Buccally Malposed Maxillary Canines in Intermediate Schools Students of Sammawa City

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ABSTRACT

Background: Canines are unique teeth because they have certain characteristics and responsibilities. They are located in the corner of the mouth, assist the incisors in cutting and tearing food, help the posterior teeth by guiding the mandible during the action of mastication. This survey aimed to determine the prevalence and gender difference of buccally malposed maxillary canines and to study the relation of this problem with the sagittal occlusion, crowding, retard deciduous canine and lack of space in the dental arch in a sample of intermediate schools students from Sammawa city.

Materials and methods: A total of 3200 students (1600 males and 1600 females) aged 13-14 years old from Sammawa city were examined to detect the buccally malposed maxillary canines. For each diagnosed case, the sagittal occlusion, the sides affected on the maxillary arch, angulation of the canines, presence of crowding, retard deciduous canine and space lacking were determined. Z-score test was used to detect the gender difference, while Chi square test was applied to correlate the canine malposition with other factors.

Results : In general 311(9.72%) of total sample have buccally malposed maxillary canines. Of them, 163(10.19%) were males and 148(9.25%) were females. This problem appeared to be higher in class I than other sagittal relations. Mesially angulated canine was more prevalent than distally one and in right more than left with non-significant gender difference. The prevalence of buccally malposed maxillary canines with the presence of crowding and retard primary canines was higher in males than females with non-significant gender difference. There was high significant association between buccally malposed canine and lacking of space.

Conclusions: Regular visits of the children to the general practitioners and /or orthodontists are mandatory trying to preserve the deciduous teeth and to educate the parents about the importance of these teeth. In addition to that, the age between 9 to 10 years is important to detect the bulging of canines trying to minimize the possibility of ectopic canine eruption.

KEY WORDS

Prevalence, canines, Sammawa city.

CITE THIS ARTCLE

Al-Atabi H, Mohammed-Salih H, Nahidh M. Buccally Malposed Maxillary Canines in Intermediate Schools Students of Sammawa City. *Iraqi Dent. J.* 2016; 38(1):21-27. http://www.iraqidentaljournal.com

ملخص

خلفية: الأنياب هي أسنان فريدة من نوعها لامتلاكها بعض الخصائص والمسؤوليات. تقع هذه الاسنان في زاوية الفم، وتساعد القواطع في تقطيع وتمزيق الغذاء من جهة، وتساعد الأسنان الخلفية من خلال توجيه الفك السفلي أثناء المضغ من جهة اخرى. تهدف هذه الدراسة إلى تحديد نسبة انتشار الأنياب العلوية سيئة الوضع شدقيا لكلا الجنسين ودراسة علاقة هذه المشكلة مع الاطباق السهمي وازدحام الاسنان وتأخر الانياب اللبنية وعدم وجود مساحة في القوس السني في عينة من طلاب المرحلة المتوسطة من مدينة السماوة.

المواد والطرق: تم فحص ما مجموعه 3200 طالبا (1600 ذكور و 1600 إناث) الذين تتراوح أعمارهم بين 13-14 عاما من مدينة السماوة للكشف عن الأنياب العلوية سيئة الوضع شدقيا. لكل حالة تم تشخيصها، تم فحص الاطباق السهمي، موقع الناب في قوس الفك العلوي، تزوي الأنياب، ووجود الزحام، تأخر الانياب اللبنية و عدم وجود مساحة في القوس السني. تم استخدام اختبار Z-score للكشف عن الفرق بين الجنسين، في حين تم تطبيق اختبار مربع كاي لربط سوء وضع الانياب مع العوامل أخرى.

النتائج :بشكل عام كان عدد الحالات المتأثرة 311 (9.72٪) من إجمالي العينة. منهم 163 (10.19٪) من الذكور و 148 (9.25٪) من الإناث. كانت هذه المشكلة أعلى في الصنف الأول من العلاقات السهمية. كانت الانياب المائلة انسيا أكثر انتشارا وفي جهة اليسار اكثر من اليمين مع وجود فرق غير معنوي بين الجنسين. كان انتشار الأنياب العلوية سيئة الوضع شدقيا مع وجود الازدحام وتأخر ألانياب الابتدائية أعلى في الذكور منه في الإناث مع وجود فرق غير معنوي بين الجنسين. كان هناك ارتباط معنوي بين الانياب سيئة الوضع شدقيا مع عدم وجود مساحة في القوس السني.

الاستنتاجات: الزيارات المنتظمة من قبل الأطفال إلى اطباء الاسنان الممارسين أو اختصاصي تقويم الأسنان إلزامية في محاولة للحفاظ على الأسنان اللبنية وتثقيف الآباء والأمهات حول أهمية هذه الأسنان . بالإضافة إلى ذلك، من المهم فحص الفئة العمرية بين 9-10 عاما للكشف عن انتفاخ الأنياب في محاولة للحد من إمكانية ظهور الانياب بشكل منحرف.

الكلمات الرئيسية: نسبة الانتشار، ألانياب، مدينة السماوة.

INTRODUCTION

Human beings have four pointed teeth one on each side of the dental arch called canine or cuspid. Each canine represents the third tooth from the median line after the central and lateral incisors forming the key stone or the corner stone of the dental arch [(1)].

The maxillary canines possess crowns that are as long as the crowns of the central incisors with single root longer than that of any tooth. The shape and position of the canines contributed to the guidance of the teeth into the inter-cuspal position by "canine guidance." [(2)]

Several characteristics of the functional form of canine crowns had a clear similarity to that of incisor and premolar. Due to possessing crowns with single pointed cusps and long roots in addition to their location in the corner of the mouth, canines resemble the prehensile teeth of the carnivore, hence the name

come. Generally, the labio-lingual thickness of the crown and the root of the canine and its anchorage in the alveolar process make this tooth the most stable one in the mouth. The shape of the crown promotes the self-cleaning property, so it is the last tooth to be lost.

The bony ridge over the labial portion of the canine's root in addition to the form and position of the canine give it more cosmetic importance [3].

Due to these characteristics, it plays a great role in keeping up the contour and shape of the dental arch, occlusion and facial expression, in addition to its role in mastication, appearance and prosthetic treatment [4].

From developmental point of view, Dewel [5] stressed on the maxillary canine as it had the longest period of development from the deepest area (below the orbit) and it had the most tortuous path of eruption from the point of origin till full occlusion. These factors made maxillary canines more susceptible to favorable or unfavorable environmental influences.

The calcification process of maxillary permanent canine crown begins at 4 months of age and completed at 6-7 years of age. It erupts in the oral cavity at 11-12 years old and its roots completed at 13-15 years old [6].

Sachan and Chaturvedi [7] summarized the etiological factors of ectopic canines as followed:

1. Early loss of deciduous teeth
2. Crowding of the permanent successor
3. Tooth size and overall arch length
4. High developmental position and long path of eruption and tortuous movement
5. Prolonged retention of the deciduous tooth
6. Failure of primary canine root resorption
7. Small or congenital missing permanent lateral incisor
8. Reduced in the length of the adjacent lateral incisor root
9. Ankylosis of permanent canine
10. Alveolar cleft
11. Malposed tooth germ
12. Hereditary factors
13. Endocrine deficiency
14. Febrile diseases.

Many studies [8-22] have been conducted in Iraq to study the problems of canines. Some of them concern with canine specifically and the other took the maxillary canine as a part from the survey.

This survey was conducted to study the prevalence of buccally malposed maxillary canines in Sammawa city and to find out the gender and sides' difference of this type of malocclusion in addition to the relation with the presence of crowding, retard deciduous canine and lacking of space.

MATERIALS AND METHODS

Sample

This study was conducted from 5 October 2014 to 29 April 2015 on a sample consisted of 3200 students (1600 males and 1600 females) attending intermediate schools in Sammawa city (280 km to the south of Baghdad).

Age was considered according to the last birthday giving an age range from 13 years 0 months to 14 years 11 months [23].

Permission was acquired from the Al-Muthanna directorate of education. The schools` authorities were contacted and the purpose of the study was explained to them to ensure full cooperation.

Criteria of the sample selection

1. All subjects are Iraqis Arabs in origin.
2. No history of orthodontic treatment.
3. Any gross facial asymmetry was excluded
4. No history of systemic disease or regular drug used for chronic disease that affecting the growth of the body.
5. Cases of cleft lip and palate were excluded.

Methods

The following instruments and equipment were used: disposable dental mirrors, kidney dish, millimeter graded vernier (INOX, Zurcher Modell, Asset plant and machinery Pty. Ltd., China), plastic ruler with 15º angle cut, medical cotton, medical gloves, cheek retractor, disinfected solution (Desident Cavicide, Spofadental, Czech), portable torch light and case sheet to register the information obtained.

The examination was carried out in rooms that were available in host school. The subjects were seated on ordinary chairs with their heads supported in an upright position and the examiner stood in front of the chair to get direct view of both sides of the mouth [24] and determined the following parameters:

Angulation of the buccally malposed maxillary canines

Mesial or distal tipping or angulation of fully erupted permanent maxillary canine was recorded when it exceeded 15º using modified plastic ruler [25].

Sagittal occlusion

Depending on Angle's classification [26], the sagittal occlusion was determined by examining the

1st permanent molar relationship:

a. Normal molar occlusion (class I): It is registered when the mesio-buccal cusp of the upper first permanent molar occludes with the anterior buccal groove of the lower first permanent molar.

b. Distal molar occlusion (class II): It is observed when the relative position of mandibular molar has shifted distally by half cusp width or more.

c. Mesial molar occlusion (class III): The relative position of the mandibular molar had shifted mesially by half a cusp width or more.

Presence of crowding

The dental arch was divided into three segments; one incisal and two lateral segments (right and left). The incisal segment was demarcated by the distal contact points of the two lateral incisors, while the lateral segments were limited by these points and the mesial contact points of the first molars [25].

Crowding (a shortage of 2 mm or more of space preventing the correct alignment of all teeth in that segment) was recorded for each segment with the aid of vernier [24].

Presence of retard deciduous tooth

Retard deciduous tooth (a tooth remained in the mouth beyond its normal time of shedding) was denoted as persistent when, owing to aplasia or anomalous eruption of the equivalent permanent teeth [25].

Lack of space

Present due to premature extraction of primary teeth causing mesial shifting of the permanent teeth and block the space of canine.

Statistical Analysis

The data were processed and analyzed by using SPSS program version 21. The statistical analyses included descriptive statistics (frequency and percentages) and inferential statistics (Z score test for comparison between both genders and Chi square test to detect the association between the determined parameters and malposed canines).

The following levels of significance are used:

Non-significant	NS	$P > 0.05$
Significant	S	$0.05 \geq P > 0.01$
Highly significant	HS	$P \leq 0.01$

RESULTS

Prevalence of the buccally malposed maxillary canines according to genders

The total sample consisted of 3200 students (1600 males and 1600 females). From this total sample, only 311(9.72%) were found to have buccally malposed maxillary canine, of them 163(10.19%) males and 148(9.25%) females (Table 1).

Table 1: Distribution of buccally malposed maxillary canines according to genders

State	*Total*		*Males*		*Females*	
	No.	*%*	*No.*	*%*	*No.*	*%*
Affected	311	9.72	163	10.19	148	9.25
Not affected	2889	90.28	1437	89.81	1452	90.75
Total	3200	100	1600	100	1600	100

Distribution of the buccally malposed maxillary canines according to the side of the problem

As shown in table 2, unilateral buccally malposed canine was more prevalent than bilateral malposition and in males more than females with a non-significant gender difference.

Table 2: Distribution of the buccally malposed maxillary canines according to state of malocclusion in both genders

State of malposition	*Total*		*Males*		*Females*		*Gender difference*	
	No.	*%*	*No.*	*%*	*No.*	*%*	*Z-test*	*p-value*
Unilateral	211	67.85	110	67.48	101	68.24	-0.143	0.889 (NS)
Bilateral	100	32.15	53	32.52	47	31.76	0.143	0.889 (NS)
Total	311	100	163	100	148	100		

Buccally malposed maxillary canines showed high frequency in the right side than the left with a non-significant gender difference (Table 3). Buccal maxillary canine malposition on both side appeared in 100 cases; 53 in males and 47 in female with a non-significant gender difference. The association between the side of canine malposition and genders was non-significant.

Table 3: Distribution of buccally malposed maxillary canines according to the sides' maxillary arch

Side of problem	*Total*		*Males*		*Females*		*Genders difference*	
	No.	*%*	*No.*	*%*	*No.*	*%*	*Z-test*	*p-value*
Right side	133	42.77	68	41.72	65	43.92	-0.392	0.697 (NS)
Left side	78	25.08	42	25.77	36	24.32	0.293	0.772 (NS)
Both sides	100	32.15	53	32.52	47	31.76	0.143	0.889 (NS)
Total	311	100	163	100	148	100		

X^2= 0.166, d.f. =2, p-value= 0.920 (NS)

Buccally malposed maxillary canines in relation to the sagittal occlusion

Distribution of buccally malposed maxillary canines in relation to sagittal occlusion in both genders was demonstrated in table 4.

Generally the highest number of cases was presented in class I cases followed by class II and the least in class III. Z-test revealed non-significant gender difference. Chi-square test disclosed non-significant association between the sagittal occlusal relation and genders.

Table 4: Distribution of buccally malposed maxillary canine in relation to sagittal occlusion

Sagittal occlusion	Total		Males		Females		Genders difference	
	No.	%	No.	%	No.	%	Z-test	p-value
Class I	222	71.38	113	69.32	109	73.65	-0.843	0.401 (NS)
Class II	63	20.26	37	22.70	26	17.57	1.125	0.263 (NS)
Class III	26	8.36	13	7.98	13	8.78	-0.257	0.795 (NS)
Total	311	100	163	100	148	100		

X^2= 1.272, d.f. =2, p-value= 0.529 (NS)

Angulations of buccally malposed maxillary canines

Table 5 demonstrated distribution of the buccally malposed maxillary canine according to its angulation. Mesially angulated maxillary canine was presented in 281 cases while in 30 cases, the canine angulated distally. Generally, both of the types of angulations were higher in the right side that of the left. Chi-square tests revealed a non-significant association between the angulation of canine malposition and the side of occurrence in the maxillary arch.

Table 5: Distribution of buccally malposed maxillary canines according to its angulation on the sides of maxillary arch

Side of problem	*Total*		*Mesially*		*Distally*	
	No.	*%*	*No.*	*%*	*No.*	*%*
Right side	133	42.77	121	43.06	12	40
Left side	78	25.08	71	25.27	7	23.33
Both sides	100	32.15	89	31.67	11	36.67
Total	311	100	281	100	30	100

X^2= 0.31, d.f. =2, p-value= 0.856 (NS)

The frequency of mesially angulated buccally malposed canines were presented in males more than females in each side and in both side cases with a non-significant genders difference. Non-significant association was found between the genders and the side of malposition (Table 6).

Table 6: Distribution of mesially angulated buccally malposed canine according to the sides' maxillary arch

Side of problem	Total		Males		Females		Genders difference	
	No.	%	No.	%	No.	%	Z-test	p-value
Right side	121	43.06	62	42.18	59	44.03	-0.313	0.757 (NS)
Left side	71	25.27	38	25.85	33	24.63	0.236	0.810 (NS)
Both sides	89	31.67	47	31.97	42	31.34	0.113	0.912 (NS)
Total	281	100	147	100	134	100		

X^2= 0.106, d.f. =2, p-value= 0.948 (NS)

The distally angulated buccally malposed canines were presented in 16 males and 14 females with nearly equal distribution on each side of the arch and in both sides with a non-significant gender difference. Again, no significant association was found between the gender and the side of the problem (Table 7).

Table 7: Distribution of distally angulated buccally malposed canine according to the sides' maxillary arch

Side of problem	Total		Males		Females		Genders difference	
	No.	%	No.	%	No.	%	Z-test	p-value
Right side	12	40	6	37.5	6	42.86	-0.299	0.764 (NS)
Left side	7	23.33	4	25	3	21.43	0.231	0.818 (NS)
Both sides	11	36.67	6	37.5	5	35.71	0.101	0.920 (NS)
Total	30	100	16	100	14	100		

X^2= 0.101, d.f. =2, p-value= 0.950 (NS)

Buccally malposed maxillary canine in relation to crowding

Table 8 showed the distribution of buccally malposed canines in relation to crowding on the sides of the maxillary arch in both gender. The crowding appeared in 206 cases (107 cases in males and 99 cases in females). There was non-significant gender difference in each side and in both side, also no significant association existed between the gender and the side of crowding.

Table 8: Distribution of buccally malposed maxillary canines on sides of the maxillary arch associated with crowding

Side of problem	Total		Males		Females		Genders difference	
	No.	%	No.	%	No.	%	Z-test	p-value
Right side	84	40.78	44	41.12	40	40.40	0.105	0.920 (NS)
Left side	55	26.70	29	27.10	26	26.26	0.136	0.889 (NS)
Both sides	67	32.52	34	31.78	33	33.33	-0.238	0.810 (NS)
Total	206	100	107	100	99	100		

X^2= 0.058, d.f. =2, p-value= 0.971 (NS)

Buccally malposed maxillary canine in relation to retard deciduous canine

The retard deciduous canine with buccally malposed canines were presented in 69 cases; 37 cases in males and 32 cases in females. No significant gender difference or association between the retard deciduous canine and buccally malposed maxillary canine were recorded (Table 9).

Table 9: Distribution of buccally malposed maxillary canines on sides of the maxillary arch associated with retard deciduous canine

Retard deciduous canine	Total		Males		Females		Genders difference	
	No.	%	No.	%	No.	%	Z-test	p-value
Right side	27	39.13	13	35.14	14	43.75	-0.731	0.465 (NS)
Left side	18	26.09	10	27.03	8	25	0.191	0.849 (NS)
Both sides	24	34.78	14	37.84	10	31.25	0.573	0.567 (NS)
Total	69	100	37	100	32	100		

X^2= 0.567, d.f. =2, p-value= 0.753 (NS)

Buccally malposed maxillary canine in relation to space lacking

The space lacking for buccally malposed canines were presented in 205 cases, 121 cases of them in males and 84 in females with a high significant gender difference in cases of both sides and non-significant gender difference in each side separately.

Chi-square test revealed a highly significant association between the lack of space and buccal canine malposition with regard to genders (Table 10).

Table 10: Distribution of buccally malposed maxillary canines on sides of the maxillary arch associated with lack of space

Space lacking	Total		Males		Females		Genders difference	
	No.	%	No.	%	No.	%	Z-test	p-value
Right side	98	47.80	51	42.15	47	55.95	-1.946	0.051 (NS)
Left side	57	27.80	30	24.79	27	32.14	-1.155	0.246 (NS)
Both sides	50	24.39	40	33.06	10	11.90	3.468	0.000 (HS)
Total	205	100	121	100	84	100		

X^2= 12.035, d.f. =2, p-value= 0.002 (HS)

DISCUSSION

Prevalence of buccally malposed canines in Sammawa city

The prevalence of buccally malposed maxillary canine in this study was 9.72%, this was higher than Ghaib [11] (8.36%), Al-Huwaizi [14] (6.5%), Al-Chalabi [22] (4.6%), and lower than Al-Fahdawi [16] (42.35%) and Aziz [18] (10.8%); this is due to the difference in sample size and selection.

This problem affected males more than females due to the smaller dental arch of females.

Prevalence of buccally malposed canines on sides of the maxillary arch

High frequency of buccally malposed canines was reported at one side and in the right side more than the left with a non-significant gender difference. Ghaib [11] reported high prevalence of unilateral buccally malposed canines.

Al-Fahdawi [16] and Al-Chalabi [22] found high frequency of buccally malposed canines on the right side in reverse to Al-Huwaizi [14] and Aziz [18].

Buccally malposed canines in relation to the sagittal occlusal relationship

High frequency of buccally malposed maxillary canines was found in class I sagittal occlusion more than other classes; because the dominance type of occlusion is class I, so it is reasonable to find a higher percentage of canine problems in class I sagittal occlusion.

Bass [27] reported lower percentage of Class II cases affected with displaced canines as greater amount of space will be available in such cases due to proclined incisors that reduced the opportunity of an early canine deflection whether buccally or palatally and gave this tooth a high chance to carry on its correct path of eruption.

All classes showed non-significant gender difference. This comes in agreement with Ghaib [11], Al-Fahdawi [16] and Aziz [18].

Angulation of buccally malposed canines

High frequency of mesially angulated buccally malposed canines than distally angulated one had been reported in this study in addition no significant gender difference between prevalence of mesially and distally angulated buccally malposed canines. This is due to its eruption path and this gives a real fact that the causative factors for the canine problems in males and females are similar mostly due to local factors in other word the canine problems outside the hormonal effect. These results are supported by Kinaan [9], Farah [10], Ghaib [11], Al-Fahdawi [16] and Aziz [19].

Buccally malposed canine and crowding

High frequency of buccally malposed canine associated with crowding was showed in this study with no significant gender difference. This may be due to lack of space and small arch.

Buccally malposed canine and retard deciduous canine

Non-significant gender difference for the prevalence of buccally malposed canine associated with retard deciduous canine was shown in this study. Retard deciduous canine cannot be considered as a causative factor for the buccally malposed canine since there is no tendency of matching the occurrence of cases of retard deciduous canine on the maxillary arch in the cases of buccally malposed canine (Chi

square revealed non-significant association). Early loss of deciduous canine may affect the permanent canine, whereas late loss (over 14 years old) of the deciduous canine may not have the same effect on the permanent canine.

Buccally malposed canine and space lacking

Highly significant association was found between prevalence of buccally malposed canine and space lacking. Buccally malposed canine has a significant tendency to be existed on the same side of the space lacking on the maxillary arch. Insufficient room in the dental arch and a vertical developmental position are often associated with buccal canine malposition [28]. This finding agrees with Al-Fahdawi [16].

CONCLUSIONS

Regular visits of the children to the general practitioners and /or orthodontists are mandatory trying to preserve the deciduous teeth and to educate the parents about the importance of these teeth. In addition to that, the age between 9 to 10 years is important to detect the bulging of canines trying to minimize the possibility of ectopic canine eruption.

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