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Effect of median oral frenulums at gingival reccesion

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Abstract
Introduction: The median frenulum plays an important clinical role in the exercise of the movement of the lip movements to the fixed gingiva, which modifies its width to fit within its limits in dealing with these forces. Their way of positioning in the creation or not of the contact point makes it possible for the frenulum to fit into the interdental space, exerting strength over the fixed gingiva and beyond, over the interdental papilla, which, as a structure is more fragile, tangible, sensitive, rather than fixed gingiva. The study aims to find a possible correlation between the incidence of various types of median labial frenulum and gingival recession on vestibular incisors surfaces.
Materials and methods: Types of frenulum varies in different age and gender ranges, giving a functional aesthetic harmony of the oral tooth in the oral cavity. Of the total of 311 patients, 124 did not meet the 2 criteria for patient selection: they had less than 20 teeth in oral cavity and included within the age of 20 years. According to age groups, the patients were divided as follows: group 1 - age 20-39, group 2 - age 40-59, group 3 - age 60 and above. Three categories were defined for the assessment of gingival recession: minimal recession - less than 3mm of exposed root, average recession - 3-4mm of exposed root and advanced recession more than 4mm root area exposed to oral cavity.
Results: If the prevalence of recession in the 30-39 age range was 37.8% and the median reach 8.6%, in the 40-64 age range, these figures reached 90.4% prevalence and 56.3% coverage on the affected teeth. Gingival recession has been found to be the highest in the gingival type (17.5%) and at least with the mucous membrane type (2.45%), while the mandibular papila type showed the maximum percentage (71.5%) with the penetration type papilla (1.5%) that shows the least. The buccal recession was found to be higher than the labial recession. The mandibular frenulums of both gingival (51.5%) and mucosal (36.1%) had gingival recession. The correlation analysis found that since the level of frenulum binding extends to the gingiva crown recession, it results to be higher in papillary frenum type and at least in the papillar type.
Conclusions: The documented data showed that among the most common frenulum types encountered in normal morphology of oral cavity, are the simple frenulum and frenulum with a labial medial attachment. Regarding the age and distribution of these frenulums, the highest percentage was for the simple fever at age 60 and for the supplement frenulum at the age of 40-59 years. Simple frenulums are commonly encountered in female patients, while frenulums with supplements in male patients. Gingival recession, both for simple and supplemental frenulum cases, was under the 3mm value, measurable in the vestibular surface. The correlation of the appearance of gingival recession and the type of frenulum, speaks for statistically significant correlation, with $p < 0.001$. The papila index of the frequency with most types of frenulum, ranged from class I and class II, in values of the approximate proportion to each other.

Keywords: median frenulum, papilla index, recession

Introduction

Median frenulum plays an important clinical role in the exercise of lip movement forces in the fixed gingiva, which modifies its width to fit within its limits in coping with these forces. Frenulums are created at the 10th uterine week and later take their final form after the occlusion of maxillary and mandibular incisors. The manner of which they are positioned at the point of contact or not, makes it possible for the frenulum to adapt to the interdental space, exerting force on the fixed gingiva further, on the interdental papilla, which is more tactile, sensitive, rather than fixed gingiva.

The study aims to find a possible correlation between the frequency of different types of median labial frenulum and the gingival recession on the vestibular surfaces of the incisors. Frenulum types vary in different age and sex limits, giving a functional aesthetic harmony of the anterior teeth in the oral cavity.

There are articles that attempt to explain the different modalities of treatment in clinical cases treated only with a prosthetic treatment protocol in the management of gingival recession and black triangles. [1] Gingival recession or gingival atrophy may occur from the apical migration of the gingiva. [1] The labial frenulum is expected to appear in the medial position of the lip, respectively, up and down, and in the lateral position, in the premolar area, respectively, in the maxilla and in the mandible. It contains connective tissue that can rarely contain muscle fibers, which apply even greater forces to the gingiva [2].

Gingiva on the other hand welcomes applied forces, based on adherent structure and with keratinized epithelial coating. It adapts to the application of force, modeling the narrowing of the fixed gingival width. This fact, in the presence of risk factors for

the emergence of the gingival recession, significantly affects the latter's occurrence.
According to one study, there is a logical relationship between the presence of gingival recession and the width of the fixed gingival, regardless of the position of the tooth and its function in the arcade, respectively in the maxilla and in mandibula. Frenulums often cause problems such as loss of papillae, recession, diastema, difficulty in mouth-washing, alignment of teeth and psychological disorders. Morphological changes should be addressed, distinguishing them from abnormal during different dental procedures [3, 4].

Materials and Methods

Patients included in the study were patients at the University Dentistry Clinic of "Albanian University", November 2017 - January 2018. Oral examination was performed on the soft tissues of the dental structures and on the soft tissues of the oral mucosa, always following the procedure, drying the tissues with air and then with the naked eye inspection of differences in the relief of the oral mucosa. Pointing to the patient, the purpose of the study, and the follow-up procedure, his consensus was sought. The morphology of the frenum was determined using the direct visual method under natural light, reflecting the upper lip with the index finger and the thumb of the two hands.
Nordland and Tarnow classified papillae height loss into 4 classes based on three anatomical elements: interdental contact point, apical vestibular enamel-cement junction (CEJ) and coronal interproximal enamel-cement fusion.
Gingival recession is the exposure of root surfaces due to apical migration of gingival tissue borders; the gingival margin migrates apically to the enamel-cement joint. Although rarely resulting in tooth loss, marginal tissue recession is associated with thermal and tactile sensitivity, aesthetic complaints, and a tendency to root caries [6].
In this study, it's the aim to find a logical relationship between the presence of the gingival recession and the type of labial frenulum, respectively, in the maxilla and mandibula. The study included a significant number of patients, classified at 20 years of age.
Group 1 - age 20-39
Group 2 - ages 40-59
Group 3 - age 60 and over.

Selection conditions for patients are the presence of at least 20 teeth in the mouth and a 20-year age limit for inclusion in the study. Patients after verbally asserting their presence and voluntary participation in the study are subject to the measures provided in the work protocol.
The presence of the medial labial frenulum at the patient's lying position in the dental chair was first examined. The stability of the frenulum was examined by moving the lip to the left and right, an examination that affects the classification of the frenulum, a clinically performed classification.
All the patients involved were informed about the protocol and duration of the procedure, the obligation to answer some questions, the examination and photography of the various oral cavity areas. This protocol was also clarified with the patients, which was performed only for study purposes, the patient would be kept anonymous. Of the total of 311 patients, 124 did not meet the 2 criteria for patient selection: they had less than 20 teeth in the oral cavity and were included at the age of 20 years.
Three categories were defined for assessing gingival recession: minimal recession - less than 3mm of exposed tooth root, average recession - 3-4mm of exposed root and advanced recession of more than 4mm of root surface [5] These gingival recession criteria were also defined based on the quantities in millimeters of periodontal disease progression, based on the name of mild, moderate, and advanced periodontal disease. The 2-3 millimeter gingival recession is further caused by minimal brush abrasion trauma, or minimal mechanical trauma to the patient's vices.

Results

After collecting the data in the baseline excel table, they were processed for the purpose of displaying the study results according to the tables below.

Table 1. Prevalence of frenulum type among predefined age groups.

Type of frenulum	20-39 years		40-59 years		60 over		Total %
	N	%	N	%	N	%	
Simple	13	6.6%	23	11.7%	28	14%	32.3%
Tectolabial	13	6.6%	2	1%	8	4%	11.6%
With noduj	27	13.7%	13	6.6%	3	1.5%	21.8%
With attachment	28	14%	29	14.7%	8	4%	32.7%
Nichum	2	1%	0	0%	0	0	1%
Total	83	41.9%	67	34%	47	23.5%	100%

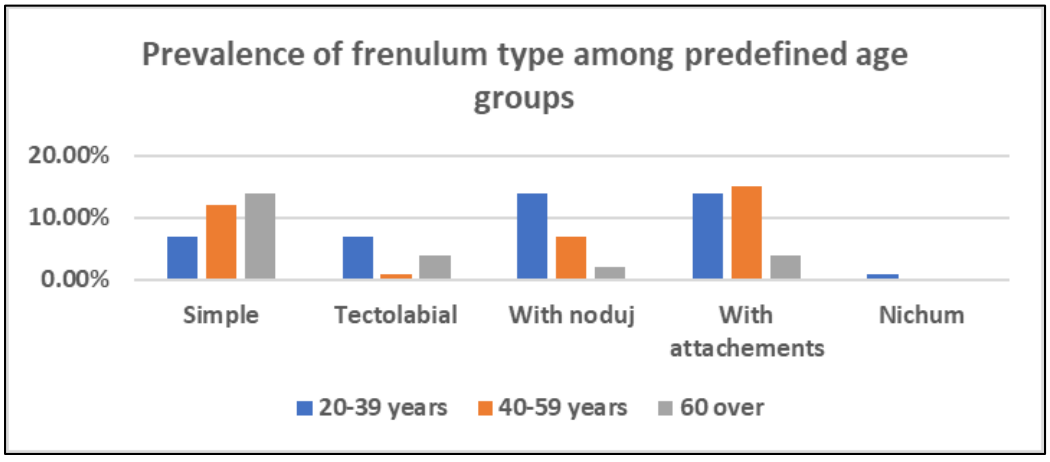

Fig 1: This graph shows the prevalence of mesenchymal frenulum type predicted in our study.

Table 2: Prevalence of frenulum type by female: male ratio.

Type of frenulum	Male		Female		Total %
	N	%	N	%	
Simple	27	13.7%	37	18.8%	32.5%
Tectolabial	17	8.6%	6	3%	11.6%
With noduj	20	10%	23	12%	22%
With attachment	35	17.8%	30	15%	32.8%
Nichum	0	0%	2	1%	1%
Total	99	50.1%	98	49.8%	100%

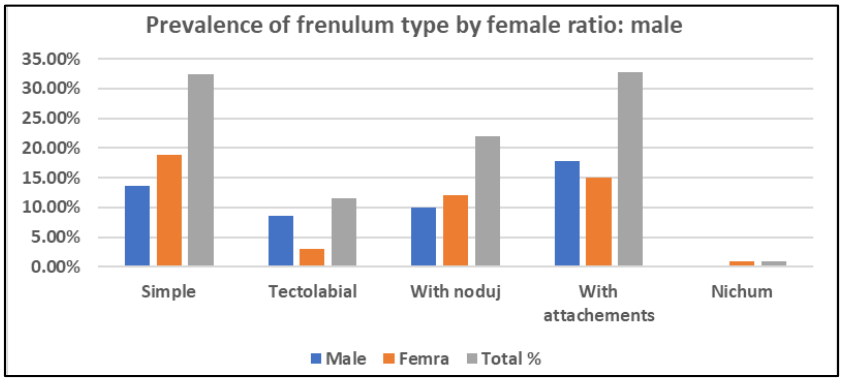

Fig 2: Prevalence of frenulum type by female: male ratio.

Table 3: Prevalence of recession type among predefined age groups.

Type of recession	20-39 years		40-59 years		60 over		Total N %
	N	%	N	%	N	%	
≤ 3mm	53	27%	23	11.7%	5	2.5%	41.2%
3 – 4mm	13	6.6%	29	14.7%	29	14.7%	36%
≥ 4mm	17	8.6%	15	7.6%	13	6.6%	22.8%
Total	83	42.2%	67	34%	47	23.8%	100%

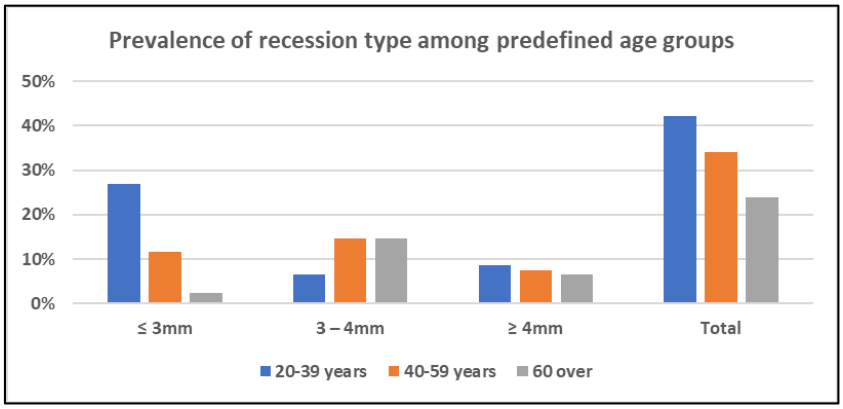

Fig 3: The graph shows the prevalence of the type of recession among the predefined age groups in the study.

The correlation of the occurrence of gingival recession and frenum type revealed statistically significant correlation - p value <0.001.

Table 4: Papillary index rating of patients included in study divided by female: male ratio.

Interdental papilla	Male		Female		Total %
	N	%	N	%	
Class I	41	21%	38	19%	40%
Class II	25	13%	47	24%	37%
Class III	31	16%	12	5.5%	21.5%
Class IV	2	1%	1	0.5%	1.5%

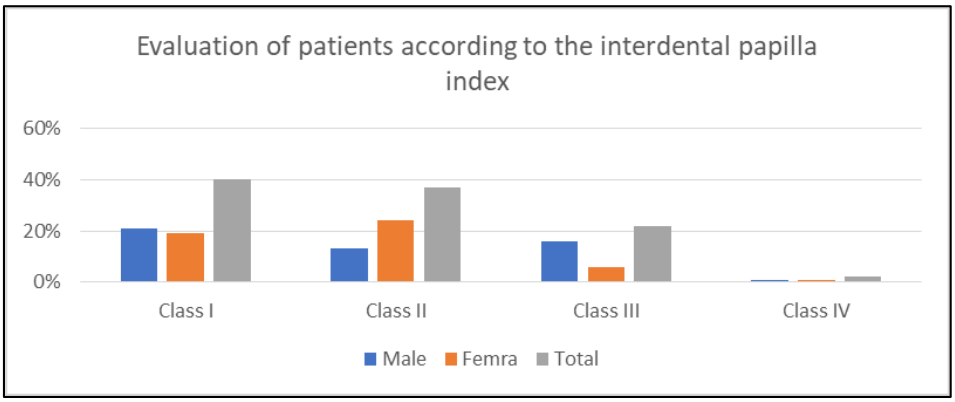

Fig 4: The graph shows the evaluation of patients according to the index of interdental papillae.

Fig 2: Female patients 26 years of age, Class IV frenulum classification, Class I interdental papillae index, Gingival recession in maxillary incisors and less than 3mm in mandibular incisors.

Fig 3. Patients with short frenulum, since the strand of the frenulum has significantly reduced the width of the fixed gingiva in maxillary incisors and mandibular incisors.

Fig 4: Patients with frenulum third grade (frenulum with nodules), papilla index class II, gingival recession 1mm.

Fig 5: Female patients, age 29 years, gingival recession after 3mm, interdental papillae index grade 2. Patients included in the study of broadband fixed gingiva, where its masticatory role is evident.

Fig 6: Female patients 20 years of age, with grade IV frenulum. Other clinical cases with short frenulum affecting the width of the fixed gingiva.

Fig 7

Discussions

The effect of the frenulum has been studied on the tension or force required to close the upper lip, the pressure exerted on the lower lip, and the ratio of these respective forces to the upper lip and to the lower lip. In a study of 259 children aged 4 to 18 years, it was concluded that higher positioning of the upper lip frenulum impedes lip closure in children [6]. Another study concluded that in 50% of patients between the ages of 18 and 64, that recession is present in one or more areas of the oral cavity, and that there is a progressive increase in the frequency of occurrence and percentage of recession areas involved, [7] If in the 30-39 year age range the recession prevalence was 37.8% and the median extent 8.6%, in the 40-64 year age range these figures reached 90.4% prevalence and 56.3% extension to the affected teeth.

Among the etiological factors of recession occurrence are periodontal stone, incorrect tooth brushing, high frenulum fixation, tooth positioning, smoking, subgingival fillings, chemicals. The effects of the recession are loss of aesthetics, gingival bleeding and plate retention, hypersensitivity, caries [8]. Without addressing the occlusal relation of the affected tooth, the treatment of gravitational gingival recession will be problematic. Early diagnosis of occlusion trauma is important for this purpose [9].

The gingival recession and the impact of the positioning of the frenulum with respect to the patient's age, average length of clinical crown, are correlated and corroborated also in the statistical data processing values [10].

The labial frenulum is more coronal at younger ages, and as a consequence of alveolar growth, it is positioned in the gingival direction. As we age, we tend to the mucosal type of the frenulum. In this way the dentist should correlate the child's age and type of frenulum and morphological variations during clinical examination to avoid misdiagnosis and unnecessary treatments. [11] Papillary frenulum type decreases with increasing age. Different types of frenulum associated with different syndromes as well as non-syndromic health status. The presence of abnormal frenulum has been reported in the literature as a feature of syndromic conditions such as: Ehlers-Danlos syndrome, hypertrophic infantile pyloric stenosis, holoprosencephaly, Ellis-van Creveld syndrome, and oro-facial-digital syndrome. Within the limitation of the study, conducted in one country, factors such as different geographical regions, race, etc., cannot be considered. To overcome the shortcomings in the registration of frenulum, the University campus that has more than 10,000 adults residing in it coming from every corner of the country with all religions, income groups and languages, was selected in a study as the site where many other factors do not appear to influence the morphology of the frenum. [13] In the present study, the most common type of frenulum was simple single frenum (63.79%). Previous studies on the prevalence of frenum types have reported a similar phenomenon of simple frenum. [8, 9] In Sewerin, Denmark, it was noted that 60.2% of patients had a simple frenum.

In a recent study by Townsend *et al*., In Caucasians and African-Americans, the prevalence of simple single frenum was 6.86%. The present study studied most of the nodules in the middle third of the frenum, while appendages are most commonly found in the labial third.

Similar findings were reported in studies by Sewerin and Townsend *et al*. These observations suggest that despite differences in ethnicity and race, the pattern of distribution of frenulum variations is probably similar. Absence of the frenum and two or more changes of each type of frenulum were not found by different authors in any of the adults examined consistent with previous studies. However, Kakodkar *et al*., Conducted a study on frenulum attachments in 1,206 school-going children; found a single case of "frenum deficiency" in a female. This suggests that the missing frenum is a very rare occurrence and possibly associated with developmental abnormalities. In our study, simple frenulum varied in 32% of cases. Various classifications of frenulum have been mentioned in the literature based on its attachment and morphology. [14] Based on the level of attachment, the frenulum has been classified as mucosal, gingival, papillary, and penetrating papillae [15]. However, this study reveals some differences of which have not been reported to date. These include simple triple frenum, multiple nodules frenum, inverted 'Y' frenum and trifid frenum. In addition, the tectolabial frenulum was found with appendages and nodules. Reports of frenal abnormalities causing difficulty in speech, conduction, aesthetics, and oral hygiene maintenance have been well documented in the literature.

Often, during the oral examination of the patient, the dentist attaches little importance to the frenulum. The frenulum can endanger gingival health when they are attached too close to the gingival margos, either because of interference with plaque control or because of muscle pull. From a periodontal point of view, evaluation of frenulum-periodontal interconnections seems to be valuable. This study was aimed at recording different types of labial and buccal frenal supplements in different age and sex groups on both lips as maxillary and mandibular. The gingival recession has been found to be least in the papillary type of the frenulum. The buccal recession was found to be higher than the labial recession. The correlation of the occurrence of gingival recession and frenum type revealed statistically significant correlation - p value <0.001. Gingival recession, often called dental root exposure, is a common clinical finding in adults. It is defined as the denudation of the surface of the tooth root in the apical motion of the gingiva. There has been some controversy over whether root exposure is pathological, physiological or a combination of both. It is important for the clinician as it may be a causative factor in pulpal hyperemesis, due to the exposed root zone.

The impact of the phrenic phenomenon and recession of the gingiva is clinically significant, since root, anti-aesthetic exposure caused by the type of gingival and papillary frenula should be eliminated in the early stages of detection of gingival recession, to prevent further exposure to the root. The gingival type of frenum in the papillary strain was found to be more associated with gingival recession as a phenomenon. Recording of oral hygiene, habits, attached gingival width, and vestibular depth allows the clinician to identify the exact cause of gingival recession [18, 19]. The frenulum alone, or in combination with the above factors, would be responsible for the recession of the gingiva. The clinician plays an important role in detecting the cause of the recession before removing the frenulum. Blind attempt to remove the frenulum will deprive the function of the frenulum. The gingival recession was found to be maximal with the gingival type (17.5%) and least with the mucosal frenal type (2.45%), whereas in the papillary type of papillary type it showed the highest percentage (71.5%) with the type of penetration of papillae (1.5%) showing the least. The buccal recession was found to be higher than the labial recession. Maxillary buccal frenum of both gingiva (47.6%) and mucosa (35%) had gingival recession. The mandibular frenum of both gingival (51.5%) and mucosal (36.1%) had gingival recession. Correlation analysis revealed that, as the level of frenum attachment extends to the coronal recession of the gingiva, it turns out to be high in the papillary type of frenum and least in the type of papillae. The absence of gingival recession in the penetrating papilla type can be explained as: the annoying adverse effect of papillary seizure of the labial frenulum can be explained in at least two different ways. The papillary seizure of the labial penetration of the frenulum passing through the interdental papillary midline is partially lost in the attached gingiva and partly anchored to the palate. The deflection forces of the joint have been blocked or modified to a significant extent. The frenum as an anatomical unit plays an important role in the expression of various signs of gingivitis. The recession and diastema together with functional and aesthetic compromise are of great disciplinary importance for the periodontist, orthodontist and therapist. There are currently two classifications of frenal connection types by Placek *et al*. and morphotypes by Sewerin. There is a need to introduce a modified classification that considers the combination of both Placek and Sewer to be of clinical relevance. The frenulum may be the original cause of a diastema in only a small part of the midline diastema.

According to Huang and Creath, the initial 13 labial frenum begins to form at the tenth week of pregnancy and by the third month in utero the morphology of the fetal frenum is similar to that of abnormal postnatal life frenum. It extends as a continuous group of tissues from the tubercle to the inner side of the lip, above and along the alveolar ridge, to be inserted into the palatal papilla. Before birth, the lateral parts of the alveolar cord are joined, and the continuous band of tissue becomes completely occluded by the bone; it is divided into a palatine part (palatine papillae) and a labial part (labial frenulum) by this occlusion. An abnormal addition of the labial frenum can cause many tooth problems, such as an abnormal lumbar diastema. A midline diastema is a gap between maxillary central incisors; can be a normal occurrence during the transitional stages of dentition (during primary dentition) [21]. However, a diastema may also be considered as an abnormally sharp division, that is, as a malocclusion. Clinicians should be able to distinguish between these two types of diastema and know when and how to manage the abnormal diastema.

The frenum of a newborn is a large, fleshy, broad-bred layer. The tissue gradually narrows, attaching midline to the connective tissue of the maxillary inner neck and the alveolar process. With the eruption of the teeth and the development of the alveolar ridge, the position of the frenulum changes. As growth progresses, the frenulum may atrophy and may assume a higher position or retain its attachment to the papillae. Dean *et al*. stated that the maxillary labial frenum is composed of two layers of epithelium that enclose a loose vascular connective tissue.

In some cases, the frenulum may include muscle fibers originating from the orbicularis oris of the upper lip muscles [21]. The origin from the lips is often broad, but the frenum index itself narrows and enters the midline in the outer layer. of the periosteum and in connective tissue of the maxillary inner neck and alveolar process.

The frenum may attach to variable sites in the gingival tissue joined several millimeters above the ridge, or in the ridge, or the fibers may pass between the central gingiva and attach to the palatal papillae.

The gingival recession may be present in some teeth separately; however, whenever it is generally present, it often affects an entire segment of the dental arch, drawing horizontally the connectivity of periodontal tissues, including the gingival papillae.

Conclusions

Documented data showed that among the most common frenulum types encountered in normal oral cavity morphology are simple frenulum and medial labial frenulum.

Regarding the age and distribution of these frenulum, the highest percentage was for simple frenulum at 60 years of age and for adenine frenulum at 40-59 years.

Simple frenulas are more commonly found in female patients, while supplemental frenulas are more common in male patients.

The gingival recession, for both the cases of simple frenulum and those with appendages, was below 3mm, measurable in the teeth on the vestibular surfaces.

The correlation of the occurrence of the gingival recession and the type of frenulum indicates a statistically significant

correlation, with p <0.001.

The index of interindental papillae for the most frequent types of frenulum types varied in grade I and grade II, in percentages approximately proportional to each other.

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References

1. Kishio Sabashi, Suguru Kondo; “Influence of Frenulum Labii Superioris on Lip Closure in Children”; Clinic Orthodontics and Pedodontics the Japanese Journal of Pediatric Dentistry. 2004; 42(5):661-667. http://doi.org/10.11411/jspd1963.42.5_661.
2. Koppolu Pradeep, Palaparthy Rajababu, Durvasula Satyanarayana, Vidya Sagar; “Case Report: Gingival Recession: Review and Strategies in Treatment of Recession”; Case Reports in Dentistry”; Volume 2012 (2012), Article ID 563421, 6 pages http://dx.doi.org/10.1155/2012/563421.
3. Kemal Ustun, Zafer Sari, Hasan Orucoglu, Ismet Duran, Sema S. Hakki; “Severe Gingival Recession Caused by Traumatic Occlusion and Mucogingival Stress: A Case Report”; Eur J Dent. 2008; 2:127–133. PMCID: PMC26331684.
4. Anmol Mathur, Manish Jain, Koushal Jain, Mahima Samar, Balasubramanya Goutham, Prabu Durai Swamy, and Suhas Kulkarni; “Gingival recession in school kids aged 10-15 years in Udaipur, India’; J Indian Soc Periodontol. 2009; 13(1):16–20. Doi: 10.4103/0972-124X.51889; PMCID: PMC2846669.
5. Milena Guerreiro Marini, Sebastião Luiz Aguiar Greghi, Euloir Passanezi, Adriana Campos Passanezi Sant’Ana; “Gingival recession: prevalence, extension and severity in adults”; Journal of Applied Oral Science; Print version ISSN 1678-7757; On-line version ISSN 1678-7765; J. Appl. Oral Sci. vol.12 no.3 Bauru July/Sept. 2004; http://dx.doi.org/10.1590/S1678-77572004000300017.
6. S Linda Christabel, Deepa Gurunathan; “Prevalence of Type of Frenal Attachment and Morphology of Frenum in Children, Chennai, Tamil Nadu”; World Journal of Dentistry. 2015; 6(4):203-207.
7. Edwards, JG. A clinical study: the diastema, the frenum, the frenectomy. Oral Health. 1977; 67:51-62. Google Scholar, Medline.
8. Messner A, Lalakea L, Aby J, Macmahon J, Bair E. Ankyloglossia: incidence and associated breast feeding difficulties. Arch Otolaryngol Head Neck Surg. 2000; 126:36-39. Google Scholar, Crossref, Medline.
9. O’Callahan C, Macary S, Clemente S. The effects of office-based frenotomy for anterior and posterior ankyloglossia on breastfeeding. Int J Pediatr Otolaryngol. 2013; 77:827-832. Google Scholar, Crossref, Medline, ISI.
10. Boutsi EA, Tatakis DN. Maxillary labial frenum attachment in children. Int J Pediatr Dent. 2011; 21:284-288. Google Scholar, Crossref, Medline, ISI.
11. Mirko P, Miroslav S, Lubor M. Significance of the labial frenum attachment in periodontal disease in man. Part 1. Classification and epidemiology of the labial frenulum attachment. J Periodontol. 1974; 45:891-894. Google Scholar, Crossref, Medline, ISI.
12. Bergese F. Research on the development of the labial frenum in children of age 9-12 [in Italian]. Minerva Stomatol. 1966; 15:672-676. Google Scholar, Medline.
13. Minsk L. The frenectomy as an adjunct to periodontal treatment. Compend Contin Educ Dent. 2002; 23:424-428. Google Scholar, Medline.
14. Kotlow LA. Diagnosing and understanding the maxillary lip-tie (superior labial, the maxillary labial frenum) as it relates to breastfeeding. J Hum Lact. 2013; 29:458-464. Google Scholar, SAGE Journals, ISI.
15. Delli K, Livas C, Sculean A, Katsaros C, Bornstein MM. Facts and myths regarding the maxillary midline frenulum and its treatment: a systematic review of the literature. Quintessence Int. 2013; 44:177-187. Google Scholar, Medline, ISI.
16. Radentz WH, Barnes GP, Cutright DE. A survey of factors possibly associated with cervical abrasion of tooth surfaces. J Periodontol. 1976; 47:148-154. [PubMed].
17. Priyanka M, Sruthi R, Ramakrishnan T, Pamela Emmadi, N. Ambalavanan; “An overview of frenal attachments”; J Indian Soc Periodontol. 2013; 17(1):12-15. Doi: 104103/0972-124X.107467.
18. Wennstrom JL, Pini Prato G. Mucogingival therapy-periodontal plastic surgery. In: Lindhe J, Karring T, Lang NP, editors. Periodontology and Implant Dentistry. 4. Oxford Blackwell; Munksgaard, 2003, 579.
19. Robo I, Marko I, Taga J, Ostreni V. "Gingiva fikse, impakti mbi periodont"; Konferenca e 8-të Stomatologjike, organizuar nga Albanian University, 31.03.2012, Libri i abstrakteve fq. 16.
20. Geiger AM, Wasserman BH. Relationship of occlusion and periodontal disease: Part IX-Incisor inclination and periodontal status. Angle Orthod. 1976; 46:99-110. [PubMed].
21. Reed J. Recession of mandibular anterior gingival following orthodontics in adults. Todays FDA. 2005; 17:45. [PubMed].