International Journal Dental and Medical Sciences Research
Volume 7, Issue 6, Nov – Dec 2025 pp 146-149 www.ijdmsrjournal.com ISSN: 2582-6018

Variations in Frenal Morphology among Madurai Population – A Clinical Study

1.Dr.G. Abirami, 2.Dr.V.R.Balaji, 3.Dr.D.Manikandan, 4.Dr.G. Rohini, 5.Dr.A. Ramsundar,

MDS, Senior Lecturer, Department Of Periodontics, Csi College Of Dental Sciences And Research, 129, East Veli Street Madurai- 625001

MDS, PHD, Professor & Head Department Of Periodontics, Csi College Of Dental Sciences And Research, 129, East Veli Street Madurai- 625001

MDS, Reader, Department Of Periodontics, Csi College Of Dental Sciences And Research, 129, East Veli Street Madurai- 625001

MDS, PHD, Reader,Department Of Periodontics, Csi College Of Dental Sciences And Research, 129, East Veli Street Madurai- 625001

MDS, Senior Lecturer, Department Of Periodontics, Csi College Of Dental Sciences And Research, 129, East Veli Street Madurai- 625001

Date of Submission: 01-12-2025 Date of Acceptance: 10-12-2025

ABSTRACT:
The maxillary labial frenum is a normal anatomic structure which has morphological variations. Maxillary labial frenum provides junction between the upper lip to the alveolar mucosa and underlying bone or periosteum. Variations in frenal attachments cause difficulties in oral hygiene maintenance and aesthetic problems.

Aim: The aim of this study was to assess the prevalence of variations in maxillary labial frenum in Madurai population.

Materials and methods: This study was conducted on 1014 subjects within age group of 18 to 40 years (438 Males, 576 Females) in Department of Periodontics & Implant dentistry, CSI college of dental sciences and research, Madurai.

Results: Based on this study, mucosal frenal attachment was the most common attachment when compared with gingival, papillary and papillary penetrating. Depending upon variations of frenum, normal frenum was most seen in Madurai population. Significant difference was found between male and female in mucosal and papillary frenal attachment.

Conclusion: Frenal anomalies cause aesthetic problems and difficulty in maintaining oral hygiene which leads to periodontal problems. It is necessary to give importance to frenum assessment and its management for complete periodontal health maintenance.

KEYWORDS: Maxillary labial frenum, Midline diastema, Papillary penetrating, Frenal attachment

I. INTRODUCTION

Frenum is a thin fold of mucous membrane with enclosed muscle fibres that attach the lips to the alveolar mucosa and underlying periosteum. [1] Histologically frenum was covered with stratified squamous nonkeratotic, orthokeratotic or parakeratotic epithelia depending upon the gingival extent of the frenum. The most notable frenum of oral cavity is maxillary/mandibular labial frenum and lingual frenum. [2]The primary function of frenum is to provide stability to upper lip, lower lip and tongue. The maxillary labial frenum is a small sickle shaped mucosal fold extending from the vestibular mucosa of the upper lip to the alveolar or gingival mucosa in the anterior midline of maxillary arch. [3]

Abnormal labial frenum can cause aesthetic problems and affect oral cavity function by retracting the gingival margin, creating a midline diastema and limiting lip movement. A high frenal attachment restrains the closure of a diastema during orthodontic treatment. [4] Frenal attachment that encroaches on the marginal gingiva distends the gingival sulcus thus promoting plaque accumulation, increasing the rate of progression of periodontal recession and thus leading to recurrence of periodontal disease after treatment.[5]

The criteria used to evaluate maxillary labial frenum is based on classification given by Placek et al [3] and Sewerin [6]

Based on the extension of attachment of fibres, frenum has been classified as

1.MUCOSAL - When the fibres are attached up to mucogingival junction.

2.GINGIVAL- When the fibres are inserted within attached gingiva.

3.PAPILLARY- When fibres are extending into interdental papilla.

International Journal Dental and Medical Sciences Research
Volume 7, Issue 6, Nov – Dec 2025 pp 146-149 www.ijdmsrjournal.com ISSN: 2582-6018

4.PAPILLARY PENETRATING- when the frenal fibres cross the alveolar process and extend up to palatine papilla.

Sewerin [6] classification
A) Normal frenum
B) Normal frenum with nodule
C)Normal frenum with appendix
D)Normal frenum with nichum
E) Bifid labial frenum
F) Persistent tectolabial frenum
G) Double frenum
H) Wider frenum

The aim of this study was to assess the prevalence of variations in maxillary labial frenum in Madurai population.

II. MATERIALS AND METHODS

A total of 1014 subjects including both males and females (438 males and 576 females) within age group of 18 to 40 years were recruited in this study. Study conducted among the patients reporting to Department of periodontics, CSI College of Dental Sciences and Research, Madurai, Tamil Nadu. Ethical approval for this study was obtained from institutional ethical committee. This study was conducted from October 2024 to February 2024. All subjects were explained about the study.

Exclusion criteria include subjects who undergone surgery on maxillary labial frenum, any congenital/developmental abnormality in maxillary labial frenum, any history of trauma/injury to maxillary labial frenum and one or both maxillary central incisors missing.Clinical examination of maxillary labial frenum was done by using direct visual method under dental unit light by upward distension of the upper lip.

III. STATISTICAL ANALYSIS

Data analysis was done by using chi-square test.

IV. RESULTS

In this study according to classification of Placek et al [3], 54.0% of patients presented with mucosal type of frenal attachment while 34.0% of patients presented with gingival type. Papillary type of frenal attachment was found in 9.9% of patients. The least common type of frenal attachment was papillary penetrating seen only in 2.1%. (Table 1)

The gender-based variations were found to be more prevalent in females in relation to mucosal and papillary type (54.5% and 11.6%) as compared to males (53.4% and 7.5%). Gingival and papillary penetrating (36.8% and 2.3%) were found to be more prevalent in [3]. males than females (31.9% and 1.9%). Significant difference was found between males and females in relation to mucosal and papillary attachment.

The prevalence of midline diastema was found to be more in the papillary penetrating type of frenal attachment (80.77%) as compared to papillary attachment (19.23%). frenal attachment (80.77%) as compared to papillary attachment (19.23%).In this study, according to the classification of Sewerin (6), 86.8% of patients had normal frenum while in 12.2% of patients, there was a nodule present in the frenum. In 0.5% of patients, there was presence of appendix and 0.3% of patients have double frenum and 0.2% of patients with wider frenum while all other forms were absent in this study.

The gender-based variations were found to be more prevalent in females in relation to normal frenum and double frenum (87.5% and 0.3%) as compared to males (85.8% and 0.2%) respectively. Normal frenum with nodule was found to be more prevalent in males (13.2%) as compared to females (11.5%)(Table 2)

V. DISCUSSION

The clinical implications related to frenal anomalies such as difficulties in speech, mastication, esthetics, and maintenance of oral hygiene constituting a periodontal problem have been well documented in the literature.[7] If labial frenal attachment is inserted at or near the gingival margin, it interferes with tooth brushing and encourages plaque formation by pulling or averting the gingival margin.[8] Any developmental or acquired defect in the underlying labial bone margin along with high frenal pull may contribute to the initiation and progression of the gingival recession.[9]. It has also been proposed that labial frenum should be carefully examined as it may serve as potential cofactor for peri-mucositis and peri- implantitis. [10]

The presence of abnormal frenal attachment has been reported in the literature as a feature of various syndromic conditions such as Turner [11], Ellis–van Creveld syndrome, Oro-facial-digital syndrome, Ehler–Danlos syndrome and Pallister–Hall syndrome. Upper labial frenum has also been a modifying factor in denture construction. [12] Abnormal frenal variations with a broad base migrated near the crest of the residual ridge; these require early recognition and surgical removal for a more satisfactory treatment outcome with complete dentures frenum and double frenum (87.5% and 0.3%) as compared to males (85.8% and 0.2%) respectively.

As suggested in literature, there are several variations found in upper labial frenum. These variations can be classified according to attachment

International Journal Dental and Medical Sciences Research
Volume 7, Issue 6, Nov – Dec 2025 pp 146-149 www.ijdmsrjournal.com ISSN: 2582-6018

of fibres of frenum or can be structural variations in frenum. It has been considered that papillary and papilla penetrating frenum is pathological. [6]

Till now very few numbers of studies have been published related to the type of the maxillary labial frenum and its prevalence. This study was conducted on 1014 subjects in Madurai, Tamilnadu. This is the first study regarding the prevalence of variations in maxillary labial frenumin population of Madurai, Tamilnadu

In this study, the prevalence of mucosal frenal attachment was found to be most common attachment (54.0%) followed by gingival attachment as second (34.0%) with papillary attachment type (9.9%) and papillary penetrating type (2.1%) as least common. In another study done by Placek et al (10) the prevalence was found to be as mucosal (46.6%), gingival (34.3%), papillary (3.1%), and papillary penetrating (16.1%). In this study significant differences were found between male & female in mucosal and papillary frenal attachment. The difference in results in this study as compared to Placek et al [10] could be due to the diversity of population.

Various studies have found differences in the structural variations of the frenum. Sewerin [14] had classified structural variations in frenum. In this study, most observed frenum was the normal frenum (86.8%). In another similar study done by Townsend et al., [15] he reported the prevalence of normal frenum as 68.64% while Mohan et al., [11] reported as 66.21%. In a similar study done by Sewerin [14] the prevalence of normal frenum of 60.2% was reported. In this study, the prevalence of normal frenum with nodule was 12.2%, which was reported to be 9.1% in a study done by Sewerin,[14] 17.42% in the study by Townsend et al[15]and 19.92% was reported by Mohan et al.[11]Normal frenum with appendix had a prevalence of 0.5% in this study, which was reported to be 19.9% in a study by Sewerin[14]10.45% in the study by Townsend et al.,[15] and 6.38% in a study of Mohan et al.[11 reported as 66.21%. In a similar study done by Sewerin (14) the prevalence of normal frenum of 60.2% was reported.

In this study the prevalence of double frenum was 0.3% and the wider frenum was 0.2%. There was absence of other variations in this study such as normal frenum with nichum, bifid labial frenum and persistent tectolabial frenum. Proper identification of frenal attachment variations and subsequent modification of treatment procedures are important for successful treatment outcome.

VI. CONCLUSION

Frenal anomalies cause aesthetic problems and difficulty in maintaining oral hygiene which leads to periodontal problems. Abnormal frenal attachment also serves as a potential cofactor for peri- implant mucositis and peri -implantitis. It is necessary to give importance to frenum assessment and its management for complete periodontal health maintainance.

REFERENCES

[1]. Al Jabbari YS. Frenectomy for improvement of a problematic conventional maxillary complete denture in an elderly patient: A case report. J AdvProsthodont2011; 3:236-9.

[2]. Chaubey KK, Arora VK, Thakur R, Narula IS. Perio-esthetic surgery: Using LPF with frenectomy for prevention of scar. J Indian SocPeriodontol 2011; 15:265-9.

[3]. Delli K, Livas C, Sculean A, Katsaros C, Bornstein MM. Facts and myths regarding the maxillary midline frenum and its treatment: A systematic review of the literature. Quintessence Int 2013;44:177-87.

[4]. De Felice C, Toti P, Di Maggio G, Parrini S, Bagnoli F. Absence of the inferior labial and lingual frenula in Ehlers–Danlos syndrome. Lancet 2001; 357:1500-2.

[5]. Dewel BF. The labial frenum, midline diastema, and palatine papilla: A clinical analysis. Dent Clin North Am 1966;1:175-84.

[6]. Hattab FN, Yassin OM, Sasa IS. Oral manifestations of Ellis-van Creveld syndrome: Report of two siblings with unusual dental anomalies. J ClinPediatr Dent 1998; 22:159-65.

[7]. Hall JG, Pallister PD, Clarren SK, Beckwith JB, Wiglesworth FW, Fraser FC, et al. Congenital hypothalamic hamartoblastoma, hypopituitarism, imperforate anus and postaxial polydactyly – A new syndrome? Part I: Clinical, causal, and pathogenetic considerations. Am J Med Genet 1980;7:47-74.

[8]. King NM, Sanares AM. Oral-facial-digital syndrome, Type I: A case report. J ClinPediatr Dent 2002; 26:211-5. Kusiak A, Sadlak-Nowicka J, Limon J, Kochanska B. The frequency of occurrence of abnormal frenal attachment of lips and enamel defects in Turner syndrome. Oral Dis 2008;14:158-62.

International Journal Dental and Medical Sciences Research
Volume 7, Issue 6, Nov – Dec 2025 pp 146-149 www.ijdmsrjournal.com ISSN: 2582-6018

[9]. Miller PD Jr. The frenectomy combined with a laterally positioned pedicle graft. Functional and esthetic considerations. J Periodontol 1985; 56: 102-6.

[10]. 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.

[11]. Mohan R, Soni PK, Krishna MK, Gundappa M. Proposed classification of medial maxillary labial frenum based on morphology. Dent Hypotheses 2014;5:16-20.

[12]. Otto M, Gluckman H. The treatment of peri-mucositis and peri-implantitis 1. SADJ 2008;63:250, 252.

[13]. Priyanka M, Sruthi R, Ramakrishnan T, Emmadi P, Ambalavanan N. An overview of frenal attachments. J Indian SocPeriodontol 2013;17:12-5.

[14]. Sewerin I. Prevalence of variations and anomalies of the upper labial frenum. ActaOdontolScand 1971;29: 487-96.

[15]. Townsend JA, Brannon RB, Cheramie T, Hagan J. Prevalence and variations of the median maxillary labial frenum in children, adolescents, and adults in a diverse population. Gen Dent 2013;61:57-60.

TABLE 1: PREVALENCE OF MORPHOLOGICAL VARIATIONS IN FRENAL ATTACHMENT

VARIATIONS	MALE	FEMALE	BOTH	P-VALUE	MIDLINE DIASTEMA
MUCOSAL	376(53.4%)	504(54.5%)	880(54.0%)	0.001(S)	0
GINGIVAL	161(36.8%)	184(31.9%)	345(34.0%)	0.216(NS)	0
PAPILLARY	33(7.5%)	67(11.6%)	100(9.9%)	0.001(S)	5(19.23%)
PAPILLARY PENETRATING	10(2.3%)	11(1.9%)	21(2.1%)	0.827(NS)	21(80.77%)
TOTAL	438(100%)	576(100%)	1014(100%)		

TABLE 2: PREVALENCE OF STRUCTURAL VARIATIONS IN FRENUM AMONG MADURAI POPULATION

VARIATIONS	MALE	FEMALE	BOTH	P-VALUE
NORMAL FRENUM	376(85.8%)	504(87.5%)	880(86.8%)	0.000(S)
NORMAL FRENUM WITH NODULE	58(13.2%)	66(11.5%)	124(12.2%)	0.472(NS)
NORMAL FRENUM WITH APPENDIX	2(0.5%)	3(0.5%)	5(0.5%)	0.655(NS)
DOUBLE FRENUM	1(0.2%)	2(0.3%)	3(0.3%)	0.564(NS)
WIDER FRENUM	1(0.2%)	1(0.2%)	2(0.2%)	1.00(NS)
TOTAL	438(100%)	576(100%)	1014(100%)	