3. From the present study, in males and females, the most common site of mental foramen (right) is between the first and second premolar (49.27% & 47.67% respectively), i.e. position -3 Figure 4.

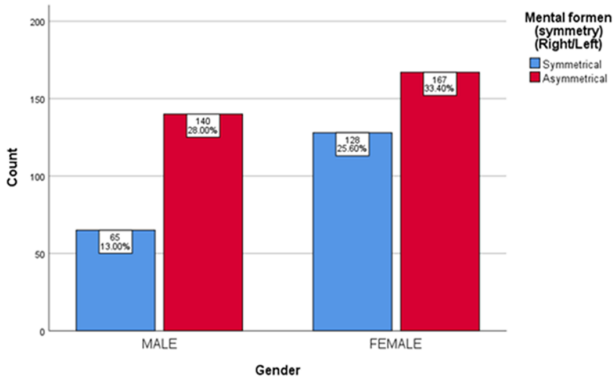

Figure 6: Bar graph shows the gender wise distribution of symmetry of mental foramen.

A negative correlation was found between gender and position of mental foramen with P-value = 0.7 >0.005 statistically, not significant. The most common position mental foramen (left) in the present study in males and females were between first and second premolar (53.6% & 50.85% respectively) i.e position -3 Figure 5. Similar results were in seen in previous literature done by Shukla *et al.* (2017) (same evidence-57%), Gada and Nagda (2014) (same evidence-63%), Krzeszinski *et al.* (2014) (same evidence- 40-50%). This variation is mostly seen due to morphological variation seen in mandibles among different gender, ethnicities and races. A negative correlation was found between gender and position of mental foramen with P-value = 0.2 >0.05 statistically, not significant.

The mental foramen was asymmetrical in 28 % of males and 33.40 % in females Figure 6 which is consistent with literature by Bello *et al.* (2018) 51.3%, Cheong and Lo (2011) 51.1%. On contract, some previous literature shows most of the individuals have symmetrical mental foramen as in Al-Shayyab *et al.* (2015). This variation is mostly seen due to morphological variation seen in the mandible among different gender, ethnicities and races. The knowledge of mental foramen also plays an important role in various dental treatments and clinical procedure (Alok *et al.*, 2017; Sarker *et al.*, 2019). Limitations of the present study are small sample size and single centred study.

CONCLUSION

Variation in the position and symmetry of mental foramen is mostly seen due to morphological variation seen in the mandible among different gender, ethnicities and races. Bearing in mind the limits of the study, the most common site of mental foramen in both right and left is in between the first and second premolar, with most being asymmetrical.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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