

# Journal of Advanced Medical and Dental Sciences Research

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Journal home page: [www.jamdsr.com](http://www.jamdsr.com)

doi: 10.21276/jamdsr

UGC approved journal no. 63854

(e) ISSN Online: 2321-9599;

(p) ISSN Print: 2348-6805

## Review Article

### Effect of Stress on the Oral Health

Sapanpuneet Kaur<sup>1</sup>, Jaskiran Nain<sup>2</sup>

<sup>1</sup>Dental Practitioner, National Dental College Derabassi (BDS)

<sup>2</sup>B.D.S. Intern, Luxmi Bai Institute of Dental Sciences and Hospital, Patiala, Punjab, India,

#### ABSTRACT:

Psychological stress appears to contribute to poor oral health systemically in combination with other chronic diseases. Stress is likely to contribute to the progressive, long-term development of oral diseases. There is a positive relationship between current stress and poor oral health was observed. Stress can motivate individuals to cope in unhealthy ways that foster oral disease (e.g., substance use, including illicit drugs, alcohol and tobacco, poor diet, and sedentary behavior). Second, chronic stress contributes to high allostatic load that can lead to the dysfunction of physiological systems critical to homeostasis, and thus, affect the underlying mechanisms of disease progression. Stress is a common cause of health problems, and your oral health is no exception. Stress may contribute to teeth grinding, gum disease, dry mouth and canker sores and may also impact your oral health routine and diet—increasing your risk of tooth decay.

**Key words**-Burning mouth syndrome, stress, oral health, lichen planus, myofascial pain dysfunction syndrome, aphthous ulcer

Received: 14 January, 2019

Revised: 5 February, 2019

Accepted: 8 February, 2019

**Corresponding Author:** Dr. Sapanpuneet Kaur, Dental Practitioner, H.N. 1, Sunny Enclave, Sec 125, Greater Mohali, Desu Majra, Sas Nagar, Punjab, India

**This article may be cited as:** Kaur S, Nain JK. Effect of Stress on the Oral Health. J Adv Med Dent Scie Res 2019;7(3): 118-122.

#### INTRODUCTION

The mouth and body are integral to each other. Recognition that oral health and general health are interlinked is essential for determining appropriate oral health care. Stress and control are risk factors for periodontal disease and cardiovascular diseases. Stress is the body's reaction to external forces or events that cause physical, emotional or mental tension.(1-5) When an individual feels stressed, adrenaline and stress hormones (e.g., cortisol) are released to prepare the body for the "fight-or-flight" response.(1)While stress is a normal part of life, excessive stress can lead to health problems and lifestyle behavioural changes (e.g., taking up or increasing smoking, increasing alcohol intake, changing dietary habits, becoming physically inactive, neglecting oral and personal hygiene) which further increase health risks. How individuals react to stress depends to a large extent on their personality type. (6-13) Studies have shown, however, that even people with

the most easy-going and adaptable personalities can suffer from stress if they lack a sense of control over aspects of their daily lives. Chronic stress (e.g., low social support, low socioeconomic status, work stress, marital stress, caregiver strain) is a known risk factor for cardiovascular disease and periodontal disease. It has been theorised that chronic stress speeds up the process of atherosclerosis in the coronary arteries and that the stress hormone cortisol plays a role in increased periodontal destruction. Cortisol also acts to suppress the immune system, allowing bacteria to flourish in the mouth. Stress and oral health is an entirely new ballgame for most people. Unfortunately, our mouths have just as much of a chance of being affected by stressful situations as our bodies and minds do. Researchers have found a significant link between stress and oral health, helping us better understand what part anxiety and depression take in the development of dental problems . Stress can reduce the body immunity by increasing the

secretion of the endogenous steroids from the suprarenal glands which produce the macrophages (the 1st line of body defense among the white blood cells) lazy and incapable of opsonizing or fixing foreign bodies like bacteria when it invades the human body. Gingivitis and periodontitis are more likely to develop in a stressed individual without showing the same signs of bleeding and swelling that would normally appear in a stress-free individual. Generalized and severe forms of tooth decay (rampant decay) were reported in very stressed patients especially women. Stress is a major factor in teeth grinding and clenching.(6) A large percentage of the grinders and clenchers do not even realize that they grind or clench because most of them do it during their sleep; in some cases it could occur during the day too. It has been reported that the clenchers and grinders have 10 to 20 folds increase in the amount of masticatory forces. Grinding and clenching will increase the frequency of the upper and lower teeth contact (normally the upper and lower teeth are in contact 20-30 minutes a day, clenchers and grinders may have their teeth in contact several hours a day). Tenderness, spasm and fatigue of the muscles of mastication, the muscles of the face and neck leading to frequent headaches especially in the morning. Damage to the temporomandibular joint (TMJ), the joint in front of the ala of the ear. The damage may be minor presented with a clicking sound when opening or closing the mouth or may be as severe as to prevent the lower jaw from functioning properly. If the problem becomes chronic, the cheek muscles may enlarge causing some distortion to the face. Excessive grinding and clenching wears-off the occlusal surfaces and incisal edges, which leads to flat shorter teeth. When the lateral forces exceeds the physiologic level, smooth V-shaped cavities will develop followed by gum recession and subsequent tooth sensitivity . Gum and periodontal damage causes tooth mobility and tooth fracture. 6. Fracture of Dental restorations such as Porcelain crowns, Bridges, Inlays, Fillings and Dentures.

#### **A systemic view of oral health and stress**

In fact, poor oral health has long been theorized to cause the dysfunction of other critical physiologic systems (5). A growing body of evidence has come to support the existence of such an “oral-systemic” relationship (9-10). This relationship has been demonstrated for some diseases more so than others, including respiratory infections, osteoporosis, childhood obesity, cardiovascular disease, and type II diabetes (12-18). A shared impetus for the development of both oral and systemic disease may be the presence of stress. As a common risk factor for both diseases of the oral cavity as well as for non-communicable diseases (e.g. cancer, cardiovascular disease, diabetes, and respiratory disease), the minimization of stress has become an integral component of novel systemic healthcare promotion techniques, such as the common risk factor approach (9).Chronic stress is likely to contribute to the

progressive, long-term development of oral disease through at least two distinguishable pathways. First, stress can motivate individuals to cope in unhealthy ways that foster oral disease (e.g., substance use, including illicit drugs, alcohol and tobacco, poor diet, and sedentary behavior). Second, chronic stress contributes to high allostatic load that can lead to the dysfunction of physiological systems critical to homeostasis, and thus, affect the underlying mechanisms of disease progression, more generally (11) many elements are elaborated on in Shankardass (23). While stress is a concern of an array of disciplines, including psychology, sociology, psychoneuroimmunology, we adopt a transdisciplinary approach to defining chronic stress based on the stress process paradigm of Pearlin et al. (17). They conceptualized stress as a process “in which demands strain on an individual’s ability to adapt - physiologically and emotionally - with implications for physiological and behavioural pathways” (16)

Individuals may experience potential sources of current stress, including people (such as children in the case of parents), places (such as densely populated intersections), and things (such as a paucity of money, food, and shelter). Typically, stressors can be categorized into one of four types: major life events (such as a death in the family), ambient strains (such as a concern for safety in the neighbourhood you live in), role strains (such as stress related to workplace hierarchy), and quotidian nature strains (stresses that result from activities of a repeated nature, such as a daily commute to work) (21).Some factors may mediate whether or not the experience of stress currently translates into more chronic stress over time (manifestations), including whether or not they perceive certain stressors as threatening, and if so, manageable given resources at hand (18). Then, where perceived current stress occurs, the coping behaviours used to deal with stressors mediate whether chronic stress manifests and harms oral health and general well-being in two main ways. First, if stressors associated with perceived current stress are not coped with in an effective manner, then chronic stress is more likely to occur. Allostatic load, a cumulative physiological impact of chronic stress, has been associated with periodontal disease (17), and some evidence indicates that this occurs due to increased inflammation (20). However, the precise causal mechanisms remain somewhat unclear (23). Second, regardless of how effective coping behaviours are, they may manifest as habits that are either healthy (e.g., exercise and relaxation, problem solving) or unhealthy (e.g., tobacco, alcohol and other drug use, poor oral maintenance) with respect to oral disease.

#### **EFFECT OF STRESS ON IMMUNE SYSTEM**

Studies had clarified that major negative life events are more dependably occurred in close proximity to the onset or exacerbation of illness, and the relationship between important negative life events and disease was mediated by the immune system (two-edged sword). Research has

shown that emotional stress can modulate the immune system through the neural and endocrine systems in at least three different ways:[1-6] 1. Through the autonomic nervous system path ways 2. Through the release of neuropeptides 3. Through the release of hypothalamic and pituitary hormones.(31) The sympathetic nervous system also regulates immune cell activities. (23)When the body is in an acute stress or alarm state, there is a marked increase of immune cells in the plasma mobilized from lymphoid organs. Emotional stress results in the release of adrenalin and noradrenaline from cells of the adrenal medulla. Through interaction with adrenergic receptors, noradrenaline and adrenaline mediate cardiovascular and metabolic effects. In blood samples collected immediately before and after an emotional stress situation, such as a parachute jump, the circulating concentration of T-helper lymphocytes (Cluster of Differentiation + T-cells), cytotoxic T-cells (CD8+), and natural killer cells (NK cells), is dramatically increased, but 1 h later, it is lowered to the baseline values. Furthermore, the plasma levels of Immunoglobulin (Ig) IgM, IgG, and complement component C3 are elevated after an acute stress situation (a lifeboat launched in free fall from an oil platform).(31) Also the release of neuropeptides such as substance P (SP), somatostatin, the endogenous opioid peptides (beta-endorphin and enkephalins), Vasoactive intestinal peptide VIP and nerve growth factor from peptidergic. sensory nerves also modulate the activity of the immune system and the release of cytokines.(5,6) They are also present in gingival and periodontal tissues in close contact with the vascular plexus and penetrate into the epithelium. Experimental studies suggest long lasting emotional stress may increase SP release, resulting in enhanced and imbalanced inflammatory reactions, which may promote tissue damage. These neuropeptides selectively regulate Th1/Th2 cytokine secretion and may regulate immune responses in, for example, granulomatous infections. Thus, multiple nervous and endocrine factors tend to drive the immune response toward Th2 cell dominance, and therefore emotional stress may be an important predisposing factor in severe and progressive chronic infections.(31)

## ORAL DISEASES CAUSED BY STRESS

### Bruxism

Bruxism is the technical term for grinding teeth and clenching jaws. (23,24)Although it can be caused by sleep disorders, an abnormal bite or teeth that are missing or crooked, it can also be caused by stress and anxiety. Nervous tension, anger and frustration can cause people to start showing the signs of bruxism without even knowing it. Because people are often not aware that they grind their teeth, it's important to know the signs and to seek treatment if you suspect you may have bruxism. Some signs of bruxism include: Tips of the teeth appear flat.(22)Tooth

enamel is rubbed off, causing extreme sensitivity, Tongue indentations. Dentist can examine the teeth to determine whether patient may have bruxism and, if so, can suggest the best method of treatment.

### Temporomandibular disorders

TMD refers to a group of conditions that affects the jaw joint (temporomandibular joint) and the associated muscles used in moving the jaw and neck. Stress is thought to be a factor in TMD. Stressful situations can aggravate TMD by causing overuse of jaw muscles, specifically clenching or grinding teeth, as with bruxism. (7,8)But even if you aren't seeing signs of bruxism, such as flat tips of teeth or decreasing tooth enamel, you may still experience other symptoms of TMD, such as jaw joint pain or popping and clicking of the jaw. (28,29)If you experience any of these, you should check with your dentist to see if TMD may be the cause.

### Gum disease

Studies at State University of New York at Buffalo, the University of North Carolina and the University of Michigan found that emotional factors played a significant role in the development of periodontal diseases.(4,5) Researchers also discovered that the severity of gum disease increased with amount of stress (from spouse, children, lack of companionship, finances or work) experienced in a patient's previous 12 months. In addition, the researchers found that those at greatest risk for gum disease were those who were highly emotional in dealing with financial problems. (6,9)But there's good news: Patients who dealt with their financial strain in an active and positive manner had no more risk of severe gum disease than those without money problems.

### Canker sores

Canker sores (or mouth ulcers) generally occur inside the mouth and are not contagious.(13,14) They often are triggered by trauma such as biting your cheek, jabbing your gum with your toothbrush or even overzealous tooth cleaning. Canker sores may also be triggered by stress. According to a report in General Dentistry, the Academy of General Dentistry's clinical, peer-reviewed journal, studies have shown that students have a high prevalence of canker sores, yet the sores appear less frequently during breaks and after graduation, when stress levels are lower.(5,6)

**Dry Mouth** -- stress refers to a series of events that lead to a reaction in the brain (perceived stress), activating the physiological fight-or-flight response in the body. (11,12) Anxiety is also a generalized unpleasant and vague sensation of fear and concern with an unknown origin, which one can feel. It consists of uncertainty, helplessness and arousal physiologically. In depression, the patient always feels despair, sorrow and anxiety, and all these

thoughts, feelings and behaviors are the symptoms of the condition.<sup>3</sup>

Saliva is a complex combination of major and minor salivary gland secretions, which acts as a cleanser in the oral cavity, contributing to chewing foods and facilitation of swallowing.<sup>(16)</sup> The saliva has a buffering effect, leading to neutralization of acids in the oral cavity and protection of the teeth. Saliva also strengthens the mucosal barrier and has antimicrobial properties. Unstimulated salivary flow rate is defined as the volume of saliva secreted by major and minor salivary glands in a minute without any stimulation. The normal range of unstimulated and stimulated salivary flow rates are 0.3–0.5 and 0.5–0.7 mL/min, respectively. Amounts less than the above suggest salivary gland dysfunction. <sup>(15)</sup>Sometimes an individual with normal salivary flow rate complains of dry mouth, also called xerostomia.<sup>(4)</sup> When the mouth doesn't produce enough saliva, it can experience chronic dryness. Not only does dry mouth result from conditions caused by stress, but it is also a common side effect of drugs used to treat depression. <sup>(17,18)</sup>This is because during periods of intense anxiety and stress, the body is more prone to acid reflux symptoms, and acid can affect the salivary glands and lead to less saliva and the feeling of a dry mouth. It may also lead to a sticky feeling and bad taste, both of which are considered dry mouth related.

**Lichen Planus** -- Lichen planus of the mouth is characterized by white lines, sores and ulcers in the oral cavity. Some experts believe lichen planus is a reaction to viral infections caused by stress. <sup>(10)</sup>Lichen planus is a common dermatological disorder, which may affect the skin and oral mucosa. <sup>(5,7)</sup>The condition was described for the first time by Erasmus Wilson in 1869 who characterized the patients as anxious, high strung, and sensitive with a tendency to worry excessively and with periods of undue emotional stress.

**CONCLUSION**—Psychological stress is a risk factor for periodontal disease. Stress can also increase the severity of periodontal disease and decrease the effectiveness of treatments. When only the indirect action of stress on the periodontium was known (appearance of risk behaviors for periodontal-induced stress: smoking, poor food and oral hygiene), care of patients could be limited to educating patients about the consequences of these behaviors. Now, advances in biomedical research show that stress also has a direct effect on the periodontium by the implementation of neuro-immunoendocrinological mechanisms. These results suggest the multidisciplinary management (physician, dentist, psychologist) of patients to identify subjects with chronic stress and to put in place countermeasures to decrease the deleterious effect stress has on the periodontium and other oral diseases.

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