

LOCALIZATION OF MENTAL FORAMEN IN KURDISH PEOPLE IN DUHOK CITY BY CONE-BEAM COMPUTED TOMOGRAPHY

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ABSTRACT

Background: The mental foramen is considered one of the most important vital organs in the body of the mandible, and any trauma to the canal or injury to its vital contents during any routine dental procedure in the lower premolar area could lead to a serious problem. This research aims to determine the location of the mental foramen in relation to lower premolar teeth to increase the awareness of any dentist about this remarkable structure, especially during implant placement or tooth extraction.

Materials and Methods: In this cross-sectional study, 100 scans of healthy Kurdish people were taken at the Delight Dental Clinic in the Duhok City, Kurdistan Region, Iraq). The period extended from March 8th to June 8th, 2023. XMind Prime CBCT from Acteon was used in the acquisition of these scans. 50 scans were of males, and 50 were of females. The patients' ages ranged between 16 and 60 years old. The location of the mental foramen was studied according to side, age, and gender.

Results: The most common location was below the 2nd premolar on both sides and in both genders, and no influence of age on the location of the foramen was found; the most common location was below the 2nd premolar in all age groups.

Conclusion: The most predominant location of the mental foramen in Kurdish people was below the 2nd premolar tooth. A thorough knowledge of the location of the mental foramen can help dentists and oral surgeons avoid undesirable complications during dental procedures.

KEYWORDS: Mental Foramen, Mandible, CBCT, 2nd Premolar.

1. INTRODUCTION

The mental foramen (MF) is an important anatomical structure located in the body of the mandible. It represents the termination of the mental canal, which opens onto the surface in an upward, outward, and backward direction (Gupta *et al.*, 2015).

This foramen transmits the mental nerve, artery, and vein. The mental nerve is a branch of the inferior alveolar nerve, which supplies sensation to the lower lip, the labial mucosa, and the lower canines and premolars (Mohammed *et al.*, 2016).

The mental foramen is located midway between the upper and lower borders of the mandible, usually between the apices of mandibular premolar teeth, and its position has been reported to vary in different ethnic groups. It could also be below the second premolar tooth (Nanayakkara *et al.*, 2018).

Usually, this foramen is one in number, and any foramen in addition to the main MF is known as an accessory mental foramen (AMF)

(Zmysłowska *et al.*, 2017). The presence of AMF is a relatively rare anatomical variation. Also, the shape of MF was studied widely, and it was found to vary among oval, circular, and irregular shapes depending on ethnic groups (Bello *et al.*, 2018).

The precise knowledge of the variations in the position, shape, and size of the MF and the presence of the AMF would be of greater importance for dentists while they perform surgical procedures on the mandible, such as the curettage of the premolars, filling procedures, dental implants, root canal treatments, or thognathic surgeries, etc. (Udhaya *et al.*, 2013).

2. MATERIALS AND METHODS

Before starting this research, approval from the research ethics committee Directorate General of Health Duhok) was obtained, and the researchers adhered to all the terms and conditions provided to them in this approval.

In this cross-sectional study, 100 healthy Kurdish patients were recruited from those who attended the x-ray unit in the Delight Dental

Clinic in Duhok City, Kurdistan Region, Iraq. The CBCT scans were captured either for dental implantation or for endodontic treatment. These scans were evaluated by an oral surgeon and a dental radiologist. The period of this research was 3 months, which extended from March 8th to June 8th, 2023. The images were taken by Acteon XMind Prime (2021, Italy), and the images were processed by the AIS 3D app PRO. The sample included 50 males and 50 females. They ranged in age from 16 to 65 years old.

The inclusion criteria that were taken into consideration were:

1. Only Iraqi Kurdish ethnic population.
2. Presence of first and second premolars on both sides of the mandible.
3. Absence of any pathology, fracture, or supernumerary or impacted teeth.

4. Images with high resolution and the availability of precise information about the patient's age and gender.

5. Patients above 16 and under 65 years of age.

6. Lacks any evidence of orthodontic treatment or orthognathic surgery.

On the basis of 3D reconstruction images, the CBCTs were evaluated in terms of visibility and location of the mental foramen on both sides and according to age and gender.

To determine the location, the longitudinal axes of premolar teeth were taken as references, and the suggested locations were: Location A: mesial to the first premolar; Location B: below the first premolar; Location C: between the first and second premolars; Location D: below the second premolar; and Location E: distal to the second premolar (Figure 1).

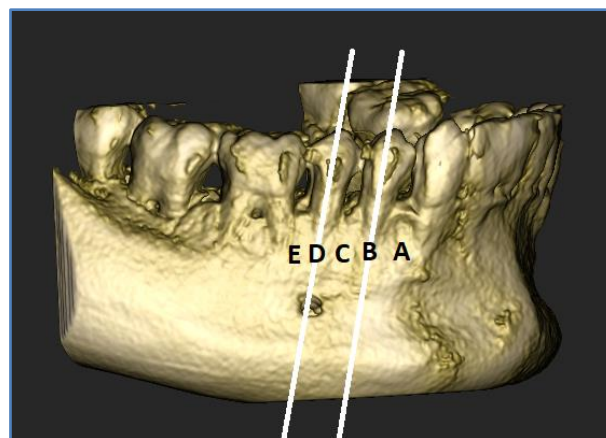


Fig. (1): Showing the five suggested locations of the mental foramen according to the long axes of the mandibular premolar teeth.

The patients were categorized according to their ages into three groups: Group 1 (16–32) years old, Group 2 (33–49) years old, and Group 3 (50–65) years old.

The significant level was set to 0.05, and the significant value was calculated from the z-score after calculating the standard deviation.

3. RESULTS

Many scans were captured in the x-ray unit of Delight Dental Clinic, but only 100 were compatible with our inclusive criteria.

The gender of the patients was set at male 50 (50%) and female 50 (50%). Their ages ranged from 16 to 65 years old. The age mean was 37.72.

After analyzing all 100 radiographs by a dental radiologist and an oral surgeon, the location of MF was recorded on both sides (right and left) according to gender and age groups.

By visibility, all the mental foramina were visible, and no case of a missing foramen was found. The most predominant location of MF on both sides and in both genders was below the second premolar tooth: 136 cases (68%) [65 cases (65%) on the right side and 71 cases (71%) on the left side], followed by in between the first and second premolar teeth: 50 cases (25%) [28 cases (28%) on the right side and 22 cases (22%) on the left side]. (Table 1)

Table (1): The Location of Mental Foramen in Both Genders According to the Side. (*Significant Value)

Location	Right	%	Left	%	Subtotal	%	P-Value
A	1	1	0	0	1	0.5	0.049*
B	2	2	1	1	3	1.5	
C	28	28	22	22	50	25	
D	65	65	71	71	136	68	
E	4	4	6	6	10	5	
Grand Total	100	100%	100	100%	200	100%	

According to gender, the most common location in males and females was below the second premolar tooth (62% in males and 72% in

females), followed by in between the first and second premolar teeth (27% in males and 24% in females). (Tables 2 and 3)

Table (2): The Location of the Mental Foramen in Males, according to the Side. (*Significant Value)

Location	Right	%	Left	%	Subtotal	%	P-Value
A	1	2	0	0	1	1	0.0001*
B	1	2	1	2	2	2	
C	14	28	13	26	27	27	
D	30	60	32	64	62	62	
E	4	8	4	8	8	8	
Grand Total	50	100%	50	100%	100	100%	

Table (3): The Location of the Mental Foramen in Females, according to the Side. (*Significant Value)

Location	Right	%	Left	%	Subtotal	%	P-Value
A	0	0	0	0	0	0	0.0009*
B	2	4	1	2	3	3	
C	12	24	12	24	24	24	
D	36	72	36	72	72	72	
E	0	0	1	2	1	1	
Grand Total	50	100%	50	100%	100	100%	

The symmetry in the location of MF between the right and left sides was predominant; 89 cases (89%) had the same location on both sides, and only 11 cases (11%) had a different location.

Also, in all age groups, the most common location was below the second premolar tooth; in

Group 1, it was 57.9%, in Group 2, it was 71.1%, and in Group 3, it was 79.2%. And it was followed by in between the first and second premolar teeth, with percentages of 31.6%, 23.7%, and 16.7% in all age groups, respectively. (Table 4)

Table (4): The Location of Mental Foramen according to Age Groups. (*Significant Value) (**Non-significant Value)

Location	G.1 (18-32) Years				P-Value	G. 2 (33-49) Years				P-Value	G. 3 (50-65)				P-Value
	Right	Left	Total	%		Right	Left	Total	%		Right	Left	Total	%	
A	1	0	1	1.3	0.038*	0	0	0	0	0.074**	0	0	0	0	0.12**
B	1	0	1	1.3		2	0	2	2.6		0	0	0	0	
C	12	12	24	31.6		10	8	18	23.7		6	2	8	16.7	
D	20	24	44	57.9		26	28	54	71.1		18	20	38	79.2	
E	4	2	6	7.9		0	2	2	2.6		0	2	2	4.2	
Grand Total	38	38	76	100%		38	38	76	100%		24	24	48	100%	

4. DISCUSSION

This study focused on the determination of the location of mental foramen in Kurdish people using CBCT technology. The precise localization of MF in the mandibular premolar area is an important step before any dental procedure. Recently, cone-beam computerized tomography technology has gained popularity in the dental community, particularly in the area of implantology, because of the image quality and the possibility of taking precise measurements of anatomical and pathological findings (Currie *et al.*, 2016).

The mental foramen has been reported to vary in position in different ethnic groups (Yeşilyurt *et al.*, 2008). The current study shows that the most common location of MF is below the 2nd premolar tooth on both sides. These findings are consistent with those of Al-Mahalawy *et al.*, (2017), who studied a Saudi population sample. Other studies, such as Vox Arx *et al.*, (2013), Verma *et al.*, (2015), and Currie *et al.*, (2016) reported the location of MF in between the 1st and 2nd premolar teeth as a common location.

According to this study, the symmetry of the location of the MF between the right and left sides of the mandible was very clear. On both sides, 89 percent have the same position. And this is in agreement with the results of Kabak *et al.*, (2017) and Ahmad *et al.* (2017), who stated that the symmetry was found to be 68% and 60% in their samples, respectively.

In the current study, in all age groups, the most common location of MF was below the 2nd premolar tooth, and there was no influence of age on the location. Unlike other studies like Saravastava's (2020), which stated that the location of MF differs according to the age.

In the recent study, no variation was seen in the location of the MF between males and females; the most common location was below the 2nd premolar tooth in both genders. This result is the same as those of Apinhasmit *et al.*, (2006), Khojazerpour *et al.*, (2015), and Shalash *et al.*, (2020). They reported that the most common location of MF was below the 2nd premolar in both genders. Unlike Mahabob *et al.*, (2021), they stated that a difference in position of the MF was found between males and females; in males, it was mostly below the 2nd premolar, while in females, it was between the 1st and 2nd premolars.

5. CONCLUSION

The most common location of the mental foramen in Kurdish people in Duhok Governorate was below the 2nd premolar tooth. As a rule, the localization of the mental foramen is of greater importance for any dentist and oral surgeon before any dental procedure in the mandibular premolar area in order to prevent any harmful effect on the foramen contents.

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