

Corroborating of Depression, Anxiety, and Stress Scale-21 items (DASS-21) and the Perceived Stress Scale-10 items (PSS-10) and Psychological Features in patients with periodontitis: a questionnaire study

Kalluri Yasasvi^{1,*}, Y.S.H.S Chakravarthy², D. Bharath Simha Reddy³, Nimmala Sriram Naidu³, Pabbineedi Sai Satya Sri¹, Gathram Prathyusha¹

¹Postgraduate Student, Department of Periodontics, Lenora Institute of Dental Sciences, Rajahmundry, Andhra Pradesh, India.

²Professor & Head, Department of Periodontics, Lenora Institute of Dental Sciences, Rajahmundry, Andhra Pradesh, India.

³Assistant Professor, Department of Periodontics, Lenora Institute of Dental Sciences, Rajahmundry, Andhra Pradesh, India.

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*Correspondence

Kalluri Yasasvi

Postgraduate Resident,

Department of Periodontics

Lenora Institute of Dental Sciences,

Rajahmundry, Andhra Pradesh, India.

E-mail: yashkalluri@gmail.com

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Abstract

Background: Periodontitis is a multi-factorial inflammatory disease that, if left untreated, can lead to tooth loss. Stress is considered one of the key contributors that can worsen the condition. Research has shown that psychological factors may activate immune responses in the host, promoting changes that facilitate the progression of periodontitis. Therefore, clinicians need to utilize psychological self-assessment scales to measure anxiety, depression, and stress in patients suffering from periodontitis.

Aim: To investigate the psychometric properties of the Depression, Anxiety, and Stress Scale - 21 Items (DASS-21) and 10-item Perceived Stress Scale (PSS-10) in patients with periodontitis and to evaluate the psychological features of patients with periodontitis.

Materials and methods: This descriptive cross-sectional study involved 300 patients diagnosed with periodontitis, conducted over three months. The participants were given the DASS-21 and PSS-10 questionnaires and completed them independently, responding based on their initial reactions. The DASS-21 comprises 21 items designed to assess levels of depression, anxiety, and stress, whereas the PSS-10 contains 10 items intended to gauge perceived stress levels.

Results: The mean and SD scores of patients using PSS-10 and DASS-21 were 16.79 ± 4.90 and 14.12 ± 5.04 , respectively. The T-value was 6.56 with a p-value of 0.000. According to the findings of this study, there was a statistically significant ($p=0.000$) association between the PSS 10 Scale and the DASS 21 scale.

Conclusion: The DASS-21 and the PSS-10 can be used as general measures for psychological assessment in patients with periodontitis.

Keywords: Anxiety, Depression, Periodontitis, Physiological, Psychological, Stress.

1. Introduction

Periodontitis is a chronic multifactorial inflammatory disease that, if left untreated, can ultimately lead to tooth loss [1]. This poses a huge health, economic and social burden, affecting more than half of the world's adult population [1]. It negatively impacts oral health-related quality of life (OHRQoL), mental health, nutrition, social interaction, and language, and is associated with many systemic diseases, including diabetes and cardiovascular disease [1]. Patient-reported outcomes (PRO) expand the evidence base on the relationship between systemic health and oral health, providing clinical dentists with research evidence that improving human well-being goes beyond simply treating dental disease [1].

Several studies, including a recent meta-analysis, demonstrated significant associations between various psychological factors including depression/depressive

state, anxiety/anxiety state, perceived stress, and periodontitis [1]. These studies revealed that psychological factors can trigger host immune responses and promote the appearance or worsening of periodontitis changes. Therefore, clinicians need to assess anxiety, depression, and stress in periodontitis patients using psychological self-report scales [1].

The DASS-21 is used in a variety of settings for all age groups. Several researchers investigated the psychometric properties of the DASS-21 in three samples of adult psychiatric patients, primarily with mood disorders, including over 1,400 patients aged 14 to 83 years [2]. The key findings highlighted a strong internal consistency across both the total and individual scale scores, as well as a clear factor structure, where the ability of the three items to load onto one another and the correlation of error terms

was evident. Additionally, the results demonstrated the sensitivity of the scales to changes following treatment. The research also found a significant ceiling effect for the depression subscale, with a smaller but still noteworthy ceiling effect observed for the anxiety subscale, and no ceiling effect was detected for the stress scale. The suggestion was made that simply changing response options might not get rid of ceiling effects, and that it is essential to revise the items to more accurately capture the most severe depression symptoms [2].

The 10-item Perceived Stress Scale (PSS-10) is a self-report questionnaire designed to assess perceived stress levels in the general population. In this context, the present study aimed to explore the correlation between periodontitis and psychological factors such as anxiety, depression, and stress by utilizing both the PSS-10 and the Depression, Anxiety, and Stress Scale-21 Items (DASS-21). Specifically, the objective was to investigate the psychometric properties of these scales in patients with periodontitis and to assess the psychological characteristics of individuals suffering from this condition.

2. Materials and methods

This study was conducted at the Lenora Institute of Dental Sciences, Rajanagaram, Andhra Pradesh, India, and the institutional ethical certificate was obtained (IEC No.:36/IEC/LIDS/2022). The participants gave written informed consent and had a clear understanding of the assessment details.

2.1 Methodology

This descriptive cross-sectional study involved observing 300 male and female patients diagnosed with periodontitis, who visited the Department of Periodontology at Lenora Institute of Dental Sciences. Data collection took place between December 2022 and February 2023. All participants met the CDC/AAP criteria for periodontitis and were 18 years of age or older, ensuring their eligibility for the study. Patients unable to independently complete the questionnaires or those with progressive systemic diseases were excluded. The 300 participants were randomly assigned to two groups: Group A completed the 10-item Perceived Stress Scale (PSS-10), while Group B completed the DASS-21. Both groups filled out their respective questionnaires based on their spontaneous responses. Before completing the survey, patients received instructions on filling out the form. They were asked to complete the questionnaires independently but were free to consult the examiner if needed. All periodontal assessments mentioned in the study were carried out by a postgraduate student who had undergone systematic training in the Department of Periodontology.

2.2 Measures

The Perceived Stress Scale (PSS) is a commonly employed tool for evaluating stress. The PSS assesses how unpredictable, uncontrollable, and unduly stressful a person's life has been over the past month. The PSS also assesses the extent to which external demands appear to exceed an individual's perceived coping abilities. The "PSS-10" was part of a series of self-reported physical and mental health questionnaires administered at his DNHS in 2010 [3].

The "PSS-10" comprises a 10-item estimate of perceived stress based on a 5-point Likert scale starting from 0 ("never") to 4 ("very often"). Six points on the "PSS-10" (1, 2, 3, 6, 9, and 10) were considered negative, and the other points (points 4, 5, 7, and 8) were considered positive. The total score ranges from 0 to 40, with higher total scores indicating greater perceived stress [1]. Figures 1 and 2 present the scores of the Perceived Stress Scale 10 questionnaire.

The "DASS-21" is an abbreviated version of the complete 42-element DASS developed by Lovibond and Lovibond. The self-report instrument contains three subscales (i.e., depression, anxiety, and stress) with seven items per subscale [5]. Depression subscales assess symptoms like dysphoria, hopelessness, devaluation of life, self-deprecation, apathy/commitment, anhedonia, and inertia. The anxiety subscale assesses core anxiety symptoms like autonomic arousal, effects on skeletal muscles, situational anxiety, and subjective experience of anxious feelings. The stress subscale assesses chronic, nonspecific arousal: difficulty relaxing, nervous agitation, easy irritability or restlessness, irritability and over-reactivity, and impatience. Each item was rated on a 4-point scale to assess the degree of the participant's emotional state undergone in the last week; the range was 0 (not true) to 3 (very true) [5]. Depression, Anxiety, and Stress Scores 21 with its scores are given in Figures 3 and 4.

2.3 Statistical analysis

The collected data were analysed using the Statistical Package for Social Sciences (SPSS) version 23.0, USA. Independent sample t-tests were conducted to assess mean values and determine significant p-values.

3. Results

Group A, which completed the 10-item Perceived Stress Scale (PSS-10), consisted of 150 participants—87 male and 63 female. Group B, assigned the DASS-21, also included 150 participants, with 91 males and 59 females. Table 1 presents the minimum, maximum, mean, and standard deviation for the PSS-10 scores. The highest score of 4 was observed for questions 3, 4, and 9, with standard deviations of 1.3344, 1.4369, and 1.4201, respectively. The maximum score of 3 was recorded for the remaining questions. Table 2 shows the minimum, maximum, mean, and standard deviation for the DASS-21 scores, where all questions were assigned a maximum score of 3. The independent t-test comparisons between the PSS-10 and DASS-21 scales are displayed in Table 3. A comparison between the two scales revealed a highly significant p-value ($p=0.000$) and a t-value of 6.56. The standard deviation for the PSS-10 was 4.90211, while for the DASS-21 it was 5.04468.

4. Discussion

The psychophysiological response of an organism to a perceived challenge or threat is called 'stress' [7]. Stress leads a person to neglect oral hygiene, significantly affecting periodontal tissues [7]. The relationship between stress and periodontal health is difficult to prove because many factors influence the frequency and severity of periodontitis [7].

Perceived Stress Scale

For each question choose from the following alternatives:

0 - never 1 - almost never 2 - sometimes 3 - fairly often 4 - very often

- _____ 1. In the last month, how often have you been upset because of something that happened unexpectedly?
- _____ 2. In the last month, how often have you felt that you were unable to control the important things in your life?
- _____ 3. In the last month, how often have you felt nervous and stressed?
- _____ 4. In the last month, how often have you felt confident about your ability to handle your personal problems?
- _____ 5. In the last month, how often have you felt that things were going your way?
- _____ 6. In the last month, how often have you found that you could not cope with all the things that you had to do?
- _____ 7. In the last month, how often have you been able to control irritations in your life?
- _____ 8. In the last month, how often have you felt that you were on top of things?
- _____ 9. In the last month, how often have you been angered because of things that happened that were outside of your control?
- _____ 10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

Fig 1: Perceived Stress Scale- A

Figuring Your PSS Score

You can determine your PSS score by following these directions:

- First, reverse your scores for questions 4, 5, 7, and 8. On these 4 questions, change the scores like this:
0 = 4, 1 = 3, 2 = 2, 3 = 1, 4 = 0.
- Now add up your scores for each item to get a total. **My total score is _____.**
- Individual scores on the PSS can range from 0 to 40 with higher scores indicating higher perceived stress.
 - ▶ Scores ranging from 0-13 would be considered low stress.
 - ▶ Scores ranging from 14-26 would be considered moderate stress.
 - ▶ Scores ranging from 27-40 would be considered high perceived stress.

The Perceived Stress Scale is interesting and important because your perception of what is happening in your life is most important. Consider the idea that two individuals could have the exact same events and experiences in their lives for the past month. Depending on their perception, total score could put one of those individuals in the low stress category and the total score could put the second person in the high stress category.

Disclaimer: The scores on the following self-assessment do not reflect any particular diagnosis or course of treatment. They are meant as a tool to help assess your level of stress. If you have any further concerns about your current well being, you may contact EAP and talk confidentially to one of our specialists.

Figure 2. Perceived Stress Scale- A

DASS21

Name: _____

Date: _____

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you **over the past week**. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

- 0 Did not apply to me at all
 1 Applied to me to some degree, or some of the time
 2 Applied to me to a considerable degree or a good part of time
 3 Applied to me very much or most of the time

1 (s)	I found it hard to wind down	0	1	2	3
2 (a)	I was aware of dryness of my mouth	0	1	2	3
3 (d)	I couldn't seem to experience any positive feeling at all	0	1	2	3
4 (a)	I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5 (d)	I found it difficult to work up the initiative to do things	0	1	2	3
6 (s)	I tended to over-react to situations	0	1	2	3
7 (a)	I experienced trembling (e.g. in the hands)	0	1	2	3
8 (s)	I felt that I was using a lot of nervous energy	0	1	2	3
9 (a)	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10 (d)	I felt that I had nothing to look forward to	0	1	2	3
11 (s)	I found myself getting agitated	0	1	2	3
12 (s)	I found it difficult to relax	0	1	2	3
13 (d)	I felt down-hearted and blue	0	1	2	3
14 (s)	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15 (a)	I felt I was close to panic	0	1	2	3
16 (d)	I was unable to become enthusiastic about anything	0	1	2	3
17 (d)	I felt I wasn't worth much as a person	0	1	2	3
18 (s)	I felt that I was rather touchy	0	1	2	3
19 (a)	I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat)	0	1	2	3
20 (a)	I felt scared without any good reason	0	1	2	3
21 (d)	I felt that life was meaningless	0	1	2	3

Figure 3. DASS- 21 Scoring Scale-A

DASS-21 Scoring Instructions

The DASS-21 should not be used to replace a face to face clinical interview. If you are experiencing significant emotional difficulties you should contact your GP for a referral to a qualified professional.

Depression, Anxiety and Stress Scale - 21 Items (DASS-21)

The Depression, Anxiety and Stress Scale - 21 Items (DASS-21) is a set of three self-report scales designed to measure the emotional states of depression, anxiety and stress.

Each of the three DASS-21 scales contains 7 items, divided into subscales with similar content. The depression scale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest / involvement, anhedonia and inertia. The anxiety scale assesses autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect. The stress scale is sensitive to levels of chronic non-specific arousal. It assesses difficulty relaxing, nervous arousal, and being easily upset / agitated, irritable / over-reactive and impatient. Scores for depression, anxiety and stress are calculated by summing the scores for the relevant items.

The DASS-21 is based on a dimensional rather than a categorical conception of psychological disorder. The assumption on which the DASS-21 development was based (and which was confirmed by the research data) is that the differences between the depression, anxiety and the stress experienced by normal subjects and clinical populations are essentially differences of degree. The DASS-21 therefore has no direct implications for the allocation of patients to discrete diagnostic categories postulated in classificatory systems such as the DSM and ICD.

Recommended cut-off scores for conventional severity labels (normal, moderate, severe) are as follows:

NB Scores on the DASS-21 will need to be multiplied by 2 to calculate the final score.

	Depression	Anxiety	Stress
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely Severe	28+	20+	34+

Figure 4. DASS- 21 Scoring Scale-B

Table 1. The mean and Standard Deviation of PSS- 10 Scores.

	N	Minimum	Maximum	Mean	Standardd Deviation
PSS_1	300	0.00	3.00	1.2533	1.0984
PSS_2	300	0.00	3.00	1.8133	0.5222
PSS_3	300	0.00	4.00	1.5933	1.3343
PSS_4	300	0.00	4.00	1.9067	1.4369
PSS_5	300	0.00	3.00	2.2533	0.9047
PSS_6	300	0.00	3.00	1.5200	1.1316
PSS_7	300	0.00	3.00	2.0467	0.8681
PSS_8	300	0.00	3.00	1.9000	1.0457
PSS_9	300	0.00	4.00	1.4933	1.4201
PSS_10	300	0.00	3.00	1.0133	0.9324

The present cross-sectional study showed that patients with periodontitis had a higher prevalence of anxiety,

depression, stress symptoms, and moderate to severe perceived stress. Similarly, an etiological relationship between periodontitis and various systemic diseases has been shown, and the severity of periodontitis was found to be a risk predictor for psychiatric symptoms [7]. Similar to the results of the present study, Coelho *et al.* found significant positive associations between stress and periodontal pocket depth, stress and clinical attachment loss, and stress and periodontitis [8].

According to Croucher *et al.*, periodontitis was associated with the negative impact and frequency of negative life events and unemployment [9]. Remarkably, these associations remained statistically significant even after adjusting for oral health behaviours and socio-demographic variables [9]. According to Deinzer *et al.*,

microbes recognize hormones in the host and realise that they can use them to adapt to their environment. This supports the theory that psychological stress can promote the development of many bacterial infections [10]. The impact of stress on periodontitis is significant and cannot be overlooked, as numerous studies have highlighted its role in the progression of the disease. Given the varying results across different studies, exploring the molecular pathways involved in stress may provide valuable insights for future research.

Table 2. The mean and Standard Deviation of DASS-21 Scores

	N	Minimum	Maximum	Mean	Standard Deviation
DASS_1	300	0.00	3.00	0.6867	0.8969
DASS_2	300	0.00	3.00	0.7600	0.9724
DASS_3	300	0.00	3.00	0.5733	0.7874
DASS_4	300	0.00	3.00	0.7067	0.9074
DASS_5	300	0.00	3.00	0.6600	0.8327
DASS_6	300	0.00	3.00	0.6733	0.8770
DASS_7	300	0.00	3.00	0.7267	0.8801
DASS_8	300	0.00	3.00	0.6333	0.8374
DASS_9	300	0.00	3.00	0.7267	0.8251
DASS_10	300	0.00	3.00	0.6600	0.8407
DASS_11	300	0.00	3.00	0.5267	0.6813
DASS_12	300	0.00	3.00	0.7467	0.8747
DASS_13	300	0.00	3.00	0.6467	0.7771
DASS_14	300	0.00	3.00	0.7000	0.8636
DASS_15	300	0.00	3.00	0.5867	0.7945
DASS_16	300	0.00	3.00	0.6800	0.8603
DASS_17	300	0.00	3.00	0.6000	0.8096
DASS_18	300	0.00	3.00	0.6867	0.8271
DASS_19	300	0.00	3.00	0.8200	0.9112
DASS_20	300	0.00	3.00	0.7000	0.9089
DASS_21	300	0.00	3.00	0.6267	0.7455

Table 3. Independent Sample t-test comparison between PSS-10 and DASS-21 Scales

Scale	N	Mean	Standard Deviation	T-Value	p-value
PSS 10	300	16.7933	4.90211	6.56	0.00
DASS 21	300	14.1267	5.04468		

Some limitations of this study should be acknowledged. First, the sensitivity and responsiveness of the "DASS-21" and "PSS-10" were not evaluated, as this would require a longitudinal approach. Additionally, the generalizability of the findings may be restricted due to the specific sample, which included only patients from the Department of Periodontology at Lenora Institute of Dental Sciences. Future research should aim to validate the "DASS-21" and "PSS-10" scores in a broader population.

5. Conclusion

This study demonstrated that both the "DASS-21" and "PSS-10" possess strong psychometric properties based on statistical analysis. These questionnaires serve as valuable tools for clinicians and researchers to evaluate anxiety,

depression, perceived stress, and distress in patients with periodontitis. Recognizing the potential influence of psychological symptoms on the progression of periodontitis is essential for delivering comprehensive, holistic care. The identification of such symptoms should prompt healthcare providers to refer periodontitis patients to a psychologist, psychiatrist, or general practitioner for appropriate intervention.

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References

- Deng Y, He S, Wang J. Validation of the Hospital Anxiety and Depression Scale and the Perceived Stress Scale and psychological features in patients with periodontitis. *J Periodontol.* 2021;92(11):1601-1612. <https://doi.org/10.1002/JPER.20-0756>
- Osman A, Wong JL, Bagge CL, Freedenthal S, Gutierrez PM, Lozano G. The Depression Anxiety Stress Scales-21 (DASS-21): further examination of dimensions, scale reliability, and correlates. *J Clin Psychol.* 2012;68(12):1322-1338. <https://doi.org/10.1002/jclp.21908>
- Nielsen MG, Ørnbøl E, Vestergaard M, et al. The construct validity of the Perceived Stress Scale. *J Psychosom Res.* 2016;84:22-30. <https://doi.org/10.1016/j.jpsychores.2016.03.009>
- Nagórska M, Obrzut B, Ulman D, Darmochwał-Kolarz D. The Need of Personalized Medicine in Coping with Stress during Infertility Treatment. *J Pers Med.* 2021;11(1):56. <https://doi.org/10.3390/jpm11010056>
- Cao CH, Liao XL, Gamble JH, et al. Evaluating the psychometric properties of the Chinese Depression Anxiety Stress Scale for Youth (DASS-Y) and DASS-21. *Child Adolesc Psychiatry Ment Health.* 2023;17(1):106. <https://doi.org/10.1186/s13034-023-00655-2>
- Sharma MK, Hallford DJ, Anand N. Confirmatory factor analysis of the Depression, Anxiety, and Stress Scale among Indian adults. *Indian J Psychiatry.* 2020;62(4):379-383. https://doi.org/10.4103/psychiatry.IndianPsychiatry_313_19
- A Tanveer S, Afaq A, Alqutub MN, et al. Association of Self-Perceived Psychological Stress with the Periodontal Health of Socially Deprived Women in Shelter Homes. *Int J Environ Res Public Health.* 2021;18(10):5160. <https://doi.org/10.3390/ijerph18105160>
- Coelho JMF, Miranda SS, da Cruz SS, et al. Is there association between stress and periodontitis? *Clin Oral Investig.* 2020;24(7):2285-2294. <https://doi.org/10.1007/s00784-019-03083-9>
- Croucher R, Marcenes WS, Torres MC, Hughes F, Sheiham A. The relationship between life-events and periodontitis. A case-control study. *J Clin Periodontol.* 1997;24(1):39-43. <https://doi.org/10.1111/j.1600-051X.1997.tb01182.x>
- Deinzer R, Kleinedam C, Stiller-Winkler R, Idel H, Bachg D. Prolonged reduction of salivary immunoglobulin A (sIgA) after a major academic exam. *Int J Psychophysiol.* 2000;37(3):219-232. [https://doi.org/10.1016/S0167-8760\(99\)00112-9](https://doi.org/10.1016/S0167-8760(99)00112-9)

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