

## Prevalence of Labial Frenum Attachment and its Relation to Diastemia and Black Hole in Kurdish Young Population

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### Abstract:

**Introduction:** Frenum appears as a fold of mucous membrane extending from the mucous lining of the labial mucous membrane towards the crest of the residual ridge on the labial surface. Labial frenum is a dynamic and often unstable structure and it will be changed in shape, size, and position during the different stages of growth and development. Midline diastemia is a distinctive space usually of about 0.5 mm between mesial surfaces of two teeth. It is more frequently seen between upper maxillary incisors causing esthetic and phonetic problems

**Aims and Objectives:** To determine the prevalence of high frenal attachment and maxillary median diastemia in Sulaimani population.

**Materials and Methods:** This cross sectional study was conducted on 279 patients (132 male and 147 female) who visited Oral Diagnosis Department of School of Dentistry University of Sulaimani for different purposes of dental treatments. The ages of the patients were divided into two groups (10 to 20) and (20-30) years. Examination was done on the dental chair; the frenum morphology was determined by using the direct visual method under dental unit light.

**Results:** The results showed that about 68.8% of the patients had gingival frenal attachment, followed by papillary 16.5, mucosal 12.5 and least frequent papillary penetrating 2% respectively. Of 279 patients, 239 of them had complete maxillary midline closure, 25 of them had diastemia and 15 recorded black hole.

**Conclusion:** This study found that gingival frenal attachment constituted the higher percentage among all frenal attachment in all age and sex groups. Complete contact between maxillary central incisors comprised the higher percentage followed by diastemia and black hole.

**Keywords:** Frenum, Diastemia, Black Hole

### I. Introduction

Frenum is a fold of mucous membrane consisting of highly vascularized connective tissue covered with epithelium. It contains a variable amount of collagenous fibrous tissue<sup>1</sup>. This fibrous tissue attaches the lip to the alveolar mucosa and underlying periosteum<sup>2</sup>. A normal frenum attaches apically to the free gingival margin so as not to exert a pull on the zone of the attached gingiva and usually terminating at the mucogingival junction. However, its level may vary from the height of vestibule to the crest of the alveolar ridge and even to the incisal papilla area in the anterior maxilla<sup>3</sup>. Labial frenum is a dynamic and often changeable structure and it goes through variation in shape, size, and position during the different stages of growth and development. During growth, it tends to decrease in size and lose clinical importance. In young children, the frenum is generally wide and thick, and during growth it becomes thin and small<sup>4</sup>. Their primary function of labial frenum is to provide stability of the upper and lower lips<sup>5</sup>.

Midline diastemia is a distinctive space usually of about 0.5 mm between mesial surfaces of two central teeth<sup>6</sup>. It is more frequently seen between upper maxillary central incisors causing esthetic and phonetic problems<sup>7</sup>. Genetic, dentoalveolar disproportion, missing tooth, peg shaped lateral incisors, unerupted midline supernumerary teeth, proclination of the upper labial segment or increased anterior overbite are considered as primary etiologic factors for this structural phenomenon. Furthermore, rotated teeth, parafunctional oral habits, such as thumb/finger sucking or abnormal tongue posture, orthodontic treatment, as in cases of rapid palatal expansion or false teeth movement, pathologic teeth migration due to periodontal disease and prominent labial frenum may regard as key etiologic factors for producing maxillary midline diastemia<sup>8,9</sup>.

Distribution of different types of high frenal attachment and interdental spaces between maxillary central incisors in Sulaimani population has not been studied widely. Therefore, the purpose of this study, therefore, is to determine the prevalence of high frenal attachment and maxillary median diastemia in Sulaimani population.

## II. Materials And Methods

This cross sectional study was conducted on 279 patients (132 male and 147 female) who visited Oral Diagnosis Department of School of Dentistry University of Sulaimani for different purposes of dental treatments. Patients were implicated into two age groups – a younger age group (10 to 20) and an older age group - (20-30) years. Ethical approval was obtained from the University Research Ethics Committee, School of Dentistry – University of Sulaimani which is in accordance with Helsinki Declaration.

The study started from November 2014 to May 2015. Exclusion criteria included Patients with systemic diseases suffering from periodontitis and patients whose labial frenum and adjacent mucosa was affected by trauma, moreover, patients taking medicine affecting gingiva, patients with orofacial defects and whose frenum had undergone surgery were also excluded from this study.

Examination was done on the dental chair; the frenum morphology was determined by applying direct visual method under dental unit light. Patients lip was gently stretched in horizontal direction away from labial alveolar process to maintain frenum consistency. The interproximal spaces between maxillary central incisors were examined for the presence of complete closure, diastemia and black hole. All examinations were carried out by an expert periodontist after taking verbal consent. Maxillary labial frenum were classified into four types according to Placek (1974)<sup>8</sup> classification given by mucosal, gingival, papillary and papillary penetrating.

Statistical Analysis: Data analysis was carried out using statistical packages, namely SPSS version 19.0. Statistical significance association between type of frenum, diastema and black hole with different variables are studied using Chi square test. P-value less than 0.05 is considered as statistically significant, at corresponding Degrees of freedom (df).

## III. Results

The results showed that about 68.8% of the patients had gingival frenal attachment, followed by papillary 16.5%, mucosal 12.5% and least frequent papillary penetrating 2% respectively **Fig.1**. The younger age group showed lower percentage of mucosal frenal type than older age group (13:22) however, the gingival, papillary and papillary penetrating types were higher in younger age than the older age group (104:88, 31:15 and 5:1) respectively **Table 1**. There was a significant relation between frenal attachments and age ( $P < 0.05$ ). Regarding comparison of frenal attachment types with sex, female showed higher mucosal and papillary and papillary penetrating (21:14, 31:15 and 4:2) frenal attachments respectively while male recorded higher gingival frenal type **Table 2**. Statistical analysis found non-significant relation between sex differences and frenal attachments.

Of 279 patients, 239 of them had complete maxillary midline closure, 25 of them had diastemia and 15 recorded black hole **Fig.2**. According to age factor, diastemia and black hole recorded higher percentages in younger age groups (17:8 and 8:7) respectively **Table 3**. Non-significant relation was seen between age groups and diastemia was found. Regarding the relation of sex differences, female showed higher number of patients with diastemia (16:9), while male recorded higher number of black hole (9:6) **Table 4**. Data analysis also detected non-significant relation between sex predilection and diastemia.

## IV. Discussion

Frenum appears as a fold of mucous membrane extending from the mucous lining of the labial mucous membrane towards the crest of the residual ridge on the labial surface<sup>10</sup> or to the incisal papilla area in the anterior maxilla<sup>3</sup>. The characterization of the maxillary labial frenum and the interdental spaces of maxillary central incisors are important because they may impose some modifications in dental treatment procedures.

The current study is a cross-section study performed on 279 patients that attended Diagnosis Department of School of Dentistry at University of Sulaimani to characterize the distribution of different types of maxillary labial frenal attachments. The most common type of frenal attachment that observed in this study was gingival type while the least common type was papillary penetrating. Similar results were achieved by Upadhyay and Ghimire among Nepalese children in 2012<sup>11</sup>. Another study also recorded high percentage (58.2%) of gingival frenal type among 428 Italian children<sup>12</sup>.

The adolescent group (10-19) showed higher percentages of gingival, papillary and papillary penetrating gingival attachment in contrary young adults (20-30) recorded higher percentage of mucosal type in our study. Comparing to Upadhyay and Ghimire, they found that mucosal and gingival attachment was higher in older age group (8-14 years) whereas papillary and papillary penetrating was higher in younger age group of children (1-7 years)<sup>11</sup>. The current study results disagree with the Jańczuk and Banach study that found higher prevalence of mucosal attachment (39%) followed by gingival type (36%) among 1542 Polish teen<sup>13</sup>. These data indicate that the papillary and papillary penetrating type may decrease with increasing age. This study also detected higher percentages of gingival type among males whereas females showed higher percentages of the other three types of frenal attachments.

Regarding maxillary interdental spaces, there were high percentage of complete interdental closure between maxillary central incisors, diastemia followed by (8.96%) then the black hole by (5.38%). Umanah et al found higher percentage of diastemia among selected Nigerian young adult population 62.4%<sup>3</sup>. Another study in Saudi Arabia reported high prevalence 64.6% of diastemia among 6-year-old children but only 14.3% among 12-year-olds<sup>14</sup>. This is rather consistent to the results of the current study. Furthermore, the current study reported a higher prevalence of maxillary median diastemia in females (5.73%) than males (3.23%) and higher black hole in males (3.23%) than females (2.15%). In contrary the same study in Saudi Arabia found higher percentage of diastemia in males (25%) than females (14%)<sup>14</sup>. This is conversely higher than our results.

It is acknowledged that the prominent of the maxillary labial frenum may diminish with age simultaneously with approximating proximal surfaces of maxillary incisors. Therefore, the clinician should evaluate maxillary labial frenum and maxillary median diastemia before establishing any dental procedure, as some of these problems may disappear gradually with age and some other may require surgical interventions.

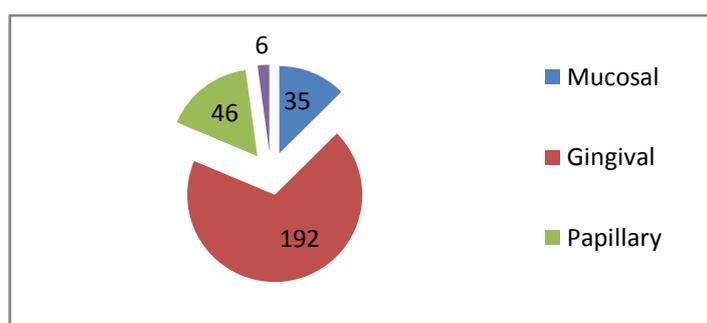
## V. Conclusions

The current study has found that the majority of frenal attachments was gingival type. The next more prevalent types were papillary and mucosal and least frequent was papillary penetrating. Complete interdental closure constituted the majority of the interproximal relation of the maxillary central incisors. There were less frequent interproximal gaps and black holes among attendee patients.

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## VI. Tables and Figures:



**Figure 1: Prevalence of frenal attachment types among dental patients.**

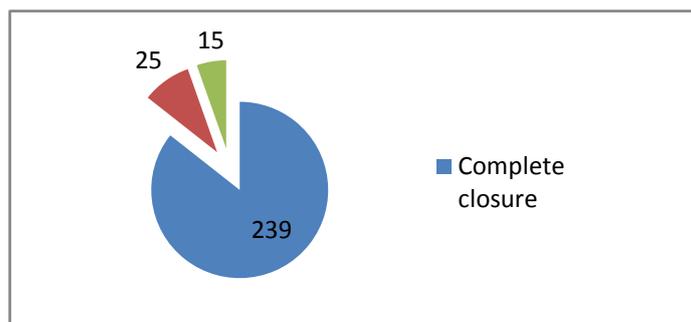


Figure 2: prevalence of maxillary midline diastemia among dental patients.

Table 1: Relation between age groups and frenal attachment types.

Age	Frenum				Chi square	P-value
	Mucosal	Gingival	Papillary	Papillary penetrating		
10-19	13 (4.66%)	104 (37.28%)	31 (11.11%)	5 (1.79%)	X <sup>2</sup> =9.354	P=0.0249 Significant (p<0.05)
20-30	22 (7.89%)	88 (31.54%)	15 (5.37%)	1 (0.36%)		
Total	35 (12.55%)	192 (68.82%)	46 (16.48)	6 (2.15%)		

Table 2: Relations between sex groups and frenal attachment types.

Sex	Frenum				Chi square	P-value
	Mucosal	Gingiva	Papillary	Papillary penetrating		
Male	14 (5.02%)	101 (36.2%)	15 (5.37%)	2 (0.72%)	X <sup>2</sup> =7.368	P=0.0611 N.S (p>0.05)
Female	21 (7.53%)	91 (32.62%)	31 (11.11%)	4 (1.43%)		
Total	35 (12.55%)	192 (68.82%)	46 (16.48)	6 (2.15%)		

Table 3: Relation between age groups and diastemia.

Age	Complete closure	Diastemia	Black hole	Chi square	P-value
10-19	128 (45.88%)	17 (6.09%)	8 (2.87%)	X <sup>2</sup> =1.921	P=0.3827 N.S* (p>0.05)
20-30	111 (39.78%)	8 (2.87%)	7 (2.51%)		
Total	239 (85.66%)	25 (8.96%)	15 (5.38%)		

Table 4: Relation between different sex groups and diastemia.

Gender	Complete closure	Diastemia	Black hole	Chi square	P-value
Male	114 (40.86%)	9 (3.23%)	9 (3.23%)	X <sup>2</sup> =2.266	P=0.3220 N.S (p>0.05)
Female	125 (44.8%)	16 (5.73%)	6 (2.15%)		
Total	239 (85.66%)	25 (8.96%)	15 (5.38%)		