H Toker
H Ozdemir

Gingival recession: epidemiology and risk indicators in a university dental hospital in Turkey

Authors' affiliations:
Hulya Toker, *Hakan Ozdemir*, Department of Periodontology, Cumhuriyet University Faculty of Dentistry, Sivas, Turkey

Correspondence to:
Hulya Toker
Department of Periodontology
Cumhuriyet University Faculty of Dentistry
Sivas 58140, Turkey
Tel.: +346 2191010
Fax: +346 2191237
E-mail: hcakmak@cumhuriyet.edu.tr; tokerhulya@gmail.com
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Abstract: *Objective:* Gingival recession is a common manifestation of periodontal disease, but is also associated with several risk factors. In this study, we investigated prevalence of gingival recession and assessed various risk indicators in a university dental hospital in Turkey. *Materials and methods:* The study group consisted of 831 persons (537 females, 294 males). Gingival recession, dental plaque, calculus, tobacco consumption, toothbrushing frequency, traumatic toothbrushing and high frenum were assessed. Gingival recession scored as present whenever the free gingival margin was apical to the cemento-enamel junction and root surface was exposed. *Results:* Overall, the prevalence of gingival recession was 78.2%. The gingival recession for buccal surfaces measured approximately between 1 and 2 mm was 17.4%. The number of gingival recession site of male subjects was significantly higher than that of the female ones ($P < 0.05$). The dental calculus and plaque levels of mandibular teeth were significantly higher than those of the maxillary teeth ($P < 0.05$). The multiple regression analyses showed that age, smoking duration, traumatic toothbrushing and high frenum are significant contributors to gingival recession. *Conclusions:* Periodontal condition is very high in this population. High level of gingival recession in this population is significantly associated with a high level of dental plaque and calculus, male gender, smoking duration, toothbrushing frequency, traumatic toothbrushing and high frenum.

Key words: risk indicators; toothbrushing

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Introduction

Gingival recession is characterized by the displacement of the gingival margin apically from the cemento-enamel junction (CEJ) (1). In affected persons, recession can cause pain and increased sensitivity of teeth, compromise aesthetics and may lead to root caries (2). A variety of aetiological factors is thought to cause recession of the gingival: oral hygiene habits, tooth malpositioning, high frenum or muscle attachments, and iatrogenic factors related to various restorative and periodontal procedures (3–6). However, the main aetiological factor is the accumulation of dental plaque biofilm with the resulting inflammatory periodontal diseases (3–5).

Although many dental conditions pass by patients unnoticed, gingival recession can often be visible dental change that is noted by patients and which may cause them to seek advice of a dentist (6). The prevalence of this condition is high, but in some patients, recession may be sign of periodontal disease. Therefore, prevention and control of gingival recession is based on an accurate survey of the prevalence of the condition in relation to the risk factors that contribute to its development (7).

A number of studies have been carried out on the prevalence and occurrence of gingival recession among different populations (2, 3, 5, 8). A prevalence of 90% has been reported in older institutionalized subjects (9) and of 58% in a US study (3). In Germany, gingival recession occurred in 76–87% of middle-aged subjects (10). Those findings corroborated by Murray (11) and Khocht *et al.* (12), found that the presence and extent of gingival recession increased with age. In a study of 164 subjects of whom 78% had gingival recession, concluded that malpositioned teeth, and vigorous oral hygiene were its most frequent causes (13). However, representative information about the occurrence and risk factors of gingival recession in Turkish populations is not found. However, there is evidence that periodontal diseases are prevalent in Turkish populations (14, 15). Furthermore in a study that was investigated to the oral health behaviour of Turkish university students, they found that self-preventive oral behaviour of the Turkish university student is at lower than in industrialized countries (16). Therefore, the aim of the present study was to estimate the prevalence of gingival recession and to assess the association of potential risk indicators with the occurrence of gingival recession in Turkish population.

Materials and methods

Study population

This study was carried out at our Periodontology Clinic. We evaluated patients referred for periodontal treatment and preventive care from June to October 2005, consecutively. Exclusion criteria were as follows: present and past history of medical conditions that may pose a health risk to the patient, edentulous individuals and individuals with extensive tooth restoration or prostheses. The sample size, with ±3% deviation, was determined to be 895 individuals with 95% confidence interval and with the assumption of a 70% maximum prevalence of gingival recession. Of 895 patients, 831 (537 women and 294 men) aged between 15 and 68 years (mean 32.2 ± 11.7 years) were completed the study, and others were excluded. Informed consent was obtained from all the patients and the study protocol was approved by the Human Ethics Committee of Cumhuriyet University Faculty of Dentistry.

Study design

A descriptive questionnaire was prepared for the examinations. The questionnaire included questions concerning age, socio-economic level, systemic and oral health status, smoking habits. The examiner collected information related to the toothbrush type and toothbrushing technique and frequency of each patient. Toothbrushing frequency of the patients was scored as follows: 1, less than once a day; 2, once a day and 3, twice a day or more. After the questionnaire had been completed, each patient received a full mouth examination for assessing gingival recession, plaque and calculus, high frenum, and traumatic toothbrushing.

The distance from the CEJ to the free gingival margin (FGM) was assessed in millimetres using the Williams probe and was rounded to the lowest whole millimetres. Gingival recession was defined as the CEJ/FGM distance when the gingival margin was located on the root. It was assessed at six sites per tooth, the mesiobuccal, midbuccal, distobuccal, distolingual, midlingual and mesiolingual surfaces for all teeth excluding third molars. Total number of gingival recession sites (NGRS) was recorded for each patient. Furthermore, gingival recession of the patients was scored as follows: 1, 1–2 mm; 2, 3–4 mm; and 3, 5 mm or more for buccal sites.

The plaque index (17) was used to determine the amount of plaque on the tooth surface. Calculus were measured the oral hygiene index (18): 0, no calculus; 1, up to a third of the tooth surface; 2, one-third to two-thirds of the tooth surface; 3, more

than two-thirds of the surface or a continuous band around the tooth. All examinations were performed by trained examiner (HT), and an assistant recorded data on prepared record sheets.

Analysis of data

Prevalence was defined as the percentage of individuals having at least one surface of a tooth with the condition for the study population. ANOVA with *post hoc* Tukey test were used for the analyses of NGRS, gingival recession score, and dental calculus and plaque. Relationship between the number of natural teeth and NGRS was analysed with Spearman correlation test. Multiple regression analyses were adopted to calculate the influence of independent variables (age, smoking, traumatic toothbrushing and high frenum) on NGRS. A P-value < 0.05 was considered significant.

Results

The demographic data for the female and male subjects are summarized in Table 1. Overall, the prevalence of gingival recession was 78.2% in the study population. In the female and male subjects, it was 76% and 82% respectively. The prevalence of gingival recession in the male participants was significantly higher than that in the female ones ($P < 0.05$). While overall, the natural teeth number of the participants was 25.3 ± 3.8, in participants with the gingival recession, it was 24.8 ± 4.1. There was negative moderate correlation ($r = -0.4$, $P < 0.05$) between the number of natural teeth and NGRS.

The gingival recession of mandibular teeth was significantly higher than that of the maxillary teeth ($P < 0.05$). The gingival recession of mandibular central and lateral incisors and right canine tooth was significantly higher than those of the maxillary ones ($P < 0.05$).

Figure 1 presents the NGRS of buccal, lingual, mesial and distal sites of the female and male subjects. Overall, the NGRS of male subjects was significantly higher than that of the female ones ($P < 0.05$). In the female subjects, the NGRS at buccal site was significantly higher than those of all the other sites ($P < 0.05$); the NGRS at lingual sites was significantly higher than mesial and distal sites ($P < 0.05$); and the NGRS at mesial sites was significantly higher than distal sites ($P < 0.05$). In the male subjects, the NGRS at buccal site was significantly higher than those of all the other sites ($P < 0.05$); and the NGRS at lingual sites was significantly higher than mesial and distal sites ($P < 0.05$).

Figure 2 presents ratio of 1–2, 3–4 and 5 mm or more gingival recession scores for buccal surfaces of the female and male participants. In this population, 17.4%, 0.8% and 0.2% of the gingival recession for buccal sites was measured between 1–2, 3–4 and 5 mm or more respectively.

Overall, the prevalence of total calculus was 74.4% in the study population. The presence of calculus was significantly higher (80% versus 70.8%) in the male participants compared with female ones ($P < 0.05$). The dental calculus and plaque levels of mandibular teeth were significantly higher than those of the maxillary teeth ($P < 0.05$). The dental calculus level of mandibular central and lateral incisors and right canine tooth were significantly higher than those of the maxillary ones ($P < 0.05$) (Fig. 3). The dental plaque level of mandibular central and lateral incisors were significantly higher than those of the maxillary ones ($P < 0.05$) (Fig. 4).

Table 1. **Descriptive and characteristics for male and female subjects**

	Male (n = 294)	Female(n = 537)
Age (mean ± SD)	33.2 ± 11.9	31.9 ± 11.5
Smoking %	43.2	19.4
Medical status n (%)		
Hypertension	10 (3.4)	32 (6)
Diabetes mellitus	10 (3.4)	14 (2.6)
Other disorders	30 (10.2)	87 (16.2)
Systemic healthy	244 (83)	404 (75.2)
Economic status n (%)		
Low	65 (22.1)	123 (22.9)
Medium	182 (61.9)	351 (65.4)
High	47 (16)	63 (11.7)
Education n (%)		
< High school	12 (35)	82 (15)
High school	69 (203)	332 (62)
> High school	19 (56)	123 (23)

Values are mean ± standard deviations or % of subjects.

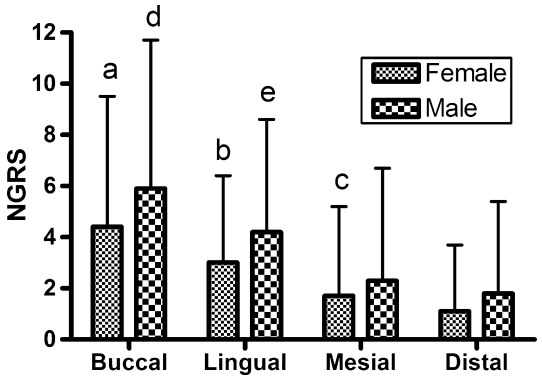

Fig. 1. Number of gingival recession sites (NGRS) score of the buccal, lingual, mesial and distal sites of female and male subjects. Data were expressed as mean ± SD. [a]$P < 0.05$ versus lingual, mesial and distal of female. [b]$P < 0.05$ versus mesial and distal of female. [c]$P < 0.05$ versus distal of female. [d]$P < 0.05$ versus lingual, mesial and distal of male. [e]$P < 0.05$ versus mesial, and distal of male.

Fig. 2. Percentage of the gingival recession score for buccal sites by gender.

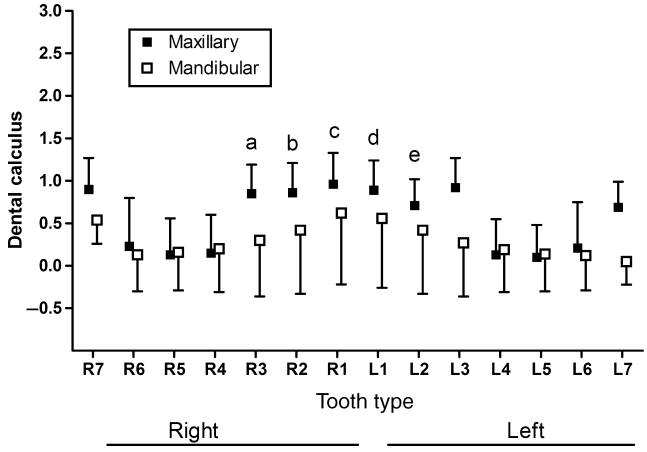

Fig. 3. Score of dental calculus of maxillary and mandibular teeth of the study population. Data are expressed as mean ± SE. R1 and L1: central incisor; R2 and L2: lateral incisor; R3 and L3: canine; R4 and L4 first premolar; R5 and L5 second premolar; R6 and L6: first molar; R7 and L7 second molar. [a]$P < 0.05$ versus R3 of mandibular. [b]$P < 0.05$ versus R2 of mandibular. [c]$P < 0.05$ versus R1 of mandibular. [d]$P < 0.05$ versus L1 of mandibular. [e]$P < 0.05$ versus L1 of mandibular.

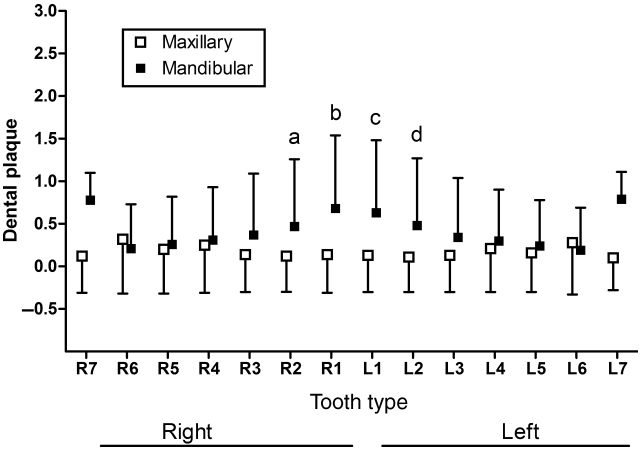

Fig. 4. Score of dental plaque of maxillary and mandibular teeth of the study population. Data are expressed as mean ± SE. R1 and L1: central incisor; R2 and L2: lateral incisor; R3 and L3: canine; R4 and L4 first premolar; R5 and L5 second premolar; R6 and L6: first molar; R7 and L7 second molar. [a]$P < 0.05$ versus R2 of maxillary. [b]$P < 0.05$ versus R1 of maxillary. [c]$P < 0.05$ versus L1 of maxillary. [d]$P < 0.05$ versus L2 of maxillary.

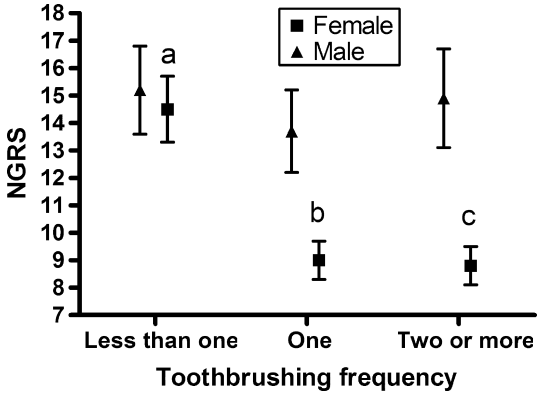

Fig. 5. The number of gingival recession sites (NGRS) with respect of toothbrushing frequency and gender of the study population. Data are expressed as mean ± SE. [a]$P < 0.05$ versus one and two or more of female. [b]$P < 0.05$ versus one of male. [c]$P < 0.05$ versus two or more of male.

The NGRS were significantly lower in the female participants with the toothbrushing frequency of one and two or more than that of female participants with the toothbrushing frequency of <1 ($P < 0.05$) (Fig. 5). There was no significant differences in NGRS among the male participants with the toothbrushing frequency of less than one, one, and two or more ($P > 0.05$). The NGRS of the female participant with the toothbrushing frequency of one and two or more were significantly lower than that of the male participants with the toothbrushing frequency of one and two or more respectively ($P < 0.05$).

The traumatic toothbrushing was 10% for all the study population. The NGRS of the female and male participants with the traumatic toothbrushing were significantly higher than those of the female and male ones with no toothbrushing, respectively (13.6 ± 8.7 versus 9.9 ± 12.3, 16.7 ± 9.7 versus 14.3 ± 17.4 respectively) ($P < 0.05$).

In this study, the prevalence of high frenum was 14.2% for all the study population. In a patient with the high frenum, the gingival recession at the site of high frenum was 4.2%. The NGRS of the male participants with the high frenum were significantly higher than that of the female ones ($P < 0.05$). The NGRS of the female participant with the high frenum were significantly higher than that of the female ones

Table 2. **Multiple regression of the NGRS, with age, high frenum, traumatic toothbrushing, smoking duration of 831 subjects**

Variable	Regression coefficient	*P*-value
Age	0.585	<0.001
High frenum	−1.611	0.015
Traumatic toothbrushing	3.487	0.010
Smoking	0.135	0.026

NGRS, number of gingival recession sites.

without high frenum ($P < 0.05$). The NGRS of the male participants with or without high frenum were similar ($P > 0.05$).

Results from multiple regression analyses are shown in Table 2. The model used the NGRS as an outcome variable. Age, high frenum, traumatic toothbrushing and smoking duration are significant contributors to gingival recession with the age being stronger.

Discussion

The results of this investigation indicate that gingival recession is a common condition in this population with a prevalence of 78% and that male subjects had more gingival recession than female subjects ones. The prevalence of gingival recession increases with age, and most of this gingival recession for buccal surfaces was between 1 and 2 mm. In general, these findings tend to confirm the results of previous cross-sectional studies of populations among whom the occurrence of gingival recession was commonplace. By age 22 years, gingival recession occurred in approximately 65% of Norwegian and Sri Lankas groups. By 30 years of age, more than 75% of the Norwegians and 90% of the Sri Lankans exhibited one or more sites with gingival recession and at these ages, only 16% and 22% of buccal surfaces showed recession between 1 and 2 mm respectively (5). However, in a US study prevalence of gingival recession of 1 mm or greater was 58% for persons between 30 and 90 years of age (2).

Mandibular teeth had more surfaces with recession than did maxillary ones. The tooth profiles suggest that as lower central and lateral incisors and canines have high recession, the recession on teeth may be mainly attributed to high debris and calculus score. This is in agreement with findings in American subjects of a similar age group (2). However, in a UK study of 92 subjects aged 25–70 years (mean 35 years) recession occurred most frequently on upper canine and first premolar teeth and lower canine, first premolar and incisor teeth in a group of patients suffering from dentine hypersensitivity (19). Furthermore, a study of young adults (19–25 years) showed premolar teeth to have the highest number of receded surfaces (7).

From the viewpoint of the public health, adequate oral hygiene is still the most important way to prevent periodontal disease and to control the progression of the disease. The prevalence of calculus in a population is a fairly good measure of the oral hygiene level and is an important risk factor for occurrence and progression of attachment loss. It is evident that the prevalence of calculus is much higher in most developing countries than industrialized countries (20). In addition, roughly 75% of our population also experience dental calculus, and dental calculus distribution closely followed the dental plaque distribution. In accordance with our findings Kulak-Ozkan *et al.* (21) evaluated the prevalence of dental caries, toothbrushing and periodontal status in 150 young participants in Istanbul, in Turkey and found that oral hygiene was insufficient in 72% of the participant and dental plaque dental calculus levels was higher in this subgroup. They concluded that was needed to co-operation between families, schools, communities and regulators in order to develop and implement comprehensive oral health promotion programmes.

The occurrence of gingival recession in female is negatively related to the frequency of toothbrushing, as was shown in Fig. 5. However, this study suggests that both traumatic toothbrushing and poor oral hygiene are associated with gingival recession. Presumably, traumatic toothbrushing influences gingival recession by mechanical action, whereas poor oral hygiene indirectly influences gingival recession, through increased periodontal disease. These results support the speculation in the paper by Löe *et al.* (5), which refers to two possible types of recession associated with good and poor oral hygiene.

High frenal attachment may be either impeding access for plaque removal or potentially, though rarely, by causing direct pull on the marginal gingival (6). Stoner and Mazdyasna (22) have found correlation between high frenum and gingival recession, whereas Powell and McEniery (23) did not find any association. In this study, we also found a correlation between high frenum and gingival recession and this correlation was evident in male participants.

The cross-sectional design of the present study does not permit an unequivocal inference about the causal relationship between the studied risk indicators and gingival recession. However, it may be concluded that the observed high level of gingival recession in this population is significantly associated with a high level of dental plaque and calculus, male gender, smoking duration, toothbrushing frequency, traumatic toothbrushing and high frenum.

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