

The Relationship Between Anxiety, Age, Gender, and Periodontal Status: A Case-Control Study

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Abstract

Background: Dental anxiety is a common issue observed in the general population and poses a significant barrier to achieving optimal oral health. This study aims to examine the relationship between dental anxiety, periodontal status, oral hygiene habits, and sociodemographic factors in patients seeking periodontal treatment.

Material and Method: In this prospective study, 150 individuals aged 18-65 were divided into three groups based on clinical and radiographic periodontal examinations: gingivally healthy (n=50), gingivitis (n=50), and periodontitis (n=50). Following periodontal diagnosis, participants were asked to complete the Index of Dental Anxiety and Fear. The relationships between dental anxiety levels, periodontal status, sociodemographic data, and oral hygiene habits were assessed, with a significance level of $p < 0.05$.

Result: The results indicated that dental anxiety levels were significantly higher in the periodontitis group compared to the gingivally healthy group ($p < 0.05$), while no significant differences were observed between the other groups ($p > 0.05$). In terms of gender, women had a significantly higher mean anxiety level (1.78) than men (1.50) ($p = 0.028$). Additionally, individuals under 45 years of age had a mean anxiety level of 1.57, compared to 1.95 in those aged 45 and over ($p < 0.05$).

Conclusion: The findings of this study suggest that periodontitis patients experience higher levels of dental anxiety compared to gingivally healthy individuals. Furthermore, women and those aged 45 and over exhibited higher anxiety levels compared to men and younger individuals. These data suggest that periodontal health status and sociodemographic characteristics may have a strong association with dental anxiety. Therefore, integrating dental anxiety management strategies into periodontal treatment protocols may help improve patient adherence and periodontal health.

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INTRODUCTION

Dental anxiety is a common concept defined as a mixture of discomfort, anxiety, and fear experienced by an individual when faced with dental treatment (1). The use of hand tools and dental anesthesia procedures often triggers fear and anxiety, causing discomfort in patients visiting the dentist. Dental anxiety may arise from previous dental experiences, as well as from past

traumatic events or a general anxiety condition unrelated to dental procedures (2, 3).

Dental anxiety, a prevalent issue that negatively affects individuals' willingness to attend dental appointments, can also adversely impact oral health. Numerous studies have reported an association between dental anxiety and poor dental and periodontal health (4-6). These findings suggest that dental anxiety may have negative effects on periodontal health.

Dental anxiety can be influenced by socio-demographic variables such as age, gender, and educational level (7, 8). Age is known to play a complex role in dental anxiety. While younger individuals tend to exhibit higher anxiety levels due to lack of familiarity with dental treatments and fear of pain, older individuals may experience reduced anxiety levels as they become accustomed to dental care (9). However, this relationship is not linear; various psychosocial factors, such as past experiences and health status, may shape the effect of age on dental anxiety (10).

Regular dental visits are essential for maintaining periodontal health; thus, reducing dental anxiety is believed to positively impact periodontal health. Understanding the relationship between dental anxiety, periodontal health, age, and gender may be beneficial in developing strategies to reduce dental anxiety. The aim of this study is to investigate the relationship between dental anxiety and these factors.

MATERIAL AND METHODS

Study Design and Participants

This cross-sectional study was conducted on patients presenting to the periodontology department between September 2024 and October 2024. The study protocol was approved by the Ethics Committee of Necmettin Erbakan University, Faculty of Dentistry (Protocol No: 2024/478).

The inclusion criteria for the study were as follows: (1) volunteers aged 18-65; (2) individuals diagnosed with healthy periodontium, gingivitis, or periodontitis. Exclusion criteria were: (1) refusal to participate in the study; (2) presence of psychiatric, mental, or physical disabilities; (3) having received periodontal treatment within the last 6 months; (4) being pregnant or breastfeeding; and (5) having used antibiotics, anti-inflammatory, or any other medications affecting periodontal tissues within the last 6 months.

All participants provided written informed consent in line with the principles of the Declaration of Helsinki.

Based on the power analysis conducted before the study (G*Power 3.1 software; Heinrich Heine University, Düsseldorf, Germany), assuming a moderate effect size (Cohen's $f = 0.25$) with $\alpha = 0.05$ and 80% power ($1-\beta$), a sample of 50 participants per group across 3 groups was targeted, totaling 150 participants (11).

Data Collection

The 150 patients included in the study were classified according to the 2017 Classification of Periodontal and Peri-implant Diseases (12). Patients were divided into three groups: periodontal healthy ($n=50$), gingivitis ($n=50$), and periodontitis ($n=50$).

Socio-demographic Variables and Frequency of Dental Visits

Information on gender, age, education level, and frequency of dental visits was collected from the participants.

Periodontal Examination

Periodontal parameters, including plaque index (PI), gingival index (GI), probing depth (PD), clinical attachment loss (CAL), and bleeding on probing (BoP), were measured to diagnose periodontal status. PD was recorded as the distance from the gingival margin to the deepest point of the periodontal pocket. CAL was determined as the distance from the cemento-enamel junction to the deepest point of the periodontal pocket. BoP was noted as present or absent. All measurements were performed by a calibrated periodontist (Z.T.E). Participants were evaluated according to the criteria specified in the consensus report of the 2017 World Workshop on the Classification of Periodontal and Peri-implant Diseases and Conditions (12, 13). Diagnostic criteria included: (i) Gingival health: no CAL, $PD \leq 3$ mm (assuming no pseudo-pocket), BoP $<10\%$, and no radiographic bone loss; (ii) Gingivitis: no CAL, $PD \leq 3$ mm (assuming no pseudo-pocket), BoP $>30\%$, and no radiographic bone loss; (iii) Periodontitis: interproximal CAL of ≥ 2 mm or ≥ 3 mm and radiographic bone loss in at least two non-adjacent teeth.

After the clinical assessment, each participant was provided with both verbal and written diagnoses regarding their oral health status and encouraged to consult a dentist for preventive and treatment measures if necessary.

Dental Anxiety and Fear

Dental anxiety and fear were assessed using the core module (IDAF-4C) of the IDAF 4C+ questionnaire, whose Turkish validity and reliability had been previously established (1). The core module of IDAF-4C consists of eight questions with two items each, addressing the behavioral, emotional, cognitive, and

physiological aspects of dental anxiety and fear. Responses in IDAF-4C are rated on a scale from "Strongly Disagree" (1) to "Strongly Agree" (5), with higher scores indicating increased dental fear. Average scale scores were classified as follows: "No or very low dental fear" (score range 1–1.5), "Low dental fear" (score range 1.51–2.5), "Moderate dental fear" (score range 2.51–3.5), and "High dental fear" (score >3.5).

Statistical Analysis

Data were analyzed using IBM SPSS V23. Normality of data distribution was assessed with the Kolmogorov-Smirnov and Shapiro-Wilk tests. Gender distribution among groups was analyzed using the chi-square test. Comparisons of age, periodontal parameters, and dental anxiety between groups categorized by periodontal status were first evaluated with ANOVA, followed by pairwise comparisons with Tukey's HSD post hoc test. Marital status, gender, age, and frequency of dental visits were analyzed with the independent t-test. For comparisons of dental anxiety by educational level, ANOVA and Tukey's HSD post hoc test were applied. Statistical significance was set at $p < 0.05$.

RESULTS

A total of 150 individuals participated in the study, including 87 females (58%) and 63 males (42%). The mean ages and gender distributions of participants across the study groups are presented in Table 1. The gender distributions among the groups diagnosed with gingival health, gingivitis, and periodontitis were statistically similar ($p > 0.05$). The mean age of the periodontitis group was higher than that of the other groups ($p < 0.05$). No statistically significant difference was found between the mean ages of participants in the gingival health and gingivitis groups ($p > 0.05$).

The comparison of periodontal parameters by group is shown in Table 2. Among the groups, the lowest PD, PI, and GI scores were observed in the gingival health group, while the highest scores were found in the periodontitis group ($p < 0.05$).

The comparison of total IDAF-4C scores by group is presented in Figure 1. Higher dental anxiety scores were observed in the periodontitis group compared to the gingival health group ($p < 0.05$). No significant differences were observed in comparisons between the other groups ($p > 0.05$).

Higher dental anxiety scores were observed in females compared to males ($p < 0.05$) (Figure 2). When comparing dental anxiety scores between individuals under 45 and those over 45, higher dental anxiety scores were observed in individuals over 45 ($p < 0.05$) (Figure 3).

The effect of educational levels on dental anxiety scores is shown in Figure 4. Higher dental anxiety scores were observed in university/postgraduate graduates compared to primary school graduates or individuals with no formal education ($p < 0.05$). However, no significant association was found among other educational levels ($p > 0.05$).

It was observed that individuals who visited the dentist regularly had significantly lower levels of dental anxiety ($p = 0.013$) (Figure 5).

Table 1. Age and gender distribution by group.

Group	Number	Number	Total	Age	
	of	of			
	Females	Males	Participants	(Mean ± SD)	
Gingival Health	32	18	50	33.63	±
				13.18 ^a	
Gingivitis	30	20	50	33.20	±
				12.09 ^a	
Periodontitis	25	25	50	44.50	±
				11.31 ^b	
p-value	0.334	0.334	1.0	0.006 ^{†*}	

[†] Chi-square test

[‡] ANOVA and Tukey HSD post-hoc test; groups with the same letter have no significant difference; abbreviations: SD: Standard Deviation

* $p < 0.05$

Table 2. Comparison of periodontal parameters by group.

Parameter	Gingival Health (Mean	Gingivitis (Mean ± SD)	Periodontitis (Mean ± SD)	p-value

	± SD)			
Probing	1.59 ± 2.10	± 3.49 ± 0.62 ^c	p =	
Depth	0.20 ^a	0.24 ^b		0.00*
Plaque	1.09 ± 1.92	± 2.25 ± 0.51 ^c	p =	
Index	0.29 ^a	0.50 ^b		0.00*
Gingival	0.92 ± 1.69	± 1.96 ± 0.43 ^c	p =	
Index	0.19 ^a	0.30 ^b		0.00*

‡ ANOVA and Tukey HSD post-hoc test; groups with the same letter have no significant difference; abbreviations: SD: Standard Deviation

* p<0.05

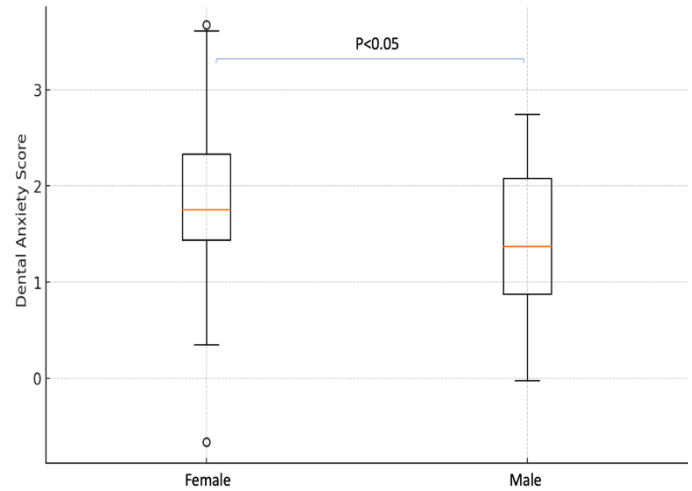


Figure 2. Comparison of dental anxiety scores by gender

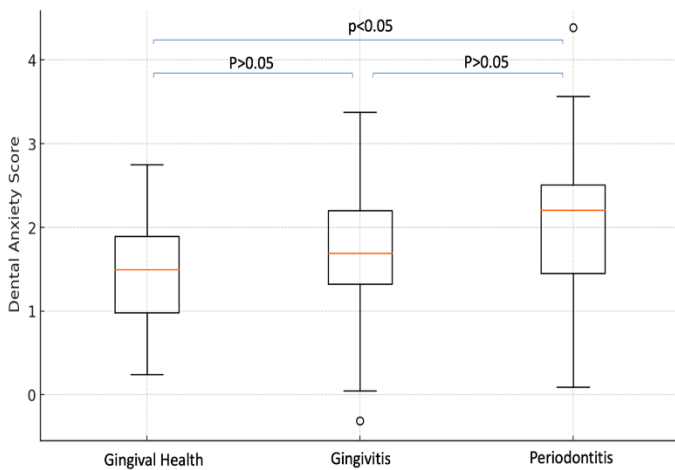


Figure 1. Comparison of dental anxiety scores by periodontal health status.

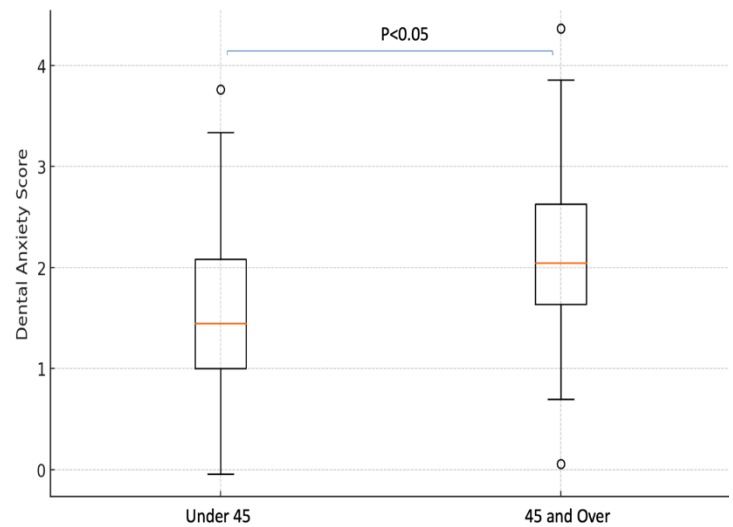


Figure 3. Comparison of dental anxiety scores by age group (under 45 vs. over 45)

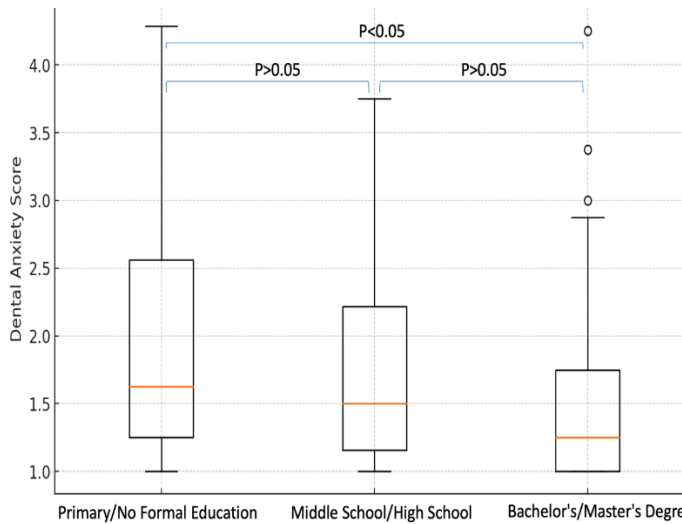


Figure 4. Relationship between educational level and dental anxiety scores.

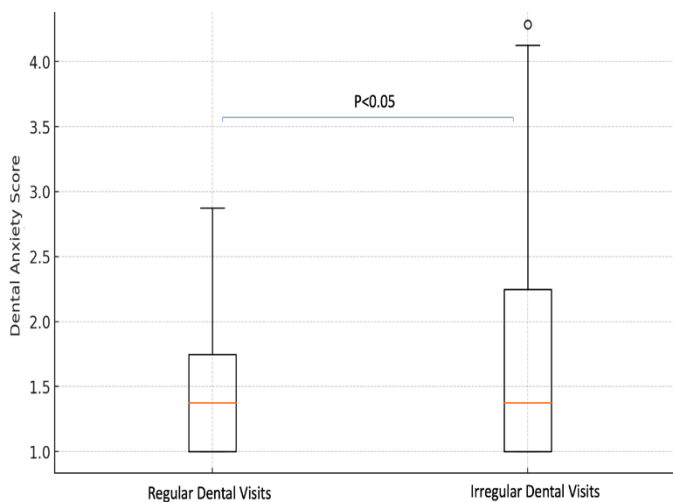


Figure 5. Relationship between frequency of dental visits and dental anxiety scores

DISCUSSION

This study aimed to evaluate dental anxiety in patients presenting to the Periodontology clinic using the IDAF-4C questionnaire. The findings of the current study indicate that dental anxiety levels are higher in patients with periodontitis compared to those with healthy gingiva. Additionally, it was observed that females had higher dental anxiety scores than males.

In a cross-sectional study conducted by Goh et al. on individuals with periodontitis, the effects of depression, anxiety, and stress on the severity of periodontitis and

oral health-related quality of life were evaluated, revealing a relationship between clinical attachment levels and anxiety (14). Similarly, an observational cross-sectional study by Gisler et al. examined the association between oral conditions and aspects of health-related quality of life in a population in Switzerland with dental treatment needs, showing that increased dental anxiety was associated with impaired oral health-related quality of life (15). Another study reported a link between dental anxiety and poor dental and periodontal health (4). Wisloff et al. found that military recruits with dental fear were characterized by more oral health problems compared to those without dental fear (16). Consistent with these studies, our study also observed higher levels of dental anxiety in individuals with periodontitis.

The impact of gender on dental anxiety has been demonstrated in several studies, with findings suggesting that females are more prone to dental anxiety (17, 18). Similarly, in this study, female patients exhibited significantly higher dental anxiety levels compared to males. This phenomenon is often attributed to differences in pain perception or pain thresholds and psychological differences between the genders (19).

Most studies examining the relationship between age and dental anxiety suggest that dental anxiety levels tend to decrease as individuals age (9, 20, 21). However, in our study, higher levels of dental anxiety were observed in individuals over 45. This may be influenced by the higher mean age of participants in the periodontitis group. Additionally, fear of pain, tooth loss, and the negative impact of poor dental health on overall well-being may contribute to increased anxiety levels in this demographic (22).

Educational status is considered a determinant factor in predicting a patient's capacity for anxiety and their potential psychological response to ongoing medical treatment (23). Therefore, it is expected that highly educated patients would exhibit less dental anxiety compared to those with lower education levels. Ragnarsson (8), in a study conducted on a population in Iceland, suggested that individuals with higher educational levels had significantly lower dental anxiety and fear during dental visits, as well as a lower incidence of total edentulism. A study by Eroglu et al. (24) revealed that a patient's level of education and culture were more influential in the development of dental anxiety and fear than their economic status. Similarly, our study found that individuals with undergraduate and postgraduate degrees had lower dental anxiety compared to primary school graduates and those with no formal education.

This finding supports the impact of educational level on dental anxiety and suggests that higher education may reduce anxiety levels due to greater knowledge and awareness of dental health.

Due to its cross-sectional design, this study does not allow for establishing causal relationships, and its single-center nature limits the generalizability of the results. Additionally, the reliance on self-reported data from participants increases the risk of bias. Future multi-center, large-scale studies examining factors influencing dental anxiety would provide more comprehensive insights on this topic.

In this study, it was observed that dental anxiety levels were higher in individuals with periodontitis, and this condition may be associated with demographic factors such as gender, age, and education. The findings suggest that females tend to experience higher levels of anxiety compared to males, and that dental anxiety levels may decrease with increasing education levels. These findings indicate that considering demographic factors in the development of strategies to reduce dental anxiety may be beneficial for improving periodontal health.

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Author contributions: Z.T.E conceived the ideas, collected the data, analysed the data, and led the writing.

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