

Prevalence and risk indicators of gingival recessions in Erbil city: a cross-sectional study

Dilven Abdulsamed Abdulhamed*
Hashim Dawood Mousa**

Abstract

Background and objectives: Gingival recession is the migration of the gingival margin toward the apex, causing root exposure. It may affect one (local) or a group of teeth (generalized), affects individuals in all ages. The prevalence of gingival recession is high worldwide. Gingival recession gives rise to numerous problems, like functional and aesthetic concerns to psychological problems. Objective of the study was to estimate prevalence of gingival recession and risk factors in Erbil province.

Methods: This cross sectional-study carried out on 989 patients that visited Khazad Teaching Center for oral health in Erbil city. All participants were evaluated by filling in questionnaires form with a clinical examination by single examiner.

Results: Among 989 participants, 70.4% were females and 29.6% were males with mean age of 34.86 ± 10.63 years. Gingival recession seen in about 93.6% of participants. Significant association was detected between educational level and age with gingival recession, but this was not consistent throughout the educational categories as it was (41.7%) in post-graduate, (12%) in college graduate, and (28.8%) in illiterate. No significant association was detected between gingival recession with gender and ethnic group ($p = 0.183$, and $p = 0.327$). The risk factors mostly associated with recession were plaque index, periodontal diseases, frenul pull, tooth position, age.

Conclusions: Almost all of the examined participants demonstrated gingival recession. Many significant risk factors (Poor oral hygiene, inflammation, trauma, anatomical, tooth malposition) are associated with the presence of gingival recession.

Key words: Calculus index, Educational level, Gingival index, Gingival recession, Plaque index.

Introduction

Gingival recession (GR) is the most common, undesirable clinical condition, characterized by the shifting of the periodontal tissue beyond the cement-enamel junction (CEJ), causing root exposure.¹ Gingival recession leads to complications such as hypersensitivity, root caries, erosion, abrasion, unaesthetic appearance (when affecting a tooth in the anterior region), anxiety and finally tooth loss due to continuous destruction of the tissue.¹⁻⁵ Although gingival recession happens in all ages, but its frequency increases with age.⁵ In most of the studies,

researchers have shown that gingival recession is of a very high frequency in older patients⁶. It is not considered as a disease, as it expresses a condition of periodontal tissue caused by clinical movement of the free gingival margin away from the crown leaving the root surface exposed to the oral environment.^{6,7} A cross-sectional epidemiological study of gingival recession showed that 88% of patients' ≥ 65 years of age and 50% of patients 18-64 years old are exhibiting one or more sites of gingival recession with at least 1mm of tissue loss.⁸ Prevalence of

*D.B.S, M.Sc. Candidate of KHCMS. Khazad training center for oral health (Erbil training center)

**B.D.S, M.Sc., Ph. D, Assist. Prof (Head of Department of Periodontology), College of Dentistry/University of Duhok

Corresponding author: Dilven Abdulsamed Abdulhamed Email: drdilvenabdulhamed@gmail.com

GR recorded worldwide with different results ranging from 15% to 100%,² for example, prevalence of GR in USA was 78%, where as in Oslo; 51% of the adults with GR were reported.¹ In Finland, 68% showed GR³ and the prevalence of GR was 39.7% in Sulaimaniya city – Iraq⁴. Gingival recession is multifactorial condition observed in both healthy periodontium and in destructive periodontal diseases. Armitage² described the GR which is present without periodontal disease. As developmental (acquired) deformities^{1, 2, 4, 5} known as anatomical factors like; thin gingival biotype, alveolar bone dehiscence, high muscle attachment, frenum pull. Moreover; most GR caused by inflammatory conditions e.g. existence of dental plaque and supra/sub gingival

Subjects and methods

This monocentric cross-sectional observational study where a convenient sampling research was conducted in Khanzad teaching center for oral health in Erbil city in January 2020 to January 2021. Sample size was estimated according to Sandhya J et al. (2015).⁸ Data from 989 systemically healthy adults was taken. 293 were males and 696 were females. They were 18-55 years old, with at least 20 teeth in the mouth. While patients with orthodontic appliances, teeth with restoration, smokers, participants who received scaling and root planning or periodontal treatment during the last 6 months,^{3rd} molar teeth and retained roots were excluded in the study. Institutional ethics committee at Kurdistan Higher Council of Medical Specialties approved the proposal of the study. A verbal and written informed consent was obtained from all the patients before participation in the study, one questionnaire form (biodata) filled in for each individual. The second part of the questionnaire included brushing habit (Frequency, duration, brushing technique, and brush type) and using oral hygiene aids (Flossing, using of mouth wash). Manual periodontal probe, Hu-

calculus, periodontal diseases. The traumatic factors that are responsible for the condition include Trauma from occlusion, vigorous oral hygiene habits.^{1-2, 5-7} Chrysanthopoulos indicated that educational level is highly associated with the occurrence of GR among Greek adults.^{1,6} Studies about prevalence of GR and its etiological factors are done all over the world, but only one study in Sulaimaniya city in Kurdistan region⁴ was done Thus, the aim of this study is to establish the prevalence of GR in Erbil city –Kurdistan region to give an insight to its occurrence and its risk factors. Hence to find active preventive program that may control the onset and/or progression of GR, consequently prohibiting its complications.

Friedy PCP-15 used to perform the clinical examination. Then teeth with recession identified, and four clinical parameters were assessed at tooth level, like Gingival recession depth it's the distance in millimeters from free gingival margin to the cement-enamel junction (CEJ), or to the CEJ of the adjacent tooth where it's covered by calculus or affected by abrasion. Teeth with recession divided into three buccal sites (distal, mid-buccal, mesial). Furthermore, gingival index [GI] by Löe and Silness (1963),⁶ Plaque index [PI] described by Löe and Silness (1967)⁷ and Calculus index [CI]⁹ were recorded. The degree of GR recorded based on Miller's classification (1985).⁹ Adjacent tooth used when CEJ of a recessed tooth destroyed by caries, or covered by calculus. Before starting of the study, a calibration session undertook on a six patients, by the author of the study and an experienced periodontologist also they achieve all the measurement of this study. Recession depth measured twice for a period of one week. In order to obtain inter-examiner and intra-examiner agreement comparison, the double measurements were utilized. The resulting

inter-examiner intra-class correlation coefficient was 0.802 (95% confidence intervals, 0.787–0.950). The intra-examiner intra-class correlation coefficients were 0.784 (95% confidence intervals, 0.583–0.858) for article author and 0.867 (95% confidence intervals, 0.654–0.855) for the experienced periodontologist. Additionally; position of tooth visualized in relation to maxillary or mandibular regular curve checked from the occlusal plane i.e. incorrectly positioned tooth. Position of the frenum recorded based on Placek et al. classification.¹⁰ Anatomical factor such as gingival biotype (width and thickness of attached gingiva) examined only in areas around the

recession, width of attached gingiva tested by tension test.^{3, 11, 12} Whereas its thickness checked by inserting endodontic file through the attached gingiva¹² after applying topical anesthesia. Right and left-handed individual's recorded.¹⁴ Trauma from occlusion examined by assessing mobility for the recessed tooth/teeth, fremitus test has been performed.¹⁵ All data were analyzed by IBM SPSS Statistics version 22. Descriptive statistics included mean and standard deviation for continuous variables. Frequencies and percentages for categorical variables were calculated. Chi square test and fisher's exact test were used to determine p value that set at 0.05.

Results

In this cross-sectional study, total 989 participants were examined with mean age of \pm SD was 34.86 ± 10.63 years. The prevalence of gingival recession by socio-demographic characteristics of the sample summarized in Table (1). Only 6.4% of the participants had no GR, while the rest demonstrated recession as follows: class I (23.1%), class II (49.4%), class III (9.5%), and class IV (11.6%). More than two thirds (70.4%) of the sample were females, with a male: female ratio of 0.42: 1. More than two thirds (68.1%) were Kurds, and

23.9% were Arabs. Around half of the sample (44.9%) were either illiterate or of primary education, and 31.1% were college graduates. The rate of severe recession was 30.6% among those aged 45-55 years, compared with 15.5% among those aged 18-24 years ($p < 0.001$). Significant association was detected between educational level and gingival recession ($p < 0.001$). The rate of severe recession was relatively high among the illiterate and primary school graduates (28.8%).

Table (1): The prevalence of gingival recession of the socio-demographic characteristics

	N	No recession No. (%)	Mild recession No. (%)	Severe recession No. (%)	p value*
Age (years)					
18-24	181	43 (23.7)	110 (60.8)	28 (15.5)	
25-34	339	12 (3.5)	265 (78.2)	62 (18.3)	
35-44	260	5 (1.9)	200 (76.9)	55 (21.2)	
45-55	209	3 (1.4)	142 (67.9)	64 (30.7)	< 0.001
Gender					
Male	293	23 (7.8)	217 (74.1)	53 (18.1)	
Female	696	40 (5.7)	500 (71.8)	156 (22.4)	0.183
Ethnic group					
Kurd	674	45 (6.7)	493 (73.1)	136 (20.2)	
Arab	236	14 (5.9)	173 (73.3)	49 (20.8)	0.327
Others	79				
Educational level					
Illiterate / primary	444	32 (7.2)	284 (64.0)	128 (28.8)	
Secondary/institute	225	16 (7.1)	170 (75.6)	39 (17.3)	

College	308	15 (4.9)	256 (83.1)	37 (12.0)	
Post-graduate	12	0 (0.0)	7 (58.3)	5 (41.7)	< 0.001
Total	989	63 (6.4)	717 (72.5)	209 (21.1)	

*By Chi square test.

Statistically significant association was detected between gingival recession and presence of periodontal disease ($p < 0.001$), frenul pull ($p < 0.001$), trauma

from occlusion ($p < 0.001$), and incorrectly positioned teeth ($p < 0.001$) as presented in Table (2).

Table (2): Prevalence of gingival recession in inflammation, trauma, and tooth position.

	N	No recession No. (%)	Mild recession No. (%)	Severe recession No. (%)	p value *
Periodontal disease					
No	435	58 (13.3)	301 (69.2)	76 (17.5)	
Yes	554	5 (0.9)	416 (75.1)	133 (24.0)	< 0.001
Frenum					
Normal	390	46 (11.8)	260 (66.7)	84 (21.5)	
Frenul pull	599	17 (2.8)	457 (76.3)	125 (20.9)	< 0.001
Trauma from occlusion					
No	533	49 (9.2)	342 (64.2)	142 (26.6)	
Yes	456	14 (3.1)	375 (82.2)	67 (14.7)	< 0.001
Tooth position					
Incorrectly positioned	377	19 (5.0)	253 (67.1)	105 (27.9)	
Correctly positioned	612	44 (7.2)	464 (75.8)	104 (17.0)	< 0.001
Total	989	63 (6.4)	717 (72.5)	209 (21.1)	

*By Chi square test.

Significant higher rates of recession were detected among those who brushes once daily than those who brushes more than once ($p < 0.001$). Also; for those who spend less than three minutes for brushing ($p < 0.001$). The rate of severe recession was high (34.9%) among those who had horizontal brushing technique compared with 14.4% of those using vertical brushing ($p < 0.001$). Regarding the type

of the brush, the rate of recession, in general, was higher among those using the hard bristled brush, but the rate of severe recession was high (41.1%) among those using the soft brush compared with 9.1% of those using the hard brush ($p < 0.001$). Significantly lower rates of recession were detected among those who use flossing ($p < 0.001$) as presented in Table (3).

Table (3): Prevalence of gingival recession by oral hygiene measures.

	N	No recession No. (%)	Mild recession No. (%)	Severe recession No. (%)	p value
Brushing					
Once/day	573	18 (3.1)	425 (74.2)	130 (22.7)	
More than once	416	45 (10.8)	292 (70.2)	79 (19.0)	< 0.001†
Duration of brushing (minutes)					
< 3	629	25 (4.0)	467 (74.2)	137 (21.8)	
≥ 3	360	38 (10.6)	250 (69.4)	72 (20.0)	< 0.001†
Brushing technique					
Horizontal brushing	324	37 (11.4)	174 (53.7)	113 (34.9)	
Vertical brushing	665	26 (3.9)	543 (81.7)	96 (14.4)	< 0.001†
Brushing type					

Hard	372	34 (9.1)	185 (49.8)	153 (41.1)	
Soft	617	29 (4.7)	532 (86.2)	56 (9.1)	< 0.001†
Flossing/mouth wash					
Floss only	34	10 (29.4)	20 (58.8)	4 (11.8)	
Mouth wash	41	4 (9.8)	34 (82.9)	3 (7.3)	
None	914	49 (5.4)	663 (72.5)	202 (22.1)	< 0.001*
Total	989	63 (6.4)	717 (72.5)	209 (21.1)	

*By Fisher's exact test. †By Chi square test.

It is evident in Table (4), that significant associations were detected between gingival recession with gingival index ($p =$

0.025), plaque index ($p < 0.001$), and calculus index ($p < 0.001$).

Table (4): Prevalence of recession by gingival, plaque, and calculus indices.

	N	No recession No. (%)	Mild recession No. (%)	Severe recession No. (%)	p value *
Gingival index					
1	438	40 (9.1)	312 (71.2)	86 (19.7)	
2	417	19 (4.5)	303 (72.7)	95 (22.8)	
3	134	4 (3.0)	102 (76.1)	28 (20.9)	0.025
Plaque index					
1	317	39 (12.3)	204 (64.4)	74 (23.3)	
2	574	21 (3.7)	441 (76.8)	112 (19.5)	
3	98	3 (3.0)	72 (73.5)	23 (23.5)	< 0.001
Calculus index					
1	671	58 (8.6)	439 (65.5)	174 (25.9)	
2	287	4 (1.4)	255 (88.9)	28 (9.7)	
3	31	1 (3.2)	23 (74.2)	7 (22.6)	< 0.001
Total	989	63 (6.4)	717 (72.5)	209 (21.1)	

*By Chi square test.

Discussion

The current study is designed to find out occurrence and possible etiological factors of GR among Erbil population in Kurdistan Region. The Study was included 989 participants of age (18-55) years old. Gingival recession is equivalent to 989 (93.6%) for all the examined participants in at least one tooth. Previous studies showed lower prevalence of (>50%) GR,^{1, 2, 4, 5, 9, 15-17} while the prevalence of GR in Sulaimani city was 249 (39.7%) out of 627 examined patients.⁴ The higher prevalence of the Gingival recession in this study compared with other studies partly because of higher prevalence of older participants in our study, since the GR is cumulative condition i.e. it is not resolved by itself and increased with aging, and partly because the samples were collected from local governmental clinical center, most

patients attending those centers are of poor socioeconomically status and have lower educational level. The non-statistically significant differences in the prevalence of GR between male and female in this study, compared to other studies which determined that GR was higher in males than females^{1, 4, 5, 9, 15-17} is due to the exclusion of smokers in the study as according to many studies smoking is associated with periodontal breakdown,^{15, 17} also the high prevalence of gingival recession in this sample study may be the cause that there was no statistically significant differences between genders. The relevance of at least one tooth with severe GR was 15.3% of (18-24) age group 30.7% of (45-55). There were statistically significant differences in prevalence of gingival recession and it is

severity among age groups with increasing age. This consistence with previous studies found that frequency of GR increases with age.^{7, 8} Many local and systemic factors affect the relationship of age with the occurrence and severity of gingival recession, such as exposure of a tooth to the factors that cause GR for longer period as well as accompanied by intrinsic changes in the periodontium which resulted in periodontal breakdown. On the other hand; the cumulative effects of the lesion itself. So; based on these information causes of GR in young adults is usually local rather than systemic, as the destruction of the periodontium progresses with time, so in older individuals the cause mostly is systemic² and the condition is more generalized. Studies by Chrysanthakopoulos,⁵ Kassab et⁹ and Dodwad¹⁵ have assessed the etiology of gingival recession to be multifactorial for instance incorrect tooth brushing, frenal pull, tooth malposition etc., with one type being associated with the other.¹¹⁻²¹ In this study, the most common factor associated with gingival recession was seen to be periodontal disease, plaque followed by malposed tooth, incorrect brushing technique and using hard bristled brush. Studies observed that dental plaque and calculus are important factors in GR,^{2, 7, 14} this study found significant association between each of dental plaque, and calculus with GR. Nevertheless; the role of

Conclusion

Gingival recession is a common multifactorial disease, as it has cumulative effect, the prevalence increased with aging. Almost 90% of the participants in Erbil population have GR in at least one tooth. In addition to age, plaque accumulation is one of the most important factors that associated with GR. Furthermore calculus, periodontal disease, tooth malposition, frenul pull, any type of

calculus is only retaining new plaque that remain in contact with gingiva as a result causing inflammation of the gingiva² Participants with periodontal diseases in this study had revealed significant association with GR. Periodontal disease showed to cause GR in many studies.^{16,17-21} Educational level is another factor causes GR, because of educated individuals have higher knowledge about preserving oral hygiene.^{15, 19} Therefore prevents plaque formation and accumulation. Educated individuals will follow dental checkup program¹⁵ so in this study; the group of (Illiterate/primary) showed high GR, while it is low among college/university group. On the other hand, each one of aberrant frenum, and incorrect position of the tooth revealed significant association with GR which is consistence with other studies.^{11, 12, 16, 17} This study showed that frequency, method and duration of brushing significantly associated with recession.¹⁸ As vigorous, hard bristled, and horizontal hard brushing for longer duration causes minor injury producing GR.¹⁷ In the present study many other factors that may have close relation to gingival recession recorded. Data of these factors not included in the study, due to the lengthy explanation and analyzing such as gingival biotype, participants dominant hand (right or left) with number and position of recessed tooth were not included in the study.

trauma (either from occlusion, or from brushing), and low educational level are potential risk factors to the occurrence of GR. The prevalence of GR is very high in this sample study, further study is required to determine other risk factors and providing a preventive programs to reduce its prevalence and decrease its complications.

Conflicts of interest

The author reports no conflicts of interest.

References

1. Patel M; Nixon P; Chan M. Gingival recession: part 1. Aetiology and non-surgical management. *Br Dent J.* 2011;211(6), 251–4.
2. Armitage GC. Development of a classification system for periodontal diseases and conditions. *Ann Periodontol.* 1999; 4:1-6.
3. Fageeh, HN; Meshni, AA; Jamal HA. Preethanath RS; Helboub E. The accuracy and reliability of digital measurements of gingival recession versus conventional methods. *BMC Oral Health.* 2019;19(1), 154–8.
4. Hamed AM, Zardawi FM, Karim SA. Prevalence, Extension and Severity of the Gingival Recession in an Adult Population Sample of Sulaimani city–Iraq. *Sulaimani Dent J.* 2015;2(1):31-7.
5. Chrysanthakopoulos NA. Gingival recession: prevalence and risk indicators among young Greek adults. *J Clin Exp Dent.* 2014; e243-9.
6. Löe H, Silness J. Periodontal disease in pregnancy. I. Prevalence and severity. *Acta Odontol Scand.* 1963; 21:533-51.
7. Löe H. The Gingival Index, the Plaque Index and the Retention Index Systems. *J Periodontol.* 1967; 38:610-6.
8. Sandhya Jain, Alpana Gupta, Deshraj Jain. Estimation of sample size in dental research. *Int Dent Med J Adv Res.* 2015; 1:1-6.
9. Kassab M, Moawia M.; Cohen, Robert E. The etiology and prevalence of gingival recession. *J Am Dent Assoc.* 2014; 134(2), 220–5.
10. Miller PD Jr. A classification of marginal tissue recession. *Int J Periodontics Restorative Dent.* 1985; 5:8–13.
11. Placek M, Miroslav S, Lubor M. et al., Significance of the labial frenum attachment in periodontal disease in man. Part I. Classification and epidemiology of the labial frenum attachment. *J. Periodontol.* 1974; 45:891-4.
12. Couso-Queiruga E, Tattan M, Ahmad U, Barwacz C, Gonzalez-Martin O, Avila-Ortiz G. Assessment of gingival thickness using digital file superimposition versus direct clinical measurements. *Clin Oral Investig.* 2021;25(4):2353–61.
13. Adnan T, Varol Ç, Yasin Ç, Turgut D. Evaluation of Gingival Recession in Left-and Right-Handed Adults. *Int J Neurosci.* 2001;110(3-4), 135–46.
14. Sarfati A, Burgeois D, Katsahian S, Mora F, Bouchard P. Risk assessment for buccal gingival recession defects in an adult population. *J Periodontol.* 2010;81:1419-25.
15. Dodwad V. Etiology and severity of gingival recession among young individuals in Belgaum district in India. *Ann Dent Univ Malaya* 20018:1-6.
16. Mythri S, Arunkumar SM, Hegde S, Rajesh SK, Munaz M, Ashwin D. Etiology and occurrence of gingival recession - An epidemiological study. *J Indian Soc Periodontol.* 2015;19: 671–5.
17. Seong J, Bartlett D, Newcombe RG, Claydon NC, Hellin N, West NX. Prevalence of gingival recession and study of associated related factors in young UK adults. *J Dent.* 2018; 81:1-10.
18. Rajapakse PS, McCracken GI, Gwynnett E, Steen ND, Guentsch A, Heasman PA. Does tooth brushing influence the development and progression of non-inflammatory gingival recession? A systematic review. *J Clin Periodontol.* 2007; 34(12):1046–61.
19. Matas F, Sentis J, Mendieta C. Ten-year longitudinal study of gingival recession in dentists. *J Clin Periodontol.* 2011; 38(12):1091–8.
20. Papapanou PN, Sanz M, Buduneli N et al. Periodontitis: consensus report of workgroup 2 of the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions. *J Periodontol.* 2018;(89)1: 173–82.
21. Palkovics D, Gera I. The significance of biotype in the predictability of dental-periodontal treatment. *Hungarian. Fogorv Sz.* 2016;109(2):45–55.