

Enhancing Oral Care: Innovations For Mental Health Support In Periodontal Disease Patients

Richa Wadhawan¹, Chanchala Kumari², Shivendra Rajput³, Abhishek Yadav⁴
Vijaya Singh⁵, Shreya Saxena⁶

Professor, Oral Medicine, Diagnosis & Radiology, PDM Dental College & Research Institute, Bahadurgarh, Haryana

Private Practitioner, Sahaj Dental Care, Ramgarh, Jharkhand

Post Graduate, Periodontology, Maharana Pratap College Of Dentistry & Research Centre, Gwalior, Madhya Pradesh

Dental Surgeon, Insitute Of Dental Education & Advance Studies, Gwalior, Madhya Pradesh

Dental Surgeon, Insitute Of Dental Education & Advance Studies, Gwalior, Madhya Pradesh

Intern, Maharana Pratap College Of Dentistry & Research Centre, Gwalior, Madhya Pradesh

Abstract:

Periodontal disease profoundly affects both oral health and overall well-being, often leading to significant psychological distress in the affected individuals. This review delves into transformative strategies for enhancing dental care for patients with periodontal disease by seamlessly integrating mental health support into treatment protocols. Enhancing treatment adherence and emotional resilience demands a thorough, all-encompassing holistic framework incorporating robust patient education, effective mindfulness techniques, and empathetic communication. Dental professionals can extensively improve patient outcomes, reduce anxiety related to periodontal treatments, while providing a more empowering treatment experience by establishing a supportive environment that addresses both physical and mental health. Merely emphasising the crucial connection between mental health and oral health, this integrative approach broadens up the possibility for greater patient satisfaction and care quality when treating periodontal disease. Ultimately, this framework not only promotes superior health outcomes but also enriches the overall patient experience. Understanding the bidirectional relationship between oral health and mental well-being, this review emphasises on evidence-based strategies, such as motivational interviewing, mindfulness techniques, and cognitive-behavioral interventions, leading to better patient engagement in oral care. Addressing the mental health aspects of periodontal disease can lead to improved treatment adherence and anxiety reduction, underscoring the necessity for a holistic approach in dental practice. This commitment to incorporate mental health support will foster better patient experiences facilitating a long-term success in periodontal management of impacted individuals.

Keywords: Periodontal health, Peri-implantitis, Microbiome, Stress, Mental health, Anxiety-disorder

Date of Submission: 17-09-2024

Date of Acceptance: 27-09-2024

I. Introduction:

According to the National Institute of Mental Health and Neuro Sciences (NIMHANS), mental health encompasses an individual's emotional, psychological, and social well-being. It affects how people think, feel, and act, influencing their capacity to handle stress, interact with others, and make decisions.¹ Strong mental health is essential for overall wellness, enabling individuals to lead satisfying lives and maintain healthy relationships. The World Health Organization (WHO) defines mental health as a state of well-being where individuals can manage ordinary life pressures, work productively, and contribute to their communities.² Before the pandemic, approximately 792 million people worldwide were estimated to have a mental disorder, a number that has surged by around 25%.³ Socioeconomic factors like unemployment, social isolation, and poverty significantly affect mental health disorders (**Figure 1**).

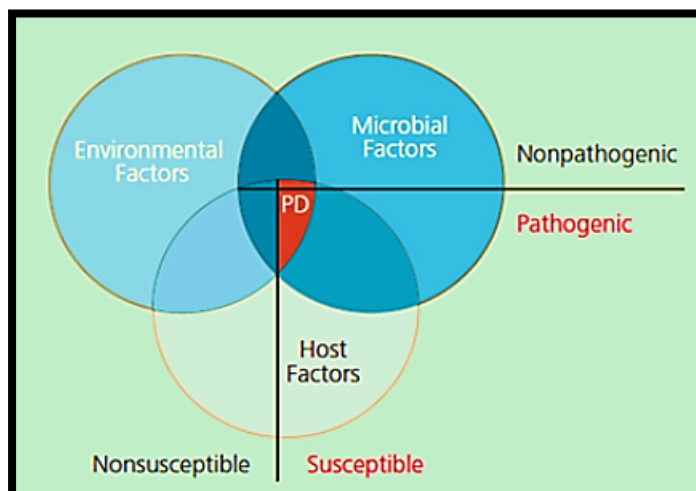


Figure 1: Various factors contributing to periodontal disease

Courtesy: <https://dimensionsofdentalhygiene.com/article/what-the-future-holds-for-periodontal-treatment/>

The pandemic has resulted in changes to health behaviors, including increased snacking, tobacco and alcohol consumption, and reduced physical activity. These detrimental behaviors, combined with stressors like fear of illness and financial uncertainty, can lead to worsening oral health.⁴

Periodontal Disease and Its Consequences: Periodontal disease, characterized by inflammation caused by bacteria affecting the gingival and surrounding structures, ranks as the second leading cause of tooth loss among adults in developed countries, following dental caries. This condition arises from the degradation of the periodontal ligament and the loss of supportive bone, both vital for tooth stability.⁵ Periodontal diseases present significant challenges, driven by microbial factors that can lead to the destruction of tooth-supporting structures and an increased likelihood of tooth loss.⁶ Peri-implantitis, a complex condition marked by inflammation around dental implants, further complicates oral health by causing progressive bone loss.⁷ Epidemiological studies highlight striking differences in how these conditions manifest across various populations, revealing unique phenotypic expressions and individual susceptibilities.⁸

Pathogenic Factors and Risk Variables: Key pathogenic species contribute to dysbiosis, while genetic variations in the host's immune response play a critical role in determining the risk of periodontitis. Despite this understanding, our knowledge regarding infections involving periodontopathic microorganisms and genetic predispositions related to peri-implantitis remains limited. Both periodontal and peri-implant diseases are influenced by multi factorial origins (**Figure 2**), with numerous risk factors identified. For periodontal disease, factors such as male gender, smoking, poorly controlled diabetes, as well as possibly obesity, osteoporosis, and inadequate calcium and vitamin D intake are significant. In terms of peri-implantitis, a history of periodontitis, poor plaque management, and inconsistent maintenance practices are key contributors, with some individuals showing heightened vulnerability to implant failures.⁹

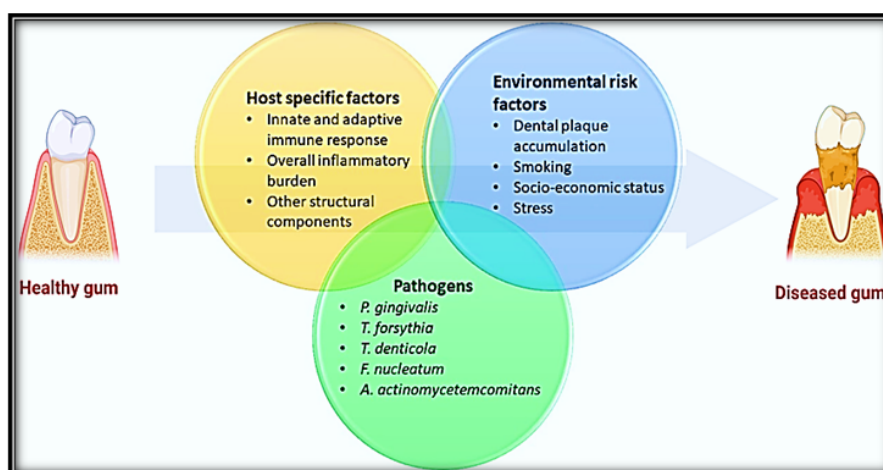


Figure 2: Overview of periodontal disease and factor that affects susceptibility to periodontal infections
 Courtesy: Haque MM, Yerex K, Kelekis-Cholakakis A, Duan K. Advances in novel-therapeutic approaches for periodontal diseases. BMC Oral Health. 2022; 22:492.

Effects of Mental Health and Psychosocial Stress on Oral Health: A growing body of evidence emphasizes the effect of psychosocial stress on periodontal health, although research into mental health disorders is still emerging (**Figure 3**).¹⁰

Figure 3: Relationship between mental health, oral health and general health

Recent studies highlight the crucial role of gut microbiota in influencing brain function and behavior, providing insights into mental disorders, particularly depression (**Figure 4**). However, the connections between oral microbiota, their interactions with the brain, and mental health issues remain largely unexplored.¹¹ Mental health disorders and certain medications are associated with higher rates of implant failure, often due to irregular dental visits, poor adherence to oral hygiene, and the use of antidepressants. Mental disorders frequently lead to increased consumption of antipsychotics and antidepressants, which carry side effects such as bruxism and xerostomia, negatively affecting oral health. Furthermore, concerns about infection and limited social interactions during the pandemic may impede access to dental care, causing patients to seek treatment only in emergencies.¹²

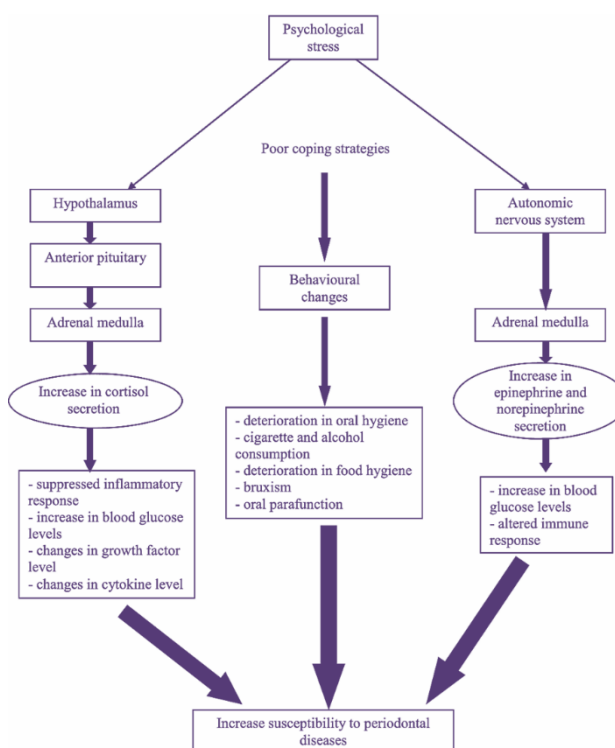


Figure 4- Biological mechanism associated with stress and periodontitis

Courtesy- Gunepin M, Derache F, Trousselard M, Salsou B, Risso J-J. Impact of chronic stress on periodontal health. *Journal of Oral Medicine and Oral Surgery*. 2018; 24(1):44–50.

Need for a multidisciplinary approach: The intricate connection between psychological conditions and dental diseases indicates that various oral health issues are related to mental health challenges. Factors such as disrupted micro biomes, migrating bacteria, and systemic inflammation play significant roles in this relationship. Mental health nurses, alongside medical and dental professionals, should be involved in the oral care of individuals with psychological disorders, advocating for a collaborative strategy in managing mental health, with oral health care recognized as an essential component of treatment.¹³ Future research should aim to elucidate the biological links between these areas to create new therapeutic avenues.¹⁴ Innovative approaches, such as psychological assessments in dental settings, education on coping strategies, and telehealth services for ongoing mental health support, can promote a holistic approach to oral care, enhancing treatment adherence and health outcomes for individuals with periodontal concerns. There is an often-overlooked reciprocal relationship between psychological and oral health, urging increased awareness among health professionals and policymakers regarding these interconnected issues.¹⁵ Given the impact of psychosocial factors on periodontal conditions and their substantial effects on quality of life, incorporating mental health strategies is vital for improving patient outcomes. Mental health disorders represent an escalating concern that necessitates greater awareness, education, prevention, and treatment efforts at both national and global levels. This review consolidates the critical link between dental health and mental wellness emphasizes the need for integrating mental health support into the management of gum disease.¹⁶

II. Discussion:

Inflammation is a hallmark of many chronic illnesses, such as atherosclerosis, cancer, and periodontitis. Numerous adjustable risk factors, including tobacco use, elevate systemic inflammation markers, potentially influencing gene regulation through various biological mechanisms. Increasing evidence suggests that psychological stress can disrupt the inflammatory response, fostering the onset and progression of diseases. The reciprocal relationship between mental health and overall physical well-being continues to be better understood. This interaction becomes particularly evident when an individual's ability to adapt is overwhelmed by environmental pressures during times of psychological strain, referred to simply as "stress" in this review.¹⁷ Stress is associated with susceptibility, onset, persistence, and worsening of multiple health conditions, contributing to increased morbidity and mortality rates. Research demonstrates that stress can trigger and exacerbate inflammation, a key element in many chronic diseases affecting the cardiovascular, metabolic, digestive, pulmonary, and rheumatologic systems, as well as conditions with infectious, allergic, autoimmune, or neoplastic origins.¹⁸

Periodontitis, Prevalence and Stress Impact: Periodontitis impacts nearly 20-50% of adults in the global population and often demonstrates chronic and episodic progression.¹⁹ This review focuses on recent insights into the interactions between stress, the immune system, and periodontitis, examining how stress responses can undermine normal immune defenses, alter the oral micro biome, and promote both local and systemic disease progression (**Figure 5**). Stress is a potentially significant adjustable risk factor directly linked to the worsening of periodontitis and other inflammatory periodontal conditions.²⁰

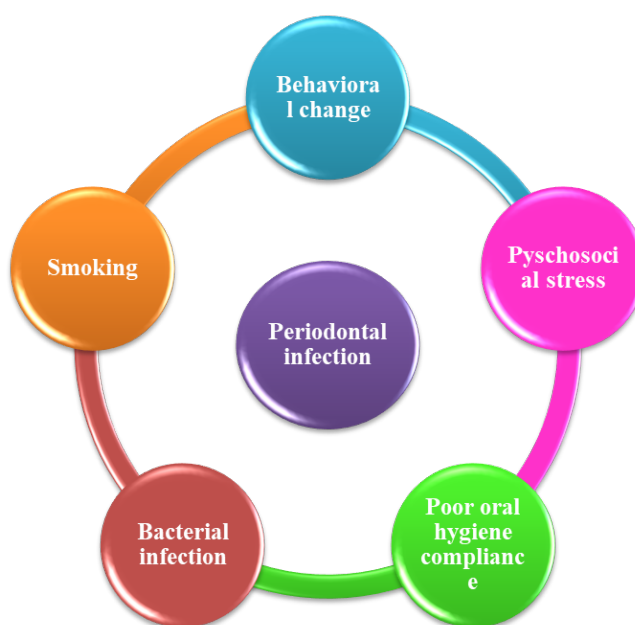


Figure5: Correlation between stress and periodontal infections

Understanding Stress & its clinical implications: Stress activates the brain's defensive motivational system, driving behaviors that protect against perceived threats. This response occurs when there's a discrepancy between an individual's coping resources and the demands of their environment.²¹ Stressors can arise from external events or from our interpretations of experiences and thoughts. A person's capacity to cope is shaped by resilience mechanisms and vulnerabilities that can be either inherent or developed over time.²² Coping strategies are essential for emotional well-being, serving two primary functions: managing emotions and redefining our relationship with stressors.²³ Resilient individuals possess an extraordinary ability to transform strains, threats, and losses into opportunities for growth, often responding with humor and optimism that propels them forward.²⁴ In stark contrast, early childhood adversity can lead to maladaptive stress responses that persist into adulthood. Children enduring chronic stress may experience accelerated aging and an increased risk of systemic illnesses, including ischemic heart disease and various cancers.²⁵ However, the impact of social support and positive relationships is profound; they enhance resilience and significantly improve a child's ability to manage stress.²⁶ This interaction underscores the critical need to cultivate environments that foster resilience, particularly for our youngest and most vulnerable. Understanding stress as an active response involving coordinated communication between the brain, endocrine, and immune systems is vital. This process activates internal defenses for survival and safety.²⁷ Nevertheless, significant cumulative biological damage can arise from allostasis—the body's attempt to maintain stability in the face of stressors—leading to what's termed "allostatic load." Clinically, the repercussions of stress are severe, with depression showing the strongest correlation. Stress can also result in substance abuse, sleep deprivation, and poor dietary habits. Systemic conditions closely linked to stress include metabolic disorders like diabetes, cardiovascular disease, infectious diseases, autoimmune disorders, and periodontal disease. Numerous studies reveal a concerning correlation between life stressors and periodontitis.²⁸ Dental anxiety, a specific source of stress, frequently leads to more severe conditions and worse clinical outcomes, as individuals often postpone seeking dental care until the disease has advanced, necessitating more invasive interventions. The message is clear: addressing stress is essential for enhancing overall health and well-being.²⁹

Stress and Periodontitis: Hypothalamic-pituitary-adrenocortical (HPA) Axis Link: A critical inquiry is how stress contributes to diseases like periodontitis, and whether this relationship is reciprocal. A growing body of research has identified various systems and pathways responsive to stress, mediating the mind-brain-body connection.³⁰ Under normal conditions, these stress pathways facilitate adaptation and survival through autonomic, endocrine, metabolic, and immune responses. However, chronic stress can cause dysregulation of these pathways, leading to significant biological damage. Specifically, the dysregulation of the HPA axis and immune system is well documented in the context of chronic stress.³¹ The HPA axis (**Figure 6**) and the sympathetic-adrenal-medullary (SAM) (**Figure 7**) system are the two neuroendocrine systems responding to stress.³²

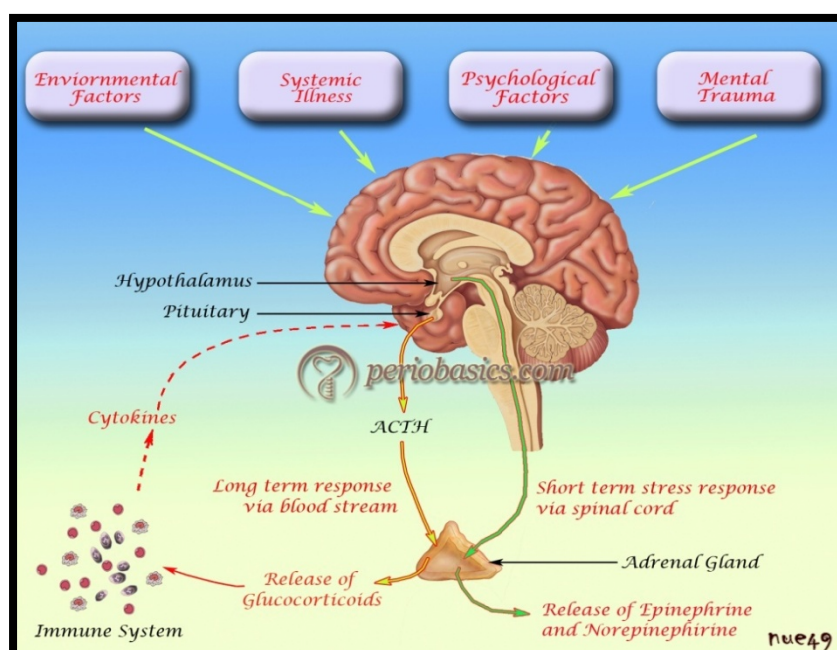


Figure 6: Stress and Periodontitis: Hypothalamic-pituitary-adrenocortical (HPA) Axis Link
Courtesy: <https://periobasics.com/stress-as-a-risk-factor-for-periodontal-diseases/>

z

Figure 7: Sympathetic-adrenal-medullary system

The paraventricular nucleus of the hypothalamus is activated in response to acute stress, releasing arginine vasopressin and corticotropin-releasing hormone (CRH), stimulating the pituitary gland to secrete adrenocorticotropic hormone (ACTH), which activates the adrenal cortex to release cortisol.³³ Cortisol levels rise with stress, as do catecholamines, through activation of the noradrenergic center in the locus coeruleus of the brainstem and the adrenal medulla, which releases epinephrine.³⁴ Both cortisol and adrenergic molecules enable the body to react to danger, whether real or perceived, by enhancing vigilance, reactivity, and mobilizing physiological resources for sustaining the “fight or flight” response.³⁵ Persistent dysregulation of the HPA axis due to stress, particularly regarding cortisol levels, is implicated in various illnesses, such as autoimmune diseases, cardiovascular disease, HIV/AIDS progression, upper respiratory infections, osteoporosis, obesity, and periodontitis.³⁶ Cortisol levels may rise following acute stress, such as the loss of a loved one, and may increase further when coping mechanisms are ineffective.³⁷ With chronic stress, cortisol levels may remain elevated, but cortisol's ability to suppress the immune response diminishes. This can initiate a cascade of inflammation, leading to increased circulating pro-inflammatory cytokines, while cortisol's action becomes generally ineffective at inhibiting inflammatory pathways due to glucocorticoid receptor resistance.³⁸ Regulatory T cells (Tregs) play a crucial role in suppressing the inflammatory response by producing Transforming Growth Factor (TGF)- β 1 and Interleukin (IL)-10, while inhibiting the activity of CD4+ and CD8+ effector cells. Notably, Treg levels diminish in depression, leading to a decreased ratio of Tregs to pro-inflammatory T cells under stress. This reduction in Tregs has also been observed in patients with atherosclerosis infected by *Porphyromonas gingivalis* (**Figure 8**).³⁹

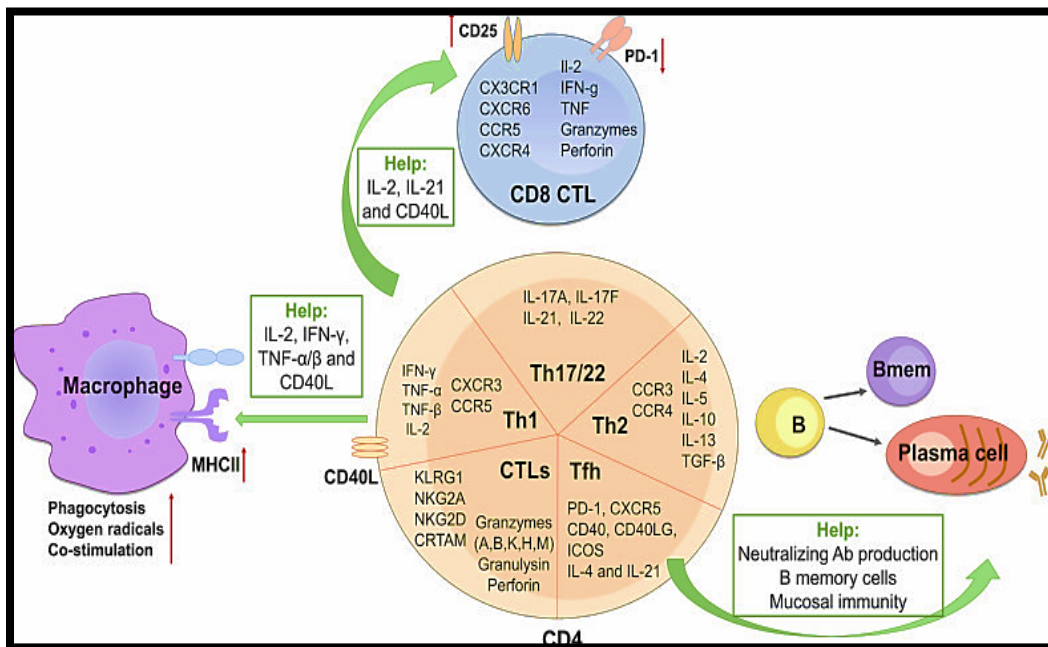


Figure 8: Role of Tregs in Periodontitis

Courtesy: Sun L, Su Y, Jiao A, Wang X, Zhang B. T cells in health and disease. *Signal Transduct Target Ther.* 2023; 8(1):23.

Animal studies shed light on the impact of chronic stress on the development and progression of periodontitis.⁴⁰ Rats subjected to experimentally induced periodontitis and chronic stress exhibited increased blood glucose, elevated plasma ACTH, corticosterone, and adrenaline levels, alongside more severe alveolar bone loss compared to their unstressed counterparts.⁴¹ This relationship is believed to be amplified through adrenergic pathways, indicating that adrenergic antagonists could emerge as promising pharmacological treatments for periodontitis.⁴² Clinically, evidence reveals a significant correlation between psychosocial stress and periodontal disease.⁴³ A cross-sectional study highlighted a positive relationship between salivary cortisol levels and the severity of periodontitis in adults over 50, after controlling for variables like age, sex, oral hygiene, and smoking. However, a systematic review noted that while some studies measured stress directly, others relied on cortisol as a proxy, complicating our understanding of causality.⁴⁴ Moreover, inflammation provides another critical link between stress and periodontitis. Animal studies utilizing various stress models—such as infections, toxin exposure, physical injuries, social deprivation, or maternal separation—have identified persistent changes in specific molecular and cellular immune markers.⁴⁵ Chronic stress leads to an increase in circulating neutrophils and functional immune suppression by altering T-helper 1 (Th-1) and T-helper 2 (Th-2) cell responses. This shift reduces T cell proliferation and antibody responses, and persistent cortisol elevation may result in glucocorticoid receptor resistance (GCR), undermining cortisol's immunosuppressive effects on lymphocytes.⁴⁶ A meta-analysis has shown elevated blood levels of IL-6, Tumor Necrosis Factor (TNF)-α, IL-1β, and C-reactive protein (CRP) in response to stress (Figure 9).

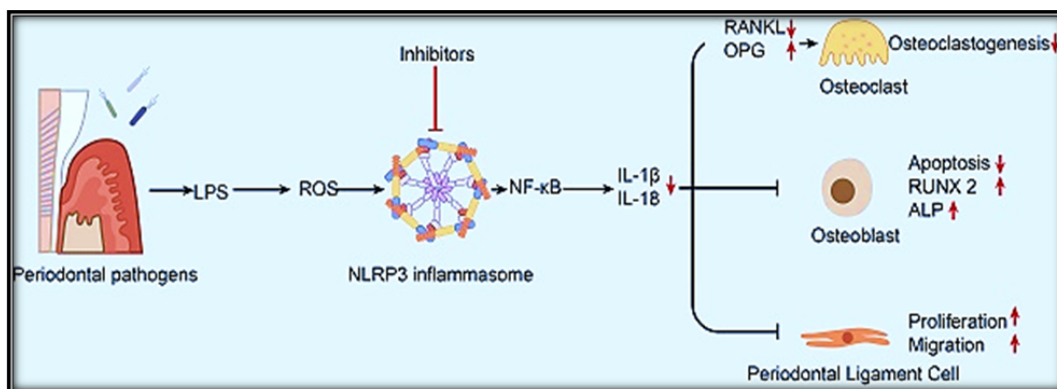


Figure 9: Role of inflammatory mediators in development of periodontitis

Courtesy: Zhao Y, Quan Y, Lei T, Fan L, Ge X, Hu S. The Role of Inflammasome NLRP3 in the Development and Therapy of Periodontitis. *Int J Med Sci.* 2022; 19(10):1603-14.

Pro-inflammatory mediators found in gingival crevicular fluid are typically heightened in active or untreated periodontitis. The dysregulation of the immune system due to chronic stress, characterized by increases in cytokines and other pro-inflammatory mediators, likely contributes to the increased risk of periodontal disease.⁴⁷The intricate relationship between stress, immune dysregulation, and periodontitis underscores the urgent need for integrated approaches in prevention and treatment, emphasizing the importance of mental well-being in maintaining oral health.⁴⁸

Stress and Microbiome Dynamics in Periodontitis: As stress diminishes immunity and heightens susceptibility to infections and bacterial proliferation, the role of the oral micro biome has gained significant attention concerning stress and periodontal disease. Periodontal disease is thought to be driven by a complex dysbiotic microbiota.⁴⁹ Various bacterial species, particularly the “red complex” bacteria such as *P. gingivalis*, *Tannerella forsythia*, and *Treponema denticola*, as well as *Aggregatibacter actinomycetemcomitans*, are recognized as key pathogens in periodontitis (**Figure 10**).⁵⁰

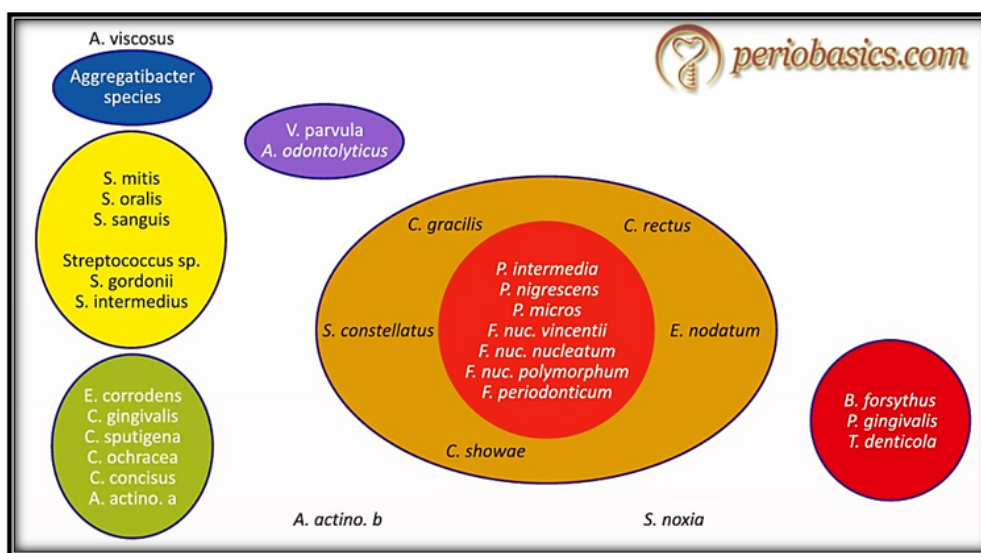


Figure 10: Microbiology of periodontal diseases

Courtesy: <https://periobasics.com/microbiology-of-periodontal-diseases/>

These pathogens have been isolated in the subgingival plaque of patients with periodontitis and found to correlate with oxidative stress markers(**Figure11**) in saliva, with the highest oxidative stress levels associated with the presence of these three red complex pathogens.⁵¹The persistence of these bacteria in dental plaque leads to continuous production of pro-inflammatory cytokines and other molecular mediators, causing extensive tissue destruction. Notably, *P. gingivalis* can alter plaque composition and the inflammatory environment through its virulence factors, thereby inducing inflammation and modulating immune responses. Studies have shown a positive association between cortisol levels and the presence of *P. gingivalis* in subgingival plaques among individuals with localized periodontitis after accounting for factors like age, sex, income, and smoking. *P. gingivalis* modifies the host immune response, contributing to the dysbiosis of the periodontal micro biome and enhancing its potential to cause periodontitis. Unique oral micro biome signatures have been identified for chronic periodontitis compared to those of periodontally healthy individuals.⁵² A key question remains whether stress or stress-induced biological mediators contribute to the dysbiosis of the periodontal micro biome, impacting disease onset or progression. Cortisol has been shown to significantly promote the in vitro growth of *P. gingivalis*, suggesting a mechanism linking stress to periodontal disease. Recent research indicates that cortisol can induce changes in the gene expression profile of the oral micro biome, consistent with chronic periodontitis signatures. Thus, elevated cortisol in saliva during stress, typically regarded as a stress marker, may directly mediate the connection between stress and periodontitis.⁵³

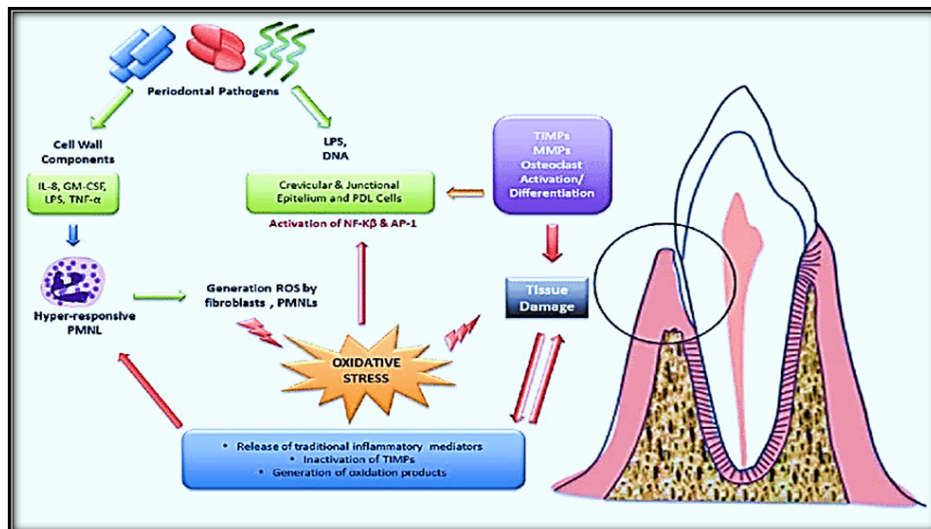


Figure 11 – Oxidative stress mediated pathway and periodontal health

Courtesy: Gumus P, Huseynalemdaroglu B, Buduneli N. The role of oxidative stress in the interaction of periodontal disease with systemic diseases or conditions. *Oxidants and Antioxidants in Medical Science*. 2016; 5(2):33.

Stress, Sleep, and Periodontitis Connection: Stress and sleep have a reciprocal relationship, influencing one another with cascading effects between sleep disruption and stress. A review noted that sleep disturbances result in numerous negative physiological outcomes, including HPA-axis activation (Figure 12), increased secretion of catecholamines, ACTH, and cortisol, reduced insulin sensitivity and leptin, elevated ghrelin and appetite, increased oxygen consumption and CO₂ production, and up regulation of inflammatory cytokines like TNF- α , IL-1, and IL-6, as well as decreased melatonin production.⁵⁴

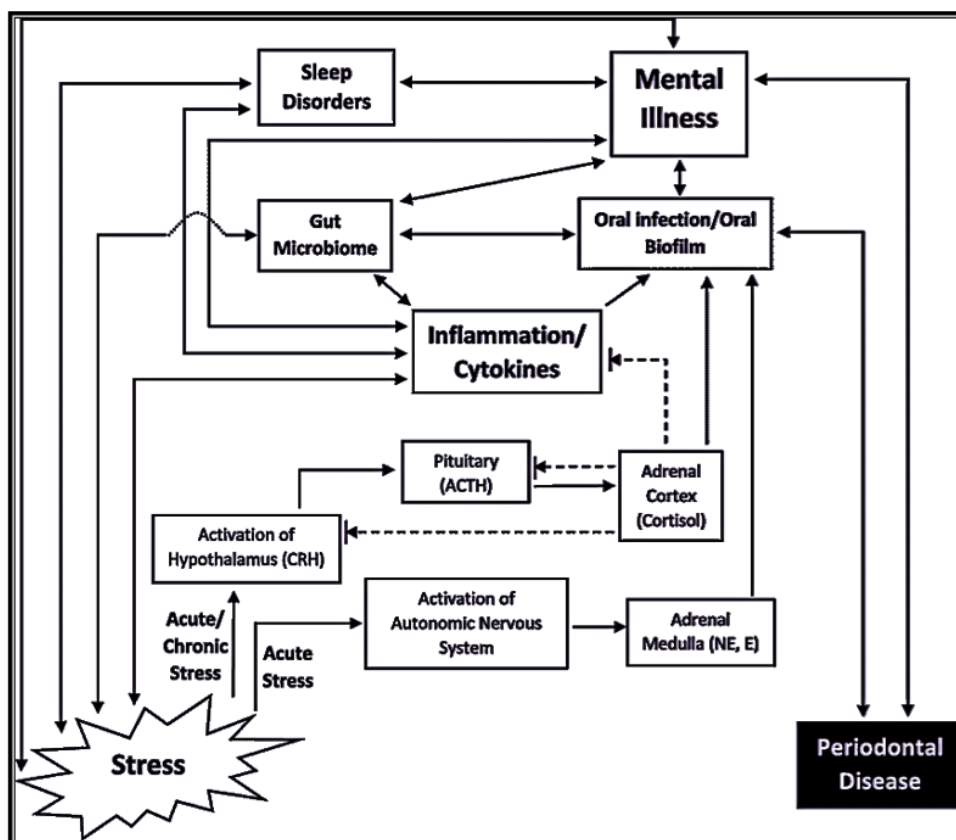


Figure 12: Flowchart of HPA Axis and periodontium

Courtesy: Spector AM, Postolache TT, Akram F, Scott AJ, Wadhawan A, Mark A. Psychological stress: a predisposing and exacerbating factor in periodontitis. *Curr Oral Health Rep*. 2020; 7:208–1.

Sleep problems can relate to duration, quality, and timing consistency. Sleep apnea is associated with HPA axis activation and higher cortisol levels compared to those without sleep disorders. Reduced sleep duration has been linked to elevated stress levels the following day.⁵⁵ Conversely, chronic stress can decrease time spent in Rapid Eye Movement (REM) sleep. Early life stress is associated with insomnia and can lead to increased serum concentrations of inflammatory cytokines. Inflammatory cytokines have been shown to disrupt sleep patterns. Moreover, sleep disorders can perpetuate the inflammatory pathway, increasing cytokine levels and potentially leading to cascading effects.⁵⁶ Sleep deprivation raises several stress biomarkers, including cortisol and blood pressure, and has been linked to increased alveolar bone loss in experimental models. Insomnia related to stress has also been associated with periodontal disease. Collectively, sleep deprivation and insomnia can result from stress and contribute to increased stress vulnerability, with susceptibility to infection and inflammation as key mediators linking stress, sleep, and periodontal disease.⁵⁷ Current evidence indicates a bidirectional relationship between stress and periodontitis, involving immune response dysregulation and oral microbiome dysbiosis.⁵⁸ This association underscores the necessity of considering stress when evaluating patients with periodontitis. Patient education and referral for assessment and counseling should be pursued for those exhibiting psychological stress or depression. An interdisciplinary approach to patient management is essential.⁵⁹ Models proposed by Genco et al. in 1998 shed light on the critical role of stress as a risk factor for periodontal disease.⁶⁰ One model examines the direct effects of psychosocial stressors, suggesting that stress triggers a cascade of immune-inflammatory responses that heighten susceptibility to infections, particularly periodontal disease.⁶¹ The secondary model reveals how stress influences health behaviors—such as poor oral hygiene, smoking, and unhealthy eating—leading to immune suppression through elevated cortisol levels.⁶² These behaviors, coupled with ineffective coping strategies, can exacerbate conditions like depression, further worsening periodontal disease progression. The link between stress and periodontal health is well-documented, particularly in cases like acute necrotizing ulcerative gingivitis, where compromised immunity and poor oral hygiene are significant contributors. Stress and depression weaken periodontal defenses, fostering an environment conducive to opportunistic microbial growth and impairing saliva flow and gingival circulation.⁶³ Notably, increased levels of stress hormones like epinephrine can disrupt blood flow, creating favorable conditions for harmful bacteria such as *Prevotella intermedia*. This pathogenic connection is supported by spikes in clinical cases during stressful periods, such as exams or high-pressure jobs. Despite extensive research over the past four decades, studies directly linking stress to periodontal disease remain limited.⁶⁴ Varied definitions of stress complicate understanding this relationship, with factors such as workplace stress, family dynamics, and significant life events yielding inconclusive results.⁶⁵ While some studies have identified psychosocial stressors and financial concerns as significant risk factors for periodontal disease, others have found no correlation between stress and disease severity.⁶⁶ Interestingly, individuals with dental insurance appear to have better periodontal health, suggesting that financial security may alleviate stress and its negative impact on oral health. However, discrepancies between studies may arise from methodological differences and participant demographics. This highlights the need for further investigation into the complex interplay between stress, mental health, and periodontal disease.⁶⁷ The current study underscores the importance of recognizing the bidirectional relationship between oral health and mental well-being.⁶⁸ Conditions affecting oral health can influence social interactions, potentially leading to mental health issues such as hopelessness and depression. Future research should focus on the biochemical and physiological pathways linking psychosocial stress to periodontal destruction, refining the definition of stress and standardizing assessment protocols for more accurate comparisons.⁶⁹ By addressing these intricate relationships, we can pave the way for more effective prevention and treatment strategies, ultimately enhancing the oral and mental health of individuals affected by periodontal disease.⁷⁰

Creative Solutions and Future Prospects: Future innovations in enhancing mental health support for periodontal disease patients can include developing integrated care models that combine dental and mental health services for comprehensive assessments and treatment plans. Expanding telehealth options will allow for remote counseling, making support more accessible for those anxious about in-person visits.⁷¹ Utilizing digital therapeutics through mobile apps can offer cognitive-behavioral therapy (CBT) techniques (**Figure 13**) and mindfulness exercises tailored for dental anxiety.



Figure 13: Cognitive behavioral therapy

Additionally, training programs for dental professionals can equip them with skills to recognize and address mental health issues, ensuring empathetic care and appropriate referrals. Community support initiatives can promote awareness of the oral-mental health link and foster support groups for shared experiences.⁷² Personalized care plans that consider mental health histories will enable a tailored approach to treatment. Exploring virtual reality (VR) technology can help patients manage anxiety during procedures through immersive relaxation experiences. Integrating mindfulness and relaxation techniques into dental settings, such as guided meditation sessions, can further alleviate patient stress.⁷³ Mindfulness and relaxation techniques, like guided imagery and breathing exercises, can reduce anxiety during dental procedures, while cognitive behavioral strategies such as cognitive restructuring and positive reinforcement can empower patients to confront negative thoughts and maintain good oral health.⁷⁴ Integrative health approaches, including art and music therapy along with aromatherapy, can provide emotional support and a soothing environment.⁷⁵ Patient education through interactive workshops and the creation of support groups can further engage and empower patients. Customized treatment plans that consider individual mental health needs and flexible appointment scheduling can alleviate stress (Figure 14).⁷⁶

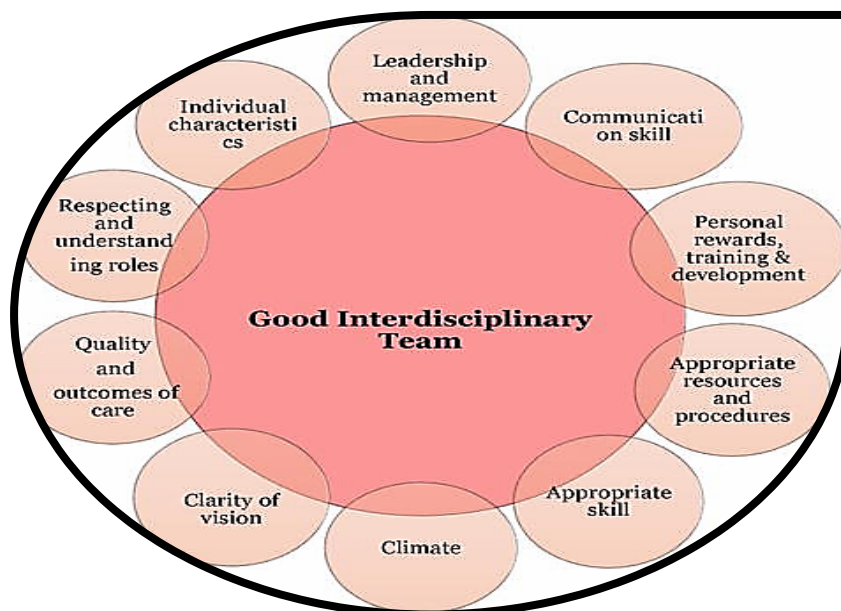


Figure 14: Interdisciplinary approach in management of Periodontitis
Courtesy: Raj SC, Tabassum S, Mahapatra A, Patnaik K. Interdisciplinary periodontics. In: IntechOpen; 2021.

Environmental enhancements, like comfortable waiting areas with calming decor, and collaboration with mental health professionals to effectively address anxiety are crucial. Implementing behavioral incentives can encourage regular dental visits by addressing both mental health and oral health goals. Finally, ongoing research will be essential to evaluate the effectiveness of these mental health interventions in dental settings, ensuring that innovations are evidence-based and continuously improved. Continuous feedback from patient surveys will allow for the adaptation of practices based on experiences and emerging research, ensuring a holistic approach that addresses both physical and mental well-being in periodontal disease management.⁷⁷

III. Conclusion:

It is important to emphasize the interconnectedness of oral health and mental well-being. The findings highlight that addressing mental health is crucial for effective periodontal disease management. Innovative approaches, such as integrated care models, telehealth services, and mindfulness practices, can significantly enhance patient outcomes by reducing anxiety and promoting adherence to treatment. This review advocates for a holistic approach that incorporates mental health support into routine dental care. By prioritizing psychological well-being, dental professionals can improve not only oral health outcomes but also overall quality of life for patients. Future research and clinical practice should continue to explore these innovative strategies, ensuring that both oral and mental health needs are met in periodontal disease management.

Financial support and sponsorship: Nil

Conflicts of interest: There are no conflicts of interest

References:

- [1] Slots J. Periodontology: Past, Present, Perspectives. *Periodontol.* 2013; 62(1): 7–19.
- [2] Schätzle M, Lõe H, Bürgin W, et.al. Clinical Course Of Chronic Periodontitis. I. Role Of Gingivitis. *J. Clin. Periodontol.* 2003; 30(10): 887–901.
- [3] Nomura Y, Morozumi T, Nakagawa T, et.al. Site-Level Progression Of Periodontal Disease. During A Follow-Up Period. *Plos One.* 2017; 12(12): E0188670.
- [4] Hajishengallis G, Chavakis T. Local And Systemic Mechanisms Linking Periodontal Disease And Inflammatory Comorbidities. *Nat. Rev. Immunol.* 2021; 21(7): 426–440.
- [5] Hajishengallis G, Chavakis T, LambrisJD. Current Understanding Of Periodontal Disease Pathogenesis And Targets For Host-Modulation Therapy. *Periodontol.* 2020; 84(1): 14–34.
- [6] Zhang J, Lin S, Luo L, et al. Psychological Stress: Neuroimmune Roles In Periodontal Disease. *Odontology.* 2023; 111(3): 554–564.
- [7] Krishnan V, Nestler EJ. The Molecular Neurobiology Of Depression. *Nature.* 2008; 455 (7215): 894–902.
- [8] Warren KR, Postolache TT, Groer ME et al. Role Of Chronic Stress And Depression In Periodontal Diseases. *Periodontol.* 2014; 64(1): 127–138.
- [9] Gundala R, Chava V, Reddy R. Role Of Stress In Periodontal Disease. *Indian J Dent Adv.* 2012; 4(1): 763–771.
- [10] Van Houtem CM, Aartman IH, Boomsma DI, Ligthart L, Visscher CM, De Jongh A. Is Dental Phobia A Blood-Injection-Injury Phobia? *Depress Anxiety.* 2014; 13(12):1026–34.
- [11] Genco RJ, Ho AW, Kopman J, et.al. Models To Evaluate The Role Of Stress In Periodontal Disease. *Ann. Periodontol.* 1998; 3(1): 288–302.
- [12] Pitzurra L, Loos BG. Stress And Periodontitis. *Ned. Tijdschr. Tandheelkd.* 2020; 127(6): 358–364.
- [13] Parwani R, Parwani SR. Does Stress Predispose To Periodontal Disease? *Dent. Update.* 2014; 41(3): 260–272. 7-8, 71-2.
- [14] Gunepin M, Derache F, Trousselard M, et.al. Impact Of Chronic Stress On Periodontal Health. *J. Oral. Med. Oral Surg.* 2018; 24(1): 44–50.
- [15] Lopez R, Fernandez O, Jara G, et.al. Epidemiology Of Necrotizing Ulcerative Gingival Lesions In Adolescents. *J. Periodontal Res.* 2002; 37(6): 439–444.
- [16] Rosania AE, Low KG, McCormick CM, et.al. Stress, Depression, Cortisol, And Periodontal Disease. *J. Periodontol.* 2009; 80(2): 260–266.
- [17] Sedghi LM, Bacino M, Kapila YL. Periodontal Disease: The Good, The Bad, And The Unknown. *Front. Cell. Infect. Microbiol.* 2021; 11: 766944.
- [18] Marcenes WS, Sheiham A. The Relationship Between Work Stress And Oral Health Status. *Soc. Sci. Med.* 1992; 35(12): 1511–1520.
- [19] Locker D, Leake JL. Risk Indicators And Risk Markers For Periodontal Disease Experience In Older Adults Living Independently In Ontario, Canada. *J. Dent. Res.* 1993; 72(1): 9–17.
- [20] Croucher R, Marcenes WS, Torres MC, et.al. The Relationship Between Life-Events And Periodontitis. A Case-Control Study. *J. Clin. Periodontol.* 1997; 24(1): 39–43.
- [21] Genco RJ, HO AW, Grossi SG et. al. Relationship Of Stress, Distress And Inadequate Coping Behaviors To Periodontal Disease. *J. Periodontol.* 1999; 70(7): 711–723.
- [22] Wimmer G, Janda M, Wieselmann-Penkner K, et.al. Coping With Stress: Its Influence On Periodontal Disease. *J. Periodontol.* 2002; 73(11): 1343–1351.
- [23] Mahendra L, Mahendra J, Austin RD, et.al. Stress As An Aggravating Factor For Periodontal Diseases. *J. Clin. Diagn. Res.* 2011; 5: 889–893.
- [24] Vyas M. Study On Correlation Of Stress And Periodontal Status. *Jamdsr.* 2018; 6(7): 76–78.
- [25] Samorodnitzky GR, Levin L. Self-Assessed Dental Status, Oral Behavior, Dmf, And Dental Anxiety. *J Dent Educ.* 2005; 69(12):1385–9.
- [26] Eke PI, Page RC, Wei L et al. Update Of The Case Definitions For Population-Based Surveillance Of Periodontitis. *J. Periodontol.* 2012; 83(12): 1449–1454.

- [27] Monteiro Da Silva AM, Newman HN, Oakley DA, et.al. Psychosocial Factors, Dental Plaque Levels And Smoking In Periodontitis Patients. *J. Clin. Periodontol.* 1998; 25(6): 517–523.
- [28] Solis AC, Lotufo RF, Pannuti CM, et al. Association Of Periodontal Disease To Anxiety And Depression Symptoms, And Psychosocial Stress Factors. *J. Clin. Periodontol.* 2004; 31(8): 633–638.
- [29] Castro GD, Oppermann RV, Haas AN, et al. Association Between Psychosocial Factors And Periodontitis: A Case-Control Study. *J. Clin. Periodontol.* 2006; 33(2): 109–114.
- [30] Shende AS, Bhatsange AG, Waghmare AS, et.al. Determining The Association Between Stress And Periodontal Disease: A Pilot Study. *J Int Clin Dent Res Organ.* 2016; 8(2): 111–114.
- [31] Wogelius P, Poulsen S, Sorensen HT. Prevalence Of Dental Anxiety And Behavior Management Problems Among Six To Eight Years Old Danish Children. *Acta Odontol Scand.* 2003; 61(3):178–83.
- [32] Meng X, Heft MW, Bradley MM, Lang PJ. Effect Of Fear On Dental Utilization Behaviors And Oral Health Outcome. *Community Dent Oral Epidemiol.* 2007; 35(4):292–301.
- [33] Reshma AP, Arunachalam R, Pillai JK, et.al. Chromogranin A: Novel Biomarker Between Periodontal Disease And Psychosocial Stress. *J. Indian Soc. Periodontol.* 2013; 17(2): 214–218.
- [34] Armfield JM. Predicting Dental Avoidance Among Dentally Fearful Australian Adults. *Eur J Oral Sci.* 2013; 121(3 Pt 2):240–6.
- [35] Armfield JM, Stewart JF, Spencer AJ. The Vicious Cycle Of Dental Fear: Exploring The Interplay Between Oral Health, Service Utilization And Dental Fear. *Bmc Oral Health.* 2007; 7:1.
- [36] Eitner S, Wichmann M, Paulsen A, Holst S. Dental Anxiety—An Epidemiological Study On Its Clinical Correlation And Effects On Oral Health. *J Oral Rehabil.* 2006; 33(8):588–93.
- [37] Armfield JM, Slade GD, Spencer AJ. Dental Fear And Adult Oral Health In Australia. *Community Dent Oral Epidemiol.* 2009; 37(3):220–30.
- [38] Bernson JM, Elfstrom MI, Hakeberg M. Dental Coping Strategies, General Anxiety, And Depression Among Adult Patients With Dental Anxiety But With Different Dental-Attendance Patterns. *Eur J Oral Sci.* 2013; 121(3 Pt 2):270–6.
- [39] Chung DT, Bogle G, Bernardini M, Stephens D, Riggs MI, Egelberg JH. Pain Experienced By Patients During Periodontal Maintenance. *J Periodontol.* 2003; 74(9):1293–301.
- [40] Guzeldemir E, Toygar HU, Cilasun U. Pain Perception And Anxiety During Scaling In Periodontally Healthy Subjects. *J Periodontol.* 2008; 79(12):2247–55.
- [41] Fardal O, Johannessen AC, Linden GJ. Pre-Treatment Conceptions Of Periodontal Disease And Treatment In Periodontal Referrals. *J Clin Periodontol.* 2001; 28(8):790–5.
- [42] Fardal O, Hansen BF. Interviewing Self-Reported Highly Anxious Patients During Periodontal Treatment. *J Periodontol.* 2007; 78(6):1037–42.
- [43] Rizzardo R, Borgherini G, Cappelletti L. Illness Behaviour And Anxiety In Dental Patients. *J Psychosom Res.* 1991; 35(4–5):431–5.
- [44] Bratthall D, Petersen PE, Stjernsward JR, Brown LJ. Oral And Craniofacial Diseases And Disorders. In: Jamison Dt, Breman Jg, Measham AR, Alleyne G, Claeson M, Evans DB, Jha P, Mills A, Editors. *Disease Control Priorities In Developing Countries. 2. Washington (Dc): Musgrove P; 2006.*
- [45] Blicher B, Josphipura K, Eke P. Validation Of Self-Reported Periodontal Disease: A Systematic Review. *J Dent Res.* 2005; 84(10):881–90.
- [46] Gilbert GH, Litaker MS. Validity Of Self-Reported Periodontal Status In The Florida Dental Care Study. *J Periodontol.* 2007; 78(7 Suppl):1429–38.
- [47] Corah NI. Development Of A Dental Anxiety Scale. *J Dent Res.* 1969; 48(4):596.
- [48] Armfield JM. The Extent And Nature Of Dental Fear And Phobia In Australia. *Aust Dent J.* 2010; 55(4):368–77.
- [49] Kleinknecht RA, Klepac RK, Alexander LD. Origins And Characteristics Of Fear Of Dentistry. *J Am Dent Assoc.* 1973; 86(4):842–8.
- [50] Kleinknecht RA, Bernstein DA. The Assessment Of Dental Fear. *Behav Ther.* 1978; 9(4):626–34.
- [51] Stouthard Mea, Mellenbergh GJ, Hoogstraten J. Assessment Of Dental Anxiety: A Facet Approach. *Anxiety Stress Coping.* 1993; 6(2):89–105.
- [52] Porritt J, Buchanan H, Hall M, Gilchrist F, Marshman Z. Assessing Children’s Dental Anxiety: A Systematic Review Of Current Measures. *Community Dent Oral Epidemiol.* 2013; 41(2):130–42.
- [53] Huan-You Liang, Zhu-Li Peng, Ji-Yang Pan, Qian Tang, Ping Wang. Development And Evaluation Of Chinese Version Of Dental Fear Survey (Dfs) *J Sun Yat-Sen Univ (Medical Sciences)* 2006; 27(2):236–40.
- [54] NGSK, Stouthard ME, Keung Leung W. Validation Of A Chinese Version Of The Dental Anxiety Inventory. *Community Dent Oral Epidemiol.* 2005; 33(2):107–14.
- [55] Schuurs AH, Hoogstraten J. Appraisal Of Dental Anxiety And Fear Questionnaires: A Review. *Community Dent Oral Epidemiol.* 1993; 21(6):329–39.
- [56] Armfield JM. How Do We Measure Dental Fear And What Are We Measuring Anyway? *Oral Health Prev Dent.* 2010; 8(2):107–15.
- [57] Malvania EA Ajithkrishnan CG. Prevalence And Socio-Demographic Correlates Of Dental Anxiety Among A Group Of Adult Patients Attending A Dental Institution In Vadodara City, Gujarat. *India Indian J Dent Res.* 2011; 22(1):179–80.
- [58] Armfield Jm, Spencer Aj, Stewart Jf. Dental Fear In Australia: Who’s Afraid Of The Dentist? *Aust Dent J.* 2006; 51(1):78–85.
- [59] Astrom An, Skaret E, Haugejorden O. Dental Anxiety And Dental Attendance Among 25-Year-Olds In Norway: Time Trends From 1997 To 2007. *Bmc Oral Health.* 2011; 11:10.
- [60] Bedi R, Mcgrath C. Factors Associated With Dental Anxiety Among Older People In Britain. *Gerodontology.* 2000; 17(2):97–103.
- [61] Enkling N, Marwinski G, Jhren P. Dental Anxiety In A Representative Sample Of Residents Of A Large German City. *Clin Oral Investig.* 2006; 10(1):84–91.
- [62] Schuller Aa, Willumsen T, Holst D. Are There Differences In Oral Health And Oral Health Behavior Between Individuals With High And Low Dental Fear? *Community Dent Oral Epidemiol.* 2003; 31(2):116–21.
- [63] Kumar S, Bhargav P, Patel A, Bhati M, Balasubramanyam G, Duraiswamy P, Et Al. Does Dental Anxiety Influence Oral Health-Related Quality Of Life? Observations From A Cross-Sectional Study Among Adults In Udaipur District. *India J Oral Sci.* 2009; 51(2):245–54
- [64] Humphris G, Crawford Jr, Hill K, Gilbert A, Freeman R. Uk Population Norms For The Modified Dental Anxiety Scale With Percentile Calculator: Adult Dental Health Survey 2009 Results. *Bmc Oral Health.* 2013; 13:29.

- [65] Warren KR, Postolache TT Groer ME, Pinjari O, Kelly DI, Reynolds Ma. Role Of Chronic Stress And Depression In Periodontal Diseases. *Periodontol.* 2014; 64(1):127–38
- [66] Ray J, Boman UW, Bodin L, Berggren U, Lichtenstein P, Broberg AG. Heritability Of Dental Fear. *J Dent Res.* 2010; 89(3):297–301.
- [67] Maggiriias J, Locker D. Five-Year Incidence Of Dental Anxiety In An Adult Population. *Community Dent Health.* 2002; 19(3):173–9.
- [68] Vettore MV, Leao AT, Monteiro Da Silva AM, Quintanilha RS, Lamarca GA. The Relationship Of Stress And Anxiety With Chronic Periodontitis. *J Clin Periodontol.* 2003; 30(5):394–402.
- [69] NG SK, Keung Leung W. A Community Study On The Relationship Between Stress, Coping, Affective Dispositions And Periodontal Attachment Loss. *Community Dent Oral Epidemiol.* 2006; 34(4):252–66.
- [70] Saletu A, Pirker-Frühauf H, Saletu F, Linzmayer L, Anderer P, Matejka M. Controlled Clinical And Psychometric Studies On The Relation Between Periodontitis And Depressive Mood. *J Clin Periodontol.* 2005; 32(12):1219–25
- [71] Locker D, Poulton R, Thomson Wm. Psychological Disorders And Dental Anxiety In A Young Adult Population. *Community Dent Oral Epidemiol.* 2001; 29(6):456–63.
- [72] Armfield Jm, Slade Gd, Spencer Aj. Cognitive Vulnerability And Dental Fear. *Bmc Oral Health.* 2008;8:2.
- [73] Oosterink Fm, De Jongh A, Hoogstraten J, Aartmanlh. The Level Of Exposure-Dental Experiences Questionnaire (Loe-Deq): A Measure Of Severity Of Exposure To Distressing Dental Events. *Eur J Oral Sci.* 2008; 116(4):353–61.
- [74] Eke PI, Dye BA, Wei L, Slade GD, Thornton-Evans Go, Beck JD, e.t al. Self-Reported 31 Measures For Surveillance Of Periodontitis. *J Dent Res.* 2013; 92(11):1041–7.
- [75] Gale En. Fears Of The Dental Situation. *J Dent Res.* 1972; 51(4):964–6.
- [76] Milgrom P, Fiset L, Melnick S, Weinstein P. The Prevalence And Practice Management Consequences Of Dental Fear In A Major Us City. *J Am Dent Assoc.* 1988; 116(6):641–7.
- [77] Oosterink Fm, De Jongh A, Aartmanlh. What Are People Afraid Of During Dental Treatment? Anxiety-Provoking Capacity Of 67 Stimuli Characteristic Of The Dental Setting. *Eur J Oral Sci.* 2008; 116(1):44–51.