RESEARCH ARTICLE

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Evaluation of the Relationship Between Gingival Recession and Patient Anxiety Assessed Using the State and Trait Anxiety Inventory

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Objective: This study aimed to evaluate the relationship between gingival recession and anxiety, as assessed using the State-Trait Anxiety Inventory (STAI-S and STAI-T) and a Modified Dental Anxiety Scale (MDAS).

Materials and Methods: This study included 140 patients aged 18-65 years with gingival recession. The etiology of gingival recession was determined, and the STAI-S, STAI-T, and MDAS were used to assess these patients. Statistical analyses using parametric tests such as t-tests and ANOVA were conducted to compare anxiety levels.

Results: Among the participants, 7.1% had high STAI-S scores, 13.6% had high STAI-T scores, and 2.9% had high MDAS (Modified Dental Anxiety Scale) scores. Anxiety scores were significantly greater in women than in men, and they varied inversely with age. A statistically significant difference was found when the participants' STAI-S and MDAS scores were compared according to the etiology of gingival recession (STAI-S p= 0.018, MDAS p<0.001). Patients with gingival recession caused by malpositioned teeth had the highest levels of anxiety.

Conclusion: One of the etiologies of gingival recession is tooth malposition, which may worsen oral health and aesthetic concerns and increase patient anxiety. This situation also emphasizes that dentists should meet patients' psychological needs while treating gingival recession.

Key Words: *Anxiety, etiology, gingival recession*

Dişeti Çekilmesi ile Hastanın Anksiyetesi Arasındaki İlişkinin Anlık ve Sürekli Durumluluk Kaygı Envanteri ile Değerlendirilmesi

Amaç: Bu çalışmada diş eti çekilmesi ile anksiyete arasındaki ilişkinin Sürekli Kaygı Envanteri (STAI-S), Durumluluk Kaygı Envanteri (STAI-T) ve (Modifiye Dental Anksiyete Skalası (MDAS) ile değerlendirilmesi amaçlanmıştır.

Gereç ve Yöntem: Diş eti çekilmesi olan 18-65 yaş arasında yüz kırk hasta çalışmaya dahil edildi. Katılımcıların diş eti çekilme etiyolojileri tespit edildi ve bu hastalara STAI-S, STAI-T ve MDAS uygulandı. Kaygı düzeylerini karşılaştırmak için t-testi ve ANOVA gibi parametrik testler kullanılarak istatistiksel analizler yapıldı.

Bulgular: Katılımcıların %7,1'inde yüksek STAI-S, %13,6'sında yüksek STAI-T ve %2,9'unda yüksek MDAS değerleri bulundu. Anksiyete kadınlarda anlamlı olarak daha yüksek tespit edildi ve yaşla ters orantılı olarak değiştiği gözlemlendi. Katılımcıların STAI-S ve MDAS skorları dişeti çekilmesi etiyolojisine göre karşılaştırıldığında istatistiksel olarak anlamlı bir fark bulundu (STAI-S p= 0.018, MDAS p<0.001). En yüksek anksiyete düzeyi konum bozukluğu olan dişlerdeki diş eti çekilmesine sahip bireylerde bulundu.

Sonuç: Diş eti çekilmesinin etiyolojilerinden biri olan dişlerin konum bozukluğu, ağız sağlığını kötüleştirebilir ve hasta kaygısını artırabilir. Bu durum diş hekiminin hastanın tedavisini yaparken psikolojik ihtiyaçlarını karşılaması gerektiği konusunu da vurgulamaktadır.

Anahtar Kelimeler: *Anksiyete, etiyoloji, diş eti çekilmesi*

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Introduction

Gingival recession is defined as the apical shift of the gingival margin concerning the cemento-enamel junction (1). Gingival recession is a common condition in both observed dentally aware populations and those with limited access to dental care. The etiology of the condition is multifactorial, but it is commonly associated with underlying alveolar morphology, toothbrushing, mechanical trauma, and periodontal disease (2). Gingival recession may increase with age, and age is recognized as an etiological factor (3). Factors such as gingival thickness and width, tooth brushing habits, subgingival restoration edges, orthodontic treatment, high frenulum attachment, bone dehiscence, tooth position, and occlusal trauma are thought to play a role in the development of gingival recession (4, 5). Although there is much interest in the role of the anatomical features of the papilla in the surgical treatment of gingival recession, the actual influence of the papilla dimension on the clinical success of surgical therapy still needs to be determined. Further studies are needed to clarify the role of tissue thickness, alveolar bone height, and the papilla dimension as significant predictors of root coverage in individuals with gingival recession (6). Various types of tooth position anomalies (rotated teeth, crowding, mesially tipped molars, etc.) were found in this study sample, and they

were significantly associated with periodontal changes, such as chronic marginal gingivitis, gingival enlargement, gingival recession, and chronic periodontitis. Patients with these anomalies need basic and surgical periodontal treatments, as well as orthodontic treatments (7). Gingival lesions such as gingival recession and clefts can be caused by occlusal interferences in maximum intercuspation and eccentric movements, as well as the lack of mutually protected occlusion (8). Iatrogenic causes such as orthodontic, prosthetic, and restorative/endodontic/periodontal treatment can also cause gingival recession (9). According to a systematic review of eight studies, gingival recession is more common in patients with piercings (10). Both lip and tongue piercings are strongly associated with the risk of gingival recession (11). The prevalence, extent, and severity of gingival recession increase with age (12). In the Brazilian population, gingival recession is related to destructive periodontal disease and is significantly associated with a high level of supragingival dental calculus (13). The high level of gingival recession observed in the Turkish population is significantly associated with a high level of dental plaque and calculus, male sex, smoking duration, toothbrushing frequency, traumatic toothbrushing, and a high frenulum (14).

Anxiety is an emotional response to tension (stress), worry, nervousness, and impending danger, and is accompanied by autonomic nervous system activation (1). Dental anxiety, one of the types of anxiety, is a complex phenomenon that is influenced by various factors, such as age, sex, education level, socioeconomic status, experience, place of residence, and patient personality (15). Dental anxiety is measured using a series of validated tests (16). In the State Anxiety Inventory (STAI-S), a patient's current state of anxiety is analyzed, whereas in the Trait Anxiety Inventory (STAI-T), a patient's general state of anxiety is measured (17). The Modified Dental Anxiety Scale (MDAS) analyzes patient's anxiety about dental procedures and the individuals who perform them (18).

Hägglin et al. (2000) observed a limited relationship between dental anxiety and dental status (19). According to some studies, dental anxiety contributes to poor periodontal and dental health as well as compromised oral hygiene on quality of life (20, 21). Studies have mainly examined the relationship between specific surgeries and anxiety (22, 23). Considering that anxiety affects dental health, oral hygiene, and oral surgery status, it may also affect gingival recession. This study evaluated the relationships among gingival recession, its etiology, and anxiety.

Materials and Methods

Research and Publication Ethics: The Clinical Research Ethics Committee of the Bolu Abant İzzet Baysal University approved this study (2022/177-05/07/2022). Informed consent was obtained from all participants before enrollment in the study. Before participation, all patients were informed about the purpose and the questionnaire, and written informed consent was obtained from the patient in accordance with the Helsinki Declaration (24). Information on compliance with the STROBE criteria for cross-sectional studies is provided. The study, which included individuals with gingival recession, was conducted at the Faculty of Dentistry's Periodontology Department between July 2022 and January 2023.

Sample Size Calculations: According to the results of the power analysis performed with the G Power program (G * Power 3.1 software; Heinrich Heine University, Düsseldorf, Germany) for the t-test, which indicates the difference between two independent means (two groups), the study had an α (margin of error) = 0.05, an effect (d) of 0.50, and a power (1-β) of 0.90; therefore, a total of 140 participants was needed.

Eligibility Criteria

Inclusion Criteria:

- - Individuals aged 18-65 years who could answer the questions were included in the study.

Exclusion Criteria:

- - Patients requiring preoperative sedation;
- - Patients with long-term analgesic consumption in the preoperative period;
- - Patients with mental retardation, a severe suicidal tendency, dementia, or psychosis;
- - Patients undergoing long-term surgical procedures and with long-term use corticosteroids use;
- - Patients who were pregnant;
- - Patients with anxiety disorder;
- - Patients with paresthesia.

Study Design: A total of 140 patients between 18 and 65 years of age with gingival recession who presented to the Bolu Abant İzzet Baysal University Periodontology Clinic were included in the study. The etiology of gingival recession was determined for each patient. Etiologies of gingival recession included the following: anatomical anomalies (frenulum, etc.), malpositioned teeth, iatrogenic causes (orthodontic treatment, prosthesis-induced recession, etc.), periodontitis, occlusal trauma, oral hygiene habits (toothbrush trauma, flossing, etc.), bad habits (piercing, scratching the gingiva, etc.), physiological factors (age, etc.) and oral hygiene status (supragingival calculus).

In the same session, the STAI-S, STAI-T (20 questions), and MDAS were used. Demographic information [age, sex, financial income, family status (divorced/family togetherness)] was obtained. The patients were questioned about having surgery under local anesthesia, having undergone a periodontal or surgical operation, and finding dental treatment frightening.

Anxiety Inventory: The anxiety inventory was used to analyze the patients' various anxiety states. The inventory comprises two subsections: the STAI-S and the STAI-T. Responses are scored on a scale ranging

from 1 (not at all) to 4 (very much)." (23). Scores range from 20 to 80, with higher scores correlating with greater anxiety. The creators of this test separated the different types of anxiety, so both scales are reliable. This means that the STAI-S only measures state anxiety and that the STAI-T only measures trait anxiety, which was the ultimate goal of this test. The creators found that they could not achieve this if the questions used to examine both types of anxiety were the same (25). Low scores indicate mild anxiety, and high scores indicate severe anxiety. Both scales have questions regarding the absence and presence of anxiety. Anxiety-present questions are used to determine the absence of anxiety in statements such as, “I feel secure.” Anxiety-present questions are used to determine the presence of anxiety in statements such as “I feel worried.” Each measure has a different rating scale (17). Individuals in the high-trait anxiety group have a score of 51 or higher, those in the medium-trait anxiety group have a score between 41 and 50, and those in the low-trait-anxious group have a score of 40 or lower (26).

MDAS was used to assess the patients' anxiety about dental procedures and the people performing the procedures. The MDAS measure includes five questions about local anesthetic injections, and all questions are answered using a simplified and consistent answer scheme. Each question is answered by the patient, who indicates whether they were ‘not anxious’, ‘slightly anxious’, ‘fairly anxious’, ‘very anxious’ or ‘extremely anxious’. A Likert-type scoring (1-2-3-4-5) system is used, with a high score denoting high anxiety. The item scores are summed to derive the total score (18). In the Turkish population, the cutoff score for the MDAS is 15 and above (27). All measurements were performed by a single clinician (T.Ş.).

Statistical Method: IBM SPSS Statistics (Version 26.0. Armonk, NY: IBM Corp.) was used for statistical analyses. Before the analysis of the data, the normality of the distribution was investigated by examining the results of the Kolmogorov-Smirnov test. According to the results, it was appropriate to perform parametric tests since most of the measurements had a normal distribution. Independent sample t-tests and one-way ANOVA were used to compare the anxiety levels of the participants according to demographic and health data, and for the significant differences Bonferroni test used for post-hoc analysis. Pearson correlation analysis was performed to determine the relationship between STAI-S, STAI-T, and MDAS. $p<0.05$ was considered to indicate statistical significance.

Results

Demographic Characteristics: The mean age of the participants was 40.86±13.91 years; the lowest age was 18 years, and the highest age was 65 years. Of the individuals participating in the study, 50% were female, and 50% were male. In terms of financial income, 41.4% of the participants had an income below the minimum wage, 27.1% had an income at the minimum wage, and 31.4% had an income above the minimum wage. A total of 4.3% of the participants stated that their family status was divorced, and 95.7% stated that their family was living together.

Health Status: When asked about the presence of systemic diseases, 32 of the participants responded yes. A total of 27.1% of the participants had regular medication use. When questioned about previous surgery under local anesthesia, 49.3% of the participants responded with yes. The percentage of participants who had previously undergone a periodontal or surgical operation was 35.7%. A total of 35.7% of the participants considered dental treatment to be frightening.

Recession Etiology: When the etiologies of gingival recession were analyzed, a total of 160 cases of gingival recession were evaluated in 140 participants. The most common etiology of gingival recession was periodontitis at 25%, followed by oral hygiene habits (21.4%), and oral hygiene status (19.3%) (Table 1).

Table 1. Etiology of gingival recession

		N	Participants (%)
Etiology	Anatomical anomalies	19	13.5%
	Malpositioned teeth	11	7.9%
	Iatrogenic causes	18	12.8%
	Periodontitis	35	25.0%
	Occlusal trauma	1	0.7%
	Oral hygiene habits	30	21.4%
	Bad habits	3	2.1%
	Physiological factors	16	11.4%
	Oral hygiene status	27	19.3%
	Total	160	

*Descriptive analysis of etiology of gingival recession-participants can give multiple responses

Results of the Participants’ Anxiety Assessments: The mean score on STAI-S was 33.78±9.62. The mean score on the STAI-T was 40.24±9.20. The mean score on the MDAS was 8.06±2.89 (Table 2).

Table 2. Basic Descriptive Findings Related to Anxiety Scales

	Min	Max	Ort.	S.S.
STAI-S	19	66	33.78	9.62
STAI-T	19	71	40.24	9.20
MDAS	5	17	8.06	2.89

* Descriptive analysis of anxiety scales for all participants

According to the STAI-S, 75% of the participants had low anxiety, 17.9% had moderate anxiety, and 7.1% had high anxiety. According to the STAI-T, 52.9% of the participants had low anxiety, 33.6% had moderate anxiety, and 13.6% had high anxiety. Only 2.9% of the participants had a MDAS above 15 (Table 3).

There was a statistically significant difference in the MDAS scores according to the participants' surgical status under local anesthesia ($p=0.026$). The anxiety levels of patients who had not previously undergone

surgery under local anesthesia were greater. There was no statistically significant correlation between the STAI-S or STAI-T score and whether the participants had undergone periodontal/surgical operations or found dental treatment frightening (STAI p=0.697, MDAS p=0.837).

Table 3. Classification of anxiety

		f	%
STAI-S	Low anxiety	105	75.0
	Moderate anxiety	25	17.9
	High anxiety	10	7.1
STAI-T	Low anxiety	74	52.9
	Moderate anxiety	47	33.6
	High anxiety	19	13.6
MDAS	Healthy	136	97.1
	High Dental Anxiety	4	2.9

* Descriptive analysis of anxiety scales based on the score classification.

There was no statistically significant relationship between the age of the participants and their STAI scores (p= 0.146). There was a statistically significant negative, weak correlation between the age of the participants and the MDAS scores (p<0.001). There was a statistically significant difference in the MDAS scores according to sex (p<0.001). Anxiety levels were greater in women than in men.

Anxiety Scales and Gingival Recession Etiologies: When the participants' STAI-S scores were compared according to the etiology of gingival recession, a statistically significant difference was found (p=0.018). The highest level of anxiety was found in patients with gingival recession caused by malpositioned teeth, and individuals with this etiology differed significantly from those with other etiologies. One patient experienced occlusal trauma, and this patient had the lowest STAI-S score. The group reporting physiological factors had the second lowest STAI-S score. In general, the score on the STAI-S varied between 30 and 35. At the same time, patients with gingival recession caused by malpositioned teeth had a high level of anxiety, which was significantly different from patients in the other groups.

Table 4. Comparison of State Anxiety, Trait Anxiety, and Modified Dental Anxiety Scale Assessments According to Gingival Recession Etiology

		N	Mean	S.D.	F	p
STAI-S	Anatomical anomalies	19	35.58 [a]	9.53	2.59	0.018*
	Malpositioned teeth	11	40.82[b]	10		
	Iatrogenic causes	18	31.11[a]	5.67		
	Periodontitis	35	31.69 [a]	8.87		
	Occlusal trauma	1	20 [c]	-		
	Oral hygiene habits	30	33.57 [a]	10.37		
	Bad habits	3	34.33 [a]	14.57		
	Physiological factors	16	29.62 [a]	4.67		
	Oral hygiene status	27	33.89 [a]	11.13		
STAI-T	Anatomical anomalies	19	40.05	8.43	1.12	0.269
	Malpositioned teeth	11	43.82	4.12		
	Iatrogenic causes	18	39.61	13.52		
	Periodontitis	35	39.66	8.49		
	Occlusal trauma	1	27	-		
	Oral hygiene habits	30	40.06	8.85		
	Bad habits	3	38.67	15.82		
	Physiological factors	16	48.20	12.68		
	Oral hygiene status	27	43.56	12.29		
Modified Dental Anxiety	Anatomical anomalies	19	8.45 [a]	3.65	3.39	0.001*
	Malpositioned teeth	11	10.00 [b]	2.41		
	Iatrogenic causes	18	8.83 [a]	1.99		
	Periodontitis	35	7.43 [a]	2.72		
	Occlusal trauma	1	5.00 [c]	-		
	Oral hygiene habits	30	7.28 [a]	2.55		
	Bad habits	3	6.00 [c]	0.41		
	Physiological factors	16	6.17 [c]	1.05		
	Oral hygiene status	27	10.12 [b]	2.97		

* One-way anova analysis for comparing of anxiety scales scores based on the etiology of gingival recession. F: Anova Value

a,b,c.. Exponential letters used to express the difference between groups. There is no difference between the groups with the same letter.

When the participants' scores on the STAI-T were compared according to the etiology of gingival recession, there was no statistically significant difference (p=0.269). In general, the STAI-T scores were similar for patients with different etiologies of gingival recession, except for the patients with an occlusal trauma etiology, and ranged between 39 and 44.

A statistically significant difference was found when the participants' MDAS scores were compared according to the etiology of gingival recession (p<0.001). The highest level of anxiety was found in patients with malpositioned teeth. On the other hand, the lowest level of anxiety was found in patients with poor habits or occlusal trauma. Patients with malpositioned teeth, anatomical anomalies, and iatrogenic causes had higher MDAS scores. In contrast, patients with poor habits, oral hygiene status, and occlusal trauma had lower MDAS scores (Table 4).

Discussion

This study aimed to evaluate anxiety levels in individuals with gingival recession and explore potential associations between anxiety and various etiological factors contributing to gingival recession. The results indicated varying levels of anxiety among participants, with a significant proportion experiencing mild to moderate anxiety. Notably, the MDAS scores revealed that only a small percentage of participants had high levels of dental anxiety. Furthermore, this study investigated the associations between different etiological factors of gingival recession and anxiety levels. There were significant differences in anxiety levels based on the etiology of gingival recession, particularly concerning anatomical anomalies and malpositioned teeth.

Dental anxiety is a prevalent issue globally, with sex and age emerging as significant factors associated with this condition (28). In the study conducted by Türer et al. (29), no significant relationship was found between the patient's age and the STAI score. Similarly, several studies have reported no significant correlation between age and dental anxiety (30, 31). On the contrary, another study identified a negative correlation between age and anxiety levels (32). The level of anxiety in patients who underwent surgery for impacted wisdom teeth was not related to sex, age, or education level (33). Arslan et al. (34) reported that dental anxiety was not affected by age or education level and that the dental anxiety levels of females were greater than those of males. Further studies with larger sample sizes are needed to investigate the effect of various factors on dental anxiety. In Arslan et al.'s (31) study, it was observed that dental anxiety was not affected by age or education level and that the dental anxiety levels of females were greater than those of males. In contrast to other studies, a statistically significant relationship was found between age and MDAS score, and MDAS score decreased with age. Also, a significant relationship was found among the STAI-S, STAI-T, and MDAS and gender. The anxiety levels of women were greater than those of men.

In the study in which the anxiety levels of thirty-five patients undergoing oral surgery were evaluated, 80% of the individuals' parents lived together, and 34.3% of them responded yes to the question of whether they underwent surgery under local anesthesia. A total of 31.4% of the participants had previously undergone oral surgery, and 31.4% of the participants reported finding oral surgery frightening (35). In this study, the rate of living with the family, the rate of undergoing surgery under local anesthesia, the rate of undergoing oral surgery, and the rate of fear of dental treatment were found to be higher compared to the other study.

Poor oral hygiene habits can cause gingival recession. Gingival recession is positively associated with the amount of abrasion (reflecting forceful brushing) and poor oral hygiene (36). There was a positive association between tooth brushing frequency and gingival recession. Other potential risk factors were the duration of tooth brushing, brushing force, frequency of changing the toothbrush, brush (bristle) hardness, and tooth brushing technique (37). Marco et al. (38) found no significant relationship between the MDAS score and the gingival index score in a study of five hundred people. Similarly, Singh et al. (39) reported low pain perception and anxiety among participants during periodontal probing, with a very low correlation between bleeding on probing and both pain and anxiety. The study revealed that adolescents had a greater fear of dental care when they experienced gingival bleeding and tooth pain. Gingival bleeding is a symptom of early gingival disease, and dental pain is likely caused by advanced dental caries. These results suggested that it is necessary to have a program to reduce dental fear and anxiety as well as a program to prevent dental diseases through regular periodic screening and education (40). Karahan et al. (41) observed no significant relationship between oral hygiene habits and anxiety. Similar to the literature, this study did not find a significant relationship between oral hygiene habits and anxiety levels.

STAI-estimated anxiety is associated with the perception of pain following periodontal flap surgery, and females experience more pain after surgery; however, the amount of pain perception is not related to age (22). In a study of one hundred and twenty oral surgery patients, no significant difference was found between the STAI-T and STAI-S scores when the surgical procedures were compared individually. There was also no significant difference in anxiety levels between patients scheduled for extractions due to previous dental treatments and those undergoing regular or surgical extractions (23). In the study in which the effect of computer-assisted visual information on dental anxiety before periodontal surgery was determined by STAI-S and STAI-T scores for one hundred and fourteen people, there was no statistically significant difference between the groups in terms of the STAI-T score. In contrast, the STAI-S scores of the verbal and visual information groups were significantly greater than those of the verbal information only group. No significant difference was found for STAI-S or STAI-T score according to the type of surgery performed (frenectomy, gingivectomy,

mucogingival, flap, implant, and sinus surgery) (42). In a study investigating the effect of visual and written information on anxiety levels before and after periodontal surgery, the STAI score decreased in the postoperative period compared to the preoperative period (29). In a study of 141 patients with gingivitis and periodontitis, the STAI scores were high in patients with gingivitis. Gingivitis was significantly more common in patients who had poor oral hygiene habits. The State-Trait Anxiety Inventory scores of the periodontal patients were significantly greater than those of the gingivitis patients. Patients with high state anxiety scores were more likely to have periodontitis (43). Four hundred and fifty-six patients were analyzed, and a positive correlation was found between the STAI score and periodontal disease status (44). In this study, participants with gingival recession generally had a low value of STAI high anxiety level and a high value of STAI low anxiety level values as a percentage.

In a study of three hundred dental students using the MDAS, higher anxiety levels were found in female dental students (45). In a study involving 234 participants, 3.8% had high Modified Dental Anxiety Scale (MDAS) scores, with first-year students exhibiting higher levels of anxiety and fear than those in other grades. A significant correlation was found between anxiety levels and the frequency of dental visits, tooth brushing habits, and dental education. As students progressed in their education, gained clinical experience, and learned theoretical aspects of dentistry, their awareness increased, and their anxiety decreased (46). In contrast to these findings, the MDAS scores of five hundred dental students at all levels increased as the number of years at the university increased (47). In the present study, which included one hundred and one people with peri-implantitis, peri-implant mucositis, and peri-implant status, no relationships were found among peri-implant status, dental anxiety, and quality of life. It was determined that the anxiety levels of the participants increased, and their quality of life decreased (48). The anxiety and fear levels of the patients who underwent surgical procedures decreased, and patients without dental bridges experienced less pain after the procedure than patients with dental bridges. In patients with dental bridges, the STAI-S and MDAS scores were significantly greater, while the STAI-S and MDAS scores were significantly lower after 1 week. In general, MDAS scores were high (49). Contrary to the data in this study, the MDAS score was generally not found to be high.

Montevecchi et al. (50) individuals with low or no anxiety appear more prone to gingival recession when a thin periodontal phenotype is present. Conversely, those with high anxiety and poor oral hygiene seem less likely to develop buccal recession, suggesting that high anxiety may have a protective effect despite poorer oral hygiene habits. Correction of the malocclusion of the teeth with treatment resulted in a decrease in the STAI value (51). In another study, higher anxiety levels were observed in individuals with malocclusion compared to healthy occlusion (52). In this study, those with poor oral hygiene status had a lower MDAS, as in the study by Montevecchi et al. Also, it revealed a statistically significant correlation between the STAI-S and MDAS scores in patients with malpositioned teeth.

This study has several limitations. The cross-sectional design limited our ability to establish causality between etiological factors and anxiety levels. Longitudinal studies are warranted to elucidate the temporal relationship between these variables. Moreover, the study was conducted at a single institution, which may limit the generalizability of our findings to other populations. Future research involving larger and more diverse samples is needed to validate our results further.

As a result, malpositioned teeth, one of the etiologies of gingival recession, can worsen oral health and aesthetic problems and increase anxiety. Therefore, dentists and dental health professionals should consider not only patients' physical health but also their emotional and psychological needs. By identifying specific factors contributing to anxiety, dental professionals can develop targeted interventions to mitigate anxiety and improve patient care outcomes.

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