





Self-Reported Periodontal Disease and its Association with Dental Anxiety in Lagos, Nigeria

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ABSTRACT

Objective: To determine the relationship between dental anxiety and self-reported periodontal status.

Material and Methods: The study was conducted among 263 patients at the Family Medicine Clinic of the Lagos State University Teaching Hospital (LASUTH), Ikeja, Lagos, Nigeria. Self-assessed gingival and periodontal disease was measured using the validated periodontal disease self-report surveillance questionnaire. The Modified Dental Anxiety Scale (MDAS) was used for evaluating dental anxiety. Student's t-test was used to test for association between categorical variables. P-value < 0.05 was considered to be statistically significant. **Results:** Seventy-seven (29.3%) participants had high dental anxiety, while 49 (18.6%) had very high dental anxiety. The prevalence of periodontal disease was higher among those with very high dental anxiety (77.6%), while female respondents had a significantly higher proportion of self-reported periodontitis (34.1%). There was a significantly higher prevalence of very high dental anxiety among respondents who had never visited the dentist (23.2%). Similarly, females (19.4%), middle-class respondents (30.8%), and those with a primary level of school education (23.5%) had a higher prevalence of high dental anxiety, even though the association was not significant. **Conclusion:** The prevalence of self-reported periodontal disease among the respondents with very high dental anxiety was higher than in those with high dental anxiety and those without dental anxiety, but the difference was not significant.

Keywords: Dental Anxiety; Oral Health; Periodontal Diseases; Self Report.

Introduction

Dental anxiety and dental fear refer to strong negative feelings associated with dental treatments, which affect a wide proportion of the population, thus constituting a significant public and oral health issues [1]. Dental fear is considered to be aroused by a real, immediately present, specific stimulus (e.g., needles, drilling), whereas in dental anxiety, the cause is unclear, ambiguous, and cannot be readily ascertained [2,3]. The reported prevalence of dental anxiety among Nigerians varied from as low as 7% to as high as 48.6%. For example, a rate of 13.6% was found among primary school teachers in Tanzania, while studies from Ghana, India, and Saudi Arabia reported a high prevalence of 47.3%, 46%, and 51.6%, respectively [4,5]. Dental anxiety constitutes a major reason why individuals avoid dental consultations and put off appointments as well as exhibit poor compliance [6]. In addition, dentally anxious patients avoid periodontal preventive measures and exhibit poor compliance, which culminates in deteriorating periodontal health [7]. One recent study indicated that 25% of Nigerian population avoided dental treatment except when they were symptomatic and mostly presented with pain [8].

Periodontal diseases are a group of lesions affecting tissues surrounding and supporting the teeth and are among the most common diseases in mankind [9]. The key presentations of periodontitis in the early stages are gingival bleeding, the gingival margin's recession, halitosis and in advanced disease, hypermobility, migration, and tooth loss resulting in impaired oral function, esthetics, and quality of life. In the Nigerian population, the prevalence was very high: 94.4% [9] and 87% [10]. Untreated gingivitis may progress to periodontitis, the severe forms of which often result in tooth loss. Severe periodontitis is said to contribute about 15% to 30% to tooth loss, which negatively affects the quality of life of an individual and is related to poorer general health in adults [1]. Moreover, periodontal disease influences the risk for some life-threatening systemic conditions like diabetes and cardiovascular diseases, as well as adverse pregnancy outcomes [11]. Thus, to effectively prevent and control periodontal diseases, it is very important for individuals to recognize early signs and symptoms [12].

The ability of dental anxiety to cause avoidance behaviours towards dental treatment with resultant impairment in periodontal health and oral health related quality of life (OHRQoL) makes it necessary to study how this very important factor affects the periodontal health of our people. More so, most studies [13,14] from this environment concentrated on measuring the degree of dental anxiety. Dentally anxious patients avoid periodontal preventive measures and exhibit poor compliance, culminating in deteriorating periodontal health and impaired oral health related quality of life (OHRQoL).

Clinically based full-mouth evaluation is considered the gold standard for surveying periodontitis and determining its prevalence and screening of periodontitis in the dental office [15,16]. An alternative method to detect periodontitis associated symptoms that could target a larger population outside dental offices is self-reported instruments. Self-report is an efficient, more attainable and accepted means of assessing sociodemographic information, population characteristics, risk factors, behaviors, and diseases but has rarely been used for periodontal disease screening [17]. Self-reported measures could facilitate the screening of periodontitis in a larger population and, eventually, the development of state and local public oral health or education programs [18]. They can also collect information about perceived periodontal alterations, oral hygiene habits, visible roots, tooth mobility, bleeding gums, gum swelling, tooth migration, tooth loss and Halitosis [17,19,20].

Due to the absence of publications on self-reported periodontal status in Lagos state and studies aiming to correlate its occurrence with dental anxiety, this study aims to determine the relationship between dental anxiety and self-reported periodontal status.

Material and Methods

Study Setting

The study was conducted at the Family Medicine Clinic (FMC), Lagos State University Teaching Hospital (LASUTH), Ikeja, Lagos, Nigeria. LASUTH is a state government-owned tertiary hospital located in Ikeja, the capital city of Lagos State, South-western region, which evolved from an existing general hospital in July 2001. The hospital is situated in Ikeja Local Government Area, one of the most populous local governments in the state. LASUTH is the recipient tertiary hospital for the 26 general hospitals in the state and its central location. The FMC receives over 10,000 patients of all ages and economic groups per month. It is attended by residents of Lagos state and its environs from varying economic and educational levels.

Sampling and Study Design

This was a cross-sectional survey. The formula $n = Z^2 P(1 - P)/d^2$ was used to calculate the sample size for this study, where n = sample size, Z = Z statistic for a level of confidence, P = expected prevalence or proportion and d = level of precision. For this study, prevalence (P) was assumed to be 19.2%, prevalence of dental anxiety from a previous study [21]: $Z = 1.96$ corresponding to 95% confidence level; $P = 19.2\% = 0.192$; $d = 5\% = 0.05$; $n = 1.96^2 \times 0.192 \times (1 - 0.192)/0.05^2 = 3.84 \times 0.192 \times 0.808/0.0025 = 238.3$ giving approximately 238. Putting non-response rate at 10%, the minimum sample size for this study was $238 + 23.8 = 261.8 = 262$. Two hundred and sixty-three (263) participants were recruited to participate in the study.

Study Participants

The study sample was recruited consecutively from adult patients who visited the FMC within 3 months (January 2020-March 2020).. The following inclusion criteria were adopted: a) 18 years of age and above; b) Presence of at least twenty teeth in the mouth; and c) Ability to complete the questionnaire independently. Regarding the exclusion criteria, the following were established: a) Use of anxiolytic or sedative one month prior to the survey; b) Mentally challenged patients and history of psychiatric co-morbidity, and c) Refusal to give informed consent.

Measures

Sociodemographic data were recorded using a self-administered questionnaire. Self-assessed periodontal disease was measured using the validated periodontal disease self-report surveillance questionnaire, [9] designed by the periodontal disease surveillance workgroup, convened by Division of Oral Health, Centre for Disease Control and American Academy of Periodontology. An additional question, "Do your gum bleed when you brush", which has been used previously, was included in the questionnaire to assess self-report bleeding, which indicates the presence of gingival inflammation [21]. The Modified Dental Anxiety Scale (MDAS), which was validated and found suitable for use in Nigerians, was used to evaluate dental anxiety [14]. The MDAS was developed by adding question related to local anesthetic injection to the existing DAS inventory. The response options were categorized into five subcategories: not anxious, slightly anxious, fairly anxious, very anxious, and extremely anxious, to give the scale a quantitative approach, with a score ranging from a minimum of 5 to a maximum of 25.

Ethical Clearance

Permission to carry out the research was sought from the Research and Ethical Committee of Lagos State University Teaching Hospital (No. LREC-06/10/1313), and written approval was obtained. Verbal and written consent was also obtained after the aim and objectives had been explained.

Study Procedures

All consented participants completed the questionnaire, which incorporated the periodontal disease self-report surveillance and MDAS components as well their socio-demographic characteristics. Socio-demographic features including gender, age, education, marital status as well as a pattern of dental clinic attendance were also obtained.

The responses to the CDC-APP self-report questionnaire were grouped into two positive and negative responses. For the question “Overall, how would you rate the health of your gums?” The response “Excellent”, “Very good” and “Good” were regarded as positive, while “Fair”, “Poor” and “I don’t know” were regarded as negative. The remaining questions and the question “Do your gums bleed when you brush”; “Yes” was regarded as positive response, while “No” and “I don’t know” were negative.

Participants with a positive response to questions 3, 4, 5 and 6 were regarded as having periodontitis, while those with negative responses but positive responses to the question “Do you bleed when you brush were grouped as having gingivitis [19,21]. A negative response to all these was regarded as not having periodontal disease.

Statistical Analysis

IBM SPSS Statistics 21 (IBM Corp., Armonk, NY, USA) was used to analyse the data. This included the computation of means, standard deviations, and percentage frequencies for various variables involved. Mean and standard deviation was calculated for quantitative variables. The Student’s t-test was used to test for association between variables. Multivariable logistic regression analysis was done to determine odds ratios and confidence intervals. P-value < 0.05 was considered to be statistically significant.

Results

A total of 263 patients participated in the survey. The majority of the study participants were female (64.6%), and the highest proportion was of lower socio-economic class (67.7%), had a secondary level of education (42.2%) and were aged between 15-25 years with a mean age of 32.69 ± 15.87 years. In addition, the majority of the respondents (73.8%) had never visited the dentist before and brushed only once daily (77.2%) (Table 1).

Table 1. Socio-demographic parameters and oral health practices of participants.

Variables	N	%
Gender		
Male	93	35.4
Female	170	64.6
Age (Years)		
15-25	139	52.9
26-35	37	14.1
36-45	25	9.5
46-55	31	11.8
56-65	19	7.2
66-75	11	4.2

76-85	1	0.4
Educational Level		
Primary	34	12.9
Secondary	111	42.2
Tertiary	99	37.6
Post-Tertiary	19	7.2
Socioeconomic Class		
Upper	72	27.4
Middle	13	4.9
Lower	178	67.7
Frequency of Dental Visit		
Every 6 Months	8	3.0
Occasionally	28	10.6
When I Have Pain	33	12.5
Never Visited	194	73.8
Alcohol Intake		
Yes	55	20.9
No	208	79.1
Cigarette Smoking		
Yes	6	2.3
No	257	97.7
Use of Dental Floss		
Yes	45	17.1
No	218	82.9
Frequency of Tooth-Brushing		
Once	203	77.2
Twice or More	58	22.0
Occasionally	2	0.8

The distribution of MDAS scores and their relationship with periodontal status is presented in Table 2. Seventy-seven (29.3%) participants had High Dental Anxiety, while 49 (18.6%) had Very High Dental Anxiety. The mean MDAS score of the study participants was 14.33 ± 5.10 and a higher mean was recorded among female patients (14.38 ± 5.20) and those with periodontal disease (14.44 ± 5.13). There was a significant association between self-reported periodontal status and gender, with female respondents having a significantly higher proportion of periodontitis (34.1%). The prevalence of periodontal disease was higher among those with very high dental anxiety (77.6%) than those without dental anxiety (73%), but the difference is not significant ($p=0.658$).

Table 2. The distribution of self-report periodontal disease, dental anxiety, and their relationship.

Variables	Male N (%)	Female N (%)	Total N (%)	p-value
Self-Report Periodontal Status				
Healthy	22 (23.7)	49 (28.8)	71 (27.0)	0.017*
Gingivitis	22 (23.7)	63 (37.1)	114 (43.3)	
Periodontitis	20 (21.5)	58 (34.1)	78 (29.7)	
Mean MDAS Score				
Male		14.33 ± 5.10		
Female		14.24 ± 4.92		
Cases without Periodontal Disease		14.38 ± 5.20		
Cases with Periodontal Disease		14.04 ± 5.03		
		14.44 ± 5.13		
Level of Dental Anxiety (DA)				
	No (0-14)	High (15-19)	Very High (>19)	
Self-Report Periodontal Disease				
Absent	37 (27.0)	23 (29.9)	11 (22.4)	0.658
Present	100 (73.0)	54 (70.1)	38 (77.6)	
Total	137 (52.1)	77 (29.3)	49 (18.6)	

Self-Report Periodontal Status				
Healthy	37 (27.0)	23 (29.9)	11 (22.4)	0.793
Gingivitis	58 (42.3)	31 (40.2)	25 (25.5)	
Periodontitis	42 (30.7)	23 (29.9)	13 (26.6)	
Total	137 (52.1)	77 (29.3)	49 (18.6)	

Table 3 displays the responses to CDC-AAP recommended items. The highest proportion of respondents (79.4%) did not think or know if they might have periodontal disease, and 35.4% rated their overall periodontal health as good. However, most of them had never experienced mobile teeth (75.3%) nor receding gums (59.7%). In addition, most do not use dental floss (82.9%) or mouthwash (77.2%).

Table 3. Responses to CDC-AAP recommended items.

Questions	N (%)
Q1 - Do you think you might have gum disease?	
Yes	54 (20.6)
No	114 (43.3)
I don't know	95 (36.1)
Q2 - Overall, how would you rate the health of your teeth and gums?	
Excellent	15 (5.7)
Very good	48 (18.3)
Good	93 (35.4)
Fair	56 (21.3)
Poor	22 (8.4)
I don't Know	29 (11.0)
Q3 - Have you ever had treatment for gum disease, such as scaling and root planing, sometimes called "deep" cleaning?	
Yes	16 (6.1)
No	234 (89.0)
I don't know	13 (4.9)
Q4 - Have you ever had any teeth become loose on their own, without an injury?	
Yes	55 (20.9)
No	198 (75.3)
I don't know	10 (3.8)
Q5 - Have you ever been told by a dental professional that you lost bone around your teeth?	
Yes	5 (1.9)
No	228 (86.7)
I don't know	30 (11.4)
Q6 - During the past 3 months, have you noticed a tooth that doesn't look right or getting longer or presence of receding	
Yes	23 (8.7)
No	157 (59.7)
I don't know	83 (31.6)
Q7 - Aside from brushing your teeth with a toothbrush, in the last 7 days, how many times did you use dental floss or any other device to clean between your teeth?	
0 time/week	218 (82.9)
1 to 7 times/week	45 (17.1)
Q8 - Aside from brushing your teeth with a toothbrush, in the last 7 days, how many times did you use mouthwash or other dental rinse product?	
0 time/week	203 (77.2)
1 to 7 times/week	60 (22.8)
Q9 - Do your gums bleed when you brush your teeth?	
No	106 (40.3)
Sometimes	148 (56.3)
Always	9 (3.4)

Table 4 presents the bivariate association between socio-demographic variables and distribution of dental anxiety among study participants. There was a significantly higher prevalence of very high dental

anxiety among respondents who had never visited the dentist (23.2%) ($p=0.026$). Similarly, females (19.4%), middle-class respondents (30.8%), and those with a primary level of school education (23.5%) had a higher prevalence of high dental anxiety, even though the association was not significant.

Table 4. Bivariate association between socio-demographic variables and distribution of dental anxiety.

Variables	Level of Anxiety			p-value
	No (0-14) N (%)	High (15-19) N (%)	Very High/Dental Phobia (>19) N (%)	
Gender				
Male	50 (53.8)	27 (29)	16 (17.2)	0.888
Female	87 (51.2)	50 (29.4)	33 (19.4)	
Age Group (Years)				
15-25	74 (53.2)	42 (30.2)	23 (16.6)	0.646
26-35	20 (50.1)	8 (21.6)	9 (24.3)	
36-45	16 (64.0)	5 (20.0)	4 (16.0)	
46-55	11 (35.5)	14 (45.2)	6 (19.3)	
56-65	9 (47.4)	6 (31.6)	4 (21.0)	
66-75	6 (54.5)	2 (18.2)	3 (27.3)	
76-85	1 (100.0)	0 (0.0)	0 (0.0)	
Socioeconomic Class				
Upper	40 (55.5)	20 (27.8)	12 (16.7)	0.755
Middle	5 (38.4)	4 (30.8)	4 (30.8)	
Lower	92 (51.7)	53 (29.8)	33 (18.5)	
Educational Level				
Primary	19 (55.9)	7 (20.6)	8 (23.5)	0.082
Secondary	53 (47.8)	32 (28.8)	26 (23.4)	
Tertiary	51 (51.5)	36 (36.4)	12 (12.1)	
Post-tertiary	14 (73.7)	2 (10.5)	3 (15.8)	
Frequency of Dental Visits				
Every 6 Months	6 (75.0)	2 (25.0)	0 (0.0)	0.026*
Occasionally	14 (50.0)	11 (39.3)	3 (10.7)	
When I Have Pain	24 (72.7)	8 (24.2)	1 (3.1)	
Never Visited	93 (47.9)	56 (28.9)	45 (23.2)	

The multivariable regression analysis shows variables with higher odds of association with periodontal disease. Frequency of toothbrushing (aOR=1.305; CI 0.678-2.513); cigarette smoking (aOR=1.596; CI 0.162-15.688); non-use of mouthwash (aOR=1.616; CI 0.803-3.249); non-use of dental floss (aOR=1.393; CI 0.654-2.968); and severe MDAS score category (aOR=1.026; CI 0.901-1.168) were associated with higher odds of periodontal disease after controlling for other covariates even though the associations were not significant. The odds were not significantly higher in different age categories nor affected by socioeconomic class, access to dental care and educational attainment (Table 5).

Table 5. Logistic regression model.

Variables	S.E.	Wald	p-value	aOR	95% C.I.	
					Lower	Upper
Age Group	0.115	1.300	0.254	0.877	0.700	1.099
Marital Status	0.222	1.545	0.214	1.317	0.853	2.034
Low Educational Attainment	0.244	1.509	0.219	0.741	0.460	1.195
Low-Socioeconomic Class	0.222	0.070	0.791	0.943	0.610	1.457
Low Frequency of Tooth Brushing	0.334	0.633	0.426	1.305	0.678	2.513
Low Frequency of Dental Visit	0.320	0.057	0.811	0.926	0.495	1.734
Last Dental Visit	0.238	2.090	0.148	0.709	0.444	1.130
Alcohol Intake	0.362	0.325	0.569	0.813	0.400	1.655
Cigarette Smoking	1.166	0.161	0.689	1.596	0.162	15.668

Level of Anxiety	0.439	0.003	0.955	0.975	0.413	2.305
High MDAS Category	0.066	0.150	0.699	1.026	0.901	1.168
Type of Dental Treatment	0.105	2.426	0.119	1.178	0.959	1.448
Non-use of Mouthwash	0.356	1.811	0.178	1.616	0.803	3.249
Non-use of Dental floss	0.386	0.737	0.391	1.393	0.654	2.968
Constant	1.777	0.223	0.637	2.315		

Discussion

Although bacterial pathogens are required to initiate periodontal disease, their presence alone is not sufficient to cause tissue destruction. The etiological importance of biological and behavioral risk factors for periodontal diseases, such as smoking, alcohol use, socioeconomic status, advancing age, oral hygiene, and systemic diseases like diabetes mellitus, has already been established [22,23]. However, some observational studies have identified other factors such as stress, depression, and anxiety as risk factors for periodontal diseases [24]. Seventy-seven (29.3%) of our study participants had high dental anxiety, while 18.6% had very high dental anxiety. The mean MDAS score of the study participants was 14.33 ± 5.10 and was higher among female patients (14.38 ± 5.20). It has been postulated that women are more susceptible to perceived threats or danger and may describe their fears more openly, while men may be more emotionally stoic and hide their anxieties [25]. Nevertheless, some studies found no sex differences and mentioned cultural characteristics as a possible explanation [26,27].

A higher mean MDAS score was also recorded among those that reported the presence of periodontal disease (14.44 ± 5.13). Several researchers group dental phobias into situational and blood injection injury types of phobia [28,29]. Antilla et al. [30] found lower rates of tooth brushing and dental visits in anxious adults, even though these adults perceived their need for dental treatment. Anxiety related to dental treatment was associated with a lower frequency of tooth brushing and higher sugar consumption [31]. In addition, studies have reported an association between dental anxiety – a different anxiety disorder, although associated with general anxiety – and poor oral health and avoidance of oral health services [32,33]. Ng and Leung [34] examined dental fear and its relation to periodontal clinical attachment levels and oral health-related quality of life. Greater levels of dental care-related anxiety and fear were associated with lower clinical attachment levels. Increased dental fear levels were also related to poorer OHRQoL [34].

Furthermore, Peruzzo et al. [35] conducted a systematic review of the evidence on the influence of stress and psychological factors on periodontal disease. Of the 14 studies (seven case-control, six cross-sectional and one prospective clinical trial) meeting inclusion criteria for the review, the majority (57%) reported a positive relationship between stress/psychological factors and periodontal disease. Another 28.5% of the studies observed a positive relationship between some characteristics of stress and periodontal disease, demonstrating that most of the work published to date examining this relationship has indeed found significant associations [35].

There was a significant association between self-reported periodontal status and gender, with female respondents having a significantly higher proportion of periodontitis (34.1%). Although compared with women, men appear at greater risk for periodontitis [36]. In addition, women have a higher perceived susceptibility to periodontal disease than men [37]. It is thus noteworthy that women reported periodontal bleeding and swelling symptoms more frequently than men.

In our study, the highest proportion of respondents (209, 79.4%) did not think or know if they might have periodontal disease and 35.4% rated their overall periodontal health as good. Most of them had never

experienced mobile teeth (75.3%) nor receding gums (59.7%). The majority of the respondents do not use dental floss (82.9%) nor mouthwash (77.2%). Thus, question 1 puts the prevalence of a self-reported periodontal disease among the respondents as 20.6%, which is similar to that of a previous study in Nigeria that assessed self-reported periodontal disease [9]. The major impediment to periodontal disease surveillance is the cost and other resources required to collect clinical data, which are the gold standard for determining periodontal disease prevalence. A possible alternative to clinical periodontal assessment is self-report, a method widely used to assess the prevalence of various medical conditions, as well as health-related behaviors and characteristics in a population. The use of valid self-report measures of periodontal diseases can be considered a low-cost alternative to facilitate epidemiological studies and allow for surveillance of the periodontal condition of the population. Since self-reported periodontal health status may be explained by the same factors that are associated with clinical periodontal health status, it has been suggested that it may be a useful measure for monitoring periodontal health in developing and resource-limited settings, where logistics and the costs associated with a clinical oral survey may make such a survey non-viable [38].

There was a significantly higher prevalence of very high dental anxiety among respondents who had never visited the dentist (23.2%). The cancellation, avoidance, or postponement of dental visits is common among anxious and vulnerable individuals. There is strong evidence that dental anxiety is associated with dental attendance; it has been reported that individuals with higher dental anxiety tend to visit the dentist irregularly [39], which in turn may lead to a deterioration in oral health. Studies have demonstrated that dental anxiety is associated with poor self-reported and clinically assigned oral health, more decayed and missing teeth, fewer filled teeth and worse periodontal health [39] which may explain the higher prevalence recorded among respondents with very high dental anxiety in this study. Armfield et al. [40], hypothesized that “people with high dental fear are more likely to delay treatment, leading to more extensive dental problems and symptomatic visiting patterns which feedback into the maintenance or exacerbation of existing dental fear”.

The multivariable regression analysis further showed higher odds of association with periodontal disease with lower frequency of toothbrushing, cigarette smoking, not using mouthwash, not using dental floss and severe dental anxiety. The odds were, however, not higher in different age categories nor affected by socioeconomic class, access to dental care and educational attainment. This shows that even though our study had many young respondents from low socioeconomic classes who infrequently attended the dental clinic, these variables had no confounding effect on the independent association between dental anxiety and periodontal disease. Dental anxiety is a multidimensional construct that consists of somatic, cognitive, and emotional elements and describes a general state that is not stimulus specific. This trait in an individual may result in avoidance of dental treatment. The relationship between periodontal illness and the psychological predisposing factors is well-established in specific conditions, like, Acute Necrotizing Ulcerative Gingivitis (ANUG), which is significantly associated with high levels of trait anxiety, depression, and other emotional disturbances [41].

Concerning other possible factors influencing periodontal disease, evidence is emerging that chronic stress, depression, and anxiety may negatively influence disease progression [42]. Although emotional disorders may increase the risk of chronic periodontitis, the mechanism remains unclear. On the one hand, the altered emotional status would change the health-related behaviors, such as oral hygiene, oral health examination, smoking, and diet, which might increase the risk of periodontitis. On the other hand, the emotional disorder have been hypothesized to deteriorate the already damaged periodontal tissues through





comprehensive immunosuppression or elevated susceptibility to inflammation. One potential hypothesis is that the activated hypothalamic-pituitary-adrenal axis in anxiety and depression results in a continued release of glucocorticoids, leading to inflammation [43]. During the activation of the HPA axis, the T-helper phenotype of a subject is influenced by the inhibition of IL-12 and the stimulation of IL-10 by the macrophages. As a result, the periodontal tissues may be more vulnerable to periodontal pathogens in sites with periodontal inflammation, and thus such a condition could lead to the localized destruction of periodontal tissues [44].

Some limitations can be observed in this study. First, there is potential underreporting in self-reported surveys, as participants are subject to recall and social desirability biases. Secondly, other factors associated with the use of oral health services or tooth loss, such as health insurance, dental caries, daily hygiene routines and access to dental services, could confound the responses.

Conclusion

The prevalence of self-reported periodontal disease among the respondents with very high dental anxiety was higher than those with high dental anxiety and those without dental anxiety, but the difference was not significant. The use of valid self-report measures of periodontal diseases can be considered a low-cost alternative to facilitate epidemiological studies and allow for surveillance of the periodontal condition of the population.

Authors' Contributions

MES		https://orcid.org/0000-0003-3231-0970	Conceptualization, Methodology, Formal Analysis, Investigation, Data Curation, Writing - Original Draft, Writing - Review and Editing and Visualization.
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All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

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Conflict of Interest

The authors declare no conflicts of interest.

Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

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