The prevalence and etiology of maxillary midline diastema among orthodontic patients attending Shorsh Dental Clinic in Sulaimani City

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Abstract

Maxillary midline diastema (MMD) is a common aesthetic problem of people seeking orthodontic problem, which means spacing greater than 0.5 mm between the proximal surfaces of maxillary central incisors. The causes for MMD may be: high frenum attachment; microdontia; macrognathia; supernumerary teeth; peg laterals; missing lateral incisors; midline cysts and unhealthy oral habits.

Objectives: The purposes of this study were to determine the prevalence of MMD among Shorish dental clinic`s patients seeking orthodontic treatment and to find the factors associated with this anomaly.

Materials and Methods: During 6 months, 507 patients with age (13 – 40) years old attending Shorish Dental Clinic, seeking orthodontic treatment were screened to find the prevalence and etiology of MMD.

Result: The MMD was present in 110 patients (21.7%). The frequency of MMD was the same in males and females. It is highest in the young age group and lowest in the older age group (29% vs. 4%).

Conclusion: The most frequent factor among the observed etiological factors was oral unhealthy habit which was found in 40% of MMD patients and 8.7% of all cases.

Keywords: *Maxillary midline diastema, frequency, etiology.*

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Introduction:

Spacing greater than 0.5 mm between the proximal surfaces of adjacent teeth is described as a "diastema" and if it is in the anterior maxilla in the midline it is known as a "midline diastema", which is a common aesthetic complaint of people, seeking orthodontic treatment[1]. Maxillary midline diastema (MMD) is a common aesthetic problem in mixed and early permanent dentitions. It may be considered normal for many children during the eruption of the permanent maxillary central incisors[2]. However, if the midline diastema is present after eruption of canines or is more than 2-4mm, there is always an underlying cause[1].

No definite etiology for midline diastema has been identified. Midline diastema can be physiological, dentoalveolar, due to a missing tooth, due to peg shaped lateral, midline supernumerary teeth, proclination of the upper labial segment, prominent frenum and due to a self-inflicted pathology by tongue piercing[1]. Angle's suggestion of abnormal frenum as the cause of midline diastema has been supported by other researches[3-5].

Tooth size discrepancy can be considered as one of the main causes for maxillary midline diastema. The most common discrepancy concerning tooth size is the presence of peg shaped lateral incisors[6].

According to oral habits, any habit such as tongue-thrust, thumb sucking, finger bite and biting the lower lip that results in a long-term force leading to upper anterior teeth separation should be considered as a possible etiological factor[6].

An accurate diagnosis is necessary before treatment can be initiated. No treatment should be initiated if the diastema is physiological and usually if the canines have not erupted[7].

The objectives of this study was to determine the prevalence of maxillary midline diastema among Shorish dental clinic`s patients seeking orthodontic treatment, and to determine the factors associated with maxillary midline Diastema.

Materials and Methods:

Five hundred and seven patients attending Shorish Dental Clinic, seeking orthodontic treatment during 6 months (October,1 2013 – April,1 2014) were screened randomly to determine the prevalence and etiology of maxillary midline diastema. The age range was between 13 – 40 years to exclude diastema caused by ugly duckling stage or periodontal condition. Patients were excluded if they had previous history of previous orthodontic treatment, any artificial crown or proximal restoration in central incisors, without periapical and/or periodontal involvement to exclude any factors that may create or change the width of midline diastema.

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After obtaining informed consent, Patients with visible space between maxillary central incisors were examined clinically by measuring the width at the incisal third of the maxillary central incisors. The existence of a 0.5 mm or more space between the maxillary central incisors was considered as a diastema and the patient as positive patient. The measurements were carried out using a Williams's graduated periodontal probe. Photographs of the patients are taken after getting an informed consent.

The causative factors were identified via intraoral examination of labial frenum, generalized spacing, peg shaped maxillary lateral incisors, missing maxillary lateral incisors and oral habits (Figures 1, 2 & 3). Findings of clinical examination of the patients that fulfilled the study criteria were recorded. Panoramic radiographs were taken to correlate the clinical findings. The statistical analysis was done by using STATA software version 12.

Results:

Total of 507 persons were examined during the study of whom 110 persons (21.7%) had diastema. The age ranged from 13 to 40 years with a mean age of 22.9

Figure 1: A patient with maxillary median diastema due to generalized spacing

Figure 2: A patient with maxillary median diastema due to missing lateral incisors

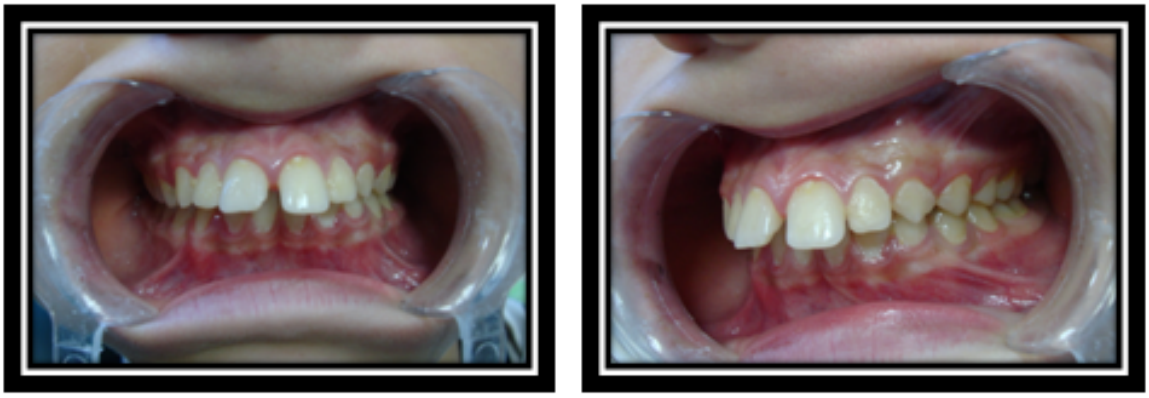

Figure 3: A patient with maxillary median diastema due to oral unhealthy habit

Table 1: Main characteristics of the sample

Characteristic	Number	%
Total	507	100
Diastema		
Yes	110	21.7
No	397	78.3
Gender		
Male	160	31.5
Female	347	68.5
Age		
13- 19 years	137	27.0
20-29 years	300	59.2
30-39 years	70	13.8
High frenum	6	1.2%
Missing lateral incisors	11	2.2
Generalized dental spacing	22	4.3
(Unhealthy) Oral habits	44	8.7
Presence of peg-shaped lateral incisors	27	5.3

years (SD=5.1 years). There were 347 males (68.5%) and 160 males (31.5%). The majority of persons (59%) were aged between 20-29 years. In terms of presence of potential risk factors, 6 persons (1.2%) had high frenum, 11 persons (4.3%) had missing lateral incisors, 22 persons (4.3%) had generalized dental spacing, and 44 (8.7%) had unhealthy oral habits (Table 1).

Table 2 compares males and females in relation to potential risk factors. Age group were similarly distributed between males and females. Although high frenum attachment was more common in females than males (1.4% vs. 0.6%), but this difference was not statistically significant (P=0.7). Similarly congenital missing lateral incisors was twice as common in females compared to males (2.6% vs. 1.3%), but the difference was not statistically significant (P=0.3). Additionally unhealthy oral habits were more common in females than males (10.1% vs. 5.6%) without being significant (p=0.1). Generalized spacing and presence of peg-shaped incisors were more common in males than females, but these differences were also not statistically significant (p=0.2) (Table 2).

Table 3 shows presence of diastema according to potential risk factors. Prevalence of diastema was

Table 2: Comparisons of males and females in relation to potential risk factors

Potential risk factor	Male Number (%)	Female Number (%)	P-value
Age group			
13-19	39 (24.4)	98 (28.2)	
20-29	98 (61.3)	202 (58.2)	$\chi2$ =0.8 P<=0.7
30-39	23 (14.4)	47 (13.5)	
High frenum attachment			
Yes	1 (0.6)	5 (1.4)	$\chi2$ =0.6 P=0.4
No	159 (99.4)	342 (98.6)	
Congenital missing lateral incisors			
Yes	2 (1.3)	9 (2.6)	$\chi2$ =0.9 P=0.3
No	158 (98.7)	338 (97.4)	
Presence of generalized spacing			
Yes	10 (6.3)	12 (3.5)	$\chi2$ =2.1 P=0.2
No	150 (93.7)	335 (96.5)	
Presence of oral unhealthy habits			
Yes	9 (5.6)	35(10.1)	$\chi2$ =2.8 P=0.1
No	151(91.3)	312 (89.9)	
Presence of peg-shaped incisors			
Yes	12 (7.5)	15 (4.3)	$\chi2$ =2.2. P=0.2
No	148 (92.5)	332 (95.7)	

similar in males and females (21.2% vs. 21.9%). In relation to age group, prevalence of diastema was highest in the young age group of 11-19 years and lowest in the older age group of 30-39 (29% vs. 4%) and this difference was statistically significant (P<=0.001). Other statistically significant risk factors include presence of high frenum, presence of missing lateral incisors, presence of oral habits, presence of generalized spacing, and presence of peg-shaped lateral incisors.

Discussion:

Frequency of MMD in the current study was found to be 110 (21.7%). This frequency is considerably lower than 23% which is the prevalence of MMD in Aseer region of Saudi Arabia [8] and it is higher in our sample as compared to prevalence of MMD in orthodontic patients attending Armed Forces Institute of Dentistry

Table 3: Presence of diastema according to potential risk factors

Potential risk factor	Diastema Number (%)	No diastema Number (%)	P-value
Gender			
Male	34 (21.2)	126 (78.8)	$\chi2$ =0.3 P=0.9
Female	76 (21.9)	271 (78.1)	
Age group			
13-19	40 (29.2)	97 (70.8)	
20-29	67 (22.3)	233 (77.7)	$\chi2$ =17.2 P<=0.001
30-39	3 (4.3)	67 (95.7)	
High frenum attachment			
Yes	6 (100.0)	0 (0.0)	$\chi2$ =21.9 P<0.001
No	104 (20.8)	397 (79.2)	
Congenital missing lateral incisors			
Yes	11 (100.0)	0 (0.0)	$\chi2$ =40.6 P<0.001
No	99 (20.0)	397 (80.0)	
Generalized spacing			
Yes	22 (100.0)	0 (0.0)	$\chi2$ =83.0 P<0.001
No	88 (18.1)	397 (81.7)	
Oral unhealthy habits			
Yes	44 (100.0)	0 (0.0)	$\chi2$ =173.9 P<0.001
No	66 (14.3)	397 (85.2)	
Peg-shaped incisors			
Yes	27 (100.0)	0 (0.0)	$\chi2$ =102.90 P<0.001
No	83 (17.3)	397 (82.7)	

in Pakistan 12.59%[9], prevalence in United Kingdom 3.4% of Caucasians[10] and 1.6% of South Indians[11]. This difference may be related to the differences in methodology, sampling technique, the dissimilarity in chronological stratification of the population groups or genetic predisposition perhaps because of a higher ratio of consanguineous marriages in our country.

In relation to age group, there is a significant difference in the prevalence of diastema with highest in the young age group of 11-19 years and lowest in the older age group of 30-39 (29% vs. 4%). This may be due to the unaesthetic appearance of MMD that might make the young age group to seek the treatment more than the old age group due to the aesthetic purpose.

Regarding the gender, the frequency of MMD is nearly the same in both genders with 21.9% in females and 21.2% in males. Also in relation to the potential risk factors, the frequency of MMD in males and females are not significant statistically. This finding is in agreement with the result of the study done by Dissanayake et al (2003)[1] in which there is no significant difference of MMD between males and females. While the study done by Luqman et al (2011)[8], in contrast to the current findings, shows higher prevalence of MMD in males than in females.

Differences in epidemiological study findings may be attributed to the increased number of factors contributing to midline diastema, to the definitions used to explain its presence and to gender and race

differences in the distribution of the hereditary feature in question[6].

In the current findings, among the potential risk factors, oral unhealthy habit was the most frequent factor as it included 44 patients ((8.7% of all 507 cases) and (40% of 110 MMD patients)), while in some references as (McCoy JD, 1946)[4] generalized spacing was the most common factor. Deep bite was found significantly associated with MMD in study done by Oesterle and Shellhart (1999)[12], and in other study the most frequent etiological factor was found to be excessive over-jet in other study[9]. This may be also due to the presence of more than single etiological factor that may be attributed to MMD in many cases.

The study could not focus on the precise etiology of MMD. Individual frequency of an observed etiological factor could be one of the reasons for this. Furthermore spacing in anterior region, Bolton's discrepancy, impacted canines, extractions, variable size of pre-maxilla and periodontal problems must be taken into consideration. Future studies should focus on correlation of MMD with a single etiological factor with a more purified sampling technique[9].

Conclusions:

The frequency of MMD was 21.7% in the sample and the frequency were the same in males and females. Whereas the relation to the potential risk factors is not significantly different between males and females, the frequency of MMD is highest in the young age group and lowest in the older age group.

References:

1. *Upul Dissanayake, MS Chandrasekara, ER Wikramanayake. The prevalence and mode of inheritance of median diastema in the Sinhalese. The Ceylon J Med Sci 2003;46:01-06*
2. *Vivek Govila, Smita Govila. Cosmotic creation-through diastema closure. Indian J Dent Sci. 2012;3:74-7*
3. *Tallents RH. Artificial gingival replacement. Oral Health. 1983;73:37-40.*
4. *McCoy JD. Applied Orthodontia. 2nd ed. Lea Febiger: Philadelphia; 1946. p. 72, 96-7.*
5. *Stones HH. Oral and dental diseases. Second edition. E. & S. Living stone Ltd., Edinburgh; 1951. p. 19-21, 211.*
6. *Alexandros T, Moullas. Maxillary midline diastema: A contemporary review. Hellenic Orthodontic Review. 2005;8:93-103.*
7. *Vivek Govila, Smita Govila. Cosmetic creations - through diastema closure. Indian J Dent Sci. 2012; 4:74-77.*
8. *Master Luqman, Syed Sadatullah, Mohammad Yunis Saleem, Mohammed Ajmal, Yahya Kariri, Mushabab Jhair. The prevalence and etiology of maxillary midline diastema in a Saudi population in Aseer region of Saudi Arabia. Int. J of Clinical Dent Sci. 2011;2:81-5.*
9. *Hameedullah Jan, Sadia Naureen, Ayesha Anwar. Frequency and etiology of medline diastema in orthodontic patients reporting to armed force institute of dentistry Rawalpindi. Pakistan Armed Forces Med J. 2010;60:126-8.*
10. *Lavelle CLB. The distribution of diastemas in different human ponpulation samples. Scand J Dent Res. 1970: 78:530-4*
11. *Nainar SM, Gnanasundaram N. Incidence and etiology of midline diastema in a population in south India (Madras). Angle Orthod. 1989;59:277- 82.*
12. *Oesterle LJ, Shellhart WC. Maxillary midline diastemas: a look at the causes. J Am. Dent. Assoc. 1999;130: 85-93.*