

Original article

Dental intervention perspective: Anatomical Variation of Mental and Mandibular Foramen in Selected Malay Patients

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Abstract:

Background: Anatomical structures of head are essential to carry out almost all of dental procedures. In this regard to study the variation of mental and mandibular foramina are prerequisite for the intervention of clinical dentistry. The study was undertaken to determine the anatomical position of the mental foramen (mF) and mandibular foramen (MF) and their relationship. **Methods and Methods:** Eighty-seven selected Malay patients were examined at Universiti Kebangsaan Malaysia Dental Clinics in which 34 were male and 53 were female. The size and position of the mF in relation to tooth position were recorded. The size and position of the MF were recorded based on the horizontal and vertical dimensions consisting of reference point's namely anterior and posterior border of ascending border of ramus as well as mandibular notch and lower border of mandibular ramus, respectively. **Results:** The mF was found to be most in line with second premolar (49%) on both sides in both sexes. The size of mF was larger on the right side and in male ($p < 0.05$). The size of MF on the right and left side for both male and female did not differ significantly ($p > 0.05$). The mean distance between the MF to occlusal plane was 10mm (SD ± 1.56) for both sides. There was no significant difference between mF and MF position ($p > 0.05$). **Conclusion:** In the Malay population, anatomical relationship and variation between mental and mandibular foramen were not found to be significant. The information would be useful in dental intervention of the clinicians.

Keywords: mental foramen, mandibular foramen, anatomical variations, Malays, dental intervention.

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Introduction

Knowledge of anatomical structures of head are essential to carry out almost all of dental procedures and to achieve profound anesthesia.¹ Anatomical position of mandibular and mental foramen play an important role in dentistry and these structures might be the same, slightly different, or totally different from one person to another. This knowledge would help in implant placement, periradicular surgery, root resection, pre-prosthetic surgery, pre-orthodontic surgery, pre-restorative surgery and many more. This can reduce post-operative complications, most likely temporary or permanent nerve injury.^{2,3} Nerve injury

is very important yet crucial, especially if results in permanent damages, there is no way that the damaged nerve to heal by itself due to the nature of nerve tissue, known that it cannot undergoes regeneration. Thus, by doing this study, hopefully it can improve this limitation and provide efficient dental procedures together with minimizing the possible complication of nerve injury.³ Therefore, the study was undertaken to determine the anatomical position of the mental foramen and mandibular foramen and their relationship of Malay population presented at Dental Clinic of the Faculty of Dentistry and Clinic of Oral and Maxillofacial Surgery, Universiti Kebangsaan

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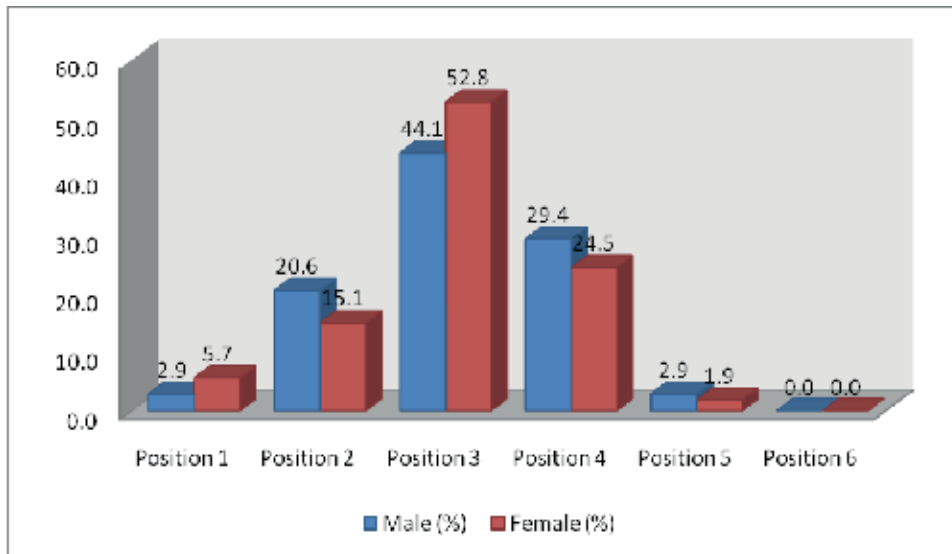


Fig.1. Distribution of the position of left mental foramen in male and female

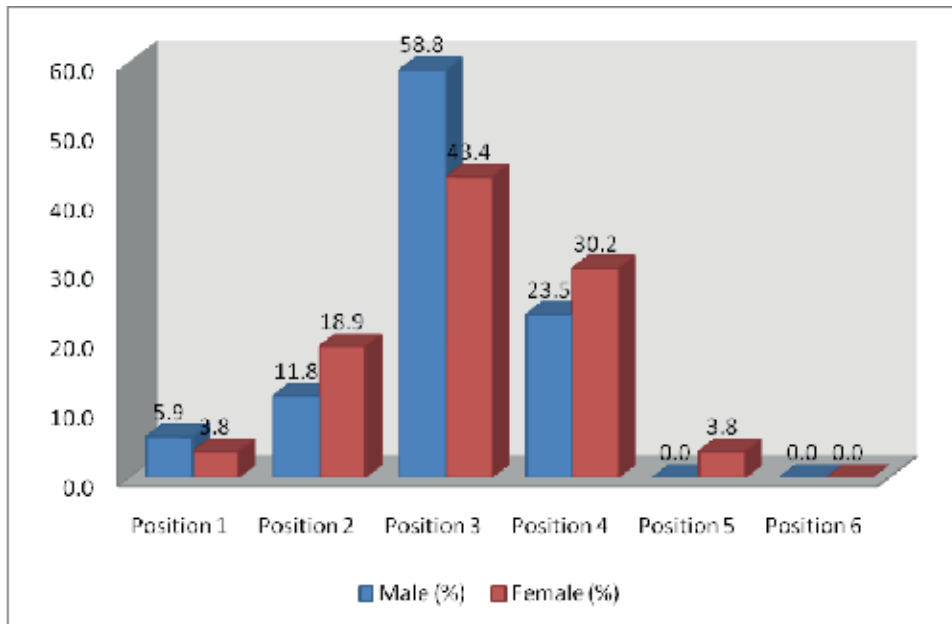


Fig. 2 .Distribution of the position of right mental foramen in male and female Malaysia Medical Centre.

Materials and methods

Study design and approval: This is a retrospective study involving a total of 87 /CBCT records of patients were collected from the radiology database of Faculty of Dentistry and from the Clinic of Oral and Maxillofacial Surgery, Universiti Kebangsaan Malaysia Medical Centre. The study was submitted and approved by Dental Faculty Research Ethical Committee.

Sample collection: The samples for the study consisted of 87 of Malaya patients with the following criteria

Inclusion criteria: Malay ethnicity, aged 15-40 years

old, teeth present from canine to second molar (at least), identifiable mental foramen and mandibular foramen from the image, high quality image with respect to the angulations and contrast.

Exclusion criteria: history of fractured mandible, edentulous especially on the lower arch, presence of gross pathologic disorders like cyst or tumor, undergone orthodontic treatment and images which could not be accessed by the current software.

Data calibration: Data was calibrated initially against the ‘gold standard’ using one training session designed to standardize data collection technique in order to achieve a good level of inter-examiner reliability prior to study. Cohen Kappa value was considered 0.725 indicated good agreement.

Mental foramen: The size of mental foramen was measured based on its largest vertical

diameter and the position of mental foramen was evaluated in relation to its position towards first premolar, second premolar and first molars.

Mandibular foramen: The mandibular foramen was measured based on horizontal and vertical dimensions. The horizontal dimension consists of two reference points joined by the anterior and posterior border of the ascending ramus whereas the vertical dimension is a line joining from the mandibular notch and the lower border of mandibular ramus. The distance from the mandibular foramen to the occlusal plane was also measured.

Statistical analysis: Data were then compiled and

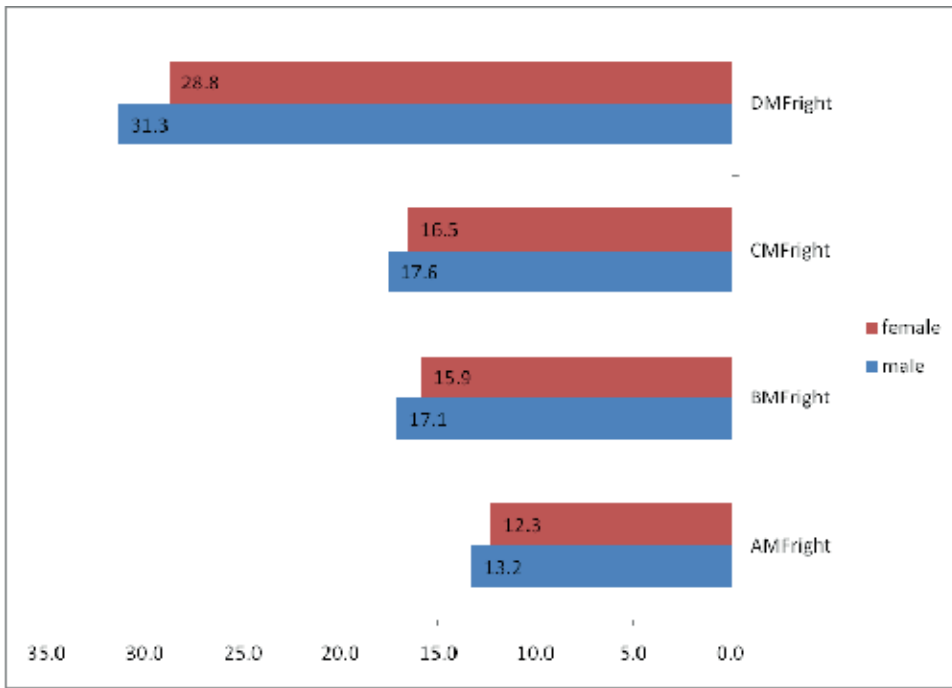


Fig. 3 a. Mean distance of position of the left mandibular foramen to the reference points

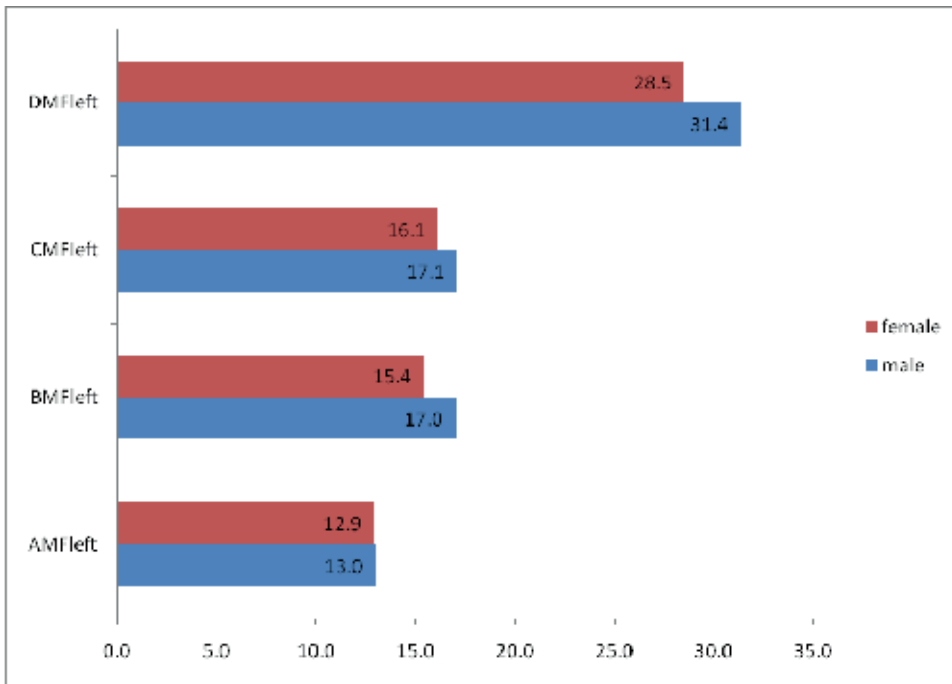


Fig. 3b. Mean distance of position of the right mandibular foramen to the reference points

analyzed using the Statistical Package for Social Sciences (SPSS version 21. *P* value of less than 0.05 was considered significant.

Ethical clearance was taken at the commencement of the study

Results

Eighty-seven CBCT records of selected Malay patients were collected in which 34 (39%) were male and 53 (61%) were female. The mental foramen (mF)

position on the left side of the mandible was reported (44.1%) in the male and (52.8%) in female. The commonest side was at the position 3, which is in line with second premolar. It's followed by the position 4 (29.4%), position 2 (20.6%) and the least position 5 (1.9%) in female (Fig. 1)

On the right side of the mandible, the position of mental foramen (mF) was reported (58.8%) in the male and (43.4%) in female. The commonest side was at the position 3, which is in line with second premolar as well. That is followed by the position 4 (30.2%) in female, position 2 (18.9%) in female and the least position 5 and 1 (3.8%) in female respectively (Fig. 2).

The mean size of mental foramen on the right side is slightly larger than the left size by 0.1mm. The male has reported had larger mental foramen (2.51mm) on the right side and (2.34mm) on the left side when compared to female sample (1.83mm) on the right side and (1.67mm)

on the left side.

Regarding the size of mandibular foramen, there is no Statistical significant difference between the right and left mandibular foramen in both sexes. These are on the right side (4.68mm) and on left side (4.67mm) while in male right side (4.86mm) and left side (4.66mm), in female right side (4.56mm) and left side (4.67mm), respectively. It is indicated the MF of right side is a bit larger in male than female (Fig.

3a & 3b)

There is no significant difference in size of the right mandibular foramen between male and female. However, there is significant difference in size of the left mandibular foramen between male (11.46mm) and female (10.35mm).

Legends

- DMF: From inferior border of mandible to mandibular foramen (MF)
- CMF: From mandibular notch of mandible to mandibular foramen (MF)
- BMF: From posterior border of mandible to mandibular foramen (MF)
- AMF: From anterior border of mandible to mandibular foramen (MF)

Regarding the association between mental and mandibular foramen with regards to their anatomical position, one does not affect the other and the variation in mandibular foramen position is not related to mental foramen and vice versa.

Discussion:

It is essential to know the positions and sizes of both mental and mandibular foramen sizes for the operation of especially implant placement, peri-radicular surgery, root resection, pre-prosthetic surgery, pre-orthodontic surgery, pre-restorative surgery.^{1,4,5,6}

In this study, it shows (Fig.1, Fig2) that there were no relationship between the positions of the mandibular foramen to the mental foramen. It means that there is no change in term of the position of mandibular foramen in relation to the mental foramen. The size of both mental and mandibular foramen may vary. From our study, we observed that the position of mental foramen mostly found in line with second premolar for male and female on right (58.8%, 43.4%) and left sides (44.1%, 52.8%), followed by between the first and second premolar, in between second premolar

and first molar and lastly in line with first molar. These findings are similar to the studies conducted by other researchers.^{7,8,9}

On the contrary, the mean size of the mental foramen was observed 2.1mm and 2.0mm for right and left side, respectively.^{10,11} It indicates that the mean size of the mental foramen on the right side is larger compared to left sides. The difference from our study might be due to the study subjects are from Nigeria.

In our study we found the sizes of mental foramen of male of Malay population than that of female. It results has the similarity with the study of some researchers.⁹ However, the different sizes right and left mandibular foramen in male and female are not found to be statistically significant.

For the distance from occlusal plane to the mandibular foramen, we found that the mean distances is about 10mm (SD±1.56). There is slight difference in the mean distance for both genders on left side that may be due to the variation of the mandible size of the gender.^{2,3,6} Therefore, we can assume that this finding might not give any clinical significance to the operator. The age factor plays the important role of the mandibular foramen position as reported by some authors.¹²

It is also observed that in the population mandibular foramen is situated slightly towards anterior border of the mandible and coronoid notch. It's similar to study by Thangavelu *et al.*⁶ 2012. Moreover, the height from occlusal plane to mandibular foramen is more on left side compared to right side in both gender of Malay

Based on the findings it may be concluded that there is no association between mental and mandibular foramen's variation in anatomical position in Malay population for both gender. Present information would be useful in dental intervention of the clinicians.

Conflict of interest: None declared.

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