Original Research Article

ASSESSMENT OF MORPHOLOGICAL VARIATIONS OF FRENAL ATTACHMENT IN DIVERSE POPULATION OF VIDARBHA REGION

ABSTRACT:

Aims: Frenum is thin fold of mucous membrane that attaches lip and check to alveolar mucosa, gingiva and periosteum. Frenum may affect gingival health when attached too close to gingival margin as it interferes in plaque control. Most often clinicians give very less importance to frenum in identifying its type and morphology which can be indicator of mucogingival problems and prevalence of unesthetic diastema. The aim of the present study was to assess morphological variations of frenal attachment in diverse population of Vidarbha region.

Material and methods: The present study includes randomly selected 150 individuals including males and females in the age group of 18-60 years. Frenum attachments were recorded according to classification given by Mirko et al (1974). The data was arranged in tabulated form and statistical analysis was performed.

Results: Among 150 individuals 38% were males and 62% females. Prevalence of gingival type of attachment was predominant (48.7%) followed by mucosal (30%), papillary (11.3%), papilla-penetrating (10%). It was also seen that diastema is more commonly found in females (62.9%) as compared to males (37%)

Conclusion: It can be concluded that gingival type of frenal attachment is predominant and persistence of midline diastema in females is more than males.

***KEYWORDS**: Frenum, Gingival, Mucosal, Papillary, Pink esthetics, Diastema*

INTRODUCTION:

Aesthetic restorative procedures play a very essential role in smile appearance. Smile is regarded as one of the most important communication skill a person could pursue [1]. Smile comprises of 2 components namely-

1) Pink esthetics - which include gingiva (interdental, marginal , attached) , alveolar mucosa and frenum attachments.

2) White esthetics – which includes teeth (shape, size, colour, variations)[2]

Frenum is a thin fold of mucous membrane with enclosed muscle and collagen fibres that attach lip to alveolar mucosa and underlying periosteum [3]. Its primary function is to provide stability to upper lip, lower lip and tongue. It is most often seen in maxilla and mandible in midline and premolar region. Maxillary labial and buccal frenum and mandibular labial and lingual frenum are most common type of frenal attachments in oral cavity. Abnormal frenal attachment leads to diastema, promotes plaque accumulation, gingival recession, bone loss and interferes in proper smiling and phonetics [4]. Any abnormalities in size and location of frenum can cause functional and esthetic problems. It is composed of connective tissue, elastic fibres, mucous glands and collagen fibres. The size and location of frenum varies among individuals and it inserts into soft tissue covering alveolar process.

High frenal attachment can be accessed by tests namely tension test or blanching test produced due to ischemia of the region upon retraction of lip. A frenum can become problematic if tension from lip

movements pulls the gingival margin away from the tooth [5]. Abnormal frenum might contribute to loss of papilla , recession , diastema , difficulty in brushing , malalingment of teeth and compromised denture fit or retention. Frenum that extends up to marginal gingiva distend the gingival sulcus , encourages the plaque accumulation and stimulate the progression of periodontal recession. All these factors can lead to psychological disturbances of an individual [4,5].

The aim of the present observational study was to analyse variations in morphology of frenum in diverse population of Vidarbha region.

MATERIALS AND METHODS:

The present cross-sectional study was conducted among randomly selected 150 individuals in the age group of 18-60 years comprising both males and females in Yavatmal district of Maharashtra. All the individuals were explained about the study and informed consent was obtained from them.

The individuals who have any congenital or developmental defects, any oro-facial syndromes , trauma or injuries in maxillary anterior region , any history of frenal surgery and under any medication known to affect gingiva (example Phenytoin sodium) were excluded from the study.

Clinical evaluations of frenum were recorded by single trained examiner under an adequate light to avoid any iatrogenic errors. Type of frenum attachment and its morphology was recorded by retraction of upper lip. The midline diastema was recorded when the space between two central incisors is more than 1mm.

Frenum can be classified on the basis of its extent and attachment to alveolar mucosa and is as follows-

MUCOSAL: fibres attached into or extending up to mucogingival junction.

GINGIVAL: fibres inserting into attached gingiva.

PAPILLARY: fibres extending into interdental papilla.

PAPILLA PENETRATING: fibres crossing alveolar process and extend upto palatine papilla.

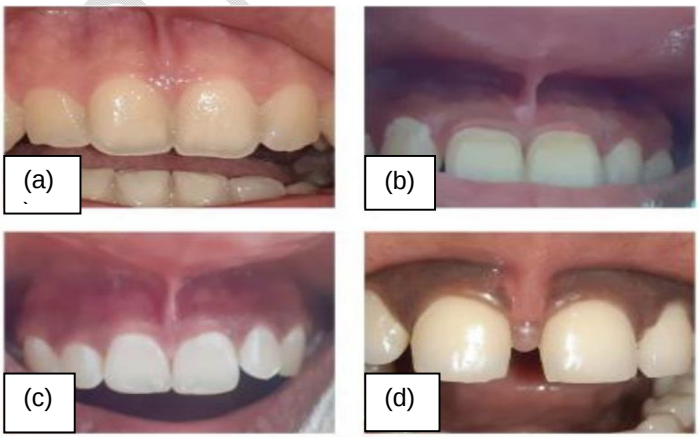

Figure 1: (a) Mucosal type, (b) Gingival type, (c) papillary type,(d) Papilla-penetrating type

STATISTICAL ANALYSIS:

The obtained data was tabulated as frequency and percentage in MS excel spreadsheet and the statistical analysis were performed.

RESULT:

TABLE 1 – AGE DISTRIBUTION OF STUDY POPULATION

AGE GROUP	FREQUENCY	PERCENT
18-30	66	44.00%
31-40	29	19.30%
41-50	26	17.30%
51-60	29	19.30%
TOTAL	150	100%

TABLE 2- GENDER DISTRIBUTION OF STUDY POPULATION

GENDER	FREQUENCY	PERCENT
MALE	57	38%
FEMALE	93	62%
TOTAL	150	100%

TABLE 3- EXTENT OF FRENAL ATTACHMENT

TYPE	FREQUENCY	PERCENT
MUCOSAL	45	30%
GINGIVAL	73	48.70%
PAPILLARY	17	11.30%
PAPILLA-PENETRATING	15	10%
TOTAL	150	100%

TABLE 4- FREQUENCY/PERSISTANCE OF DIASTEMA

DIASTEMA	FREQUENCY	PERCENT
PRESENT	27	18%
ABSENT	123	82%
TOTAL	150	100%

TABLE 5- AGE WISE DISTRIBUTION OF DIFFERENT TYPE OF FRENAL ATTACHMENT

TYPE	AGE GROUP				TOTAL
	18-30	31-40	41-50	51-60	
MUCOSAL	18 40.00%	8 17.80%	11 24.40%	8 17.80%	45 100%
GINGIVAL	33 45%	12 16.40%	10 13.70%	18 24.70%	73 100%
PAPILLARY	12 70.65%	1 5.80%	2 11.70%	2 11.70%	17 100%
PAPILLA-PENETRATING	7 46.70%	4 26.70%	2 13.35	2 13.30%	15 100%

TABLE 6- GENDER WISE DISTRIBUTION OF DIFFERENT TYPE OF FRENAL ATTACHMENT

TYPE	MALE	FEMALE	TOTAL
MUCOSAL	21 46.70%	24 53.30%	45 100%
GINGIVAL	24 32.90%	49 67.10%	73 100%
PAPILLARY	6 35.30%	11 64.70%	17 100%
PAPILLA-PENETRATING	6 40%	9 60%	15 100%

TABLE 7- PERSISTENCE OF DIASTEMA

DIASTEMA	PRESENT	ABSENT	TOTAL
MALE	10 17.54%	47 82.45%	57 100%
FEMALE	17 18.27%	76 81.72%	93 100%

Table 1 provides percentage of various age groups examined among the total population and gives idea about demographic characteristics .Present study includes 150 subjects out of which majority of population belong to age group of 18-30 years that is 44% of total population followed by age group of 31-40 years and 51-60 years comprising 19.30% followed by the age group of 41-50 years comprising 17.30% of total study population.

Table 2 gives idea about gender wise distribution of study population. It was found that 38% of total population examined were males where as 62% were females.

Table 3 shows various types of frenum present in study population. It was found that 48.70% of population possess gingival type of frenal attachment followed by mucosal type constituting 30%. Papillary type comprises 11.30% and papilla penetrating comprises 10%.

Table 4 illustrates persistence of diastema. It was found that midline diastema was absent in majority of population (82%) out of total study population and was present in only 18% of population.

Table 5 indicates about 45% of population exhibiting gingival type were from age group of 18-30 years followed by 16.4% in 31-40 years age group, 13.70% in 41-50 years age group and 24.70% in 51-60 years age group. Around 70.6% of papillary followed by 46.7% of papilla-penetrating followed by 40% of mucosal attachments were seen in majority of age group population 18-30 years. Most commonly found frenal attachment is Gingival type which is also statistically significant since *P* value is less than 0.01.

Table 6 gives idea about type of frenal attachment predominant in males and females .Out of total male population examined, 46.70% exhibits mucosal type of frenal attachment where as about 67.10% of female population exhibit gingival type of frenal attachment. It shows that gingival type is most commonly found frenal attachment in female population also it is statistically significant as the *P* value is less than 0.01 where as in male population variation in frenal attachment is non significant as *P* value is more than 0.01.

Table 7 shows that only 17.54% of male population shows presence of diastema where as only 18.27% of female population shows diastema. The prevalence of diastema in males and females are almost equal and is non significant statistically as the *P* value is more than 0.01.

DISCUSSION:

Aberrant frenal attachment may cause problems in speech, mastication, esthetics and maintenance of oral hygiene constituting a periodontal problem [3]. A tight or abnormal frenal attachment may also contribute to failure of healing of traumatic injuries, restrict movements of lips, contribute to speech abnormalities and create undesirable esthetics in anterior teeth [6].Retention and fit of maxillary complete denture also affected by abnormal frenal attachment. Any developmental anomaly in underlying labial bone margin along with high frenal pull may contribute to initiation and progression of gingival recession and further bone loss. It is also proposed that labial frenum should be carefully examined as it may serve as potential co-factor for peri-mucosities and peri-implantitis [7, 8].Moreover, Mintz et al also mentioned that an abnormal frenum is associated with syndromic and non-syndromic conditions [9].A low frenum attachment may affect the movement of muscular structures which in turn may affect the position of jaw and arrangement of dentition [10]. The present observational study was conducted to assess variations in morphology of frenal attachment in diverse population.

In the present study, it was found that gingival type of attachment was predominant in majority of population constituting 48.7% followed by mucosal type in 30% of population. The results were compared with the study done by Mirko et al [11] in which authors found mucosal type as predominant (46.6%) followed by gingival (34.3%).

Similar study was done by SL Cristabel [12] in south Indian population showing gingival type as predominant variant of frenal attachment constituting 49.5% followed by mucosal (38.8%), papillary (9.8%), and papilla-penetrating (1.9%). Also similar results were obtained by study done by S. Rathod et al [5] which constitutes gingival type 49.9%, mucosal 29.8% , papillary 16.5% and papilla-penetrating 3.8%.

The study shows gingival type of attachment predominant in most of the population including males and females, hence it can be concluded that no clinically significant gender based variations are seen. These results are in accordance to the findings of the study done by Jindal et al [13] and the study done by SL Cristabel [12] where no gender based differences are seen.

Failure of frenum to migrate apically has been implicated as the causative factor in persistence of midline diastema. It was found that diastema was more common in females (18.27%) as compared to males (17.54%). The results were compared with the study done by Adigun et al [10] and the similar

results were obtained. Any interference in allocation of continuous band of connective tissue can lead to midline diastema and also interferes with the growth of anterior portion of maxilla. Papillary and papilla-penetrating types are considered to be pathological in permanent dentition [11].

The limitations of the study are limited sample size, its cross sectional design and variation in population that may hamper the results. Hence, further research can be carried out with larger sample size including siblings to evaluate genetic variations in type of attachment and morphology of labial frenum.

CONCLUSION:

From the above study, it can be concluded that gingival type of frenal attachment is predominant as compared to mucosal, papillary, papilla-penetrating type. The midline diastema is more prevalent in females with papilla-penetrating type of frenal attachment. Determining frenal attachment before any aesthetic procedure is of prime importance so as to avoid further complications. The present study highlights the importance of early diagnosis of abnormal frenum and its effect on deciding the treatment plan.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper

REFERANCES:

1. Hungund, Shital, Dhwani Gohil, and Rakesh Mishra. "Assessment of smile architecture and pink aesthetics: A successful methodology in cosmetic dentistry." *European Journal of General Dentistry* 1.02 (2012): 85-89.
2. Patil, Abhilasha S., et al. "Pink Esthetics: A Study on Significant Gingival Parameters." *The Journal of Contemporary Dental Practice* 21.2 (2020): 207-210.
3. Priyanka, M., et al. "An overview of frenal attachments." *Journal of Indian society of Periodontology* 17.1 (2013): 12.
4. Divater, Vijayalakshmi, et al. "Frenal attachment and its association with oral hygiene status among adolescents in Dakshina Kannada population: A cross-sectional study." *Journal of family medicine and primary care* 8.11 (2019): 3664.
5. Rathod Surekha, et al. "Evaluation of variations in morphology and attachment of frenum in diverse population-A cross-sectional study." *Clinical Epidemiology and Global Health* 8.4 (2020): 1094-1097.
6. Kotlow, Lawrence A. "Oral diagnosis of abnormal frenum attachments in neonates and infants: evaluation and treatment of the maxillary and lingual frenum using the Erbium: YAG laser." *J Pediatr Dent Care* 10.3 (2004): 11-14.
7. Delli, Konstantina, et al. "Facts and myths regarding the maxillary midline frenum and its treatment: a systematic review of the literature." *Quintessence international* 44.2 (2013).
8. Otto, M., and H. Gluckman. "The treatment of peri-mucositis and peri-implantitis 1: implantology corner." *South African Dental Journal* 63.4 (2008): 250-252.
9. Mintz, Sheldon M., Michael A. Siegel, and Paul J. Seider. "An overview of oral frena and their association with multiple syndromic and nonsyndromic conditions." *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology* 99.3 (2005): 321-324
10. Northcutt, Michael E. "The lingual frenum." *J Clin Orthod* 43.9 (2009): 557-65

11. Mirko, Placek, Skach Miroslav, and Mrklas Lubor. "Significance of the labial frenum attachment in periodontal disease in man. Part 1. Classification and epidemiology of the labial frenum attachment." *Journal of periodontology* 45.12 (1974): 891-894.
12. Christabel, S. Linda. "Prevalence of type of frenal attachment and morphology of frenum in children, Chennai, Tamil Nadu." *World journal of dentistry* 6 (2017): 203-207.
13. Jindal, Vikas, et al. "Variations in the frenal morphology in the diverse population: A clinical study." *Journal of Indian Society of Periodontology* 20.3 (2016): 320.
14. Adigun, Abiola, Tolulase Yemitan, and Omolara Uti. "Relationship between maxillary midline diastema width and labial frenum attachment in a sample of Nigerian adolescents: A cross-sectional study." *Nigerian Journal of Medicine* 31.3 (2022): 274-279.
15. Varghese, Tony, et al. "Various morphological variations in attachment of maxillary labial frenum: an observational study." *J Res Adv Dent* 8.1 (2018): 189-192.