

Relationship of Anxiety and Depression in Patients with Chronic Periodontitis

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Objectives Many researchers have attempted to link the current concepts of anxiety and depression to periodontal disease. This study aimed to compare the level of anxiety and depression in Iranian patients with chronic periodontitis (CP) and periodontally healthy controls.

Methods Fifty CP patients and 50 periodontally healthy controls participated in this study according to our eligibility criteria. Periodontal clinical examination was performed using a Williams probe. The clinical attachment loss (CAL), pocket probing depth (PPD) and bleeding on probing (BOP) were recorded for all teeth except for third molars. In order to psychologically assess the individuals, the Beck's Depression Inventory (BDI) and the Beck's Anxiety Inventory (BAI) were used. The mean scores of BAI and BDI were compared between the two groups using the Student t-test.

Results The mean age of participants was 44.86±8.07 years. The mean score of BDI was 13.58±8.35 in periodontally healthy controls and 25.62±13.01 in CP patients. The mean score of BAI was 9.9±5.65 in the control and 21.02±13.63 in the test group. The Student t-test revealed a significant difference between the two groups in total score of BDI and BAI (P<0.000). A significant correlation was noted between the BDI and age (P=0.027) but BAI had no significant correlation with age (P=0.245).

Conclusion According to the results of this study, the level of anxiety and depression in CP patients was higher than that in periodontally healthy controls in our study population.

Keywords Anxiety; Depression; Chronic Periodontitis

Introduction

Inflammatory change in tooth supporting structures including the gingiva and periodontium is a common condition that mainly occurs as the result of accumulation of dental plaque, which can lead to development of gingivitis or periodontitis. Gingivitis can remain for long without progression to periodontitis. It is a completely reversible condition given that the oral hygiene improves, and plaque and calculus are carefully eliminated. The reasons behind the progression of gingivitis to periodontitis have not been well elucidated. Similar to all opportunistic infections, it seems that the proliferation of pathogenic microorganisms, their invasiveness and more importantly the host immune response to infection (host defense mechanisms and immunity status) are the main factors determining the development of periodontitis.¹

Some chronic, recurrent diseases such as periodontal disease have periods of exacerbation. In other words, periodontitis has a progressive course and there may be phases of exacerbation, which would trigger the immune response and are associated with increased inflammation.¹

The possible role of anxiety and depression in exacerbation cycles of periodontal disease has been under psychoneuroimmunological investigations for some time. Several definitions are available for anxiety and depression

and they are believed to be implicated in development of many conditions. Many researchers have attempted to link the current concepts of anxiety and depression to periodontal disease.²⁻⁵ Considering the available literature regarding the relationship of anxiety and depression and periodontitis, the possible mechanisms through which, depression and anxiety can affect the course of periodontal disease are believed to be hormonal. Also, neurological changes due to psychological stress affecting the immune system, changed oral hygiene behaviors, and unhealthy habits such as cigarette smoking can create a vicious cycle and lead to progression of periodontal inflammation.^{6,7}

This study aimed to compare the level of anxiety and depression in Iranian patients with chronic periodontitis (CP) and periodontally healthy controls.

Materials and Methods

This case-control study was conducted in the School of Dentistry of Shahid Beheshti University of Medical Sciences in 2018. The study was approved by the committee of medical ethics of Shahid Beheshti University of Medical Sciences (IR.SBMU.RIDS.REC.1395.335). Fifty CP patients and 50 periodontally healthy controls participated in this study according to our eligibility criteria. Medical history of patients and their sociodemographic

information such as age, sex, marital status, level of education, frequency of tooth brushing and cigarette smoking were recorded. The inclusion criteria were age between 35 and 60 years and affliction with CP. Participants with a history of psychological disorder, periodontal therapy within the past 3 months, systemic conditions affecting the results of dental examination of patients (such as uncontrolled diabetes mellitus, HIV infection, and cardiovascular diseases), and those taking immunosuppressive medications or calcium channel blockers were excluded.

Periodontal clinical examination was performed using a Williams probe. The clinical attachment loss (CAL), pocket probing depth (PPD) and bleeding on probing (BOP) were recorded for all teeth except for third molars. The periodontal parameters were measured at 6 points around each tooth (mesiobuccal, buccal, distobuccal, mesiolingual, lingual and distolingual). The test group included patients between 35 and 60 years, having a minimum of 20 teeth and having CP causing periodontal destruction with $CAL \geq 4$ mm, positive BOP in at least 10 teeth and $PPD \geq 6$ mm in a minimum of five teeth. The control group included healthy subjects between 35 and 60 years, having a minimum of 20 teeth and being periodontally healthy according to the measured periodontal parameters.

In order to psychologically assess the individuals, the Beck's Depression Inventory (BDI)⁸ and the Beck's Anxiety Inventory (BAI)⁹ were used. These tools are commonly used for screening and to determine the occurrence and severity of depression and psychological symptoms. The BDI is a self-reported scale that includes 21 items covering symptoms such as sadness, pessimism, worthlessness, anhedonia, thoughts of death, irritability and isolation. Each item is scored 0 to 3. The scores are summed up. The total score <10 indicates absence of depression, scores 11 to 16 indicate mild depression, scores 31 to 40 indicate severe depression and scores >40 indicate very severe depression.⁸

The BAI is a self-reported scale that includes 21 items describing the symptoms of anxiety, and each item is scored based on a 4-point scale. A final score <7 indicates minimum level of anxiety, scores 8-15 indicate mild anxiety, scores 16-25 indicate moderate anxiety and scores >26 indicate severe anxiety.⁹

The mean scores of BAI and BDI were compared between the two groups using the Student t-test. The Pearson's correlation test was used to determine the correlation between BAI and BDI scores with age. Level of significance was set at 0.05.

Results

Of 100 participants, 47 (47%) were males and 53 (53%) were females. The mean age of participants was 44.86 ± 8.07 years (range 35 to 60 years). The mean age of participants was 45.92 ± 8.3 years in CP patients and 43.8 ± 7.8 years in

the control group. CP group consisted of 23 males (46%) and 27 females (54%); whereas, there were 24 males (48%) and 26 females (52%) in the control group. There were no significant differences in age and gender between the two groups ($P=0.841$ and $P=0.348$, respectively).

The mean score of BDI was 13.58 ± 8.35 (range 0 to 38) in periodontally healthy controls and 25.62 ± 13.01 (range 0 to 50) in CP patients. The Student t-test revealed a significant difference between the two groups in total score of BDI ($P<0.000$; Table 1).

Table 1- Measures of central dispersion for the BDI score in the test and control groups

Group	Mean \pm SD	Max	Min	P-value
Control group	13.58 \pm 8.35	0	38	P<0.000
Test group	25.62 \pm 13.01	0	50	

The mean score of BAI was 9.9 ± 5.65 (range 0 to 27) in the control and 21.02 ± 13.63 (range 0 to 57) in the test group. The Student t-test revealed a significant difference in the total score of BAI between the two groups, and the level of anxiety in CP patients was significantly higher than that in healthy controls ($P<0.000$, Table 2).

Table 2- Measures of central dispersion for the BAI score in the test and control groups

Group	Mean \pm SD	Max	Min	P-value
Control group	9.5 \pm 5.65	0	27	P<0.000
Test group	21.02 \pm 13.63	0	57	

A significant correlation was noted between the BDI and age ($P=0.027$) but BAI had no significant correlation with age ($P=0.245$).

Discussion

Psychosocial stresses can play an important role in periodontal disease if they negatively affect the host immune response. It seems that anxiety and depression change the behavior of tissue in response to local stimuli and play a role in development of periodontal disease as such. In general, interactions between the psychological status, immune system, central nervous system and endocrine system play a role in health status of individuals.^{10, 11}

Our study assessed the relationship of two psychological disorders with CP. CP patients and healthy controls had significant differences with each other with respect to both conditions ($P<0.000$). As shown in previous studies, the level of anxiety and depression in periodontitis patients is higher than that in periodontally healthy controls.^{10, 12-16} Evidence shows that the main mechanisms through which, psychological factors increase the susceptibility of patients to gingivitis and periodontitis include behavioral mechanisms and unhealthy lifestyle such as poor oral hygiene, bad nutritional habits and cigarette smoking. Direct pathophysiological effects on host immune response due to interactions between psychological factors and periodontal disease are in need of further investigations.^{6, 7} Behavioral responses of individuals to the progressive

course of periodontal disease are categorized as another group of psychosocial stressors.¹¹ Evidence shows that patients with high level of stress and anxiety are trapped in a vicious cycle, and plaque accumulation in them further aggravates the disease.¹⁰ Roberts et al.¹³ and Moss et al,¹⁷ in an in vitro study evaluated the effects of catecholamines on subgingival plaque microorganisms and concluded that different microorganisms demonstrate variable growth responses to noradrenaline. Of the tested microorganisms, *Actinomyces naeslundii* (4.49%), *Eikenella* (3.43%) and *Campylobacter* (9.79%) showed increased proliferation. Change in the composition of subgingival plaque in response to changes caused by stress plays a critical role in the etiology and pathogenesis of periodontal disease.^{13, 17}

Patients with high levels of anxiety and depression experience higher frequency of gingival bleeding and have higher number of dental visits compared with normal individuals.¹¹ Moreover, anxiety and depression can cause physical problems, decrease the quality of life and cause periodontitis. Depression is suggested as a pathogenic factor responsible for development of periodontitis.¹⁶ Another study also confirmed aggravation of inflammation due to the presence of depression symptoms and physical problems.¹⁸ Obesity associated with anxiety is another cause of gingivitis and periodontitis. A considerable percentage of overweight women were shown to have higher number of teeth with PPD>6 mm and CAL>5 mm. Patients with a mean PPD of 3 mm and BOP >25% had higher dental anxiety and lower self-esteem.¹⁹ Overweight and obese individuals often have higher frequency of smoking, higher levels of depression and anxiety and lower level of life satisfaction.²⁰ Evidence shows that anxiety has

a direct correlation with increased PPD while satisfaction with life is correlated with higher frequency of dental flossing. Thus, it may be concluded that psychological factors have a correlation with periodontitis and body mass index.^{19, 20} On the other hand, some other studies failed to find a strong association between depression, anxiety and hopelessness with periodontitis. One possible reason may be the small sample size.^{21, 22} However, some others showed a significant correlation between the number of lost teeth and level of depression.²³

In our study, psychological factors were evaluated based on self-reports by patients. Previous studies have used various methods for assessment of the correlation of psychological factors and periodontitis, which may provide incorrect information or bias. Moreover, study populations, age, sex and level of education of patients as well as controlling for the potential confounders such as cigarette smoking and oral hygiene status are widely variable in studies and may explain the variability in the results.

Conclusion

According to the results of this study, the level of anxiety and depression in CP patients was higher than that in periodontally healthy controls in our study population. Future studies are required to find the mechanisms of involvement of these conditions in development of periodontal disease.

Conflict of Interest

Non Declared ■

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