PREVALENCE OF GINGIVAL RECESSION AND ASSOCIATED FACTORS: A CROSS-SECTIONAL STUDY

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ABSTRACT

This cross-sectional study aimed to evaluate the prevalence of gingival recession (GR) in a sample of 50 patients treated at the Federal University of the Jequitinhonha and Mucuri Valleys (UFVJM), with a mean age of 38.1 years. GR, characterized by apical migration of gingival tissue and consequent exposure of the tooth root, was identified in 66% of the participants, with a higher occurrence observed in premolars (38.7%). A survey revealed a predominance of the thick periodontal phenotype (74.8%) and the Pini-Prato A- and Cairo Type I classifications, indicating superficial recessions and no loss of proximal attachment. Dentin hypersensitivity was identified in 36% of the cases, a percentage lower than expected, probably due to the smaller extent of the recessions. The results indicated that most participants brushed their teeth frequently (66% brushed their teeth three times a day), although there is evidence that inadequate habits may contribute to the development of GR. We also observed a female predominance (58%) and a high prevalence of individuals with income below one minimum wage (72%), indicating the possible influence of these sociodemographic factors on the occurrence of the condition.

Keywords: Gingival recession. Prevalence. Associated factors. Oral health.

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INTRODUCTION

The exposure of the tooth root characterizes gingival recession or gingival recession (GR) due to the loss of attachment, as the free gingival margin moves apically, potentially affecting the vestibular, lingual, and palatal surfaces, leading to pathological changes such as increased sensitivity and susceptibility to root caries (Cunha et al., 2019; Fernandes et al., 2016).

The pathogenesis mechanism of GR occurs through a localized inflammatory process (Susin, 2004). Its etiology is multifactorial, with various related factors that can act together. Among the conditions that can trigger the recession process are traumatic brushing (McCracken, 2009), bone anatomy (Maroso, 2015), labial frenulum attachment, tooth positioning, periodontal disease, local plaque retention factors, smoking, and orthodontic movement (Albandar & Kingman, 1999; Susin, 2004). Consequently, in addition to aesthetic changes, GR can lead to dental hypersensitivity and difficulty in hygiene, which in turn favor the development of carious lesions and periodontal diseases, and negatively impact individuals' quality of life (Wagner et al., 2016).

Studies indicate that the prevalence, extent, and severity of GR tend to increase gradually with age (Kassab & Cohen, 2003), suggesting the cumulative effect of a long period of exposure of the mucogingival complex to potential etiological agents of GR, associated with local and systemic physiological changes over the years (Mythri et al., 2015). Additionally, it is proven that men have higher levels of GR compared to women (Rios et al., 2014), and this incidence occurs in both developed and underdeveloped countries, affecting individuals with good or poor oral hygiene (Löe, Anerud, & Boysen, 1992). In Brazil, the prevalence of at least one site with GR ≥ 1 mm is 29.5% in young people aged 14 to 19 and 99% in adults over 40 (Susin et al., 2004).

Thus, GR is a common condition observed in dental practice, and it is common for patients to recognize it and seek professional guidance and treatment (Mythri et al., 2015; Nieri et al., 2013; Toker & Ozdemir, 2009). This knowledge is essential to guide preventive and treatments, influence public policies aimed at oral health, and ensure proper patient management. Therefore, the objective of this cross-sectional study was to identify the prevalence of gingival recession among patients treated at the Federal University of Jequitinhonha and Mucuri Valleys (UFVJM) and the associated factors.

METHODOLOGY

STUDY DESIGN

This was a cross-sectional study conducted at the Surgery and Periodontology Clinic of the Department of Dentistry at the Faculty of Biological and Health Sciences of UFVJM, developed from December 2023 to August 2024.

ETHICAL ASPECTS

The research was registered on the Brazil Platform, evaluated, and approved by the Research Ethics Committee (CEP) with Human Beings of UFVJM and received the CAAE number 76940024.4.0000.5108. Ethical aspects were observed based on national (Resolution 466/12) and international (Helsinki Declaration, 2013 version) legislation. Patients who were invited to participate in the research and met the inclusion criteria, after agreement, signed the Free and Informed Consent Term (TCLE) to freely decide on their participation. Data collection began only after consent. Illiterate participants or those who had difficulty reading the TCLE had the term read and explained by members of the research team.

POPULATION AND INCLUSION/EXCLUSION CRITERIA

Dentate patients treated at the UFVJM dental school clinic were invited to participate in the research, and recruitment was also advertised on social media. Participants were randomly selected, provided they met the inclusion criteria, which were individuals aged between 18 and 60 years, of both sexes, in good general and oral health who showed consent to participate. Exclusion criteria included patients who frequently used analgesics, anti-inflammatory drugs, and antidepressants, and those with gingival inflammation.

SAMPLE SIZE DETERMINATION

To determine the sample size, the expected prevalence of gingival recession was used. A statistical calculation was performed with a significance level of 95% and a margin of error set at 5%. A prevalence of 79.2% was obtained from the literature (Goergen et al., 2023), resulting in a minimum sample of 254 patients. The software used for the calculation was GPower, version 3.1. Although the initial calculation predicted a larger sample, the study was conducted with an effective total of 50 patients. This reduction was due to time constraints and participant availability.

INSTRUMENTS AND PROCEDURES

A research form was developed as an instrument for data collection. The form included questions such as name, age, skin color (1) white, (2) brown, (3) black, income in salaries, sex (1) female and (2) male, quantification of aesthetic discomfort using a numerical scale ranging from 0 to 10, and the number of times teeth were brushed per day (1) once, (2) twice, (3) three times, (4) more than 3 times a day. Subsequently, an odontogram was used to mark missing teeth, and finally, a table was filled with the following information: which tooth had GR, if it had GR in other sites, classification by Pini-Prato et al., classification by Cairo et al.; the height of GR, the width of GR, if there was sensitivity and the periodontal phenotype.

To quantify aesthetic discomfort and sensitivity caused by GR, a numerical scale ranging from 0 to 10 was used. Patients were asked to assign a score reflecting their dissatisfaction, with 0 corresponding to no discomfort and 10 representing the maximum level of discomfort. This method facilitates the precise quantification of symptoms such as dentin hypersensitivity caused by root exposure (Tugnait & Clerehugh, 2001).

The classification by Pini-Prato et al. (2010) was used, where he clinically classified superficial defects of dental structures in the GR area. Two main factors were evaluated to establish the classification: the presence (A) or absence (B) of the cementoenamel junction (CEJ) and the presence indicated by the positive sign (+) and absence by the negative sign (-) of discrepancy of the dental surface caused by abrasion. Thus, four class variables were observed: A-, A+, B-, and B+. This classification (Pini-Prato et al., 2010) describes the analysis and classification of dental surface defects as an important tool in the diagnosis and treatment of gingival recession areas.

In addition to the above classification, the one by Cairo, Nieri, Cincinelli, Mervelt, and Pagliaro (Cairo F. et al., 2012; Jepsen S. et al., 2018) was also used. The authors classified gingival recessions into three categories:

- Recession type 1: gingival recession without proximal attachment loss – the proximal cementoenamel junction is not clinically detectable.
- Recession type 2: associated with proximal attachment loss – the amount of loss (measured from the proximal cementoenamel junction to the depth of the proximal sulcus/pocket) is less than or equal to the vestibular attachment loss (measured from the vestibular cementoenamel junction to the apical end of the vestibular sulcus/pocket).
- Recession type 3: associated with proximal attachment loss – the amount of loss (measured from the proximal cementoenamel junction to the apical end of the

sulcus/pocket) is greater than the vestibular attachment loss (measured from the vestibular cementoenamel junction to the apical end of the vestibular sulcus/pocket).

TRAINING AND CALIBRATION OF EXAMINERS

Before starting data collection, conducted between June and July 2024, a training session was held with the researchers to perform the periodontal examination and calibration to determine the appropriate GR measurements through the Inter-examiner Agreement Test (KAPPA) and the Intraclass Correlation Coefficient (ICC). For this process, a patient with gingival recession in multiple dental elements, who regularly attended the UFVJM clinic, was selected. The research team members performed measurements related to gingival recession present in the dental elements, including the width and height of the recession, assessment of the periodontal phenotype, and the presence of dentin hypersensitivity in the affected areas. After the measurements, the KAPPA coefficient, used to assess the qualitative agreement between examiners regarding the presence of recession and sensitivity, was 0.799, indicating good agreement. The ICC, applied to verify the consistency of quantitative measurements, such as the height and width of gingival recession, was 0.624, indicating moderate agreement. These methods ensured the reliability and standardization of the measurements used in the study.

VARIABLES AND DEFINITIONS

Gingival recessions were considered according to the apical displacement of the gingival margin, which refers to the movement of the gingiva towards the root of the tooth, resulting in the exposure of the root surface. To measure the height and width of GR, sterile instruments were used, composed of a No. 5 clinical mirror, a Williams-type millimeter periodontal probe, and clinical tweezers.

The height of GR was measured on the vestibular surface of the tooth, by the distance between the CEJ and the gingival margin, while the width was measured from mesial to distal, also on the vestibular surface, at the height of the CEJ. For this, the patient was positioned appropriately, with good lighting and visualization of the evaluated area, and the examiner was assisted by a Williams-type millimeter periodontal probe. In the other sites – lingual, palatal, distal, and mesial – it was only observed whether there was GR or not.

According to what was proposed by De Rouck et al. (2009) to differentiate the periodontal phenotype as thin or thick through the visual method, an evaluation of the gingival thickness in transparency to probing is necessary. Thus, when translucency of the

Williams probe through the free gingival margin was observed, it was classified as a thin phenotype, and thick when the probe was not seen during probing.

The dentin hypersensitivity test, aimed at assessing the degree of sensitivity present in the evaluated dental elements, consisted of passing the tip of the probe on the most cervical portion of the evaluated element, forming a 90º angle with the long axis of the tooth for a few seconds. At the time of stimulus application, the individual's reaction was evaluated by an examiner, who remained in the 11 o'clock position, to visualize any facial and/or body expression of the participant, and then the patient was also asked about their perception of sensitivity.

STATISTICAL ANALYSIS

Statistical analyses were performed with the SPSS® for Windows® (Statistical Package for the Social Sciences Inc.) software, version 26. Exploratory data analyses provided frequencies, means, standard deviations, medians, and percentiles. Equality tests were performed. A 95% confidence interval was used. The significance level adopted was 5%. Normality assessment was verified by the Kolmogorov-Smirnov test. In the case of non-normal data distribution, the Mann-Whitney test was performed. The Student's t-test was used if there was a normal distribution of the data. The correlation between quantitative data was verified by Pearson or Spearman correlation tests when appropriate.

RESULTS

The study sample consisted of 50 individuals, with a mean age of 38.1 years (SD ± 16.7), of which 33 (66%) had GR. Regarding sex, 29 (58%) participants were female. Regarding self-declared skin color, 28 participants identified as brown (56%). Regarding oral hygiene habits, 33 (66%) participants reported brushing their teeth three times a day. Regarding social class, 36 individuals reported receiving up to one minimum wage (72%) (Table 1).

Table 1. Participant data (n=50)

Variable	Mean	SD
Age	38.1	16.7
	n	%
Gingival recession		
Present	33	66.0
Absent	17	34.0
Skin color		
White	14	28.0
Brown	28	56.0
Black	8	16.0
Sex		
Female	29	58
Male	21	42
Tooth brushing		

1x a day	1	2.0
2 to 3x a day	8	16.0
3x a day	33	66.0
More than 3x a day	8	6.0
Income (minimum wage)		
Up to 1	36	72.0
From 2 to 4	11	22.0
More than 4	3	6.0

It was found that 163 (12.7%) teeth had GR. Among the affected teeth, premolars were the most affected, totaling 63 teeth (38.7%). Additionally, 46 teeth with GR (28.2%) had a recession in other sites. In the Pini-Prato classification, the A- pattern was the most recurrent, with 67 teeth (41.1%). In the Cairo classification, Type I stood out, present in 118 teeth (72.4%). The presence of dentin hypersensitivity was observed in 60 participants (36%), and the thick periodontal phenotype was identified in 122 teeth (74.8%). The mean height of gingival recession was 1.9 mm (SD ± 1.4), and the mean width was 2.7 mm (SD ± 1.1). The aesthetic impact of gingival recession was assessed with a mean of 4.0 (SD ± 2.1) (Table 2).

Table 2. Clinical parameters

Category	n	%
Teeth with gingival recession		
Absent	1119	87.3
Present	163	12.7
Group of teeth with gingival recession		
Canine	49	30.1
Incisor	28	17.2
Premolar	63	38.7
Molar	23	14.1
Gingival recession in other sites on the same tooth		
No	117	71.8
Yes	46	28.2
Pini-Prato classification		
A+	55	33.7
A-	67	41.1
B+	3	1.8
B-	38	23.3
Cairo classification		
Type I	118	72.4
Type II	21	12.9
Type III	24	14.7
Presence of dentin hypersensitivity		
No	103	63.2
Yes	60	36.8
Periodontal phenotype		
Thin	41	25.2
Thick	122	74.8
	Mean	SD
Height of gingival recession	1.9	1.4
Width of gingival recession	2.7	1.1
Aesthetic impact	4.0	2.1

Statistical tests indicated no significant association between the Cairo classification and the presence of dentin hypersensitivity among the tooth groups (p = 0.084). However, the Cairo classification showed a significant association between the dental group and the type of recession (p < 0.001) (Table 3)

Table 3. Association between tooth group and gingival recession parameters

Gingival Recession Parameters	Canine	Incisor	Premolar	Molar	p-value
Gingival recession in other sites	n (%)	n (%)	n (%)	n (%)	
No	40 (81.6)	13 (46.4)	44 (69.8)	20 (87.0)	0.003
Yes	9 (18.4)	15 (53.6)	19 (30.2)	3 (13.0)	
Pini-Prato Classification					0.064
A+	15 (30.6)	4 (14.3)	30 (47.6)	6 (26.1)	
A-	18 (36.7)	17 (60.7)	22 (34.9)	10 (43.5)	
B+	1 (2.0)	0 (0.0)	2 (3.2)	0 (0.0)	
B-	15 (30.6)	7 (25.0)	9 (14.3)	7 (30.4)	
Cairo Classification					<0.001
Type I	42 (85.7)	13 (46.4)	44 (69.8)	19 (82.6)	
Type II	2 (4.1)	1 (3.6)	15 (23.8)	3 (13.0)	
Type III	5 (10.2)	14 (50.0)	4 (6.3)	1 (4.3)	
Presence of dentin hypersensitivity					0.084
No	34 (69.4)	13 (46.6)	38 (60.3)	18 (78.3)	
Yes	15 (30.6)	15 (53.6)	25 (39.7)	5 (21.7)	
Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	
Gingival recession height	1.85 (1.1)	2.66 (2.2)	1.82 (1.0)	1.69 (1.3)	0.388
Gingival recession width	2.65 (0.9)	2.53 (0.9)	2.58 (1.0)	2.73 (1.1)	0.054
Aesthetic impact	1.83 (3.1)	1.80 (3.1)	1.71 (3.0)	1.68 (3.0)	0.157

DISCUSSION

Gingival recession is defined as the exposure of the root surface due to the migration of gingival tissue toward the apical region, leading to the loss of gingiva around the teeth. The rationale for this study is the need to understand the prevalence and factors associated with gingival recession among patients treated at UFVJM. The results indicated that 66% of the patients evaluated had a gingival recession. Based on the analyses in this study, it can be noted that the assessment of GR and its prevalence is fundamental not only for the clinical aspects of the condition but also for understanding the influences of sociodemographic and behavioral factors of patients. When relating these findings to data from the literature, it is important to highlight that, although the prevalence of GR in the general population is estimated at around 60% (Dominak & Gedrange, 2014), the results of this study, with a 66% incidence of GR, are close to the rate observed in Dominak's study. The prevalence of 12.7% observed in this study, specifically related to the teeth evaluated, may reflect both the diagnostic methodology employed and the specific characteristics of the sample. According to Pini-Prato et al. (2006), the prevalence of GR in individual teeth can vary between 10% and 30%, depending on the region of the mouth and the risk factors

present, which corroborates the findings of this study, indicating that the variation in prevalence may be influenced by these factors.

The prevalence of GR of 66% observed in this sample was lower than that found in previous studies. Susin et al. (2004) observed that 99% of adults over 40 years of age had at least one site with GR ≥ 1 mm. Kassab and Cohen (2003) reported a prevalence of 50% in adults, while Rios et al. (2014) identified a rate of 80% in a population of patients with periodontal disease. Mythri et al. (2015) also corroborate this trend, highlighting that the prevalence of GR increases with age, although they did not specify an exact number. This discrepancy in prevalence can be attributed to the age profile of the participants in this study, whose average was 38.1 years since GR tends to increase with age. This indicates a cumulative effect due to the long exposure of the mucogingival complex to potential etiological agents of GR, together with the local and systemic physiological changes that occur over the years. (Mythri et al., 2015). The predominance of females in the sample is in line with the literature, which indicates that women tend to seek dental care more than men. (Albandar et al., 2017). This behavior may have positively influenced the data on toothbrushing, since (66%) of the participants reported brushing their teeth three times a day, thus contributing to the lower prevalence of GR. However, brushing frequency alone does not guarantee the prevention of gingival retraction, since inadequate brushing technique can induce gingival trauma (McCracken et al., 2009). Additionally, self-reported skin color and socioeconomic distribution of participants suggest that socioeconomic factors play a significant role in oral health. Studies show that incomes less than or equal to one minimum wage are often associated with a higher prevalence of oral diseases (Holtfreter et al., 2018).

The higher prevalence of GR in premolars and canines reinforces the literature, which associates these teeth with greater susceptibility due to their position in the arch, exposure to constant mechanical trauma, and occlusal pressure during chewing (Cairo et al., 2012). The anatomy of these teeth facilitates the accumulation of biofilm and gingival inflammation, contributing to recession (Meyer et al., 2014). These anatomical characteristics are reinforced by studies demonstrating that the morphology and position of these teeth in the arch can predispose to biofilm retention and gingival inflammation, leading to recession (Cairo et al., 2012; Jepsen et al., 2018).

The Pini-Prato classification, with a predominance of type A-, differs from the Cairo classification (2012), which presents a predominance of type I. This difference suggests that the Pini-Prato classification may be more related to recessions caused by systemic factors or inadequate oral hygiene practices. The Cairo classification indicates that, in

healthy young individuals, recessions tend to be less severe and are generally associated with local factors, without loss of proximal attachment. This distinction between the classifications is supported by the studies of Jepsen et al. (2018) and Maroso (2015), which discuss the clinical implications of the absence of proximal attachment loss and the possible anatomical causes for these differences. The high prevalence of the thick periodontal phenotype observed in this study is in line with the conclusions of De Rouck et al. (2009), who highlight its protective function against mechanical trauma and inflammation. This data reinforces the importance of assessing the periodontal phenotype during clinical consultations since individuals with a thin phenotype are more likely to develop gingival recession (Kassab & Cohen, 2003). On the other hand, the thick phenotype offers greater resistance, but when exposed to risk factors, such as orthodontic movement or periodontitis, individuals may be more susceptible to gingival recession (Cortellini & Bissada, 2018).

Regarding dentin hypersensitivity, the observed rate was lower than expected for patients with GR, possibly due to the small extent of the recessions, with an average height of 1.9 mm, and the age profile of the population evaluated. This level of recession may not be sufficient to significantly expose the dentin and cause severe sensitivity (Tugnait & Clerehugh, 2001). Furthermore, age may contribute to a lower prevalence of sensitivity, given that in young patients the enamel is generally thicker and there is less root exposure (Pashley, 2013). This finding is important because it suggests that early detection and intervention in cases with lower recession height can prevent dentin exposure and its clinical effects.

In terms of aesthetics, the data indicate that most participants do not consider GR to be a significant aesthetic problem. Nieri et al. (2013) point out that the perception of aesthetic impact may be more relevant in populations seeking periodontal treatment for cosmetic reasons, reinforcing the idea that the perception of GR is individual and often depends on factors such as location and visibility of recessions, with incisors being more aesthetically affected than molars, for example.

These findings, both about hypersensitivity and aesthetic impact, have important clinical implications, especially when analyzed together with the type of gingival recession and the patient's periodontal phenotype. GR is frequently associated with dental hypersensitivity due to dentin exposure. However, the intensity and frequency of this symptom can vary considerably, depending on the extent of recession and the periodontal phenotype of each patient (Litonjua et al., 2014). Patients with a thin periodontal phenotype, for example, are more likely to have deeper recessions, which may result in greater dentin

exposure and, consequently, increase the risk of hypersensitivity (Mahajan, 2010). Clinically, this suggests that a detailed assessment of the periodontal phenotype and the type of gingival recession is crucial to identifying individuals at greater risk of developing dentin hypersensitivity. This may guide the dentist in choosing more specific preventive and therapeutic strategies, such as the use of gingival grafting techniques to cover exposed areas in patients with a thin phenotype, or the application of desensitizing agents in the early stages of recession to minimize pain (Mairoana et al., 2005).

This study has some limitations that should be considered. The assessment of skin color and income was based on self-reporting, which may introduce subjective biases and compromise the accuracy of the data. The restriction of the sample to a population attended at a dental school clinic also limits the generalization of the results, suggesting the need for larger and more representative samples. In addition, factors such as oral hygiene habits, such as brushing with excessive force and the use of hard-bristled brushes, and family history of gingival recession, which could influence the findings, were not included.

It is recommended that future research increase the sample size and include additional variables, such as the type of brushing technique used and the frequency of dental visits, allowing a more complete understanding of the relationship between GR and associated factors. The adoption of more rigorous assessment methods, such as the systematic collection of socioeconomic data, will contribute to the validation of the findings and allow for a more in-depth analysis.

CONCLUSION

It is concluded that the prevalence of GR was 66% among patients treated at UFVJM. The tooth that presented retraction most frequently was the premolar. GRs were mostly A- and type I, being shallow and narrow, and the majority without dentin hypersensitivity and with a thick phenotype. The sample was predominantly composed of women with an income below one minimum wage.

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