

Comparative Assessment of Depressive Disorder with Different Forms of Periodontitis among Adults Resident in Kanpur City: A Pilot Study

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ABSTRACT

The present study was carried out to assess the relationship between clinical depression and the different forms of periodontitis using clinical parameters and a depression rating scale. A total of 27 patients were recruited in this cross-sectional study, of which 10 patients were diagnosed with chronic periodontitis, 7 patients with aggressive periodontitis, and the rest were categorized into healthy controls. The clinical parameters assessed were the gingival index, probing depth, and clinical attachment loss. A tentative diagnosis of depression was made using the Patient Health Questionnaire-9 (PHQ-9). On comparing the three groups, the PHQ-9 scores were significantly higher in aggressive periodontitis subjects. Mann-Whitney test for pairwise comparison revealed that the mental status in aggressive periodontitis subjects was significantly altered in comparison to healthy and chronic periodontitis patients. Furthermore, there was no statistically significant difference in the mental status of chronic periodontitis subjects and healthy controls. Clinical depression could be a probable risk factor in the development of periodontal disease, especially aggressive periodontitis. There was no significant association with chronic periodontitis. Future studies can focus on corroborating the evidence obtained from this pilot study using longitudinal study design and employing biomarkers as a valuable aid.

Key words: Clinical depression, Periodontal systemic interactions, Periodontitis, Risk factors.

INTRODUCTION

Periodontitis is a multifactorial disease wherein the primary etiological agent is plaque and environmental and genetic factors along with the host immune response have been shown to play a part in the etiopathogenesis of this disease. Chronic and aggressive periodontitis are two forms of the disease. Chronic periodontitis is the most commonly occurring and slowly progressing form of periodontitis. Aggressive periodontitis is characterized by rapid progression of bone and attachment loss in an otherwise healthy individual.[1] The rapid breakdown has been attributed to microbial, genetic, and environmental factors, and the treatment planning along with implementation is a formidable task in these patients, due to the interplay of various factors. It also has a familial aggregation, and various genetic studies have tried to assess the mode of inheritance. Depression, one of the most common psychiatric illnesses, can evoke emotional and physiologic reactions and is the most important modifiable risk factor for physical illnesses. Several pathophysiologic mechanisms can explain the association of chronic stress and depression with systemic diseases.[2,3] The proposed mechanism shows that chronic stress induces vascular inflammation through elevations in circulating pro-inflammatory cytokines. In addition, stress and depression can modify the host immune response, thereby making the individual more susceptible to periodontitis.[4] It has also been postulated that depressed patients tend to neglect oral hygiene, professional dental care, and also in indulge in malicious habits such as smoking and alcohol consumption. These above-mentioned factors are well-documented risk factors for periodontal disease.[5-7]

Stress, anxiety, and depression are not precise risk factors for periodontal disease, but some observational studies have identified them as potential risk factors that could affect the progression of the disease.[8,9] There seems to be a role for neuroendocrine and neuro-immune mediators in the pathophysiology of inflammatory diseases. This can provide inroads to develop an accurate diagnosis and customized treatment planning for at-risk patients. Hence, the aim of this present study was to assess the relationship between psychological factors and the different types of periodontitis.

MATERIALS AND METHODS

A cross-sectional study was conducted at the Department of Periodontics, Rama Dental College Hospital & Research Centre, Kanpur, Uttar Pradesh, India. Ethical clearance was obtained from the Institutional Ethics Committee and Review Board. The study population comprised of consecutive sample of 30 participants of both the gender and with an age range of 19–60 years. Even though a wide age range was chosen, age matching with the controls could be done due to the appropriately included samples in each group.

The subjects were classified into two categories of periodontitis in accordance with the American Academy of Periodontology criteria of 1999.[10] Patients who did not meet the criteria were deemed as healthy controls and were recruited for the purpose of comparison of results. Written informed consent was obtained from all the study participants.

The diagnosis of chronic and aggressive periodontitis was established using clinical (probing depth [PD], clinical attachment loss [CAL], and gingival index [GI]) and radiographic (horizontal or angular bone loss) parameters.

Only subjects who were <30 years of age with deep pockets, minimal subgingival plaque, and inflammation were selected for the aggressive periodontitis category. Controls had a healthy periodontium with no gingival inflammation (GI = 0, PD ≤ 3, CAL = 0).

The exclusion criteria were periodontal therapy in the previous 3 months, smokers/alcoholics, patients who reported any type of systemic alteration that might have hindered periodontal clinical examination such as uncontrolled diabetes, patients with cardiovascular disease, and those who made use of immunosuppressant drugs.

After the clinical examinations, the recruited patients were invited to answer the self-administered psychometric scale. The depression was assessed and graded on severity using the Patient Health Questionnaire-9 (PHQ-9).[11]

As a severity measure, the PHQ-9 score can range from 0 to 27 since each of the 9 items can be scored from 0 (not at all) to 3 (nearly every day). Major depression is diagnosed if 5 or more of the 9 depressive symptom criteria have been present at least “more than half the days” in the past 2 weeks, and 1 of the symptoms is depressed mood or anhedonia. Other depression is diagnosed if 2, 3, or 4 depressive symptoms have been present at least “more than half the days” in the past 2 weeks, and 1 of the symptoms is depressed mood or anhedonia. One of the nine symptom criteria (“thoughts that you would be better off dead or of hurting yourself in some way”) counts if present at all, regardless of duration.

Statistical Analysis

Statistical tests were performed using the SPSS-22 Macros software. The overall comparison between the groups was obtained with Kruskal–Wallis test, and further pairwise comparisons were derived with Mann–Whitney test. Values of $P < 0.05$ were considered as statistically significant. Furthermore, Spearman’s correlation was performed using the clinical parameters and the PHQ 9 scores.

RESULTS

The final sample comprised 27 subjects who completed the periodontal examination and answered the scale evaluation. 10 subjects fell into the category of generalized chronic periodontitis, whereas 7 patients were classified as generalized aggressive periodontitis. The remaining 10 subjects were deemed as healthy controls. The psychometric evaluation reveals that aggressive periodontitis subjects had a higher PHQ-9 score when compared to chronic periodontitis subjects or healthy controls. This has been elucidated in Table 1 where Kruskal–Wallis test has been employed for an overall group wise comparison ($P < 0.001$).

Table 1: Kruskal–Wallis test to compare PHQ-9 scores between the three groups

Variable	Grouping	<i>n</i>	Mean rank	<i>P</i>
PHQ-9 score	Healthy controls	10	6.80	<0.001*
	Chronic Periodontitis	10	14.20	
	Aggressive Periodontitis	7	24.00	

* $P \leq 0.05$ is statistically significant. PHQ-9: Patient Health Questionnaire-9

Pairwise comparisons reveal that aggressive periodontitis subjects suffered more depressive symptoms when compared to the other two groups ($P = 0.001$ and $P = 0.032$). The mental status of chronic periodontitis and healthy controls seems to have no significant difference ($P = 0.100$). These results have been illustrated in Table 2.

Table 2: Mann–Whitney test with bonferroni correction for pairwise comparison of PHQ-9 scores

Grouping	<i>P</i>
Healthy controls versus chronic periodontitis	0.100
Healthy controls versus aggressive periodontitis	0.001*
Chronic Periodontitis versus aggressive periodontitis	0.032*

* $P \leq 0.05$ is statistically significant. PHQ-9: Patient Health Questionnaire-9

Spearman's correlation was performed using the clinical parameters (GI, PD, and CAL) and the PHQ-9 scores in all the three groups of patients. There was a weak positive correlation between the GI and PHQ-9 score (0.46) and PD and PHQ-9 score (0.57) in the generalized aggressive periodontitis subjects. The correlations are not statistically significant and they are depicted in Table 3.

Table 3: Spearman correlation between the clinical parameters and PHQ-9 scores among the three groups

Variables	Control	Chronic periodontitis	Aggressive periodontitis
Mean GI			
Correlation	-	-0.127	0.464
<i>P</i>	-	0.727	0.294
<i>n</i>	10	10	7
Mean PD			
Correlation	-0.305	-0.006	0.571
<i>P</i>	0.392	0.986	0.180
<i>n</i>	10	10	7
Mean CAL			
Correlation	-	-0.074	-0.054
<i>P</i>	-	0.839	0.908
<i>n</i>	10	10	7

PHQ-9: Patient Health Questionnaire-9, GI: Gingival index, PD: Probing depth, CAL: Clinical attachment loss

DISCUSSION

The aim of this pilot study was to detect whether an association exists between psychosocial factors and the different forms of periodontitis. Although numerous cross-sectional studies have been performed to assess the relationship status,

mixed results have been obtained,[12,13] and most of the existing literature was focused on chronic periodontitis.[14-17] Some of the studies have employed the use of biomarkers such as cortisol and dehydroepiandrosterone to ascertain the association between the two.[16,17]

However, there exists a void in the literature when it comes to the influence of mental status on aggressive periodontitis patients, as compared to chronic periodontitis subjects. It is little known whether there is a difference in the susceptibility profile among the two forms of the disease and if psychological factors have a bearing on the same.

A study conducted by Monteiro et al. on 150 patients, i.e., 50 with adult-onset rapidly progressive periodontitis (RPP), 50 with routine chronic adult periodontitis (RCAP) and 50 healthy matched controls showed that depression and loneliness were significant in distinguishing the two forms of periodontitis.[18] RPP group presented significantly increased depression and loneliness compared to RCAP and control groups. The results of our study are in accordance wherein aggressive periodontitis patients had higher PHQ-9 scores when compared to chronic periodontitis subjects and healthy controls. An overall and pairwise comparison of the PHQ-9 scores among the three groups showed a statistically significant difference with $P < 0.05$.

Furthermore, our study has followed the classification system put forth by the American Academy of Periodontology in 1999 for distinguishing the different types of periodontitis, whereas Monteiro's study was performed in 1996, i.e., before the new classification criteria. Numerous self-reporting psychometric scales have been employed in the assessment of depression, of which the Beck's Depression Inventory (BDI-II) has been consistently used in most of the studies involving periodontitis.[14,19]

In our methodology, we have used the recently developed tool for assessing depression, i.e., PHQ-9. Various studies in the field of medicine have shown that PHQ-9 has an edge over BDI due to the stronger correlation with the patient's depressive symptoms in chronic hepatitis C patients and is a more reliable tool for diagnosing depressive disorder in heart failure patients.[20,21] Comparative studies using BDI-II and PHQ-9 scales in an outpatient bariatric clinic and integrated mood disorder practice showed that PHQ-9 can be used as a viable alternative to BDII due to its practical applicability, shorter format, and free availability.[22,23]

In our study, the aggressive periodontitis patients had PHQ-9 scores ≥ 10 , and it has been stated that such scores had a sensitivity of 88% and a specificity of 88% for major depression.[11] It is reasonable to suppose that it can be utilized as a valuable tool in the diagnosis of depression in future studies of aggressive periodontitis.

A lot of theories have been proposed to deduce the inter-relationship between depression and periodontal diseases. Depression can be considered as an inflammatory disease due to the triggered release of cytokines in the systemic circulation and this is comparable to the pathogenesis of periodontal disease. Periodontitis can also have a causal relationship such as when periodontal disease increases the risk for depression through the psychosocial effects of poor oral hygiene (for example, shame, isolation and loneliness) or more directly through the systemic inflammatory effects of periodontal disease that may potentiate inflammatory and oxidative, nitrosative stress processes, and thus depressive symptoms.[24]

FUTURE PERSPECTIVES

Furthermore, biomarkers were not used to further validate the results obtained from this study. Future longitudinal studies and clinical trials can be directed toward obtaining more penetrating evidence toward the inter-relationship between clinical depression and periodontitis. Instead of self-report scales, structured interviews can be incorporated into the study design to prevent subjective bias in answering the questions.

LIMITATION OF THE STUDY

A weak positive correlation was obtained with GI and PD in the chronic periodontitis group, the exact nature of the association could not be ascertained with our study as the correlations were not statistically significant. This can be attributed to the small sample size which is one among the limitations in this study.

CONCLUSION

This pilot study highlights the possible correlation between clinical depression and aggressive periodontitis. There was no significant association with chronic periodontitis. These results suggest that a more holistic treatment approach has

to be planned in case of aggressive periodontitis patients which should involve psychological counseling for subjects diagnosed with clinical depression. Future studies should be targeted in revealing the exact nature of association between the two disorders by employing the use of biomarkers.

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