Is depression associated with periodontal status in elderly?

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Abstract

Aim: To examine whether the depression is associated with periodontitis in elderly and to evaluate oral hygiene of these patients. **Methods:** One hundred and ninety one individuals aged 60 years or more were randomly selected. Periodontal examination was performed in full mouth by probing depth and clinical attachment loss in 6 sites for each tooth. The Simplified Oral Hygiene Index (OHI-S) per individual was also obtained. Depression was assessed by the Geriatric Depression Scale (GDS-15) to show how the elderly have been feeling during the last week. **Results**: Only SOHI was statistically significant (t = 4.7169, p<0.001), which better explains the variance in periodontal status. The variable GDS-15 revealed no significant values (t=0.3901, p=0.6971). **Conclusions:** There was no association between periodontitis and depression in elderly, but there was association between periodontitis and oral hygiene.

Keywords: depression, periodontitis, oral hygiene, elderly.

Introduction

Aging is a constant and complex process that occurs in all types of body cells, although it presents special features in certain organs and systems[1]. According to the World Health Organization (WHO), the chronological level of 60 years of age is used to define an elderly population in developing countries[2].

Oral conditions and depressive symptoms in elderly have been little studied. There are few studies about the association between periodontal disease and depression in elderly[3]; however, several studies have addressed the association between periodontal disease and stress[4-6]. The depressed activity of neutrophils and macrophages linked to human physical and psychological states, such as family problems, aging and unemployment, can clarify the role of depression on periodontal condition[7].

Considering that depression and periodontal diseases are accompanied by an activation of inflammatory responses, the aim of this study was to examine whether depression in elderly may be a systemic factor associated with periodontitis and to evaluate oral hygiene of these patients.

Material and methods

This cross-sectional study was conducted in accordance with the resolution 196/96 of the Brazilian National Health Council and Complementary, and was

approved by the Ethics Committee of the Federal University of Maranhão (Protocol number 2315-012694/2008-90).

Population and Sample

Sample size calculation was performed using the *Bioestat 3.0* (Ayres M., MCT-CNPq, Belém, PA, Brazil), which indicated a minimum sample of 188 elders with a power test of 80% and alpha level of 5%[8]. The sample was formed by random number table and was composed by 191 subjects aged 60 years or more from those attending the university for third-age persons of Federal University of Maranhão. Smokers, edentulous individuals and those who underwent periodontal treatment less than 6 months before were excluded.

Data Collection

A questionnaire was used to assess personal health history and physical factors. The Geriatric Depression Scale (GDS-15) was applied to detect depressive symptoms in elderly by 15 negative/affirmative questions. One point was assigned for each positive answer, where 0-4 points was considered normal, 5-10 points were diagnosed with a probable light depression and 11-15 points with a probable severe depression[9].

A full-mouth periodontal examination was performed. The extent measure of attachment loss was performed by measurements of probing depth (PD) and clinical attachment loss (CAL) using a Williams periodontal probe (Hu Friedy®, Chicago, IL, USA) parallel to the tooth long axis[10]. The Simplified Oral Hygiene Index (OHI-S) for every individual[11] was also obtained, and classified as adequate and inadequate (regular and poor). Severe periodontitis was diagnosed based on PD $\geq$ 4mm and CAL $\geq$ 5mm[12].

Statistical Analysis

Logistic regression model was used to verify whether at least one of the independent variables (the OHI-S and GDS-15) had influenced the dependent variable (severe periodontitis). The chi-square test was used to analyze the distribution of severe periodontitis, oral hygiene and geriatric depression. For all the tests was used the significance level of 5%.

Results

Among the 191 participants, 156 (81.7%) were female and 35 (18.3%) were male aged 60 years or more, and the mean age was 68.8 years. The educational status of the elderly was an average 5.6 years of study. Most participants were married corresponding to 71 (37.17%), followed by widowed (64/33.51%), single (40/20.94%) and divorced (16/8.38%).

Severe periodontitis was present in 104 (54.4%) elders, while 160 (83.7%) revealed inadequate oral hygiene and 138 (72.3%) did not have depression. Table 1 illustrates the sample distribution according to depression, oral hygiene and severe periodontitis. Ordinal logistic regression model measured the outcome variable (periodontal status) and the exposure variables (depression, oral hygiene) and showed an association between periodontal status and oral hygiene, which was used as adjustment for confounding bias, and lack of association between periodontal status and depression in elderly (Table 2).

Table 2- Ordinal logistic regression analysis measuring the outcome variable (periodontal status) and exposure variables (depression, oral hygiene).

Variable	OR	Confidence intervals (95%)	p
Depression	1.1102	0.541 to 2.228	0.7755
Oral Hygiene	3.4060	1.930 to 6.012	<0.001

The periodontal dependent variable and the independent variables, OHI-S and depression, were also submitted to the multiple regression test, which showed the value of F (regression) as significant ($F = 11.4549$, $p < 0.001$), accepting that at least one of the variables had influence on periodontal status. Among the partial regression coefficients, only the OHI-S was statistically significant ($t = 4.7169$, $p < 0.001$) which may better explain the variance on periodontal status. The GDS-15 revealed no significant values ($t = 0.3901$, $p = 0.6971$).

Discussion

Depression is the result of several interdependent neurobehavioral symptoms. The variation may be explained by stress factors that have been associated with a decrease in immune function and increase of the susceptibility to infections. Moreover, if the relation stress/periodontal disease is true, greater prevalence of this disease can be found among patients with severe depression[5].

This study evaluated depression as a perceived risk factor associated with periodontal disease in elderly, but no

Table 1- Sample distribution according to severe periodontitis, oral hygiene and Geriatric Depression Scale (GDS-15).

Variable	No depression	Probable mild/severe depression	Total	p*
Severe periodontitis				
Absent	63	24	87	0.9634
Present	75	29	104	
Oral hygiene				
Adequate	27	4	31	0.0437
Inadequate	111	49	160	

*Chi-square test ($\alpha = 0.05$)

significant association was found between these variables. Similar data were observed by Peruzzo et al.[5], who found no association between depression and established periodontitis in subjects with an age range of 19 to 67 years.

Tobacco smoking has been associated with an increased prevalence and severity of periodontal diseases, and there is evidence that systemic and local malondialdehyde (MDA) levels are increased by smoking in addition to having an impact on periodontitis[13]. In this study, smokers were excluded to eliminate this potential confounder, based on the fact that smoking may be considered a risk factor for further periodontal disease progression among healthy elderly people aged 70 years and over[8]. Periodontal disease in elderly is a common process of aging and there were no signiûcant correlations between mean serum levels of disease markers and additional attachment loss[8], so the risk factors for systemic diseases such as diabetes and coronary heart disease were included in our study.

The World Health Organization[2] classifies the aging process in four stages: the middle-elderly from 45 to 59 years old, the elderly from 60 to 74 years old, the ancient from 75 to 90 years old and extreme old age from 90 years onwards. Thus, the age group chosen for evaluation in this study was composed by elders aged 60 years or more, since the epidemiological studies indicated greater severity[6,14] and prevalence[15] of periodontal disease in people over 50 years[6,14-15].

A case-control study has been conducted to determine whether severe periodontitis and its treatment are associated with oxidative stress[16]. The authors found that patients with severe periodontitis exhibited higher Diacron-reactive oxygen metabolites (D-ROM) levels, so they suggest a positive association between severe periodontitis and oxidative stress. Croucher et al.[17] showed that periodontitis may be related to psychological stress in adults. However, these studies have non-homogenous samples, so it is possible that depression among young and old subjects is different and the elderly who reported depression may only have developed this condition recently, instead of having a psychiatric disorder earlier in life.

Periodontal examination was conducted in all teeth and not only in the index teeth. This choice provides the best way to assess accurately the prevalence and severity of periodontal disease in a population[18]. The partial examination underestimates the extension, severity and prevalence of periodontitis when compared with the full mouth method[10].

Within the limitations of this study, it was concluded that there was no difference in frequency distribution of periodontitis between elderly with depression or not, but the elderly with depression showed significantly more inadequate oral hygiene. So, there was no association between periodontitis and depression in elderly, but there was association between periodontitis and inadequate oral hygiene, which it was used as adjustment for confounding bias. Due to the high frequency of inadequate oral hygiene in elderly, great need for dental care to this age group is required, so this study has provided data to emphasize the need of dentists in multidisciplinary elderly care teams.

Acknowledgements

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