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Association of stress, depression and anxiety with periodontal health indicators: A clinical study in adult population of Rishikesh

Himanshu Aeran^{1,*}, Amrinder Singh Tuli², Yashika Puri²¹Dept. of Prosthodontics & Crown and Bridge, Seema Dental College & Hospital, Rishikesh, Uttarakhand, India²Dept. of Periodontology, Seema Dental College & Hospital, Rishikesh, Uttarakhand, India

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ABSTRACT

Background: Chronic periodontitis is a condition that causes inflammation in the tissues that support teeth, gradual attachment loss, and bone loss. Stress is the body's feedback towards detrimental forces, diseases, and additional atypical circumstances that are determined to distress its routine physiological equilibrium. On the other hand, the most prevalent psychological problems connected to periodontitis are anxiety and sadness.

Aims & Objective: This study intends to assess the relationship between stress, depression, and anxiety with indices of periodontal health.

Materials & Methods: A total of 171 patients were assessed & divided into 2 groups. Gingival index, modified sulcus bleeding index, community periodontal index for treatment needs, probing pocket depth, and clinical attachment level were evaluated. The Depression Anxiety Stress Scale–21 questionnaire used as the basis for the psychometric evaluation.

Results: The statistical analysis made use of the student 't' test and Pearson's correlation coefficient. When compared between the two groups, Group A had significantly higher values for each metric. The psychometric parameters and the periodontal parameters had a weakly positive connection ($p < 0.0001$).

Conclusion: According to the current study, people who are stressed, depressed, or anxious are more likely to develop periodontal disease. Therefore, stress, depression & anxiety could be viewed as a significant periodontal disease risk factor.

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1. Introduction

Periodontitis is a multi-factorial disease.¹ The non-modifiable risk factors include age, gender, genetics, and ethnicity. Local risk factors include plaque and calculus deposits, cigarette use, alcohol use, diabetes mellitus, cardiovascular illnesses, medications like anti-convulsants, obesity, and stress are all modifiable risk factors.²

Stress is the body's feedback towards detrimental forces, diseases, and additional atypical circumstances that are determined to distress its routine physiological equilibrium.

* Corresponding author.

E-mail address: drhimanu4@gmail.com (H. Aeran).

When a person encounters a life event, such as marital discord, monetary burden, or the death of a beloved, that is greater than his or her capacity to address the crisis, such reactions are adverted as psychological stress. It is established that this psychological stress has a counteractive impact on the potency of the immune response, which sooner or later leads to periodontal deterioration.³

Depression is a known medical issue that can be created by both a crucial depressive disorder and indications of subthreshold depression manifesting as lethargy, a sad mood, feelings of blameworthiness or low self-worth, interrupted sleep or eating, and troubled concentration. Additionally, anxiety symptoms

often accompany depression. Disturbances in mood, as well as in thinking, acting, and physiological pursuit are certain of its trait. This batch of disorders includes agoraphobia, panic disorder, specific phobias, social phobias, obsessive-compulsive disorder, post-traumatic stress disorder, and acute stress disorder.⁴

The procedure via which stress originates inflammation demands interlinkage between the immunological, endocrine, neurological, and genetic systems. Neuroendocrine hormones comprising of glucocorticoids and catecholamines escalate by stress.⁵ Stress diminishes immunological responses by prompting these hormones, which aggregates in lower lymphocyte count & proliferation, natural killer cell activity, antibody production, and awakening of dormant viral infections. It is appreciated that the research on the combined impact of psychological stress, depression, and anxiety on the progression and severity of periodontal disease is deficient. Considering the aforementioned facts, the current study is intended to further explore the relationship between stress, depression, and anxiety with periodontal health indicators.⁶

2. Materials and Methods

A comparative cross-sectional study was undertaken on patients who visited the periodontology department's outpatient clinic at Seema Dental College & Hospital in Rishikesh. The consent form was signed by the patients who agreed to participate in the trial. Age, sex, marital status, religion, place of residence, level of education, occupation, smoking habit, and frequency of tooth brushing were all included in the demographic and socioeconomic data. The Depression Anxiety Stress Scale-21 was the psychometric test that was utilised (DASS-21). The patients that were included had at least 20 teeth, were between the ages of 25 and 55, were in general good health, and had gingivitis to mild periodontitis with CAL / 3mm. The study excluded patients who were on corticosteroid therapy, immunosuppressive medications, had periodontal surgery within 6 months of the evaluation, were pregnant, or were nursing.

2.1. Sample size

Patients attaining the above criteria were enlisted in the study. A total of 171 patients were randomly assigned and divided into 2 groups.

Group A-Patients with CAL ≥ 3 mm in at least 30% examined sites.

Group B- Patients that did not satisfy the criteria in Group A.

The gingival index (GI), modified sulcular bleeding index (MSBI), probing pocket depth (PPD), clinical attachment level (CAL), and community periodontal index for treatment needs (CPITN) were estimated for

periodontal assessment to determine the need for therapy. All measurements were taken using calibrated manual probes, including the WHO probe and the University of Michigan "O" probe with William's marks.

A questionnaire called the Depression Anxiety Stress Scale (DASS-21) was used for the psychometric evaluation. There are 21 unfavourable emotional symptoms in the DASS-21 (Lovibond & Lovibond, 1994). Using a 3-point severity/frequency scale, individuals are scored according to the degree to which they have experienced each symptom throughout the previous week. For each question, there were three possible answers: 0, 1, and 2. By adding the scores for the relevant 21 items—of which 1 was normal, 2 was mild, 3 was moderate, 4 was severe, and 5 was extremely severe—the scores for the Depression, Anxiety, and Stress scales are calculated.



Fig. 1: Armamentarium used



Fig. 2: Measurement of probing pocket depth

3. Results

All the clinical & psychometric parameters were statistically analysed. Demographic data was collected & Descriptive statistical analysis for mean & standard deviation was done with the SPSS system. Unpaired 't' test was used for intergroup comparison. For assessing the correlation

between Periodontal parameters & the psychometric assessment, Pearson's correlation coefficient was used.

This study consisted of 60.20% males in Group A and 52.05% in Group B. There were 39.80% females in Group A & 47.95% in Group B. The overall mean age was 38.99 years in Group A & 32.88 years in Group B (Table 1). The mean score of MSBI, GI, PPD, CAL CPITN was higher in Group A as compared to Group B respectively (Table 2). For psychometric analysis- mean score for Depression, stress & anxiety along with their total score was higher in Group A as compared to Group B (Table 3). There was a weak positive correlation between MSBI, GI, PPD, CAL, CPITN & D, A, S, DASS total score (Table 4). The total percentage of non- smokers was in Group A was 71.4% and smokers was 28.6% out of which the frequency varied from 3.2- 20.3%. The total percentage of non- smokers was 71.2% and of smokers was 28.8% out of which the frequency varied from 2.6- 6.6%. (Table 5). The total percentage of duration of non- smokers was 74.95% and of smokers was varying from 1.1- 6.3% in Group A & 50.06% varying from 1.3- 6.6%. In Group B (Table 6). The total percentage of frequency of non- smokeless tobacco users was 84.2% and of smokeless tobacco users was varying from 4.2-8.4% in Group A & 76.7% varying from 1.3-6.6% in Group B (Table 7). The duration of non- smokeless tobacco users varied from 1.1- 3.2% in Group A & 1.3-14.6% in Group B (Table 8).

Table 1: Gender wise distribution of subjects

Group	Gender	Frequency	Percentage
A	Male	59	60.20%
	Female	39	39.80%
B	Male	38	52.05%
	Female	35	47.95%

Table 2: Descriptive analysis for MSBI, GI, PPD, CAL & CPITN

Parameters	Group A	Group B	p-value
MSBI	2.18 $\pm$ 0.53	1.12 $\pm$ 0.37	0.01
GI	2.19 $\pm$ 0.55	1.16 $\pm$ 0.32	0.01
PPD	2.74 $\pm$ 0.38	1.97 $\pm$ 0.47	0.000
CAL	2.80 $\pm$ 0.37	1.99 $\pm$ 0.48	0.000
CPITN	29.13 $\pm$ 2.48	19.52 $\pm$ 5.04	0.000

Table 3: Intergroup comparison of mean depression, anxiety, stress & depression anxiety stress total score

	D	A	S	DASS Total
Group A	6.64 $\pm$ 3.34	5.37 $\pm$ 2.02	5.37 $\pm$ 2.02	16.60 $\pm$ 7.37
Group B	4.50 $\pm$ 2.14	2.53 $\pm$ 1.87	1.96 $\pm$ 1.14	8.99 $\pm$ 3.76
Total	11.14 $\pm$ 5.48	7.12 $\pm$ 4.49	7.33 $\pm$ 3.16	25.59 $\pm$ 11.13

Table 4: Correlation between modified sulcus bleeding index, gingival index, probing pocket depth, clinical attachment level, community periodontal index for treatment needs & depression, anxiety, and stress

	D	A	S	DASS Total
MSBI				
r- value	0.079	0.003	0.046	0.057
p- value	*0.674	*0.988	*0.804	*0.761
GI				
r- value	0.130	0.019	0.063	0.032
p- value	*0.485	*0.918	*0.736	*0.864
PPD				
r- value	0.094	0.167	0.192	0.071
p- value	*0.613	*0.370	*0.300	*0.703
CAL				
r- value	0.135	0.065	0.194	0.127
p- value	*0.469	*0.728	*0.296	*0.497
CPITN				
r- value	0.095	0.016	0.256	0.169
p- value	*0.612	*0.933	*0.164	*0.362

Table 5: Distribution according to frequency of smoking

Group	Subjects	Frequency	Percent
A (28 smokers)	0	73	73.7
	2.0	3	3.2
	3.0	3	3.2
	5.0	3	3.2
	6.0	1	1.1
	7.0	1	1.1
	10.0	8	8.4
	20.0	6	6.3
	Total	98	100.0
	.0	52	75.0
B (21 smokers)	1.0	3	2.6
	3.0	6	6.6
	4.0	3	3.9
	5.0	5	6.6
	6.0	1	1.3
	7.0	1	1.3
	8.0	20	20.3
	20.0	1	1.3
	Total	73	100.0

4. Discussion

For the purposes of this study, "periodontitis" was defined as having clinical attachment loss of 3 mm or more in at least 30% of the studied site and being kept in Group A. Group B had the subjects who did not fall under this category. In periodontitis, the systemic signs of the illness may become apparent when the inflammatory action is long enough and severe enough. It has long been accepted as "folk knowledge" that psychological factors may contribute to the development of diseases.⁷

Table 6: Distribution according to duration of smoking

Group	Subjects	Frequency	Percent
A (28 smokers)	0	70	73.7
	1.0	1	1.1
	3.0	1	1.1
	5.0	7	7.4
	6.0	2	2.1
	8.0	1	1.1
	10.0	6	6.3
	12.0	3	3.2
	15.0	1	1.1
	20.0	1	1.1
	25.0	1	1.1
	35.0	1	1.1
	Total	98	100.0
B (21 smokers)	0	52	75.0
	2.0	4	5.3
	3.0	5	6.6
	4.0	2	2.6
	5.0	3	3.9
	6.0	3	3.9
	12.0	1	1.3
	15.0	1	1.3
	Total	73	100.0

Table 7: Distribution according to frequency of smokeless tobacco

Group	Subjects	Frequency	Percent
A (18 users)	0	80	84.2
	1.0	8	8.4
	2.0	3	3.2
	3.0	4	4.2
	Total	98	100.0
B (17 users)	0	56	88.2
	1.0	5	6.6
	2.0	3	3.9
	5.0	1	1.3
	Total	73	100.0

In this study, Group A contained 60.20% males while Group B contained 52.05%. In Group A there were 39.80% females while in Group B there were 47.95%. Gender was not identified in our study as a risk factor for periodontitis. The reason for this inconsistency might be that the total number of female subjects (74) in our study was less as compared to male subjects (97). The overall mean age was 38.99 years in Group A & 32.88 years in Group B. This data was in conformity with the academic work conducted by Shreshtha S et al⁸ where mean age of subjects of Group 1 -Periodontitis group was higher as compared to Group 2 which was statistically significant & had reported higher prevalence and severity of periodontal disease with increasing age. The cumulative nature of the periodontal

Table 8: Distribution of subjects according to duration of smokeless tobacco

Group	Subjects	Frequency	Percent
A (18 users)	0	80	84.2
	2.0	2	2.1
	3.0	2	2.1
	4.0	3	3.2
	5.0	3	3.2
	6.0	2	2.1
	7.0	2	2.1
	10.0	1	1.1
	Total	98	100.0
B (17 users)	0	56	89.5
	1.0	1	1.3
	2.0	1	1.3
	3.0	1	1.3
	4.0	1	1.3
	5.0	2	2.3
	7.0	1	1.3
	10.0	1	1.3
	13.0	1	1.3
	Total	73	100.0

support loss indicating the time of exposure to the causative causes may be the cause of the older sample's periodontitis.

Between Group A and Group B, there was a significant difference in the mean MSBI score ($p < 0.001$). This was in line with a study by Teja V et al,⁹ who found that individuals with generalised chronic periodontitis had greater mean bleeding on probing scores than gingivitis patients or patients who were not under any stress. A typical clinical marker used to track the development and condition of periodontal disease is bleeding on probing (BOP). Lang and colleagues¹⁰ show how the lack of BOP is a trustworthy sign of periodontal stability. Periodontal damage and BOP, a significant marker of clinical inflammation, have been linked in research. Despite the fact that there is a clear link between them, it has also been found that a significant portion of sites with gingival inflammation and/or calculus are resistant to attachment loss.

The mean GI score between Group A and Group B differed significantly. ($p < 0.001$). According to Johannsen A et al,¹¹ there is a substantial difference between patients with and without depression and weariness in terms of gingival index. A well-established inflammation that affects the superficial gingival connective tissue characterises gingivitis, which is the organism's reaction to persistent microbial plaque. Gingivitis may develop into periodontitis as a result of microbial migration to subgingival areas. They are similar to other chronic inflammatory disorders in terms of immunological control, clinical progression, and stress.

On intergroup comparison, there was a significant difference in the mean PPD score between both groups. Considerable probing depth was depicted in patients with

chronic periodontitis and depression by Sundarajan S et al⁵ in their study. In the same study, a strong correlation between mean cortisol levels and periodontal disease was also shown. In contrast to patients with anxiety and despair, individuals with chronic periodontitis had a higher level of clinical connection, according to Solis AC et al.¹² The notion that depression, stress, and anxiety are related to periodontitis was not supported by the study's findings.

According to Park SJ et al,¹³ people with symptoms of depression had a higher mean CPI score of 3 or more than those with a lower CPI score. According to Saletu A et al,¹⁴ patients with chronic periodontitis had a higher mean depression score than those with gingivitis. Multiple inventories as psychometric tools were employed in this study.

According to Vettore MV et al.¹⁵ patients with periodontitis who also experienced anxiety had higher average anxiety scores than patients with gingivitis who did not experience anxiety. In a study by Jaiswal R et al,¹⁶ they found a significant correlation between patients with chronic periodontitis and higher mean Stress scores. Lenk M et al¹⁷ showed that periodontal patients—those with patients with >30% of teeth with >5 mm attachment loss—had a higher Dental Anxiety Stress scale. According to the study, patients with periodontitis have more psychopathological symptoms than those with good periodontal tissues.

5. Conclusion

Within the confines of this study, it may be deduced that patients who experience some degree of depression, anxiety, or stress are more likely to develop periodontal illnesses than those who do not experience these conditions. The potential relationship between depression, anxiety, and stress and periodontal health markers may be assessed using studies with a longer duration & a bigger sample size.

6. Source of Funding

None.

7. Conflict of Interest

None.

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Author biography

Himanshu Aeran, Director Principal, Professor & Head
 <https://orcid.org/0000-0002-7723-7108>

Amrinder Singh Tuli, Professor and Head

Yashika Puri, PG 3rd Year

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