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Original Research

A Possible Connection Between Major Depressive Disorder And Periodontitis: A Clinico-Biochemical Study

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ABSTRACT:

Introduction: Depression has been considered to be a root-cause for many morbid diseases and has been highlighted to be a major concern for public health. Also, extensive works to establish a relation between this disorder and periodontal status have been carried out. The present trial aims to find an association between major depressive disorder and periodontal health with a focus on depression scales, clinical parameters and biochemical analysis. **Materials and Methods:** Eighty patients who fulfilled the inclusion criteria and who were ready for regular follow were subjected to the self-rating depression scales. Depending on the response to this analysis, the patients were divided into Group I: subjects who showed positive response to the psychometric examination and Group II: who showed negative response. The patients were then examined for clinical parameters (plaque index, approximal plaque index and probing pocket depth) and biochemical analysis (Thyroid stimulating hormone and growth hormone). **Results:** The parameters recorded were subjected to Student's t-test, Chi-square test, Partial correlation and Multivariate analysis of variance. On intergroup comparison, clinical parameters showed statistically significant results whereas the biochemical analysis did not demonstrate any significant outcomes.

Conclusion: To conclude, further longitudinal and prospective studies with larger sample sizes should be conducted in order to investigate the association of periodontal disease and psychological variables.

Keywords: Depression, Periodontal Health, Depression Scales, Biochemical Analysis

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INTRODUCTION

polymicrobial Periodontitis is complex, а inflammatory disease of the periodontium causing destruction of the supporting structure of the tooth/teeth. 1The etiopathogenesis of the disease is multifaceted and several factors have been found to be associated with the initiation and progression of the disease.² Bacteria, particularly the red and green complex is the prime culprit behind this disease though several other factors like genetics, systemic illness, trauma from occlusion, habits likesmoking, anatomical factors (like high frenal attachment, shallow vestibule) and nutritional deficiency have been highlighted. However, variations in the

inflammatory response have been reported between individuals and between various sites in the same individuals.³ Major Depressive disorder- a wellknown psychiatry illness has been considered to be a matter of concern by WHO (World health organization) in 2008 as it was declared to bethe third primary cause of the globalailments. It has been estimated that it would occupy the first position in the upcoming ten years.⁴The disorder is characterized by a range of symptoms like depression, lack of enthusiasm, poor focus, guilts or feeling of worthlessness, apatite alterations, sleep disturbances and suicidal tendencies.5 The underlying etiology of the disease is complex and several theories like anomaliesin the signaling of neurotransmitters and disturbances in the intricate regulation and functioning of the nervous system have been emphasized.⁴ Few authors have suggested a possible interconnection between periodontitis and depression. Many studies have also proposed a bidirectional relation between the two disorders.⁶ However, there has been controversies in this regard which has led to inconclusive statements. The present study aims to find an association between major depressive disorder and periodontal health with a focus on depression scales, clinical parameters and biochemical analysis.

MATERIAL AND METHOD

The current clinical trial was conducted in the Department of Periodontology, Pacific Dental College and Hospital, Udaipur. Informed consent was obtained from all the participants included in the study.With the power of 80% and the level of significance 0.05, the sample size was calculated to be eighty. The duration of the trial was two years. The inclusion criteria of the study were: male subjects with age ranging between 30-60 years having a minimum of twenty teeth present in the oral cavity. The exclusion criteria of the trial were subjects who were systemically compromised and were under medications, subjects who had undergone periodontal therapy in the past six months and those who were succumbed to deleterious habits.Eighty patients who fulfilled the inclusion criteria and who were ready for regular follow-ups were selected. The participants chosen for the study were subjected to the following self-rating depression scales- 1. Hamilton Depression Rating Scale, 2. Zung Self Rating Depression Scale, 3. Epworth Sleepiness Scale and 4. Pittsburg Sleep Quality Index. The description and the scoring criteria of each scale is mentioned below. Based on the results of the psychometric analysis, the participants were divided into two groups: Group I: Comprised of 40 subjects who presented positive response to the psychometric examination and Group II Comprised of 40 subjects who showed negative response to the psychometric examination. Following an initial inspection of the oral cavity, these patients were evaluated for the following clinical parameters:

- 1. Plaque index (Turesky-Gilmore-Glickman modification of Quigley-Hein Plaque Index, 1970). The plaque on both the buccal and lingual surfaces was recorded using disclosing agent to evaluate the etiological factors causing periodontal diseases.
- 2. Approximal plaque index was registered to assess the level of plaque accumulation over the contact areas (between the teeth) where the accessibility of the toothbrush bristles is limited.
- 3. Probing pocket depth (PPD) using UNC-15 probe were calculated by recording the distance between base of the pocket and gingival margin. The buccal, lingual, mesial and distal aspects of each tooth was considered to analyze the degree

of tissue destruction occurring due to the disease process.

BIOCHEMICAL ANALYSIS

Following aseptic protocols, 5 ml of venous blood was withdrawn from the participants by venipuncture from the anti-cubital fossa. The blood samples were dispensed immediately into 2 vials, one with EDTA and the other without EDTA. Vials were shaken well, labelled and were sent to the lab for biochemical investigation assess the levels of Growth hormone (GH) and Thyroid stimulating hormone (TSH). The samples were tested for the above markers using sandwich principles.

STATISTICAL ANALYSIS

The parameters were checked for statistical analysis using IBM SPSS Statistics for Windows, Version 24.0. IBM CORP. The parameters were subjected to the following tests:

- a) Student's t-test
- b) Chi-square test
- c) Partial correlation
- d) Multivariate analysis of variance

RESULTS

40 subjects participated in the present study and were categorized into either group I or group II depending on the psychometric analysis. Majority of them belonged to the age group of 36-40 years. The mean Hamilton Depression Rating Scale score was 31.95 in Group I with a standard deviation of 4.36 and 11.63 in Group II with a standard deviation of 3.41. The difference between the two groups was seen to be statistically significant. (p=0.001). The Zung Self-Rating Depression Scale score demonstrated a mean score of 60.68 ± 7.96 in Group I as compared to 29.1 \pm 6.45 in Group II which was also statistically significant. (p=0.001). The mean ESS was statistically significant with Group I, showing a value of 16.95 \pm 3.02 and Group II showed a value of 10.25 \pm 2.29 (p=0.001). Group I showed a mean value of 16.68 \pm 3.25 001). (Table 2) (Graph 2). And Group II showed a value of 7.18 \pm 3.67. The difference was statistically significant (p=0.). The mean plaque index in Group I was observed to be 2.70 ± 0.46 and in Group II, it was observed to be 2.05 ± 0.749 . The difference between the mean plaque score between the groups was statistically significant (p=0.001). (Table 3) (Graph 3)The mean Approximal plaque index was calculated as 82.9 \pm 10.01 % in Group I subjects and 42.8 \pm 18.41 % in Group II subjects and the difference was statistically significant (p=0.001). Out of the 80 subjects enrolled in the study, the API scores of 35 subjects (43.8%) and 34 subjects (42.5%) depicted mediocre and inappropriate oral hygiene respectively. 11 subjects (13.8%) showed signs of appropriate oral hygiene. The appropriate oral hygiene subjects (11, 13.8%) belonged to Group II, whereas no subject in Group I showed appropriate oral hygiene. Only 9

subjects (22.5%) in Group I showed mediocre oral hygiene as compared to higher value of 26 subjects (65%) in Group II. Inappropriate oral hygiene was evident in 31 subjects (77.5%) in Group I as compared to only 3 subjects (7.5%) in Group II. All these values were seen to be statistically significant. (Table 4) (Graph 4)The mean probing pocket depth in Group I subjects were seen to be $6.3\text{mm} \pm 1.28\text{mm}$. In Group II, the mean Probing Pocket Depth was 3.4mm \pm 0.67mm, the difference was seen to be statistically significant. (p=0.001). (Table 5) (Graph 5)

BIOCHEMICAL ANALYSIS

The mean Thyroid Stimulating Hormone level in Group I was 2.1 ± 1.45 and in Group II, it was observed to be 2.2 ± 1.56 . The difference was seen to be non-significant (p=1.49). (Table 6) (Graph 6). The mean values of Growth Hormone were seen to be 0.28 \pm 0.72 in Group I and 0.23 \pm 0.42 in Group II, which was also non-significant (p=0.59). (Table 7) (Graph 7). As the score of psychometric variables increased, there was a significant increase in periodontal destruction which was exhibited as an increase in probing pocket depth. Hamilton Depression Rating Scale Score showed a co-relation coefficient of 0.065 whereasZung self-rating depression scale score showed a correlation coefficient of 0.556. Epworth Sleepiness Scale displayed a co-relation coefficient of 0.29. Pittsburgh sleep quality index presented a corelation coefficient of 0.338. (Table 8) (Graph 8). A correlation between the psychometric variables and periodontal parameters was performed in order to find anassociation between depressive mood and periodontal status. When the psychometric variables were correlated with the periodontal status in Group I and Group II, no significant correlation was found. (Table 9)When the correlation of psychometric variables to Growth Hormones and Thyroid Stimulating Hormones for the entire sample was performed, there was no significant correlation found (Table 10). When the psychometric variables were correlated with Growth Hormones and Thyroid Stimulating Hormone in Group I and group II, no significant correlation was found. (Table 11)

DISCUSSION

Mental illness has been associated with an increased incidence of cardiovascular diseases, cerebrovascular strokes, diabetes, cancer, cognitive impairment etc. pathophysiological Also. several pathways demonstrating the negative effect of psychological or mental depression on the periodontium have been paved. Extensive research on this topic has revealed that the two disorders share several common risk factors and determinants like low socioeconomic status, low literacy levels, smoking, poor diet and ethnicity.^{7,8}A strong interconnection has been traced out between stress and periodontitis via experimental models. Supporting literature has recommended that depression chains an imbalance in the hypothalamuspituitary-adrenal axis that influences the functioning of adrenaline and cortisol. The above alterations can lead to modification in the immune response, heightens the pro-inflammatory cytokines and can induce oxidative and nitrosative stress which increases the susceptibility of an individual to periodontitis. Also, depressions via psychosocial effects can lead to poor oral health as well as halitosis.9Several clinical trials were carried out to explore a causal link between sleep deprivation, depression and alterations in the periodontal health. Stress and depression is one of a significant etiological factor of a well-known periodontal pathology- Acute necrotizing ulcerative gingivitis (ANUG).¹⁰ The results of the current study were in accordance with the trial conducted by Monteiro da Silva AM, Oakley DA in the year 1996. The study showed a positive correlation between the disorders.¹¹ Genco RJ, Ho AW, Grossi SG (1999) conducted a cross-sectional study of 1426 subjects to examine the impact of psycho-social factors on periodontal parameters. High Cronbach Depression scale, clinical attachment loss and radiographic evaluation of interproximal alveolar bone level were assessed. The authors concluded that periodontal status could be improved by behaviour modifications.12Saletu A, Pirker-Fru["]hauf H, Saletu F, Linzmayer L, Anderer P, Matejka M (2005) investigated the relationship between periodontitis and psychopathology utilizing psychometry (both observer- and self-rating scales). The study included 40 patients suffering from periodontitis and 41 healthy patients. The results showed increased depression and anxiety scores, reduced well-being, increased somatic complaints, deteriorated quality of life and introversion in periodontitis.¹³ In contrary to our results, the study conducted by Lianne MK, Campbell MK, Elbourne DR, Altman DG (2004) showed a negative correlation between stress or depression and periodontal status. The parameter used for this study was cortisol analysis.¹⁴ The present study emphasized on several self-recording psychometric analysis tools that were reliable. Beside recording the clinical parameters to assess the periodontal status, we also considered biochemical markers like Thyroid stimulating hormones and growth hormones which are important indicators for depression. However, the study did not regard other important parameters like clinical attachment loss, bleeding on probing or gingival index. Also, the present study did not include radiographic parameters which could have exhibited a better outlook on the periodontal state.

CONCLUSION

The present trial was an attempt to find a relation between depression and periodontal heath. On intergroup comparison, clinical parameters showed statistically significant results whereas the biochemical analysis did not demonstrate any significant outcomes.To conclude, further longitudinal and prospective studies with larger sample sizes should be conducted in order to investigate the association of periodontal disease and psychological variables.

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