IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 24, Issue 6 Ser.9 (June 2025), PP 32-37
www.iosrjournals.org

Prevalence of different types of maxillary labial frenal attachments in 3-8 years old school going children.

Dr. Rehan Khan[1], Dr. Sushma Maku[2], Dr. Kalyani Karwa[3], Dr. Parikshit Kadam[4]

Professor and HOD[1] SDDCH Parbhani, PG student[2,3] SDDCH Parbhani, Senior lecturer[4] SDDCH Parbhani.

Abstract

Background- *The labial frenum is a dynamic structure and is subject to variations in size, shape and position. Frenum attachments are folds of mucous membranes that connect the lips to the alveolar mucosa and underlying periosteum. Aberrant positioning of the maxillary labial frenum can lead to various clinical issues, including mucogingival problems and midline diastema.* ***Aim-*** *To determine the prevalence of the various types of maxillary frenal attachments in 3-8 years old school going children.* ***Study design-*** *This cross-sectional study was carried out among 614 school-going children aged 3 to 8 years. They were clinically examined for maxillary labial frenal attachment location and morphology under direct visual method. Demographic details including age and sex were recorded.* ***Results-*** *In 614 children, the most prevalent type of frenal attachment was mucosal (87.0%) followed by gingival (8.1%), papillary (2.8%) and papillary penetrating (2.1%) attachment. The prevalence had no gender difference but the age had significant association. Frenum attachment differed significantly by gender (P=0.01) and by age (P = 0.4). The mucosal or gingival-type frenum was significantly greater than the age of children with papillary penetrating–type frenum.* ***Conclusion-*** *The most prevalent type of frenal attachment among school going children was mucosal type. The papillary penetrating type of frenal attachment decreases with age, and which was not associated with gender. The dentists should correlate the age of the child and type of frenal attachment during their clinical examination to avoid misdiagnosis and unnecessary treatment.*

Date of Submission: 13-06-2025 Date of Acceptance: 26-06-2025

I. Introduction

A frenum is a mucous membrane fold which connects the lip to the alveolar mucosa, gingiva and the underlying periosteum. It exhibits inherent morphological variations. “Frena” are seen in maxilla and mandible in midline or premolar region. Maxillary labial and mandibular labial and lingual frenum are most notable frenum of oral cavity. Its primary function is to provide stability of upper and lower lip and the tongue and to retain the lip in harmony with the growing bones of the maxilla.[1]

The labial frenum is a dynamic structure and is subject to variation in size, shape and position. It also has septo-maxillary ligament that transmits septal growth force to premaxilla. Most often, during the oral examination of the patient the dentist gives very little importance to the frenum, for assessing its morphology and attachment.[2]

The frenum, which embryologically originates as remnant of the central cells of the vestibular lamina at the midsagittal area, consists primarily of connective tissue and epithelium and occasionally contains muscle fibers. The primary function of the labial frenum is to support or provide stability to the upper lip and to keep the lip in harmony with the growing bones of the maxilla. Thus, it contributes to the regulation of the facial growth. Loss of papilla, recession, diastema, difficulty in brushing, malalignment of teeth and compromised denture fit or retention are related to papillary and papilla penetrating type of frena which leads to psychological disturbances to the individual. A frenum can become problematic if tension from lip movement pulls the gingival margin away from the tooth, or if the tissue hinders the closure of a diastema during orthodontic treatment. Frenal attachment that intrude on the marginal gingiva distend the gingival sulcus, encouraging plaque accumulation, intensifying the rate of progression of periodontal recession and thereby causing recurrence after treatment. There are various syndromes associated with relatively specific frenal abnormalities, ranging from multiple, hyperplastic, hypoplastic or an absence of frena which includes Ehlers-Danlos syndrome, Infantile hypertrophic pyloric stenosis, Holoprosencephaly, Ellis-van Creveld syndrome and Oro-facial-digital syndrome.[3]

Maxillary labial frenum has been linked to midline diastema, which prevents central incisors from making contact; it can delay orthodontic treatment and result in post-orthodontic relapse; and it may also contribute to caries development in nursing children.[4] The maxillary labial frenum is also a local anatomic factor that affects

the accumulation and retention of plaque and can interfere with effective tooth brushing, by influencing the patient's ability to remove plaque. In adults, an abnormal frenum might contribute to the establishment and progression of periodontal disease, increase the difficulty in controlling gingival recession and influence the fit or retention of dentures.[5] In order to aid physicians identify functional impairments that require therapy, Placek M et.al., (1974)[6] gave clinical morphological classification based on the anatomic site of attachment. The placement of frenum attachment in the mucogingival junction, attached gingiva, interdental papilla and up to the palate through the interdental papilla described the frenum attachment. Labial frenum has been examined in adults and teens, but studies utilizing this classification in children are lacking. Furthermore, the distribution of frenum attachment type among different ethnic groups has not been examined. So, this analytical cross-sectional study aimed to identify the prevalence of maxillary labial frenum attachment in 3-8 years old school going children in Parbhani.

II. Methodology

EXPERIMENTAL DESIGN

This cross-sectional study involved a convenience sample of 614 children, ranging from 3 to 8 years old. This study was carried out in the Department of Pediatric and Preventive Dentistry after getting approval from the Institutional Ethical Committee. Followed by the guidelines of 'WMA Declaration of Helsinki.' Written informed consent was obtained from the school authorities.

SOURCE OF DATA

The study involved 614 Children between 3 to 8 years of age attending schools. They were examined for maxillary labial frenal attachment location and morphology under direct visual method. Demographic details including age and gender were recorded.

INCLUSION CRITERIA

1. School going children with age group of 3-8 years old.

EXCLUSION CRITERIA

1. Surgically treated labial frenum.
2. Child with facial anomalies like CL & CP.
3. Children below 3years and above 8 years of age.
4. Children who were absent on day of clinical examination.

CLINICAL EXAMINATION

All children were examined at school under adequate natural lighting by the same examiner. Lip gently stretched away from the alveolar process in an almost horizontal direction. Frenal attachment was classified into four types according to Placek et al. classification[6].

The four types of frenal attachment were defined as follows (Fig. 1):

1. Mucosal (Fig. 1a): frenum inserting up to and including the mucogingival junction with no evidence of crossing into the attached gingiva, i.e., the stretched frenum did not appear to elevate the keratinized tissue.

(a) (b)

2. Gingival (Fig. 1b): frenum inserting into the attached gingiva and not extending coronal to the line demarcating the base of the midline papilla. The line demarcating the base of the midline papilla was defined as the line connecting the gingival zeniths of the two central incisors.

3. Papillary (Fig. 1c): frenum inserting coronal to the line demarcating the base of the midline papilla without

any visible evidence of frenum extension to the palatal aspect or of blanching anywhere on the palatal aspect of the midline papilla or on the incisive papilla, even when further tension was applied to the frenum.

(c) (d)

Fig. 1. Examples of frenum attachment types- (a) Mucosal. (b) Gingival. (c) Papillary. (d) Papillary penetrating.

4. Papillary penetrating (Fig. 1d): frenum inserting coronal to the line demarcating the base of the midline papilla combined with visible evidence of frenum extension to the palatal aspect or of blanching anywhere on the palatal aspect of the midline.

DATA ANALYSIS

Data was collected, entered in SPSS version 22 and was subjected to statistical analysis. The association of frenum type with age, gender was calculated using Chi-square test as appropriate. Statistical significance was set at p-value < 0.05

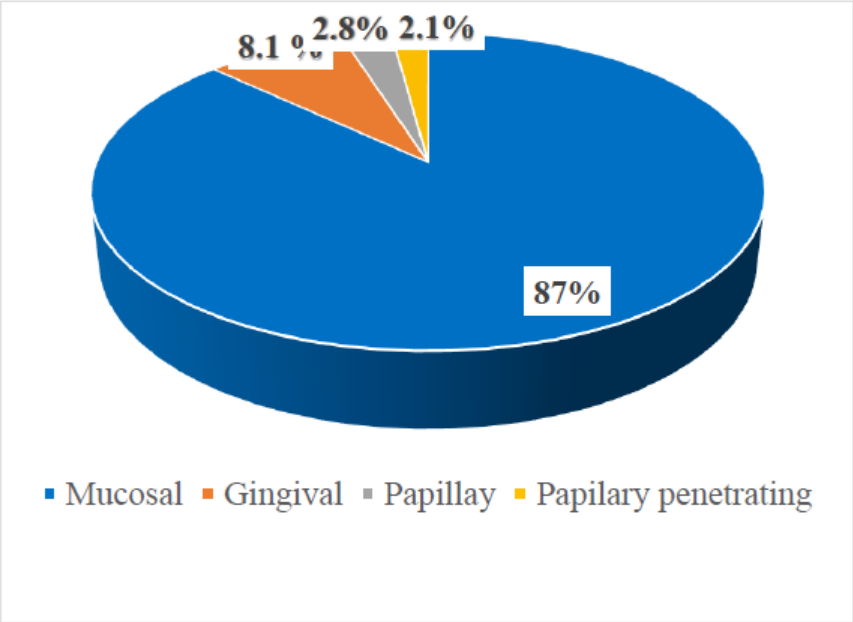


Figure 2: Study distribution in percentage according to frenum type (n=6.14)

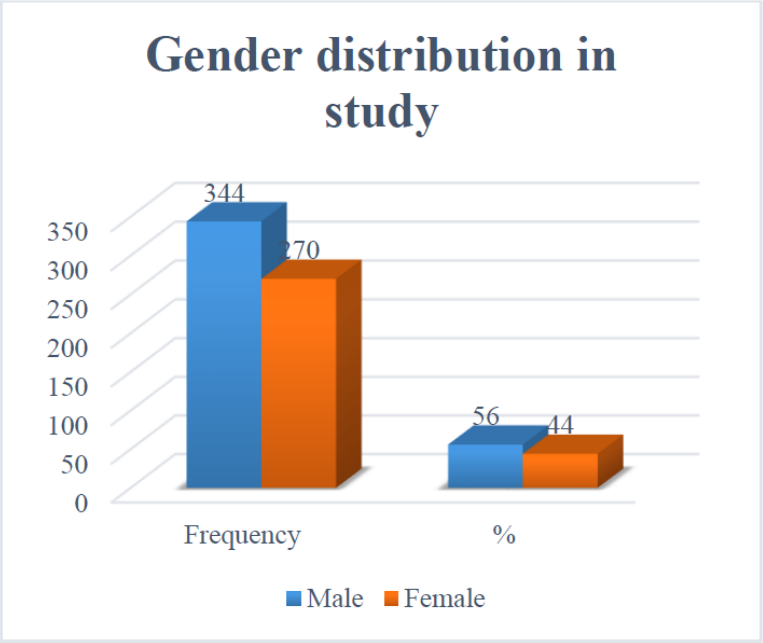
III. Results

This cross-sectional study was carried out in the Department of Pediatric and Preventive Dentistry. The study included 614 children of age 3-8 years and examined for frenal attachment location and morphology. After statistical analysis following frenal attachment types were observed,

87.0% were mucosal type, 8.1% were gingival type, 2.8% were papillary type, 2.1% were papillary penetrating type.

The most prevalent type of frenal attachment among all was the mucosal type, followed by the gingival type. Frenum attachment differed by gender (p = 0.01) and by age (p = 0.4).The prevalence of these types did not differ by gender, but there was a significant association with age. A total of 614 children were examined, of which 344(54%) were males and 270(46%) were females. (Graph 1) with age group of 3-8 years old. The prevalence of frenum attachment was mucosal in 534 (87.0%), gingival in 50 (8.1%), papillary in 17 (2.8%) and papillary

penetrating in 13 (2.1%) (Figure 2). The males showed the prevalence of mucosal frenum in 293 children, gingival in 30 children, papillary in 11 children, and papillary penetrating in 10 children. The females showed the prevalence of mucosal in 241 children, gingival 20 children, papillary in 6 children and papillary penetrating in 3 children. The maxillary labial frenulum did not exhibit any sexual dimorphism.



Graph 1: Gender distribution in study.

STATISTICAL RESULTS

Table 1: Gender of participants

Gender	Frequency	%
Male	344	56
Female	270	44

Table 2: Age of patients

Age (in years)	Frequency	%
3	34	5.5
4	26	4.2
5	82	13.4
6	134	21.8
7	192	31.3
8	146	23.8

Table 3: Distribution of study participants according to frenum type

Type of Frenum	Frequency	Percent
Mucosal	534	87.0
Gingival	50	8.1
Papillary	17	2.8
Papillary penetrating	13	2.1
Total	614	100.0

Table 4: Type of Frenum according to Gender

Type of Frenum	Gender		Total
	Male	Female	
Mucosal	293	241	534
Gingival	30	20	50
Papillary	11	6	17
Papillary penetrating	10	3	13
Total	344	270	614

Table 5: Type of Frenum according to age

Type of frenum	Age (in years)						Total
	3	4	5	6	7	8	
Mucosal	30	20	73	114	163	134	534
Gingival	3	5	5	10	20	7	50
Papillary	0	0	3	6	6	2	17
Papillary penetrating	1	1	1	4	3	3	13
Total	34	26	82	134	192	146	614

Table 6: Association of demographic variables with types of the frenum

Characteristics	Category	Types of frenum n (%)				Total (N)	p- value
		Mucosal	Gingival	Papillary	Papillary penetrating		
Gender	Male	293(85.2)	30(8.7)	11(3.2)	10(2.9)	344	0.01
	Female	241(89.3)	20(7.4)	6(2.2)	3(1.1)	270	
Age category (years)	3-5	123(86.6)	13(9.2)	3(2.1)	3(2.1)	142	0.4
	6-8	411 (87)	37(7.8)	14(3)	10(2.1)	472	

Fisher's Exact test

IV. Discussion

A frenum is a thin fold of tissue that connects lips to the gums in maxilla. The normal frenal attachment is flexible, does not extend into the gum margin or papilla and does not interfere with oral functions or cause spacing between teeth. While, abnormal frenal attachments may cause problems in speech, mastication, esthetics and maintenance of oral hygiene constituting a periodontal problem.[3] Some of disadvantages and disturbances that frenum abnormality causes are diastema, abnormal position of the anterior central incisors, rapid dental caries, periodontal problems during food remaining and impaction, esthetic problems and upper lip damage[7]. The present study is the first to compare maxillary labial frenum attachment among children of different ethnic backgrounds and to report on labial frenum anatomy in this specific geographic area. There are several studies in the literature on the attachment of maxillary labial frenum in children, adolescents, and adults[6]. The earliest report on the epidemiology of maxillary labial frenum attachment in children was published by **Bergese[8]**.

This study was carried out by examining 614 children, with age 3-8 years old across the various schools in Parbhani City. It was found that 87.0% of children had mucosal type attachments. Our study also found significant differences in frenum types based on age. This study has detailed the many forms of maxillary labial frenulum. The mucosal type is inserted up to and including the mucogingival junction with no signs of bridging into the associated gingiva.[9] In the present study, mucosal was the most prevalent type which is in accordance to the study done by **Placek et al.[6]** where he examined 465 Czech teens and adults, aged 15–40. For the entire group, they found the mucosal type of maxillary frenum attachment to be most common (46.5%), with the gingival type second most frequent (34.3%). They reported no age or gender difference in the prevalence of different types of frenum attachment which was similar to our study. However, they did not provide any statistical analysis. Because of the lack of information on the number of children included in the study or the distribution of the frenum categories in children, it is not possible to directly compare their results with the present study.[10] Also, studies done by **Mirko P et al.[9], Dahal et al.[11], Chaulagain et al.[12], Rajkarnikar et al.[13]** and **Joshi et al.[14]** stated that most common type of frenal attachment was mucosal type (46.5%, 59.3%, 100%, 70.5% and 60% respectively). However, it contradicts with the study done by **Divater V et al.[15]** and **Rathod S et al.[3]** where the

gingival type of attachment was the most predominant type followed by mucosal type. This variation in the level of attachment may be due to the fact that these studies were conducted on older children.

In this study, the mucosal type of frenum was more prominent in older children, while the papillary penetrating type was observed significantly more in younger children, which was similar to the findings of the study conducted by **Divater et al**.[15] As the age of the child progresses, the frenum appears to move along the labial surface of the alveolar process. This movement is relative during the primary dentition because the frenal attachment remains in place while the new bone deposits raise the alveolar ridge's height. The overall evidence indicates that the attachment of the frenum in children will shift to a more apical position with increasing age[10]. However, as the permanent maxillary central incisors erupt into the oral cavity, the maxillary arch undergoes accelerated vertical growth.[16] In contrast to our study **Lindsey et al.[17]** stated that papillary penetrating type of frenal attachment type findings were consistent with the significant decline of papillary penetrating frenum with increasing age (both chronological and dental). They did not characterize other forms of attachment; therefore, no information is available regarding the distribution of other types of frenum attachment.

In this study, unlike **Mirko P et al.[9]** and **Rathod S et al.[3]** there were no gender variations in the prevalence of different types of labial frenum attachment. According to studies, children with the most coronal attachment levels tend to be younger than those with more apical frenal attachments. A shift in frenum attachment from coronal to apical occurs with age[3]. There has been no documentation of a shift in the opposite direction.[3] However, this study could not assess this aspect, as the extremes of age were not considered in the sample.

V. Conclusion

Thus, within the limitation of the study it can be concluded that, the mucosal type of frenal attachment was the most common among school-aged children, followed by the gingival type. The papillary penetrating type was found to decrease with age and showed no significant gender association. Dentists should consider the child's age when evaluating frenal attachment types to ensure accurate diagnosis and avoid unnecessary treatments.

References

[1]. Mintz SM, Siegel MA, Seider PJ. An overview of oral frena and their association with multiple syndromes and nonsyndromic conditions. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2005;99: 321–324

[2]. Rajani ER, Biswas PP, Emmatty R. Prevalence of variations in morphology and attachment of maxillary labial frenum in various skeletal patterns-A cross-sectional study. Journal of Indian Society of Periodontology. 2018 May 1;22(3):257-62.

[3]. Rathod S, Bawankar PV, Chikhale P, Bidwaikar A. Evaluation of variations in morphology and attachment of frenum in diverse population-A cross-sectional study. Clinical Epidemiology and Global Health. 2020 Dec 1;8(4):1094-7.

[4]. Kotlow LA. The influence of the maxillary frenum on the development and pattern of dental caries on anterior teeth in breastfeeding infants: Prevention, diagnosis, and treatment. J Hum Lact. 2010 Aug;26(3):304-8.

[5]. Fowler EB, Breault LG. Early creeping attachment after frenectomy: a case report. Gen Dent 2000; 48:591–593.

[6]. Placek M, Skach M, Mrklas L. Significance of the labial frenum attachment in periodontal disease in man. Part I. Classification and epidemiology of the labial frenum attachment. J Periodontol 1974; 45:891–894.

[7]. Komori S, Matsumoto K, Matsuo K, et al. Clinical Study of Laser Treatment for Frenectomyof Pediatric Patients. Int J Clin Pediatr Dent 2017;10(3):272-277.

[8]. Bergese F. Research on the development of the labial frenum in children of age 9–12 (in Italian). Minerva Stomatol 1966; 15: 672–676.

[9]. Mirko P, Miroslav S, Lubor M. Significance of the labial frenum attachment in periodontal disease in man. Part I. Classification and epidemiology of the labial frenum attachment. J Periodontol. 1974;45:891-4.

[10]. Boutsi EA, Tatakis DN. Maxillary labial frenum attachment in children. International journal of paediatric dentistry. 2011 Jul;21(4):284-8.

[11]. Dahal S, Gupta SP, Baral R, Dahal S, Niroula D, Humagain M. Journal of Kathmandu Medical College. 2022 Jul 1;11(2):90-4

[12]. Chaulagain R, Khanal N, Singh AK. Morphology of maxillary labial frenum in chepang community of Chitwan. J Nepal Health Res Counc. 2021 Apr 23;19(1):185-8.

[13]. Rajkarnikar J, Khanal S, Acharya J. Prevalence and variations of the maxillary labial frenum in children, adolescents and adults. Nepal Med Coll J. 2018;20(1-3):94-7.

[14]. Joshi U, Pradhan M, Neupane A, Lawaju N, Khadka N, Chaulagain R. Variations in maxillary frenal morphology in a sample of newari children of bhaktapur. J Nepal Soc Perio Oral Implantol. 2021Jul;5(1):34-8.

[15]. Divater V, bali P, nawab A, hiremath N, jain J, kalaivanan D. Journal of family medicine and primary care. 2019 nov 1;8(11):3664-7

[16]. Huang WJ, Creath CJ. The midline diastema: a review of its etiology and treatment. Pediatr Dent.1995;17(3):171–9.

[17]. Lindsey D. The upper mid-line space and its relation to the labial fraenum in children and in adults. A statistical evaluation. Br Dent J 1977; 143: 327–332.