

Assessment of maxillary labial frenum morphology in primary, mixed, and permanent dentitions in Wardha district

Nilima Thosar, Priti Murarka, Sudhindra Baliga, Nilesh Rathi

Department of Pedodontics and Preventive Dentistry, Sharad Pawar Dental College, Wardha, Maharashtra, India

Address for correspondence:

Dr. Priti Murarka,
Department of Pedodontics
and Preventive Dentistry,
Sharad Pawar Dental College,
Wardha - 442 004, Maharashtra, India.
E-mail: pkmurarka@gmail.com

ABSTRACT

Background: Frenal attachments are folds of mucous membrane enclosed with muscle fibers that attach the lips to the alveolar mucosa and underlying periosteum. They mostly go unnoticed by the dentist during the oral examination of the patient. **Objectives:** The present study was conducted to evaluate maxillary labial frenum morphology in primary, mixed, and permanent dentitions among schoolchildren in Wardha district. **Materials and Methods:** Thousand healthy school children between 3 and 14 years of age were included in this study. The maxillary labial frenum was examined using direct visual method and classified according to Sewerin's typology. The data obtained were analyzed statistically using Chi-square test. **Results:** Simple frenum (88.3%) was found to be the most common maxillary labial frenum. No sex-wise or dentition-wise differences were found in frenum morphology. Statistically significant difference was seen with persistent tectolabial labial frenum ($P < 0.05$). **Conclusion:** Simple frenum was found to be the most prevalent maxillary labial frenum morphology. Dentists should give due importance for frenum assessment during oral examination of children.

Key words

Frenal morphology, maxillary labial frenum, schoolchildren

INTRODUCTION

A frenum is a soft tissue structure formed by small band or fold of mucosal membrane that attaches the lips and cheeks to the alveolar process and limits their movements.^[1] It shows variations in shape, size, and position during the different stages of growth and development.^[2,3]

In a normal oral cavity, various frena are present, namely, maxillary labial frenum, the mandibular labial frenum, and lingual frenum.^[4] The maxillary labial frenum connects the alveolar process of maxilla and central incisors to the upper lip whereas in mandible, the lingual frenum connects to the body of tongue just lingual to central incisors.^[5,6]

Diverse frenum morphology may show several clinical problems. Maxillary labial frenum present in children has been associated with midline diastema which can complicate orthodontic treatment and may also lead to postorthodontic relapse.^[7]

Several classifications for maxillary labial frenum have been proposed, of which Sewerin's typology is widely accepted.^[8,9]

Hence, the present study was undertaken to evaluate the prevalence of different morphologic types of maxillary labial frenum in primary, mixed, and permanent dentitions in schoolchildren of Wardha district.

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MATERIALS AND METHODS

The study was conducted on 1000 children belonging to six different schools. Age group of selected children was ranging from 3 to 14 years. Institutional Ethical Committee approval was taken before starting the study. An informed consent of parents was obtained prior to the examination. Clinical examination of all children with primary, mixed, and permanent dentitions was carried out. Children who exhibited congenital anomalies, syndromes, systemic diseases, any type of trauma or surgery in the maxillary anterior region, habits, or any history of previous hard and soft tissues, and corrective treatment were excluded from the study.

Clinical examination was conducted using the direct visual method under natural light by reflecting the upper lip with index finger and thumb of both hands by single investigator. A thorough intraoral examination was carried out to assess the frenum morphology of maxillary labial frenum. The morphology of the maxillary labial frenum was classified according to Sewerin's typology [Table 1].^[10] Only the normal variations given by Sewerin were considered and not the attachment location of the frenum. Data analysis was done by descriptive and inferential statistics using Chi-square test. The software used in the analysis was SPSS version 17.0 (IBM Corporation) and $P < 0.05$ was considered for the level of significance.

RESULTS

A total of 612 boys and 388 girls participated in the present study. The most prevalent frena observed were the simple frenum (88.3%), simple frenum with nodule (4.7%), and persistent tectolabial frenum (2.1%) [Table 2].

In males, simple frenum (90.2%) was the most prevalent frenum followed by simple frenum with nodule (2.9%) and persistent tectolabial frenum (1.6%). The same results were seen in females with the most prevalent frenum being simple frenum (54%) followed by simple frenum with nodule (4.7%) and persistent tectolabial frenum (1.8%). No significant difference ($P = 0.41$) was observed in males and females for the different types of maxillary labial frenum in mixed as well as permanent dentition [Table 2].

Prevalence of simple frenum increased with age, while the persistent tectolabial frenum decreased proportionally [Table 3]. In the permanent dentition, the prevalence of simple frenum was slightly high (91%) as compared with primary dentition (85.7%).

A significant difference ($P < 0.05$) was observed with persistent tectolabial frenum in primary dentition (6.35%) when dentition-wise distribution of

maxillary labial frenum morphology was compared [Table 3]. This was found to be statistically highly significant when analyzed using the Chi-square test ($P < 0.05$).

DISCUSSION

The maxillary labial frenum is a fold of the mucous membrane which connects the lip to the alveolar process of the jaw.^[11] Diverse morphology of maxillary labial frenum is observed in routine dental practice, which is not documented in the literature. Hence, there was a need to classify them properly in different categories during clinical examination.

The Sewerin's typology of frenum introduced in 1971 is the most commonly used classification to categorize maxillary labial frenum morphology.^[10] Many studies have used Sewerin's typology to classify maxillary labial frenum morphology, but very less literature is available for their comparison in terms of all the three dentitions.

Table 1: Sewerin's typology of maxillary labial frenum morphology

Simple frenum
Simple frenum with nodule
Persistent tectolabial frenum
Simple frenum with appendix
Simple with nichum
Bifid
Double
Two or more variations

Table 2: Sex-wise distribution of frenum morphology according to Sewerin's typology

Frenum morphology	Male (n=612), n (%)	Female (n=388), n (%)	Total (n=1000), n (%)
Simple frenum	552 (90.20)	331 (54.08)	883 (88.3)
Simple frenum with nodule	18 (2.94)	29 (4.74)	47 (4.7)
Persistent tectolabial frenum	10 (1.63)	11 (1.80)	21 (2.1)
Simple frenum with appendix	1 (0.16)	5 (0.82)	6 (0.6)
Simple frenum with nichum	1 (0.16)	0 (0.00)	1 (0.1)
Bifid	4 (0.65)	3 (0.49)	7 (0.7)
Double	1 (0.16)	5 (0.82)	6 (0.6)
2 or more variables	3 (0.49)	4 (0.65)	7 (0.7)

$\chi^2=9.51, P=0.41, NS, P>0.05, NS$ – Not significant

Table 3: Dentition-wise distribution of frenum morphology according to Sewerin's typology

Frenum morphology	Primary (n=126), n (%)	Mixed (n=396), n (%)	Permanent (n=478), n (%)	χ^2 -value
Simple frenum	108 (85.71)	354 (89.39)	435 (91.00)	0.22, $P=0.89$, NS, $P>0.05$
Simple frenum with nodule	6 (4.76)	20 (5.05)	24 (5.02)	0.00, $P=1.00$, NS, $P>0.05$
Persistent tectolabial frenum	8 (6.35)	6 (1.52)	9 (1.88)	8.11, $P=0.01$, S, $P<0.05$
Simple frenum with appendix	1 (0.79)	1 (0.25)	0 (0.00)	2.02, $P=0.36$, NS, $P>0.05$
Simple frenum with nichum	0	1 (0.25)	0 (0.00)	-
Bifid	0	8 (2.02)	2 (0.42)	2.02, $P=0.36$, NS, $P>0.05$
Double	0	3 (0.76)	2 (0.42)	0.00, $P=1.00$, NS, $P>0.05$
Two or more variables	3 (2.38)	2 (0.51)	6 (1.26)	0.50, $P=0.77$, NS, $P>0.05$

NS – Not significant, S – Significant

The present study was conducted on 1000 schoolchildren of 3–14 years of age to determine the morphological variations of maxillary labial frenum attachment. The study included children with primary, mixed, and permanent dentitions, whereas other studies show children with only primary dentition,^[10] children or adolescents with mixed^[12] and permanent dentition, and studies involving only adults.^[13]

Study design used for the present study was similar to the study carried out by Díaz-Pizán *et al.*^[8] The present study differs with that of the study of Díaz-Pizán *et al.* with respect to the age of the sample assessed, in which in their study, children of 0–6 years were studied. In the same study, the different frenum attachments and its relation to midline diastema were assessed. However, in the present study, we examined primary, mixed, and permanent dentitions of children of age 3–14 years. In the study by Sewerin,^[10] 1430 children in the age range of 0–60 years were included in the study and the classification system used was for the diverse frenum.

In the present study, the most commonly observed maxillary labial frenum was the simple labial frenum (88.3%). Previous studies conducted on the prevalence of frenal types have reported a similar incidence of simple labial frenum.^[10,14]

The most prevalent frenum type recorded was the simple frenum in all the three dentitions followed by simple frenum with nodule and persistent tectolabial frenum. This finding differs in certain studies, wherein simple frenum is the most common frenum morphology followed by persistent tectolabial frenum and simple frenum with nodule.^[8,12-16]

The prevalence of simple frenum was found to be increased with age, whereas the persistent tectolabial frenum decreased proportionately with age.^[17] In the study of Díaz-Pizán *et al.*,^[8] higher prevalence of the tectolabial frenum was found in infants (0–6 months) and this prevalence gradually decreased significantly with age, a tendency that was also suggested by other similar studies.^[10,12] Vera supported this change in frenum type

and reported that in younger children during the first few years of age, the prevalence of tectolabial frenum is high, but as the age advances, that is, in permanent dentition, vertical growth of the alveolar process occurs, which in turn allows the frenum's gingival insertion to change position farther away from the alveolar ridge.^[12] One more factor attributed to this phenomenon is that due to the maxillary sinus development and intra-alveolar eruption of the permanent maxillary incisors, apical migration of the frenum insertion occurs. Therefore, high proportion of the persistent tectolabial frenum was seen in the primary dentition, which gradually evolves to normal simple frenum during the permanent dentition.^[8,15] The high prevalence of tectolabial frenum seen in younger children caused misdiagnosis during the first few years of age and resulted in unnecessary surgical correction of the frenum.^[18]

In the present study, frenum with appendix was the second most prevalent frenum noticed in the permanent dentition, and the simple frenum with appendix, nichum, bifid type, and double or with two or more variations was rarely found with <1% of the children.

The maxillary labial frenum presents a diverse array of morphological variations. Hence, the detailed classification of maxillary labial frenum has been proposed based on morphology.

The present study shows the prevalence of different morphologic types of maxillary labial frenum in Indian children. However, there are very few studies showing the prevalence of diverse frena in different locations and races. In addition, the exact etiology for the development of various frena is not yet established. Therefore, further studies including different parts of the world and various races are highly essential to reveal more knowledge about the maxillary labial frenum morphology.

CONCLUSION

The following conclusions were drawn from the present study based on the results concerning schoolchildren in Wardha district:

- Maxillary labial frenum, being a small anatomic structure in the oral cavity, exhibited diverse morphology
- Simple frenum was the most prevalent morphologic type in primary, mixed, and permanent dentitions followed by persistent tectolabial frenum
- The prevalence of persistent tectolabial frenum observed was less in the permanent dentition than primary dentition.

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Conflicts of interest

There are no conflicts of interest.

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