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Exploring The Prevalence of Canine Malposition among Dijlah University Dental Students: A Cross- Sectional Study

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Aim: To test the null hypothesis that there is a significant relationship between canine misalignment and gender discrepancies and the positioning of canine teeth in both upper and lower jaws among dental college students, at Dijlah University.
Materials and Methods: This study was conducted at Dijlah University Dental Teaching Hospital in Baghdad, Iraq, involving 1311 dental students aged 18-24. The clinical dental examination was conducted using traditional methods, involved a comprehensive evaluation of the entire arch, probing to detect any remaining deciduous canine teeth together with visual examination. The examination looking for several abnormalities, including a canine "bulge," diverging of lateral incisors, lack of space, crowding, and fibrous tissue. Also, a thorough assessment of the student's age and timing of eruption and exfoliation of teeth were also conducted. The Study obtained authorization by the Dijlah University Ethical Committee and after the collection of data, it was arranged in tables then using the statistical package for social sciences to analyze the data to reach the final results.
Results: A total of 1311 students underwent assessments, with 502 males (38.291%) and 809 females (61.708%) participating in the study. The findings indicate an occurrence of impacted canines among females (1.296%) compared to males (0.533%) aligning with studies. Both male and female participants exhibit instances of misalignment particularly in the upper jaw than the lower jaw.
Conclusion: Canine malposition prevalence, gender distribution, and position of malposed canines might vary among different populations and situations, underlining the need for further national survey to explore these variations extensively.

Keywords: Canine; impaction; malposition; dental students; prevalence.

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Introduction

Malocclusion, a common dental anomaly, encompasses various forms of dental misalignment, including canine malposition. Often, problems with development and eruption lead to a number of canine abnormalities, such as ectopic canine eruption, transmigration, transposition, agenesis, and impaction.[1] The permanent upper cuspid is the most commonly impacted tooth, following the third molar.[2] A numerous systemic conditions and local circumstances could be contributing factors; insufficient space for primary canine eruption or early loss abnormal tooth bud position; the existence of a cystic lesion, neoplasm or alveolar cleft; ankyloses; root dilacerations; a cryptogenic or unknown cause; some glandular secretory deficiencies; nutritional deficiencies; radiation; or fever.[3] The maxillary canine begins its development (calcification) high up in the maxilla at around the age of 4–5 months and near the last of the 12 months it can be seen in elevated position in the maxilla above the root bifurcation of upper deciduous first molar and beneath the orbit's floor.[4]

From this site to the occlusal plane, the path of eruption is curvier and complicated than any other tooth; and as the root starts to form approximately at 7 years of age, the cuspid moves close to the occlusal plane, the crown positioning in close proximity to the lateral incisor's root and emerging into the mouth at the age of 11 and 12 years. By 12 years the canine has usually reached the occlusion.[5]

Literature shows that occurrence of the mandibular malposed canine among dental students in Iraq was more prevalent (12%) relative to the maxillary buccally malposed canine (10%). Malpositioned canines were often more common in female students than in males, with class I Angles being the most common categorization and buccal rather than lingual.[6, 7] A different study emphasized that 9.72% of a group of students exhibited buccally malposed maxillary canines, with an especially high incidence in individuals with Class I anteroposterior relationship. Mesially inclined canines were widespread than distal angulated ones, as well as there was no significant difference between genders.[8]

The variance in the overall outcome of malocclusion's frequencies specify that the currency of malocclusion modify according to gender, variation in ethnicity, age, a type of malocclusion, geographic areas, territories, genetic predisposition, variations in growth and development of the facial skeleton, and also the diagnostic criteria. Malocclusion is widely considered as an important public health concern, and its basal causes are many-sided such as biological, oral behaviors, race, in addition to mental and environmental factors.[9] This research delves into examining how often canine misalignment occurs among dental college students, at Dijlah University; focusing on gender discrepancies and the positioning of canine teeth in both upper and lower jaws

Materials and methods

This study was conducted in Dijlah University Dental Teaching Hospital – Baghdad-Iraq. The protocol of the study was approved by Dijlah University Ethical Committee (NO. 2 in 27/3/ 2024). The researchers obtained authorization from the college officials to conduct the research. With the signed consent form from the students who were evaluated, they had ensured that they committed entirely to hospital and academic protocols as well as research ethics in order to conduct this research investigation.

The sample was collected in College of Dentistry Dijlah University- Orthodontic

clinic by examining the dental students whom are 18-24 years old and the inclusion criteria that were used during sample collection include; all students are Iraqis 'and have Arabic origin, also should not previously treated orthodontically. On the other hand, the exclusion criteria were the exclusion of any severe facial asymmetry, all cases of cleft lip and palate, surgical/ intentional canine's extraction, and the rejection to undergoes clinical dental examination. A total (1311) dental students fulfil the criteria (females = 809, males=502).

The clinical dental examination was conducted using traditional methods, which involved a comprehensive evaluation of the entire arch, probing to detect any remaining deciduous canine teeth together with visual examination, after the collection of data, it was arranged in tables then statistical analysis by using the statistical package for social sciences (SPSS) (version 25) to analyze the data. was done to reach the final results. Also, a thorough assessment of the student's age and the timing of eruption and exfoliation of teeth were also conducted.

Results

By looking for any abnormality in the canine's position, the results of the clinical dental examination of the total 1311 dental students, 502 were males which represented (38.291%) and 809 were females (61.708%) as seen in table 1.

Table 1. Distribution of students according to gender

Gender	No.	Percentage
Male	502	38.291%
Female	809	61.708%
Total	1311	100%

However, the results found the impacted canines was more common in female students (1.296%) than males (0.533%). This data points out the prevalence of impacted canines, within this group of students as in table 2.

Table 2. Distribution of students with Impacted Canines

Gender	Maxilla			Mandible			Total Percentage %
	Right	Left	Bilateral	Right	Left	Bilateral	
Male	2	2	-	1	1	1	0.533 %
Female	7	3	1	3	2	1	1.296 %
Total	9	5	1	4	3	2	1.829 %

On other hand, the finding offers a glimpse into how the alignment of canine teeth differs between males and females. It shows that both palatal and buccal misalignments occur, with proportions seen in each gender 2.898% in males and 2.288% in females for buccal malposition; followed by Palatal malposition 0.915% in males and 1.525% in females as in table 3 and figure 1.

Table 3. Distribution of students with canine's malposition in maxilla

Gender	Palatal malposition			Percentage %	Buccal malposition			Percentage %
	Right	Left	Bilateral		Right	Left	Bilateral	
Male	7	4	1	0.915%	13	14	11	2.898 %
Female	11	7	2	1.525%	14	10	6	2.288 %
Total	18	11	3	2.44%	27	24	17	5.186 %

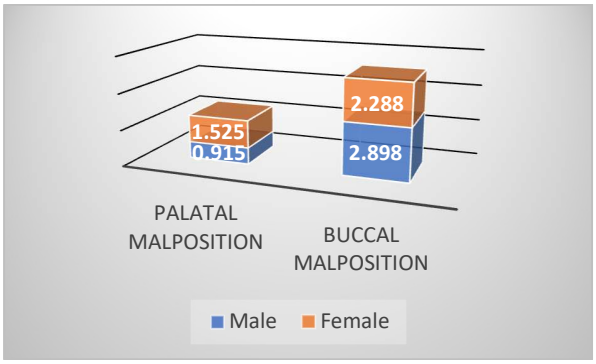

Figure 1. Distribution of students with canine's malposition in maxilla

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Furthermore, the Table 4: outlined the distribution of mandibular canine malposition among students. Lingual and labial malpositions are identified in both genders, in male 0.457%, 1.754% respectively while in female 0.61%, 1.983% receptively. The results suggest a higher prevalence of labial malposition in both genders compared to lingual malposition as in table 4 and figure 2.

Table 4. Distribution of students with canine's malposition in mandible

Gender	Lingual malposition			Percentage %	Labial malposition			Percentage %
	Right	Left	Bilateral		Right	Left	Bilateral	
Male	3	2	1	0.457 %	5	7	11	1.754%
Female	6	2	-	0.61 %	7	5	14	1.983%
Total	9	4	1	1.067 %	12	12	25	3.737%

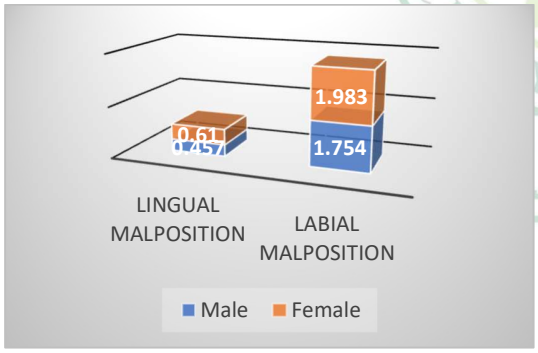

Figure 2. Distribution of students with canine's malposition in mandible

Discussion

Dental practitioners frequently deal with canine impaction and malposition. Canines exhibit a complex eruption pattern and are among the last teeth to erupt in the dental arch. These circumstances suggest that a natural eruption procedure for this tooth may not occur.[9] The canine's aesthetics and functionality are quite important, however, it appears frequently impacted. The main basal cause for the failure of maxillary canines' eruption is still unknown.[10] Therefore, a full assessment of age of the patients and the eruption as well as the exfoliation patterns was also done.[11] This study conducted at Dijlah University on dental students in Iraq and revealed interesting findings regarding the prevalence of canine malposition and impaction. The clinical examination of 1311 students reveals that 502 males (38.291%) and 809 females (61.708%). The distribution of students with impacted canines showed a higher percentage in females (1.296%) compared to males (0.533%), these results comes in agreement with results from. Abdulla [8] when he conducted a survey on similar group "Dental students of IBN SINAA Dentistry College in IBN Sina University of Medical and Pharmaceutical Sciences, Iraq, Baghdad" who found canine impaction prevalence was (6.5%)with female occurrence of (4.2%) over male (2.3%).

Also agreed with Samih [12] who found among the panoramic radiographs analyzed, the prevalence of canines' impaction was 36.24% in males and 63.76% in females. The elevated number of impactions were found unilaterally (82.1%) while bilaterally represented (17.9%). The capsid's impactions in right side represented (42.79%) which were less common than in left side (75.1%).

In the present study that was conducted on canine misalignment among studied group it was found that buccal misalignment is prevalent, in both male and female students; affecting both the upper and lower jaws, these findings corresponded with Al-Atabi et al [13] which similarly observed a greater occurrence of buccally misaligned canines as opposed to palatal or lingual misalignment when collected a sample of 3200 consisted of 1600 males and

1600 females their ages ranged 13-14 years old from Al-Sammawa city, Iraq, reported that 311 patients which represented (9.72%) of total sample revealed buccally malposed maxillary canines; 163 (10.19%) were males and the females were 148 (9.25%).

whereas other Iraqi studies, such as the one conducted by Yaseen & Aldabagh [7] reported a higher prevalence of misaligned canines in the lower arch compared to the upper arch for both genders. They also indicated that female students exhibited an incidence of canine misalignment more than their counterparts.

Regarding gender-based distribution of prevalence of canine impaction, most studies found that females had a higher prevalence.[14] These results may be linked to their smaller cranium, which could result in a reduction of the skeleton of the face and the jaws. This could possibly rise the risk of upper canine impaction.

The higher occurrence of canine impaction in females could be due to the increased frequency of peg-shaped, small sized, or missing lateral incisors which usually associated with displacement of canines palatally. [15,16] As well as may be due to the way that the female is more concerned with esthetic and seek to orthodontic treatment, leading to the discovery of their impacted canines. [17]

Regarding the site of canine's impaction, in this study the prevalence of maxillary cuspids impaction were found greater in the maxillary arch (15) as compared with lower one (8), this result agreed with several studies; Rosdiana [18] revealed that in 1,019 patients (94.3%) without canine impaction, 52 patients (4.8%) with maxillary canine impaction, and 10 patients (0.9%) with mandibular canine impaction. This corresponds with the findings of a study conducted by Alhadi et al. in Yemen [19] as their 5-year retrospective study indicated a higher prevalence of impacted canines in the maxilla (93.9%) compared to the mandible (6.1%) as well as the similar results reported by Pooja et al. [20]

However, Abdulla in his study revealed that 6.5% of Iraqi dental students in other university have canine malocclusion, with a higher occurrence of impacted mandibular canines (4.2%) compared to maxillary canines (2.3%).[7]

The prevalence rate of impacted lower canines in the present study was found to be more than published data, with a value of 2%.[21] On the other hand, as Alqadasi et al [22] found that there is an effectiveness of micro osteoperforations on the rate of maxillary canine retraction however the results from the study at Dijlah University corroborate findings on canine malposition among dental students highlighting a greater occurrence of buccally misaligned canines and a higher prevalence in the upper jaw compared to the lower jaw, for both males and females.

Conclusions

As a conclusion, by comparing these results with prior studies, it becomes obvious that canine malposition prevalence, gender distribution, and the position of malposed canines might vary among different populations and situations, underlining the need for further national survey to explore these variations extensively.

Acknowledgements

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Sample size calculations

The sample size was set based on previous research that estimated a prevalence of canine malposition in similar populations at 6-10 %. Using this expected prevalence, a 95% confidence level, and a margin of error of 5%, a minimum sample size of 1100 participants was deemed necessary. A total of 1311 participants were included in this study to ensure robustness of the results.

Competing Interests: The authors declare that they have no competing interests

Data Availability: The datasets used and analysed during the current study are available from the corresponding author on reasonable request

Ethics approval and consent form: The Study obtained authorization by Dijlah University's Ethical Committee (NO. 2 in 27/3/ 2024) With the signed consent form from the students.

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