**Original Research Article**

**Gingival recession in relation to mucogingival deformities and other predisposing factors affect females in lower esthetic zone**

Abstract  
**Background.**Gingival recession (GR) is one of the most common esthetic problems affecting the middle and older aged peoples. GR can lead to many clinical problems as root caries, hypersensitivity, erosions, abrasions, plaque retention and aesthetic dissatisfaction. This study aimedto evaluate the prevalence of gingival recession in relation to mucogingival deformities in lower esthetic zone. **Methods:** A cross-sectional study was done on a sample of 290 females. The participants were interviewed for personal habits and examined for intraoral  
distribution of gingival recession and its various predisposing factors.   
**Results.** The prevalence of gingival recession in lower anterior teeth was 234, 80.69 %.Around half of the participants had Millers' class I GR (n=146, 49%), thin gingival phenotype (n=168, 56.9 %), mucosal and gingival labial frenum attachment(n=132, 44.7%, n=148, 50.2%). Most of the participants had a sufficient attached gingiva (n=246, 83.4%) and normal vestibular depth(n=278, 94.2%). GR were statistically significant with vestibular depth, gingival biotype and attached gingiva (P≤0.05).

**Conclusion.** The prevalence of gingival recession in lower aesthetics zone was high in females especially Miller class I gingival recession due to thin gingival phenotypes. Most of Yemeni females have adequate attached gingiva, normal vestibular depth with a frequent mucosallabial frenum in lower anterior teeth.

**Keywords.** Gingival recession,esthetic and mucogingival deformities.

* **Introduction**

Gingival recession (GR) is one of the most common esthetic problems affecting the middle and older aged peoples [1]. GR can lead to many clinical problems as root caries, hypersensitivity, erosions, abrasions, plaque retention and aesthetic dissatisfaction [2]. GR may be localized or generalized [3,4]. There are many classifications of GR; however, Miller’s classification (1985) is still the most widely used until now [5]. Plaque, calculus, poor and inadequate tooth brushing, iatrogenic factors (such as orthodontic, or prosthetic treatment)and anatomical factors or muco-gingival deformities are the most etiological factors of GR [6,7].

Armitage’s in 1999 classified the mucogingival deformities as developmental or acquired and conditional deformities [8]. Recently in 2018, mucogingival deformities were classified as: gingival/soft tissue recession, lack of keratinized gingiva, decreased vestibular depth, aberrant frenum/muscle position, gingival excess and abnormal gingival color [9]. Sufficient attached gingiva is important to maintain gingival health in patients with poor oral hygiene. Many studies mentioned the importance of keratinized tissue and attached gingivain maintaining periodontal health with optimal plaque control [10-14].

Gingival biotype or phenotype was classified into thin and thick phenotype [11]. Thin gingival biotypewas most prominent in females when compared to males [12].Gingiva of anterior teeth are at greater risk of recession especially when it has a thin periodontal phenotype and less or absence of attached gingiva [13]. Gingival phenotype could be evaluated by many methods invasive and noninvasive. These methods includevisual evaluation, needlesinjection, transgingival probing, histological sections, cephalometric radiographs, probe transparency, ultrasonic devices, and CBCT [14].

GR is an issue that has its clinical importance in dental field. A number of studies all over the world had evaluated the prevalence and predisposing factors of GR [12,13,15,16,17,18]. There are several factors that play role in gingival recession as age, plaque, tobacco consumption, trauma from occlusion, calculus, tooth brushing, high frenal attachment, tooth position, tooth movement by orthodontic forces, improper designed partial denture, restorations [13,16,19,20]. Several studies showed different sites of GR with increase in the lower incisors area [12,15,17,19].

Early detection and diagnosisof GR prevent tooth loss in future. Prevention of tooth loss depends mainly on periodic survey of the prevalence and risk factors that  
contribute to the GR. Up to our knowledge, there is no study showed the GR prevalence and its predisposing factors in lower esthetic zone in Yemeni females which is important for esthetic and health. Hence, this study aims to evaluate the prevalence of gingival recession in relation to mucogingival deformities in lower esthetic zone and its predisposing factors in Yemeni females.

* **Methods**

**Study subjects**. A cross sectional study was done on patients attended the department of Oral Medicine, Oral Diagnosis and Periodontology, Faculty of Dentistry, Sana’a University. A study was conducted over a period of two years (March 2017-March 2019).

**Sample size.** The sample size for this study was estimated by using G\*power 3.1.2.9 program with 0.3 effect size and 95% power gave a sample of 290 females in the age group between 17 and 60 years.

**Data collection**. The study was designed following STROBE guidelines and conducted in adherence to Declaration of Helsinki. The study protocol was approved by the Ethical Committee of the Faculty of Medicine and Health Sciences, Sana a University, Yemen. The study was explained to the patients and informed consents were obtained. Inclusion criteria include all females aged from 17-60 year-old attended to Dental Teaching Clinic, Sana’a University. While exclusion criteria include females who had fixed or partial prostheses and/or orthodontic appliance which could be causative factors for GR.

A single calibrated examiner [HS] filled the questionnaire of demographic data by interviewing the participants. This questionnaire includes the following data: age, level of education, smoking habit, khat chewing habit, oral hygiene practices, medical and dental history. All females were clinically examined under adequate illumination using front surface mouth mirror, curved sharp sickle explorer (standard explorer), and William's graduated periodontal probe. Measuring gingival recessions (the distance of recession is measured from the cemento-enamel junction to gingival margin) on the labial, mesial, distal and lingual surfaces of lower anterior teeth as well as measuring gingival recession according to the Miller’s classification of marginal tissue recession [21]. In addition, gingival index, plaque index and pocket depth were evaluated in order to determine the diagnosis of periodontal diseases according to the periodontal diseases classification in 1999 [22]. Tension and rolling test was used to confirm the adequacy of the attached gingiva width.

Gingival phenotypes were assessed on the basis of visual method by showing probe transparency and transgingival probing method with no.15 K-file at three points i.e. mesial, mid-facial and distal. The mucosal surface was pierced at a 90º angle with slight pressure until hard tissue was reached. A gingival thickness of >1.5 mm is defined as thick biotype and a  
gingival thickness of <1.5 mm as thin biotype. Position of lower labial frenum (mucosal or gingival or papillary, papillary penetrating), and vestibular depth (normal or shallow)were recorded [16]. Kappa scores higher than 0.9 were attained for intra-examine calibration exercises for identifying periodontal clinical parameters.

**Statistical analysis**. Data analysis was performed for the collected data by using Chi-square test and Phi and Cramer's V Coefficient. Data were entered and analyzed using SPSS Statistics version 22.0, IBM United States Software.

* **Results**

The overall study sample was 290 female patients. Most of the sample have GR in the lower anterior teeth (n=234, 80.69 %), while the rest of participants were GR free patients (n=56, 19.31%). About half of the participants (n=160, 55.0%) were at the age group of 20 -35 year-old. Regular tooth brushing was reported by most of the study sample (n=202, 68.5%). A high percentage of the study sample were non-smoker and non-khat chewer and free from systemic diseases (n=254,86.1%, n=180, 61.0 %, n=261,88.5 %, respectively). Characteristics of the study sample is shown in table 1.

Millers' class I GR was founded in about half of the sample (n=146, 49%), the second most prevalent type of recession was Millers' class III (n=60, 20.3%). Thin gingival phenotype was founded in about half of participants (n=168, 56.9%). Most of the participants had a sufficient attached gingiva (n=246, 83.4%). Characteristics of mucogingival area is shown in table 2.

Majority of teeth had a gingival and mucosal lower labial frenum attachment. Most of the teeth has normal vestibular depth, thin gingival biotype and sufficient attached gingiva as shown in table 3.

GR were statistically significant with vestibular depth, gingival biotype and attached gingiva (P≤0.05). However, GR was not statistically significant with lower labial frenumattachemnt. Relationship between GR and gingival soft tissue is described in table 4.

* **Discussion**

GR can be localized or generalized and can be  
associated with one or more surfaces [1]. Mandibular anterior teeth are more affected by GR than maxillaryanterior teeth as observed in previous investigations [13]. The larger occurrence of GR in the mandibular teeth is probably related to the characteristics of the keratinized mucosa, which is wider and thicker in the maxilla than in the mandible, this strong correlation has been observed between the quantity and quality of gingival tissue and GR [12]. The concept of multiple predisposing factors in the etiology of the GR was supported by parallel longitudinal studies [23].

The early diagnosis of the etiological factors of GR may help in prevention and treatment needs. For this reason, this study aims to evaluate the prevalence and predisposing factors of GR in lower esthetic zone in Yemeni females. In this study, it was found that the prevalence of GR in the study was 80.69%, and these findings are consistent with the previous studies   
Checchi et al. and Albandar et al. [24, 26]. Most of GR was Millers' class I GR which was founded in about half of the sample (n=146, 49%), the second most prevalent type of recession was Millers' class III (n=60, 20.3%) similar to Myrthi et al. 2015 [15] in contrast to Sarfati et al. 2010 study, who founds that the majority of cases has Miller’s class I, II [16].

GR is not much common in young adults although its frequency increases with age. In this study, most affected females (n=160, 55.0%) were at the age group of 20 -35 year-old, and these findings are consistent with the previous studies Albandar et al. and Ravipudi et al. [26, 27]. Most of them were regular tooth brushing (n=202, 68.5%) and non-smoker and non-khat chewer (n=254, 86.1%, n=180, 61.0 %; respectively). In the present study, about half of the cases (n=168, 56.9%) had thin gingival phenotype at all teeth examined, whereas the majority of the cases (n=246, 83.4%) had a sufficient attached gingival width. There is a significant (*P*< 0.05)  
association between the adequacy of the attached gingiva and GR which was similar to the findings of Wennström et al.[28]. In contrary, Stoner and Mazdyasna [29] and Nguyen-Hieu et al. [30] proposed that lack of an adequate zone of attached gingiva result in increased incidence of GR so it is supposed that the thin gingival biotype of Yemeni participants is the strongest risk factor for GR in lower aesthetics zone.

Majority of teeth had gingival and mucosal lower labial frenum attachment and most of the teeth has normal vestibular depth, thin gingival biotype and sufficient attached gingiva. GR may be related to different etiologic factors that were not reported in this study as prominent roots, thin labial alveolar bone, malpositioning of teeth, and trauma form brushing  
[31, 27]. There is a non significant association between type of frenal attachment and prevalence of GR (*P*< 0.05) which is opposite to studies conducted by Toker and Ozdemir [32] and Mathur*et al*. [33]. However, this is similar to studies conducted by Tenenbaum [35] and Nguyen-Hieu *et al*. [36] who proposed that GR is not associated with the high frenal attachment. This is could be because of low number of papillary lower labial frenum.

* **Conclusion**  
  The results of this study showed the high prevalence of gingival  
  recession in lower esthetics zone especially Miller class I gingival recession due to thin gingival phenotypes. Most of Yemeni females have adequate attached gingiva, normal vestibular depth and mucosal and gingival labial frenum attachment.

•**Acknowledgements.** The authors thank all dental staff at Sana`a university for facilitating the examination process of the patients, and the dental patients for their participation in the study.

•**Conflict of Interest**. The authors declare that they have no conflict of interest.

•**Authors' contributions.** A.M.M conceived the ideas; A.M. and A.B led the writing ; S.H. collected the data and A.M analysed the data. All Authors read and approved the manuscript.

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Table 1. Frequency of associated factors with GR

|  |  |  |  |
| --- | --- | --- | --- |
| Variables | | Frequency | % |
| Age | < 20 years | 24 | 8.2% |
| 20-35 years | 160 | 55.0% |
| 35-50 | 100 | 34.4% |
| >50 | 6 | 2.1% |
| Frequency of tooth brushing | Regular | 202 | 68.5% |
| Irregular | 88 | 29.8% |
| Smoking | Yes | 36 | 12.2% |
| No | 254 | 86.1% |
| Khat chewing | Yes | 110 | 37.3% |
| No | 180 | 61.0% |
| Systemic disease | None | 261 | 88.5% |
| Diabetes mellitus | 6 | 2.0% |
| Hypertension | 16 | 5.4% |
| Hypertension and Diabetic | 7 | 2.4% |

Table 2. Characteristics of mucogingival area

|  |  |  |  |
| --- | --- | --- | --- |
| Variables | | Frequency | % |
| Gingival recession by Miller | 0 | 66 | 22.4% |
| Class I | 146 | 49.5% |
| Class II | 15 | 5.1% |
| Class III | 60 | 20.3% |
| Class IV | 3 | 1.0% |
| Lower labial frenum attachment | Mucosal | 132 | 44.7% |
| Gingival | 148 | 50.2% |
| Papillary | 10 | 3.4% |
| Vestibular depth | Shallow | 12 | 4.1% |
| Normal | 278 | 94.2% |
| Gingival phenotype | Thick | 122 | 41.4% |
| Thin | 168 | 56.9% |
| Attached gingiva (mm) | Sufficient | 246 | 83.4% |
| Insufficient | 44 | 14.9% |

Table 3. Distribution of gingival soft tissue characteristics according to the tooth type

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Gingival soft tissue characteristics | | TOOTH | | | | | | | | | | | |
| Right central | | Left central | | Right lateral | | left lateral | | Right canine | | left canine | |
| F | % | F | % | F | % | F | % | F | % | F | % |
| Lower labial frenum attachment | Mucosal | 22 | 45.8% | 22 | 45.8% | 22 | 45.8% | 22 | 44.9% | 22 | 45.8% | 22 | 44.9% |
| Gingival | 25 | 52.1% | 25 | 52.1% | 24 | 50.0% | 25 | 51.0% | 24 | 50.0% | 25 | 51.0% |
| Papillary | 1 | 2.1% | 1 | 2.1% | 2 | 4.2% | 2 | 4.1% | 2 | 4.2% | 2 | 4.1% |
| Papillary penetrating | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Vestibular depth | Shallow | 2 | 4.2% | 2 | 4.2% | 2 | 4.2% | 2 | 4.1% | 2 | 4.2% | 2 | 4.1% |
| Normal | 46 | 95.8% | 46 | 95.8% | 46 | 95.8% | 47 | 95.9% | 46 | 95.8% | 47 | 95.9% |
| Gingival biotype | Thick | 20 | 41.7% | 20 | 41.7% | 20 | 41.7% | 21 | 42.9% | 20 | 41.7% | 21 | 42.9% |
| Thin | 28 | 58.3% | 28 | 58.3% | 28 | 58.3% | 28 | 57.1% | 28 | 58.3% | 28 | 57.1% |
| Attached gingiva (mm) | Sufficient | 36 | 75.0% | 41 | 85.4% | 42 | 87.5% | 45 | 91.8% | 42 | 87.5% | 40 | 81.6% |
| Insufficient | 12 | 25.0% | 7 | 14.6% | 6 | 12.5% | 4 | 8.2% | 6 | 12.5% | 9 | 18.4% |

Table 4. Relationship between GR and gingival soft tissue

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Gingival soft tissue characteristics | | Gingival recession | | | | P – value |
| Yes | | No | |
| F | % | F | % |
| Vestibular depth | Positive | 0 | 0.0% | 12 | 100.0% | .011 |
| Negative | 99 | 35.6% | 179 | 64.4% |
| Gingival biotype | Thick | 50 | 41.0% | 72 | 59.0% | .036 |
| Thin | 49 | 29.2% | 119 | 70.8% |
| Attached gingiva (mm) | Sufficient | 96 | 39.0% | 150 | 61.0% | 0.00 |
| Insufficient | 3 | 6.8% | 41 | 93.2% |
| Lower labial frenum attachment | Mucosal | 48 | 36.4% | 84 | 63.6% | .756 |
| Gingival | 48 | 32.4% | 100 | 67.6% |
| Papillary | 3 | 30.0% | 7 | 70.0% |
| Papillary penetrating | 0 | 0.0% | 0 | 0.0% |