Original Article

J Babol Univ Med Sci
22; 2020. P: 143-149

The Relationship between Depression and Periodontal Indices in the Elderly in Amirkola

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J Babol Univ Med Sci; 22; 2020; PP: 143-149

Received: Nov 20th 2019, Revised: Jan 10th 2020, Accepted: Feb 4th 2020.

ABSTRACT

BACKGROUND AND OBJECTIVE: Chronic periodontitis is a slow-growing inflammatory disease that often occurs in adults. In the elderly, periodontal indices may also change due to a number of psychological factors, such as depression and consequent changes in cortisol levels. Therefore, this study was performed to investigate the relationship between depression and periodontal indices in the elderly in Amirkola, Northern Iran.

METHODS: This case-control study, which is part of the second phase of the Amirkola Health and Ageing Project (AHAP) to investigate the health status of the elderly in this city, was performed on 300 elderly people. After examination, subjects were divided into two groups: periodontitis (n=100) and control (n=200). In both groups, the presence of depressive symptoms was assessed using the Geriatric Depression Scale (GDS), in which a score of 5 or higher is a sign of depression, and periodontal indices including OHIS and PDI were examined based on PDI≥4 periodontitis criterion. Then, the two groups were compared in terms of the association between periodontal indices and depression.

FINDINGS: In this study, 133 were female (44.3%) and 167 were male (55.7%). 35 patients (35%) in the case group and 61 patients (30.5%) in the control group had symptoms of depression. The mean GDS score in patients with periodontitis (3.70±3.68) was slightly higher than healthy individuals (3.49±3.40), but no significant correlation was observed between GDS and PDI. Old age, male gender, lower level of education and smoking were higher in patients with periodontitis, which was statistically significant only in smoking and level of education (p=0.042 and p=0.009, respectively). In this study, a positive and weak relationship was observed between age and PDI (r=0.19 and p=0.001).

CONCLUSION: The results showed that there is a relationship between periodontal indices and depression. Although it was not statistically significant, it is clinically noteworthy.

KEY WORDS: *Symptoms of Depression, Periodontitis, The Elderly.*

Please cite this article as follows:

Hozuri M, Khirkhah F, Hossieni SR, Baladi F, Mehryari M, Haji Mirza M, et al. The Relationship between Depression and Periodontal Indices in the Elderly in Amirkola. J Babol Univ Med Sci. 2020; 22: 143-9.

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[DOR: 20.1001.1.15614107.1399.22.1.18.0]
[DOI: 10.22088/jbums.22.1.143]

Introduction

Numerous mental disorders such as depression are associated with certain physical illnesses (1). The elderly population is growing faster than other age groups in the world. Due to the increased longevity and durability of natural teeth in each individual, the prevalence and severity of periodontal disease in the elderly is expected to increase worldwide (2). Research has shown that the most important mental illnesses of the elderly include depressive disorders, cognitive disorders, fear, addiction and suicide, respectively. Depression is known as one of the most common emotional issues in old age that endangers the mental and physical health of the elderly. This is one of the common causes of disability in the elderly and its prevalence is increasing (3).

Severe depression can start at any age. However, it is more common in the elderly and depression is more common in men after the age of 55 (4). Some researchers have shown a high prevalence of depression in people aged 55-64. However, another group reported the peak of depression in the age group of 60-69 years. Nevertheless, some studies have shown a lower prevalence of depression in the elderly (4). Depressed patients often have poor oral health due to disinterest in self-care, which increases the prevalence of the disease in this group of people. Salivary flow is reduced and the patient may suffer from dry mouth, increased rate of dental caries and periodontal disease (4).

A positive association has been reported between depression and oral diseases, especially caries, tooth loss and complete edentulousness in adults and the elderly (5). Periodontitis is the most common type of periodontal disease that is caused by the spread of the inflammatory process of the gums to the periodontal supporting tissues (6). Topical factors such as dental plaque are the most important factors affecting periodontitis, while other factors include systemic factors such as leukemia and diabetes, behavioral factors such as smoking and other possible risk factors such as heredity, stress, depression, etc. (7,8).

Chronic periodontitis is the most common form of periodontitis and a slow-growing inflammatory disease that often occurs in adults, but may also occur in children and adolescents. Psychological factors such as stress and depression are effective in the development of chronic periodontitis. A positive correlation has been reported between cortisol levels and periodontal indices and bone resorption and tooth loss (9). Various studies have been performed on the relationship between psychological disorders such as depression and periodontal status in recent years (10). In a meta-analysis reviewing 14 articles, Liu et al. found that emotional disorders and chronic periodontitis were significantly related (11). Nazir et al. in a review of the prevalence of periodontal disease and its association with systemic conditions, concluded that depressed individuals showed higher concentrations of cortisol in the gingival crevicular fluid and were less responsive to periodontal treatment (10). Kisely et al. in a systematic review concluded that there is no association between periodontal disease and psychological conditions such as depression (1). Due to inconsistent results and since no study has been found in this region to evaluate the relationship between depression and periodontal disease, this study was conducted to investigate the relationship between depression and periodontal characteristics in the elderly in Amirkola.

Methods

This case study is part of the second phase of the Amirkola Health and Ageing Project (AHAP) to investigate the health status of the elderly in this city (12,13). After approval by the ethics committee of Babol University of Medical Sciences with the code IR.MUBABOL.HRI.REC.1397.161, it was performed on 300 randomly selected elderly people over 60 years of age in Amirkola. With 95% confidence level, 80% power and assuming $\sigma 1 = \sigma 2 = 2.5$ for GDS score, to find 1 GDS score difference between the two groups, the number of samples was estimated 98 for the case group and twice that for the control group. After dental examination, 100 people were assigned into the periodontitis group and 200 healthy people were in the control group. Individuals without teeth and with uncontrolled systemic problems were excluded from the study. Depression symptom variable was measured based on the standard 15-item Geriatric Depression Scale (GDS), according to which a score of 5 or higher was considered a sign of depression (14). In terms of periodontal indices, simplified oral hygiene index (OHIS) (15) and periodontal disease index (PDI) were evaluated based on the periodontitis criterion PDI≥4 (16) and a score of 0-6 (15). Periodontal indices of the two groups were evaluated through clinical examinations by 9 dentists. In the absence of Ramfjord teeth, opposite or adjacent teeth were selected (17). Tobacco use was also examined in terms of using cigarettes or hookah. Then the two groups were compared in terms of association of depression with periodontal indices using SPSS 18 software and

[DOR: 20.1001.1.15614107.1399.22.1.18.0]
[DOI: 10.22088/jbums.22.1.143]

statistical tests of T-Test, Chi-Squared Test and multivariate logistic regression, while p<0.05 was considered significant.

Results

133 women (44.3%) and 167 men (55.7%) participated in this study, of which 35 (11.7%) were smokers. In patients with periodontitis, 35 people (35%) and in the healthy group, 61 people (30.5%) had symptoms of depression (Table 1). The mean age in the periodontitis group (69.57±6.92 years) was significantly different from the healthy group (67.23±6.35 years) (p= 0.004). The mean GDS score in patients with periodontitis (3.70±3.68) was slightly higher than healthy individuals (3.49±3.40), but no significant correlation was observed between GDS and PDI (Table 2). Old age, male gender, lower levels of education and smoking were higher in patients with periodontitis, which was statistically significant only in smoking and level of education (p= 0.042 and p= 0.009, respectively) (Table 3). The mean PDI score was 3.21±1.58 in the group with symptoms of depression and 3.01±1.60 in the group without symptoms of depression, which was slightly higher in the group with symptoms of depression, but it was not statistically significant. The mean score of OHIS was 2.67±1.84 in patients with symptoms of depression and 2.40±1.61 in the group without symptoms of depression, which was slightly higher in the group with symptoms of depression, but it was not statistically significant. In this study, a positive and weak relationship was observed between age and PDI (r= 0.19 and p= 0.001). On the other hand, no significant correlation was observed between GDS and PDI. Higher education had a significant preventive effect on periodontitis. With increasing GDS score, OHIS and PDI showed a slight increase that was not statistically significant (Figure 1).

Table 1. Comparison of periodontitis with the variables of depression, age, gender, level of education and smoking in two groups of healthy people and patients with periodontitis

Variable	Periodontitis Number(%)	Healthy Number(%)	P
Depression			
Positive	35(36.5)	61(63.5)	0.43
Negative	65(31.9)	139(68.1)	
Gender			
Female	37(27.8)	96(72.2)	0.07
Male	63(37.7)	104(62.3)	
Age			
60–69	60(29.3)	145(70.7)	
70–79	32(42.1)	44(57.9)	0.09
80≥	8(42.1)	11(57.9)	
Education			
Illiterate	65(40.4)	96(59.6)	
Up to high school diploma	31(27.7)	81(72.3)	0.009
College education	4(14.8)	23(85.2)	
Smoking			
Smoker	17(48.6)	18(51.4)	0.042
Non-smoker	83(31.3)	182(68.7)	

Table 2. Comparison of mean GDS and OHIS indices in the periodontitis group and healthy individuals

Group / Index	Periodontitis (Mean±SD)	Healthy (Mean±SD)	P-value
GDS	3.70±3.68	3.49±3.40	0.62
OHIS	3.17±1.74	2.16±1.56	< 0.0001

Table 3. Logistic regression model to determine the role of variables affecting periodontitis in the elderly in Amirkola

Variable	P-value	Adjusted OR(cl 95%)	P-value	Crude OR(cl 95%)
Symptoms of depression	0.370	1.29(0.74-2.24)	0.431	1.23(0.74-2.04)
The ratio of female to male	0.142	0.65(0.36-1.16)	0.071	0.64(0.39-1.04)
Age				
60-69	0.481	-	0.092	-
70-79	0.227	1.43(0.80-2.57)	0.043	1.76(1.02-3.03)
≥80	0.815	1.13(0.41-3.16)	0.249	1.76(0.67-4.59)
Education				
Illiterate	0.014	-	0.012	-
Up to high school diploma	0.050	0.58(0.33-1.00)	0.032	0.57(0.34-0.95)
College education	0.011	0.22(0.07-0.70)	0.016	0.26(0.09-0.78)
Smoking				
(+/-)	0.066	2.11(0.95-4.65)	0.042	2.07(1.02-4.22)

[DOR: 20.1001.1.15614107.1399.22.1.18.0]
[DOI: 10.22088/jbums.22.1.143]

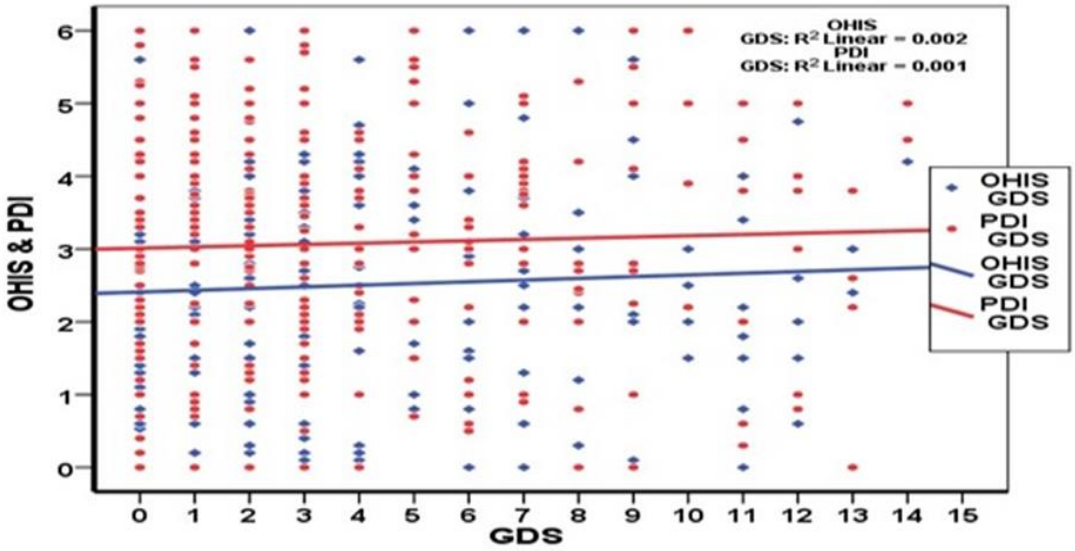


Figure 1. Diagram of the relationship between PDI and OHIS indices and GDS

Discussion

In this study, the difference between the mean GDS in patients with periodontitis was slightly higher than in healthy individuals, but was not statistically significant. In addition, the percentage of people with symptoms of depression in patients with periodontitis was higher than the healthy group, but it was not statistically significant. With increasing GDS index, OHIS and PDI showed a slight increase that was not statistically significant. In the study of Skośkiewicz-Malinowska et al., it was found that there is no significant correlation between periodontal indices and depression in the elderly over 65 years (17). Furthermore, Delgado et al. concluded that the association between depression and periodontal pockets was not statistically significant (18). In the study of Kisely et al., it was found that there is no significant relationship between periodontal disease and psychological conditions such as depression (19). In the study of Jenabian et al., it was found that with the increase in the severity of depression from mild to severe, the desire and motivation to observe personal hygiene, especially oral health, decreases gradually, but the mean of none of periodontal indices was significantly associated with increased severity of depression (20). Solice et al. concluded that periodontal clinical indices (periodontal pocket depth and clinical attachment loss) did not differ between patients with acute depression and the control group (21), which is consistent with the findings of this study. On the other hand, in the study of Gautami et al., it was found that psychological factors such as anxiety and depression have negative effects on periodontal and gingival status among medical students (22). This inconsistency with the results of the present study may be associated with differences in the study population and much higher levels of stress for education and skill acquisition and their implications in medical students. Furthermore, Kumar et al. concluded that there was a significant association between major depressive disorder and chronic periodontitis in a hospitalized population (23). The differences between the findings of this study and the present study are probably due to geographical differences and the study population who were hospitalized, as well as differences in controlled variables such as the type of depression, sampling methods, study design and age range. In the present study, a significant relationship was observed between aging, smoking, lower education and periodontitis. Similarly, the study by Silla et al. showed that low social class, smoking, low level of education and age were significantly associated with periodontal disease (24). In a study on the elderly Indian population, Prasanna et al. concluded that patients with male gender had lower incomes and smokers had more acute illness and their periodontal status was worse (10). In the present study, the differences between men and women were not statistically significant and other findings were similar to the results of Prasanna et al. (10). According to a study by Sivaranjani et al., there is a positive association between serum cortisol and chronic periodontitis (25). Alnaerich-Silla et al. in a study concluded that lower social class, smoking, low level of education, male gender and age were significantly associated with periodontal disease (24). In a systematic review of the role of stress in the development of periodontal disease

[DOR: 20.1001.1.15614107.1399.22.1.18.0]
[DOI: 10.22088/jbums.22.1.143]

in the elderly, Salazar et al. concluded that the prevalence of periodontal disease worldwide increases with age. On the other hand, there is a positive relationship between stress and periodontal disease in the elderly (2). Prasanna et al. in a study to investigate the relationship between behavioral variables and social status with periodontal disease in people over 55 years of age concluded that patients with male gender, lower incomes and smokers had more acute illness and their periodontal status was worse (10). In their study, Li et al. found that there was a positive association between depression and chronic periodontitis (26). In a study of a general population, Rosania et al. found that stress, depression, and cortisol were correlated with periodontal disease. In addition, neglecting oral hygiene during periods of depression and stress were associated with attachment loss and tooth loss (27). Although these studies have shown an association between periodontitis and depression, only a limited number of studies have suggested the mechanism of action, and the rest of the studies have often shown poor hygiene as an effective factor. Banihashemrad et al. in evaluating periodontal parameters in patients with depressive disorders in an Iranian population concluded that there is no significant relationship between depression and periodontal disease (7). In this study, a relationship was observed between periodontal indices and depression. Although not statistically significant, it is clinically important. Therefore, considering that periodontitis is a multifactorial disease and it is not possible to identify one major causative agent for it, and since the exact mechanism of action and severity of the effect between mental illnesses (including depression) and periodontal disease differs in different communities and geographical areas with different cultural, economic and social indicators, more detailed studies are required in this regard.

Acknowledgment

Hereby, we would like to thank the deputy of research and technology of Babol University of Medical Sciences for their financial and spiritual support, as well as the staff of Amirkola Health and Ageing Project and the Center for Research on Social Factors Affecting the people of Amirkola.

[DOR: 20.1001.1.15614107.1399.22.1.18.0]
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[DOR: 20.1001.1.15614107.1399.22.1.18.0]
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