Morphology and Positional Characteristics Of Maxillary Labial Frenum In Jordanian Children

Eman Hammouri, BDS, Moa'th Ghozlan, BDS *,*
*Hasan Alsmadi, BDS *Farouk Rihani, BDS *,Talal Alrawashdeh, BDS **.*

ABSTRACT

Objectives: To determine the prevalence of the different morphological variants and anatomical location variations and characteristics of maxillary labial frenum in Jordanian children.

Methods: This descriptive study was conducted on randomly selected patients who attended the pediatric dental clinic at Prince Rashid Bin Al Hassan military hospital in the north of Jordan for dental treatment during July and August 2016. Collected data included gender, age, morphology and attachment location of the maxillary labial frenum. The morphology were classified using Sewer in classification and attachment location using Mirkoclassification.

Results: Three hundred Jordanian patients were included in the study. Males (153) slightly outnumbered females (147). The age ranged between 1.33 and 13.25 years with an average of 7.8 ± 2.41 SD. Gingival attachment of maxillary labial frenum was the most common in both males and females (58%) followed by mucosal (27%), papillary (9.67%) and papillary penetrating type (5.33%). Morphologically, simple variant was the most common (54.67%) followed by simple with nodule (25.67%), simple with appendix (9.67%), persistent tectolabial (4.33%), and other variants (less than 6%). There was a significant correlation between the position of the maxillary labial frenum and the age of the child (-0.233).

Conclusion: Gingival frenal attachment was the most common and there was a significant statistical correlation between the age of the patient and the location of the maxillary labial frenum. The diversity of morphology of the maxillary labial frenum in healthy children urges the physicians to differentiate the normal from abnormal variant in order to avoid misdiagnosis and unnecessary surgical intervention.

Key words: Gingival Attachment, Morphology, Maxillary Labial Frenum, Simple with Appendix.

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Introduction

The maxillary labial frenum (MLF) is a dynamic band of oral mucosa composed of stratified squamous epithelium, elastic and collagen fibers, and nerve fibers. It originates from the periosteum of the anterior maxillary alveolus and is connected to the upper lip so that it limits the movement of the lips. [1,2] Dewel claimed that MLF is a post-eruptive remnant of tecto-labial band.[2] In the first few years of life, MLF is usually thick and broad, this then decreases in size and becomes thinner with age.[1,3] Although the thick and broad MLF is normal in young children it may lead to dental caries in primary teeth because of difficulty in dental cleaning.[1,4,5] Normal thick and broad MLF in young children impose difficulty in distinguishing it from abnormal variants.[6,7]

Abnormal MLF can be seen in different

From Department Of:
*Pediatric Dentistry Section, Prince Rashid Bin Al Hassan Military Hospital.
**Conservative Dental Section, Prince Rashid Bin Al Hassan Military Hospital.
Correspondence should be addressed to Dr: Eman Hussein Hammouri, Email:emanhammouri@yahoo.com
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shapes, sizes, and anatomical positions in relation to alveolar process and these variations may have serious consequences such as difficulty in breast feeding,[5] localized gingival recession,[8] interference with retention and stability of upper denture,[9] frequent trauma to MLF,[10] and midline diastema.[7, 11, 12] Although not pathognomonic, torn MLF may indicate child abuse.[10] The absence or multiplicity of MLF may aid in diagnosis of certain syndromes. Absent MLF is seen in Ehler- Danlos [13] and Holoprosencephaly [14] syndromes and multiple MLFs may be seen in Oral Facial Digital[15] and Ellis Van-Creveld[16] syndromes. There are many classifications for MLF based on anatomical location, such as Placek*et al*[17]and Mirko*et al*[18] and morphology such as Sewerin[19], Modified Sewerins Topology,[7,20] and Mohan *et al*.[21] Mirko*et al* [18] anatomical location classification is as follows: 1. Mucosal, the frenum is inserted in the mucosa and does not cross the muco-gingival line, 2. Gingival, the frenum crosses muco-gingival line and is inserted in the attached gingiva, 3. Papillary, the frenum is inserted in the midline papilla without crossing palatally, and 4.Papillary penetrating, the frenum penetrates the midline papilla in the palatal mucosa.

Maxillary labial frenum morphological classification of Sewerin[19] is as the following: simple frenum, persistent tectolabial frenum, frenum with appendix, frenum with nodule, duplicated frenum, frenum with recess, and bifid frenum.

This study was undertaken to determine the prevalence of the different morphological and anatomical location variations of MLF in Jordanian children.

Methods

This descriptive study was conducted on randomly selected patients who attended pediatric dental clinic at Prince Rashid Bin Al Hassan military hospital in the north of Jordan for dental treatment during July and August 2016.Three hundred patients who attended the clinic for dental treatment not related or caused by the MLF were included. Well trained pediatric dentists evaluated the selected patients. Collected data included gender, age, morphology and anatomical location of the MLF. To make sure the measurement are reliable, the morphology and location of MLF of all patients were examined clinically by elevating the maxillary lip, taking colored photographs when necessary, to be re-evaluated by other investigators, and classified using Sewerin[19] and Mirko*et al*[18]classification respectively. The study was approved by the local ethical committee of the Royal Medical Services of Jordan. Exclusion criteria included patients with history of trauma or surgery that may alter shape, size, or location of the frenum, patients diagnosed with syndrome or having abnormal clinical manifestations of unknown syndrome, and patients with cleft lip or cleft lip and palate. Simple statistics such as mean, average, range, frequency, Chi square test, 95% confidence interval, and percentages were used. Bivariant correlations among different parameters were computed with the Pearson r.

Results

Three hundred Jordanian patients were included in the study. Males (153) slightly outnumbered females (147). The age ranged between 1.33 and 13.25 years with an average of 7.8 ± 2.41 SD. Figure 1 shows the percentage of different age groups of MLF in males, females, and the whole sample and it reveals that the majority (73.33%) were between 5 and 11 years. Figure 2 shows the distribution of MLF according to position where the most common was gingival type in both males and females (58%) and papillary penetrating type (5.33%) was the least common. Table I shows the distribution of MLF according to morphology and it reveals that the simple variant was the most common type (54.67%) whereas none of the patients had frenum with recess type. Figure 3 shows some of MLF types. There is no statistically significant difference between male and females (95% confidence interval is 3.8%).Table II shows the correlation between the gender, age, morphology, and position of MLF and there was a significant correlation between the position of the MLF and the age of the child (-0.233) but there was no other correlation between any two parameters.

Table I: Distribution of MLF cases according to morphology.

Morphology of MLF	Male	Female	Total	Chi square
Simple	83	81	164	0.920367
Simple with appendix	11	18	29	0.159175
Simple with nodule	43	34	77	0.395149
Persistent tectolabial	5	8	13	0.365814
Double	1	0	1	0.326989
With recess	0	0	0	0
Bifid	4	2	6	0.442689
Two or more variations	6	4	10	0.569136

Table II: The correlation between the gender, age, morphology, and position of MLF.

		Gender	Position	Morphology	Age
Gender	Pearson Correlation	1	.113	-.052	.089
	Sig. (2-tailed)		.052	.374	.124
	N	300	300	300	300
Position	Pearson Correlation	.113	1	.115*	-.233**
	Sig. (2-tailed)	.052		.046	.000
	N	300	300	300	300
Morphology	Pearson Correlation	-.052	.115*	1	-.053
	Sig. (2-tailed)	.374	.046		.363
	N	300	300	300	300
Age	Pearson Correlation	.089	-.233**	-.053	1
	Sig. (2-tailed)	.124	.000	.363	
	N	300	300	300	300

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

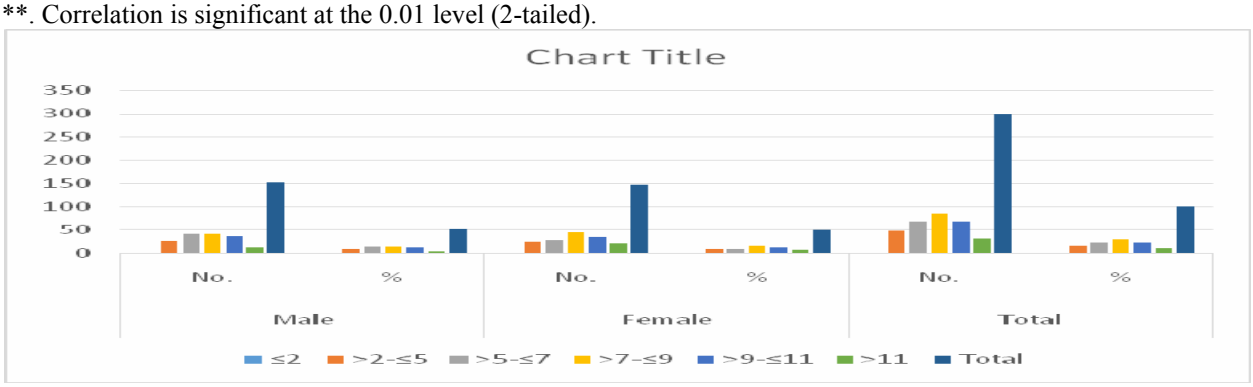


Fig 1. The percentage of different age groups of MLF in males, females, and the whole sample.

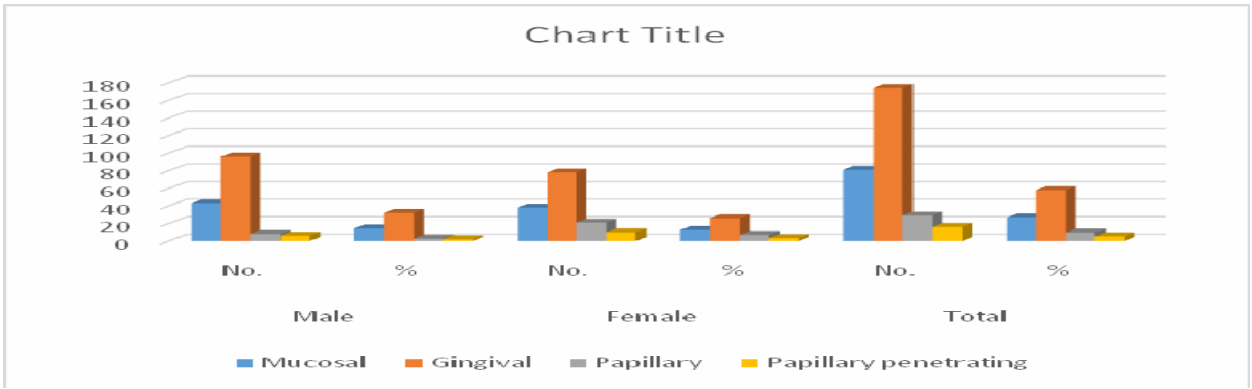
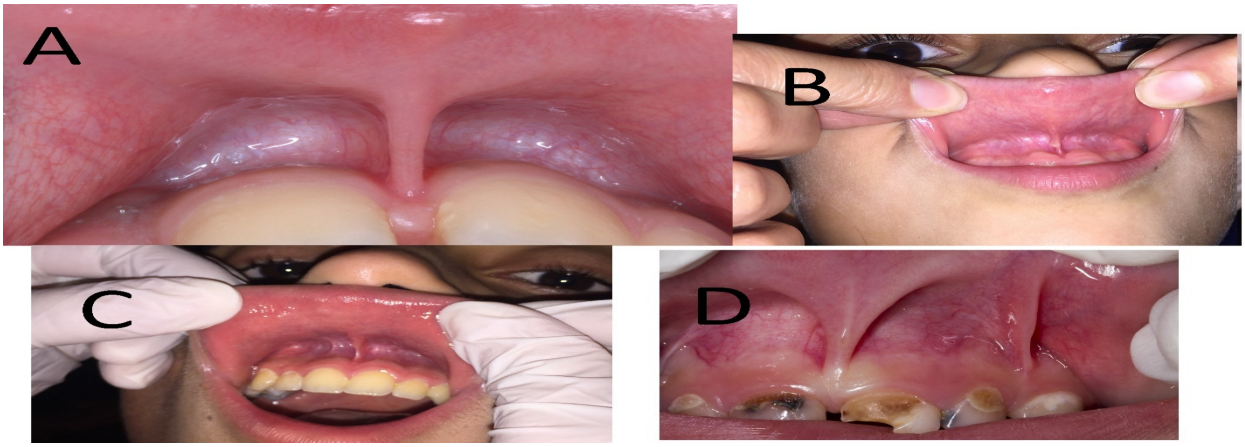


Fig 2. Distribution of MLF cases according to position.

Fig 3. Some types of midline frenum, A. Simple, B. Simple with Nodules, C. Simple with Appendix, D. Double and central Bifid.



Discussion

The maxillary labial frenum is subject to variation in morphology, size, and position during its development and its growth pattern has an intimate relationship with alveolus growth.[22] This is the first study that determines the prevalence of the different morphological and anatomical location variations of MLF in Jordan. In this study, gingival variant (58%) was the most common frenal attachment and it was noticed that 62.7% of males belonged to this group and only 53.1% of females had this type. Other studies such as Christabel and Gurunathal,[1] Addy *et al*,[23] Kaimenyi,[24]Boutsi and Tatakis,[25] and Upadaya[26] showed predominance of gingival variant. However; these findings are higher than Christabel and Gurunathal[1] (58% Vs 49.5%) where males and females were almost equal in their study (49.2% Vs 49.9%). On the contrary, Janczuk and Banach[27] reported that mucosal type was the most common followed by gingival type. Papillary penetrating was found to be the most common in infant by Lindsey[28] while in this study it was the least common. The explanation for these findings could be related to the age of the studied groups, where Lindsey[28] study involved infants and Janczuk and Banach[27] involved older children. In our study the majority (73.33%) were between 5 and 11 years and it is known that the maxillary labial frenum might move from a more coronal to a more apical position with growth of the maxillary alveolus with increasing age as suggested by Popovich *et al*.[29] In their study, Boutsi and Tatakis, [25] concluded that frenal attachment differs significantly with age where mucosal or gingival variants occur more frequently and papillary or papillary penetrating occur less frequently. This was obvious in our study where there was a statistically significant correlation between the age and the position of the frena, whereas there was no statistically significant correlation between gender and position, Table II. Although this study involved pediatric age groups we used Sewerin*et al*[19] classification for the morphology of MLF as it can be applied in all age groups. So it can be used inthe future if a more extensive study is done on children and adults in Jordan. More than half (54.67%) of the cases had simple frenum, which was almost equal in both males (27.67%) and females (27%), and this agrees with Christabel and Gurunathal[1] and less than that reported by Mohan *et al*[21] *(63.79%)*.Nagaveni and Umashankara[6] studied the morphology of MLF in primary (3- 5 year), mixed (7- 14 year), and permanent (15 -16 year) dentition of Indian children and the simple frenum was the most frequent in all groups (60%, 70, and 78% respectively) and those figures are higher than that found in our study. Another Indian study by Jindal *et al*,[30] on patients aged between 16 and 40 years found simple frenum to be the most common 77%. Frenum with nodule (25.67%) was the next more frequent in our study followed by frenum with appendix (9.67%) and this was slightly higher than Mohan *et al*[21](19.92%, 6.38% respectively). Persistent tecto-labial frenum (4.33%) was the next frequent which agrees with Townsend *et al*[7](2%) but differs from the Nagaveni and Umashankara[6] group 1 (primary dentition) and Diaz-Pizan*et al*[20] where persistent tecto-labial was the second

most frequent (21% and 24%, respectively). These differences are related to the age of subjects in the study which is between 1 and 13 years, and the size of the sample. None of the patients showed frenum with recess and this agrees with most of the previous studies where this variant was rare in comparison with other types. Although the sample of the study was chosen randomly, its small size and being conducted in a single hospital on a pediatric age group are limitations that need to be overcome by studying a large sample that involves adult and pediatric age groups, twins, and siblings in different hospitals to represent the whole Jordanian population and to determine the etiology and inheritance pattern of MLF. We suggest another study with a long term follow up to detect the MLF morphological changes that occur with increasing age and the effect of the various types on oral hygiene and dental caries. In conclusion, gingival frenal attachment was the most common location of MLF and there was a significant statistical correlation between the age of the patient and the location of the MLF. Morphologically, the simple type was the most frequent and the diversity of the MLF in healthy children urges the physicians to differentiate the normal from abnormal variant in order to avoid misdiagnosis and unnecessary surgical intervention.

Conclusion

Gingival frenal attachment was the most common and there was a significant statistical correlation between the age of the patient and the location of the maxillary labial frenum. The diversity of morphology of the maxillary labial frenum in healthy children urges the physicians to differentiate the normal from abnormal variant in order to avoid misdiagnosis and unnecessary surgical intervention.

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