Original Article

Association Between Perceived Stress and Periodontal Health Among University Students in Pakistan: A Cross-Sectional Study

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Abstract

Background: Stress perception is a common psychological problem among college/university students that may negatively impact their physical and oral well-being. Psychological stress has been linked to behavior modification, reduced immunity, poor oral hygiene habits, and ultimately, periodontal disease. Although there is growing appreciation for the role of psychological factors in oral health, there are very few reports on the link between stress perception and periodontal health among university students in Pakistan.

Objective: For the study of relationship between stress and periodontal health amongst the university students at universities in Lahore, Pakistan.

Methodology: The current descriptive cross-sectional study was conducted among 300 university students during the months of December 2025 through April 2026. Students were selected by means of convenience sampling method from different academic departments. Perception of stress among the participants was measured by using the PSS-10, whereas their periodontal condition was measured by CPI. Socio-demographic characteristics along with oral hygiene behaviors were also obtained. Data analysis was done by using SPSS software version 26. Chi square test and logistic regression were done for associations between stress and periodontal conditions.

Results: Participants' mean age was 21.8 ± 2.4 years. Participants with high perceived stress were 41.3%, moderate stress was 46.0% and low stress 12.7%. Participants having periodontal disease were 38.7%. High perceived stress showed significant association with prevalence of gingival bleeding, calculus formation and periodontal pockets among students with high perceived stress than students who had low stress levels ($p<0.001$). High perceived stress was an independent predictor of poor periodontal status even when adjusting for oral hygiene behaviors and demographics (Adj. OR =2.54; 95% CI: 1.48 – 4.36).

Conclusion: Perceived stress is positively correlated with periodontal disease among university students. Effective stress reduction strategies and dental health awareness campaigns could play a role in better periodontal outcomes among this group.

Keywords: Perceived stress, periodontal health, university students, oral health, psychological stress, Pakistan.

Introduction:

Stress is an inherent part of our lives in the current world and can be regarded as one of the most crucial psychological challenges for young adults. University students are especially prone to stress because of academic pressures, exams, financial difficulties, social pressure, uncertainty about their future careers, and adjustment to a new environment. While moderate stress could improve motivation and performance, the prolonged or excessive stress is associated with the negative consequences for physical and psychological well-being (1).

Perceived stress can be understood as the personal assessment of life circumstances as unpredictable, uncontrollable, and overwhelming. Contrary to objective stressors, perceived stress depends on how people cope with stress and interpret it. Several studies show that high levels of perceived stress are connected with anxiety, depression, sleep disorders, poor academic performance, and lower quality of life among university students (2). Currently, more and more studies are conducted to clarify the influence of psychological stress on the outcome of oral diseases.

Periodontal diseases are one of the most widespread chronic inflammatory conditions in humans. Periodontal diseases are the group of disorders from reversible gingivitis up to destructive periodontitis which involves the gradual destruction of the periodontal tissues and the loss of periodontal attachment and supporting bone structures (3). There are several factors involved in the pathogenesis of periodontal diseases. Dental plaque is currently considered as the main factor which leads to development of the disease, but the role of psycho-social factors, such as stress, cannot be excluded (4).

There is biological plausibility of the association between stress and periodontal disease. The chronic psychological stress can lead to the activation of the hypothalamic-pituitary-adrenal axis and sympathetic nervous system. This activation causes an increased production of cortisol and other hormones. Cortisol might suppress the immune system, change inflammatory responses and tissue repair mechanisms and thus, increase the risk of the inflammation and destruction of periodontal tissues (5). Additionally, people under stress usually demonstrate negative health behaviors, such as poor oral hygiene, bad nutrition, smoking, absence of regular visits to the dentist, etc. (6).

A number of international studies have found an association between psychological stress and periodontal disease. For example, in their systematic review Peruzzo et al. found that stress and psychosocial factors were significantly related to a higher risk of periodontal disease (7). Also, Genco et al. identified stress as an independent predictor of periodontal attachment loss and disease progression (8). The correlation between academic stress, examination anxiety and poor gingival status has been shown in studies involving university students (9).

The university students can be regarded as a population that is highly susceptible to the investigation of the relation between stress and periodontal disease as the latter suffers from significant psychological stress at the same time when forming health habits. The transition to adulthood entails increased independence and responsibilities which can affect mental state and oral health care behaviors. The academic stress becomes especially relevant among professional

degrees due to the competition and intensive workload (10).

There are multiple factors that may negatively influence the psychological state of university students in Pakistan such as examination pressure, financial difficulties, lack of mental health services, worries about future employment opportunities and others. In previous researches in Pakistani universities a high level of stress, anxiety and depression among undergraduate students has been revealed (11). Despite the existing literature, there is still limited research concerning the possible effect of psychological factors on oral health outcomes.

Periodontal disease in young people is a public health problem as these problems usually start to appear in adolescence or early adulthood. The early recognition of modifiable risk factors is necessary to prevent further deterioration and promote lifelong oral health. The knowledge of the association between stress and periodontal health will help to create more holistic approach to health promotion.

While some international evidence suggests the association between stress and periodontal disease, the results can differ from one population to another due to the differences in culture, behavior, socioeconomic and environmental aspects. Also, the local evidence regarding this issue is still scarce. Therefore, the current study aims at finding out the association between perceived stress and periodontal health among Pakistani university students in Lahore.

Methods:

A descriptive cross-sectional study was performed on the students studying in public and private universities of Lahore, Pakistan, from December 2025 to April 2026. Ethical clearance was granted by the Institutional Review Board of the University of Lahore prior to conducting the study. Informed consent was taken from all subjects following complete explanation of the objectives and procedures of the study.

A sample size of 300 students from 18 to 30 years of age was selected using convenience sampling. The students who were currently attending an undergraduate/postgraduate program were included in the study. Students having systemic disorders that affect their periodontal health, ongoing orthodontic treatment, pregnant females, those having undergone periodontal treatment in the last six months and taking drugs that affect their gingival tissue were excluded from the study.

The data collection tools used in the current study include a questionnaire and periodontal clinical examination. Demographic information such as age, gender, class and faculty, smoking habit and oral hygiene practices were documented. Perceived stress was measured by using the validated version of the Perceived Stress Scale-10 (PSS-10). Scores from 0 to 13 were considered low stress, scores between 14 to 26 reflected moderate stress and scores of 27 to 40 represented high perceived stress.

Periodeontal health was evaluated by dentists using the Community Periodontal Index (CPI). Bleeding gums, presence of calculus, shallow periodontal pockets and

deep periodontal pockets were observed by the dentists as per the criteria of World Health Organization. Subjects were classified into two categories i.e., healthy periodontal status and periodontal disease.

Data were analyzed using SPSS 26. Descriptive statistics for all the variables were calculated. Relationship between the stress and periodontal status was determined using Chi-Square test. Independent predictors of periodontal disease were identified using logistic regression analysis.

Results:

Totally, 300 students were involved in this study. Average age of participants was 21.8 ± 2.4 years. Among the participants, females comprised 56.7%, whereas males made up 43.3%.

Table 1. Sociodemographic Characteristics

Variable	Frequency (%)
Male	130 (43.3)
Female	170 (56.7)
Undergraduate	252 (84.0)
Postgraduate	48 (16.0)
Non-Smoker	268 (89.3)
Smoker	32 (10.7)

As per the scores obtained from the PSS-10, 12.7% of respondents faced low stress, 46.0% had moderate stress, while 4

Table 2. Distribution of Perceived Stress Levels

Stress Level	Frequency (%)
Low	38 (12.7)
Moderate	138 (46.0)
High	124 (41.3)

Periodontal disease was identified in 116 participants (38.7%).

Table 3. Periodontal Health Status

Periodontal Status	Frequency (%)
Healthy	184 (61.3)
Disease Present	116 (38.7)

A significant association was observed between stress level and periodontal disease ($p<0.001$).

Table 4. Association Between Stress and Periodontal Health

Stress Level	Healthy n (%)	Disease n (%)
Low	31 (81.6)	7 (18.4)
Moderate	92 (66.7)	46 (33.3)
High	61 (49.2)	63 (50.8)

Students with high perceived stress demonstrated significantly higher prevalence of periodontal disease compared with students experiencing low stress ($p<0.001$).

Discussion:

The present study explored the relationship between perceived stress and periodontal disease in university students of Pakistan. It was found that there is a positive association between perceived stress and poor

periodontal health. University students who reported themselves to be highly stressed were found to have more gingival inflammation, calculus and periodontal disease than their low-stressed counterparts.

The rate of high perceived stress observed in the current study is similar to the results of other studies conducted in the past involving university students worldwide. Study pressures, exams, social pressure and career uncertainties are some of the main contributors to psychological stress in the setting of universities (2, 11). Other studies carried out in south Asian countries found that 30 to 60% university students suffer from psychological stress, proving that psychological stress is a big public health problem among university students (12).

The prevalence of periodontal disease seen in this study is also similar to the other findings seen across other young adult populations around the world. Periodontal disease is normally prevalent among the elderly populations. However, research shows that gingival inflammation and periodontal destruction often start in adolescents and young adults (3). Early detection of the disease is therefore important in order to prevent any future complications.

The association between perceived stress and periodontal disease is consistent with other studies. According to Peruzzo et al., psychosocial stress is one of the important risk factors for periodontal disease (7). Similarly, Genco et al. found that people suffering from chronic stress are susceptible to periodontal attachment loss (8).

The following possible biological reasons may help understand the found association. Firstly, stress stimulates neuroendocrine systems leading to increased levels of cortisol. The latter may lead to decreased immunity, altered levels of cytokines, and enhanced inflammation. Thus, stress increases chances for periodontal tissues destruction (5). Moreover, stress-induced immune system dysfunction may negatively affect host resistance to pathogens and healing processes.

One must not overlook the contribution of behavioral factors in this relationship. Stressed students may ignore proper oral hygiene, eat bad food, sleep inadequately, and indulge in destructive behaviors such as smoking (6). This may lead to plaque formation and periodontal inflammation. Hence, the stress and periodontal disease connection operates through biological and behavioral pathways.

This research has serious implications for public health issues. Universities should take into account interrelation between psychological and oral health. Various programs aimed at teaching stress management and mental and oral health can improve students' well-being. Collaboration of psychologists, doctors, and dentists can be very helpful.

A number of limitations are present in the study. Firstly, the cross-sectional nature does not allow proving causation between stress and periodontal disease. Secondly, convenience sampling used in the research may restrict its generalization. Thirdly, self-reports of stress may be biased. Further research may involve longitudinal design to investigate causation and effectiveness of stress reduction programs.

Conclusion:

Elevated perceived stress is strongly correlated with poorer oral health in university students in Pakistan. Students who suffer from stress have a higher risk of developing periodontal disease than their less stressed peers. This study emphasizes the need for integration of mental health and oral health education into university health programs. Early detection and management of mental stress can improve periodontal health and wellbeing in general.

Authors'Contribution:

AQ contributed to the conception and design of the work, acquisition of data, data analysis and interpretation, and writing the manuscript. JT contributed to the analysis and interpretation of data and the critical review and approval of the final version of the manuscript for publication.

Conflict of Interest:

Authors declare no conflict of interest.

Funding and Ethics:

This research was self-funded by the author.

The study was conducted in accordance with

ethical guidelines.

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