

Crosstalk between Mind and Oral Cavity: An Insight into Pathogenesis, Classification, Presentation and Management of Oral Psychosomatic Disorders

**Kanu Jain^{1*}, Monica Mehendiratta², Priyanka Kardam³, Jyoti Yadav³
and Deepti Garg Jindal⁴**

¹Department of Oral Pathology, Jaipur Dental College, Rajasthan, India.

²Department of Oral Pathology, ITS Dental College, Greater Noida, India.

³Department of Oral Pathology, Sudha Rustagi College of Dental Sciences and Research, Village Bhupani, Faridabad, Haryana, India.

⁴Department of Oral Pathology, Bhojiya Dental College, Baddi, Himachal Pradesh, India.

Authors' contributions

This work was carried out in collaboration between all the authors. Authors KJ and MM designed the study and formulated the first draft. Author PK carried out the literature search and constructed figures. Authors JY and DGJ provided assistance in corrections of the final manuscript.

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ABSTRACT

In general, the conviction is that psychological factors are important in the development of all disease. Epidemiological surveys have revealed that there are different ways in which emotional stressful stimuli can act on oral mucosal target sites. Whether their role is in initiation, progression, aggravation or exacerbation of disease or in predisposition or reaction to a disease is still not clear. Based on available evidences, a need for the understanding of oral psychosomatic disturbances is felt. This review summarizes the underlying pathophysiology of bodily changes brought about by stress related psychosomatic mechanism and their role in further development of structural changes seen in association with oral cavity. An effort has also been made to realize the significant

*Corresponding author: E-mail: kanu_priya99@rediffmail.com;

role of reassurance and counselling procedures in overall management of patients with oral psychosomatic disorders.

Keywords: Disorder; management; oral cavity; psychosomatic; stress.

1. INTRODUCTION

The term psychosomatic means something pertaining to mind-body relationship or having bodily symptoms of psychic, emotional or mental origin. Psychosomatic diseases are actual physical diseases which may be produced or aggravated by emotional disturbances [1]. In general, psychosomatic disorders are harmful effects resulting from psychic influences on the organic control of tissues [2]. Harold Wolff attempted to correlate life stresses to physiological responses of human body. He concluded that the main causative factor underlying psychosomatic diseases is stress [3]. Stress originates from a latin word 'Stringere' which means 'tight' or 'strained' [4]. Hans Selye [5] defined stress as a stimulus event of sufficient severity to produce disequilibrium in the homeostatic physiological systems. General stress is associated with particular life traumas as listed in Holmes and Rahe's social readjustment rating scale of 43 life events [6]. Franz Alexander hypothesized that specific unconscious conflicts are associated with various psychosomatic disorders [7]. Alexander's multi-factorial theories were later confirmed by Herbert Weiner [8]. Both the specific personality type and

the unconscious conflicts fall under the rubric of specific causative theories of psychosomatic disorders. To understand the basic pathophysiology of oral psychosomatic disorders, it is important to understand the role of stress in activation of neuroendocrine system [9]. The stressful input is perceived by the cerebral cortex which leads to central nervous system [CNS] stress response. This response in turn causes activation of the Hypothalamo-pituitary-adrenal [HPA] axis and peripheral nervous system [PNS] which may affect the body directly or through modulation of the immune system. The endocrine, nervous and immune systems are involved in the above mentioned stress induced psychosomatic mechanism through sharing of ligands [hormones, neurotransmitters, and cytokines]. Their receptors constitute a biochemical information circuit between each of these systems.

1.1 Endocrine System Responses to Stress [11] [Fig. 1]

Certain studies in animals and humans suggest that long term stress is associated with alterations in brain structure and functions [10].

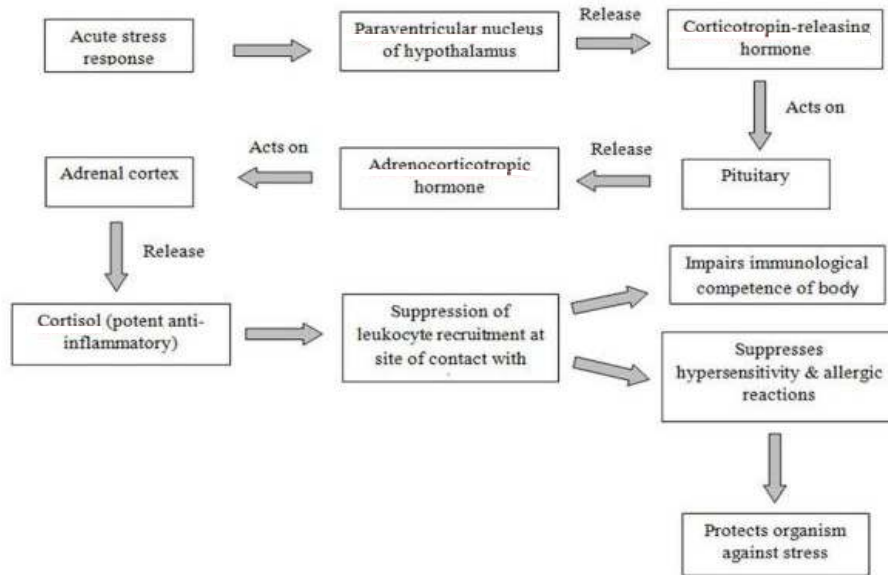


Fig. 1. Endocrine system responses to stress

This causes dysregulation in stress responsive systems of the body providing adequate protection by cortisone. When stress becomes chronic, there is more of immune reaction in the form of hypersensitivity and allergy which further causes more recruitment of leukocytes at site of antigen contact and an aggravated inflammatory response. In this way, effect of stress on endocrine systems causes modulation of immune system ultimately causing development of the psychosomatic disorders [11].

1.2 Nervous System Responses to Stress [11] [Fig. 2]

The interactions between sympathetic nervous system and immune system during periods of stress cause vasodilatation at peripheral sites. This further causes increased migration of

dendritic cells as a part of hypersensitivity reaction. Initially, there is an increased trafficking of all major leukocyte subpopulations to the site of immune activation. Tissue damage, antigens or pathogen driven chemoattractants subsequently determine which subpopulations to be recruited more. This could be the reason for exacerbated immunopathologic response observed during inflammatory and autoimmune diseases.

The effects of stress are also seen on various systems on body which may cause conditions like obesity, anorexia nervosa, chronic pain, immune and skin disorders to arise [12]. The bodily changes brought about by stress in this way may also have a role in structural changes occurring in oral tissues.

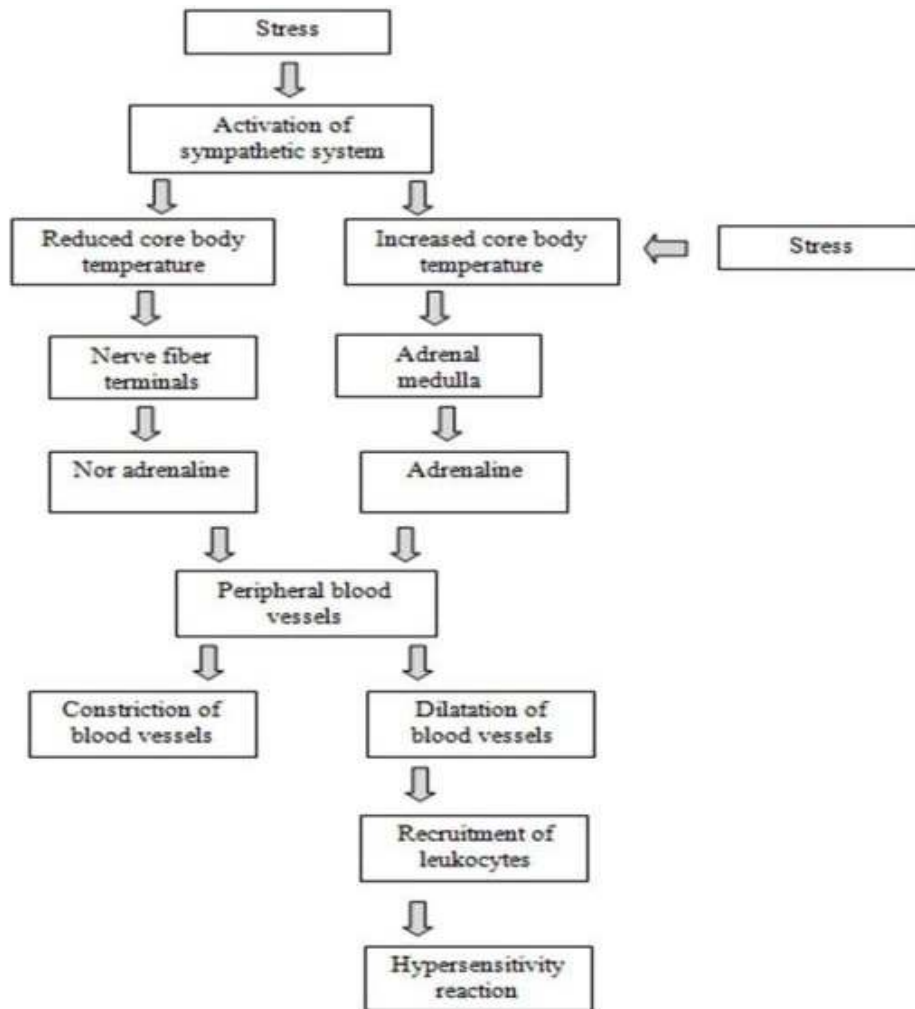


Fig. 2. Nervous system responses to stress

2. PSYCHOSOMATIC DISEASE AND ORAL CAVITY

Psychologically, the oral cavity is directly or symbolically related to major human instincts. There is an aesthetic significance of mouth and teeth for the psychological development of an individual. According to Mc-Carthy and Shklar, [13] the overall relationship of psychological factors to oral mucosal disease may be categorized under several headings, representing different ways in which emotional stressful stimuli act on oral mucosal target sites. Recently, a simple working type of classification for psychosomatic disorders of oral cavity based on the primary symptom was proposed by Thorakkal Shamim [14]. This includes pain related disorders, disorders related to altered oral sensation, disorders induced by neurotic habits, autoimmune disorders, and miscellaneous disorders. The author later added another subset to this to include disorders caused by altered perception of dentofacial form and function to give revised classification [15]. We have discussed different entities in this paper that can be placed under oral psychosomatic disorders.

3. PAIN RELATED DISORDERS

3.1 Myofacial Pain Dysfunction Syndrome [MPDS]

The term MPDS was proposed by Laskin [16]. It is also known as Temporomandibular Joint Pain Dysfunction Syndrome or Masticatory Myalgia Syndrome. The traditional view is that myofacial pain arises from trigger points in a taut muscle. The two proposed hypotheses are occlusal disharmony and psychological distress. Irregularities in occlusion like posterior bite collapse and deep overbite-overjet relationships predispose patients to increased parafunctional activity [17]. Occlusal disharmony was earlier mechanical concept which was later replaced by Shwartz concept [18] of dysfunction of entire masticatory apparatus leading to psychological characteristics. Laskin's Psycho-physiologic theory postulates that the psychological distress leads to parafunctional activities leading to muscle fatigue and finally spasm. A vicious cycle of stress-pain-stress is created [16,19]. An increase in emotional stress excites HPA axis activating the efferent system which causes contraction of muscle fibers. The muscles become more sensitive to external stimuli. MPDS patients have significantly higher levels of

steroids and catecholamines than in normal [20]. Treatment of MPDS, therefore must accent emotional support and stress reduction, as well as physically therapeutic techniques [21].

3.2 Oro Mandibular Dystonias [OMD]

The terms OMD, craniocervical dystonia or Meige syndrome are often used to describe a dystonia whereby repetitive sustained spasms of masticatory, facial, or lingual muscles result in involuntary and painful jaw movements [22]. Involvement of masticatory muscles may lead to misdiagnosis as temporomandibular joint disorder [TMJD], bruxism, or another dental problem [23,24]. Patients may present with jaw deflection, jaw retrusion or combination. Dystonic spasms may also result in dyskinesias of lips and tongue [23]. It is important to be familiar with OMD, as it can often be misdiagnosed as a dental condition. Stress with accompanying depression, anxiety, obsessive compulsive disorder, and other psychological conditions are considered in its etiology [25]. Treatment approaches include medication, Botulinum toxin, local anesthetic blocks, dental appliances, behavioral modification, psychological support, and surgical procedures [26]. Pharmacological therapy is usually the first line of management and surgical therapies are generally a last resort. [25] Developing strategies to avoid stresses and education for self-care activities that patients can perform help in symptom control.

3.3 Atypical Facial Pain [AFP] and Atypical Odontalgia [AO]

The term AFP is controversial. It is often used for patients who have not been adequately evaluated or because they imply that the pain is purely psychological in origin. Some classifications use term "Facial Pain not fulfilling other Criteria" to describe it [27]. The pain occurs as continuous dull ache with intermittent severe episodes, primarily affecting areas of face other than joints and masticatory muscles. Pain may be bilateral and often present for several years. Many etiologies like vascular, neuropathic, or sympathetically maintained pain and linkage to a strong psychogenic component have been proposed. Analgesics remain ineffective [27]. AO has a similar character but is localized to one or more posterior teeth, simulating pulpitis but clinically and radiographically, it may be sound [28]. Patients often attribute their pain to inappropriate dental treatment and subsequent

recurrence apparently from another tooth or minor trauma to face [27]. The pathophysiology has been proposed to be psychogenic, vascular, neuropathic or idiopathic [29]. It is important to exclude all other pathologies before the diagnoses [AFP and AO] are given. A patient should be evaluated thoroughly with desired investigations. General dental and medical practitioners must consider the risk of exacerbation of associated psychological distress and importance of psychological assessment and counselling at an early stage [27]. Consultation with otolaryngologists, neurologists and psychiatrist can prove to be helpful.

3.4 Phantom Tooth Pain [PTP]

The term PTP was introduced in 1978 by Marbach [30]. Prior to this, similar symptoms were known as idiopathic periodontalgia and AO [31]. Marbach defined PTP as a syndrome of persistent pain or paresthesia in teeth and other oral tissues that might appear following pulp extirpation, apicoectomy or tooth extraction. Nerves are injured by physical trauma or even after routine inferior alveolar nerve blocks if the needle pierces nerve sheath [30]. Due to lack of objective findings, Klausner suggested that PTP was a diagnosis of exclusion [32]. Later, Marbach and Raphael [33] described PTP as a deafferentation pain disorder in teeth that have been denervated by removal or pain in the area formerly occupied by teeth prior to their extraction. Other experts strictly define PTP as unexplained persistent pain at the site of an extracted tooth [34].

3.5 Munchausen's Syndrome [MS]

Initially described by Asher in 1951, MS represents a pathomimesis associated to serious emotional distress [35]. It primarily results from psychosocial stress and personality disorders which lead to perturbations and biologic vulnerability [36]. Patients repeatedly undergo unnecessary investigations and operative treatments. No organic pathosis is seen, and treatment consistently fails to relieve the symptoms [37]. Patients typically present with apparently acute illnesses supported by plausible histories, later often found to be full of falsifications. Few patients have been recognized presenting with orofacial complaints like facial pain, multiple odontalgias, TMJ problems etc. They may undergo unnecessary interventions for the same [37-39]. The laboratory investigations

are normal in most of cases. The psychological evaluation may show identity disorders, hypersensitivity, improper control of wishes and impulses, deformed perception of reality and unstable interpersonal relationships, sometimes feelings of guilt, doubled by the associated need to be punished or to pay for this one [36]. When this factitious disorder is suspected or discovered, immediate psychiatric consultation is recommended.

3.6 Self-Mutilation and Oral Artefactual Disease [OAD]

Self-injurious behavior is a complex disorder. Attention seeking through self-mutilation may arise in stressful situations [40]. It is seen in anxious patients or in patients with psychogenic problems and sensory loss. These patients usually present with learning disability. OAD may manifest as nasal ulceration, facial emphysema, periorbital ecchymosis, mandibular subluxation, gingival and mucosal ulceration, dental and salivary gland pain and glossopharyngeal neuralgia [40]. Lesions of OAD are bizarre, typically destructive and may involve hard and soft tissues. They usually arise due to chronic lip licking, tongue and mucosa chewing. The treatment is complex and requires a multidisciplinary approach. Asking the patient whether an injury has occurred previously may be helpful although direct confrontation is often ineffective. Psychiatric consultation is essential to the success of treatment [40].

4. DISORDERS RELATED TO ALTERED ORAL SENSATION

4.1 Burning Mouth Syndrome [BMS]

It was first categorized as a distinct disease in 2004 by the International Headache Society. It is an intraoral burning sensation for which no medical or dental cause can be found [41]. It is characterized by oral burning or pain with no clinically observable lesions in the involved mucosa [42,43]. Different terms are used for its identification including stomatopyrosis [mouth burning], glossopyrosis [tongue burning], stomatodynia [mouth pain], glossodynia [tongue pain] and oral dysesthesia [44]. Burning sensation usually increases with increasing age due to atrophy of mucosa and decreased salivary secretion. BMS has been associated with several psychiatric diseases and personality disorders [45,46]. A cross-sectional controlled study showed that BMS patients have a significantly

higher frequency of past or present major depressive disorder, general anxiety disorder, hypochondria, and cancerophobia [47]. For many years, BMS was managed with antidepressants. Recently, it has been observed that psychiatric interventions with counseling and reassurance of patient show great promise in treatment [41].

4.2 Idiopathic Xerostomia

Xerostomia is a subjective feeling of oral dryness accompanied by severe reduction in secretion of saliva and salivary gland hypofunction. Various systemic diseases like Sjogren's syndrome, anticholinergic effects of many medications, psychological conditions, and physiological changes can cause xerostomia [48]. Depressive symptoms are usually evident in individuals with idiopathic subjective dry mouth [49]. The rate of resting salivary secretion can be influenced by noxious stimuli of psychological origin. A chronic exposure of environmental conditions of stress in rats modified the activities of sympathetic efferents to the pineal, salivary and adrenal glands [50]. Circulating catecholamines could mediate stress effect on submandibular gland through adrenergic secretory responses. Diagnosis can be made by good history taking and clinical examination. On inspection, saliva appears foamy, viscous and ropy. Salivary gland imaging can also be helpful. Sialogogues to responders and salivary substitutes to non-responders are given.

4.3 Disturbances of Taste

Dysgeusia, Ageusia and Hypogeusia are taste disturbances which refer to unpleasant or altered taste sensation, complete loss of taste and reduced taste sensation respectively. A recent study pointed out the relation between acute stress and reduced sweet, sour and salty taste perception [51]. Another study showed that sweet and salt taste thresholds are modulated during stressful conditions. There is a relationship between baseline anxiety level and taste perception of healthy individuals [52]. Taste disturbances are associated with altered serotonin and noradrenaline levels, such as in anxiety or depression [53]. These modulations may explain the appetite alterations in individuals under stressful conditions [52]. Elimination of underlying stressors is the key to management. Patients may respond to reassurance but most of them may require psychological care.

5. MISCELLANEOUS

5.1 Recurrent Aphthous Stomatitis [RAS]

RAS belongs to a group of chronic, inflammatory, ulcerative diseases of the oral mucosa [54]. The condition was initially described by a Polish surgeon, Johann von Mikulicz Radecki, in 1898 [55]. Studies have suggested that psychological disturbances could play a role in the onset and recurrence of RAS lesions [56-58]. RAS is observed during stressful situations such as school exams, dental treatments, and periods of significant changes in life such as new job or new residence [59]. It is an immune complex vasculitis in which psychological stress induces immunoregulatory activity by increasing the number of leukocytes at sites of inflammation [60,61]. Psychological stress may serve as a trigger or a modifying factor rather than being a cause of the disease [59]. Application of protective emollients, topical corticosteroids and antibiotics along with stress management interventions like relaxation and psychological counselling may be beneficial in reducing RAS and its recurrence.

5.2 Lichen Planus

It is a chronic mucocutaneous disease with different clinical patterns in the oral mucosa. Erasmus Wilson was the first person to describe it in 1869 [20]. It is currently considered to develop as a psychiatric problem due to depression, anxiety, and psychological stress [62,63]. These psychological alterations may form starting point and seems to modify and promote dysregulation of immune functions by altering cytokine balance, which is associated with the development of autoimmune diseases and have been shown to be contributory to the pathogenesis of OLP [63,64]. Psychological services should be combined with conventional therapy for these patients to avoid the occurrence of somatisation and to prevent disease exacerbation [65].

5.3 Psoriasis

Psoriasis is a multifactorial disease shaped by genetics and environmental factors [66]. Psychological stress triggers result in a redistribution of leucocytes with increased trafficking of inflammatory cells into the skin, which may exacerbate psoriasis. Langerhans cells play a role in the stress response of normal

skin; their function in psoriasis is open to speculation [67]. Second, the response of the HPA axis may be blunted in psoriasis with stress sensitivity. Finally, psychological stress may enhance neurogenic inflammation in psoriatics [68]. While stress may be an exacerbating factor, psoriasis itself may contribute to significant adverse psychological sequelae. Breaking this stress cycle may be an important part of any therapeutic approach. Thus, stress reduction through psychotherapy and pharmacotherapy may be useful in treating psoriatic patients who are stress responders [69].

5.4 Geographic Tongue

Also known as Erythema Migrans, Annulus Migrans, Benign Migratory Glossitis, Wandering Rash of the Tongue and Erythema Areta Migrans, [70] it is characterized by multiple, well demarcated zones of erythema, concentrated at the tip and lateral borders of tongue. The erythema is due to atrophy of the filiform papilla. The atrophic areas are typically surrounded at least partially by slightly elevated, yellowish-white, serpentine or scalloped borders. The lesions appear quickly in one area, healing within a few days or weeks, and then develop in a different area. It is usually asymptomatic but occasional burning sensation may occur [71]. Psychosomatic factors appear to play a significant role in its etiology [72]. It has been reported that lesions arise in connection with pronounced emotional stress like in students preparing for examinations [70,71]. Geographic tongue is considered a feature of pustular psoriasis because of clinical and histological resemblance. Use of antihistamines in symptomatic cases provides relief due to their local anaesthetic effect. Decreasing stress through psychological counselling can be helpful.

5.5 Chronic Periodontal Disease

Periodontal diseases are inflammatory conditions and many forms are associated with specific pathogenic bacteria, which colonize the subgingival area. However, the presence of bacteria itself is not capable of producing advanced tissue destruction in all individuals. Initiation and progression of periodontal infections are modified by local and systemic conditions, which are defined as risk factors. Systemic risk factors include diabetes mellitus, smoking, age and genetic factors. Recent studies have also pointed toward several potential risk indicators such as psychosocial factors; stress,

depression and ineffective coping, state and trait anxiety [73,74]. These effects are mediated through HPA and production of cortisol, a glucocorticoid capable of reducing immunocompetence, which leads to increased biofilm colonization and reduced ability to prevent connective tissue invasion. Additionally, after periods of chronic elevation, cortisol loses its ability to inhibit inflammatory responses initiated by immune reactions, which leads to sustained inflammatory destruction within the periodontium. The behavioral mechanism emphasizes that people suffering from stress and depression may increase smoking or drinking more frequently, consume an unhealthy diet and neglect their oral hygiene. This leads to increased oral biofilm burden and decreased resistance of the periodontium to inflammatory breakdown [75,76]. Stress management through counseling may bring significant change in periodontal status of these patients.

5.6 Acute Necrotising Ulcerative Gingivitis [ANUG]

It is also known as "trench mouth" and Vincent's angina. It is an endogenous oral infection characterized by necrotic punched out ulcerations of interdental papilla and marginal gingiva caused by Spirochaetes, Fusiform and Bacteroides species. Stress, which has long been known to be associated with ANUG, appears to play a role through induction of increased cortisol and catecholamine levels. These mediators may compromise the host immune responses and the gingival microcirculation, respectively. Cortisol may also serve as a nutrient source for Bacteroides bacteria [77]. Treatment modalities involve eliminating or reducing the levels of bacterial pathogens by mechanical and antibiotic means, along with attempts at controlling significant psychological and physical precipitating factors.

5.7 Erythema Multiforme [EM] and Recurrent Herpes Labialis

EM is a typically mild, self-limiting and recurring mucocutaneous reaction with target lesions. Oral lesions are accompanied by rapidly rupturing vesicles and bullae causing diffuse sloughing and ulceration of the whole surface [78,79]. Though, it is often caused by infectious agents like Herpes simplex virus [HSV], over 50% of patients have unknown etiology with stress or emotional factor as second largest category [78]. Recurrent herpes labialis is a mucocutaneous

infection with HSV-1 causing pain and blistering on the lips and perioral area [15]. There is an impact of stress on virus specific memory immune response. In a study, restraint stressed mice showed a decrease in the generation of virus-specific cytotoxic T lymphocytes to HSV-1 after primary infection; these stress-induced changes are accompanied by an increase in the reactivation of virus [80]. By delivering appropriate information and educating the patient, oral physicians can play a role in preventing the recurrence of these lesions.

5.8 Bruxism

The term 'la bruxomanie' was first introduced by Marie Pietkiewicz in 1907. It was later adopted as 'bruxism' to describe tooth gnashing and grinding occurring without a functional purpose [81]. It usually occurs during sleep and result in wear of teeth and trauma to periodontal tissues. Occasionally, trauma to facial muscles and TMJ may also occur. Psychological factors like depression, anxiety and emotional stress play an important role in its start and progression; as well as in its frequency and severity [82]. In children, behavioral problems and potential emotional problems have been found to be potential risk factors [83,84]. At present, there is no specific and effective treatment to eliminate the habit of bruxism permanently [85]. The treatment alternatives range from use of oral devices, pharmacological therapies to cognitive-behavioral techniques [86].

5.9 Body Dysmorphic Disorder [BDD]

BDD, also known as dysmorphophobia, is an under recognized yet relatively common and severe mental disorder [87]. The term is misleading as it is not a phobia. These patients have a serious preoccupation with their physical appearance that they feel is defective. The physical problem may be small or even imaginary [88]. The sufferer has a desire for corrective treatment [87]. These people are concerned about facial profile, teeth, chin, smiling, talking, and laughing. These factors can impact their abilities to work, socialize, meet friends, and therefore, reduce their abilities to function normally in society [89]. Early identification of BDD is of utmost importance. Dentists or clinicians should consider referring these patients for further evaluation before beginning treatment.

5.10 Anorexia Nervosa [AN] and Bulimia Nervosa [BN]

AN is characterized by restricted eating, loss of weight, obsessive fears of weight gain, absence of menses and a disturbance in body image represented by feeling of being fat even when underweight. BN is characterized by binge eating episodes, in which the individual consumes a large amount of food with a sense of loss of control, followed by compensatory behaviors to prevent weight gain such as purging, laxative abuse, excess physical exercise and fasting because of the pathological fear of weight gain [90]. Tooth erosions may result from repeated vomiting. Ulcers in palate and self-mutilation of gingiva are features of the disease. Esophageal tears [caused by retching] and Russel's Sign [Abrasions on the back of the fingers caused by thrusting to touch the throat to induce vomiting] are also seen. These disorders are more seen in teenage females as the transition of adolescence into adulthood, and acceptance of physical changes, peer group involvement and adult autonomy are especially difficult [91]. The treatment of these disorders is a complex process where nutritional counselling and psychotherapy are of primary importance, whereas psychotropic drugs play a secondary role [90].

5.11 Delusional Halitosis [DH]

Delusional beliefs are seen in association with a number of neuropathological conditions, from which the individual cannot be dissuaded and which is not in keeping with his or her cultural background [92]. Dentists most commonly can encounter patients with DH. It is a psychosomatic condition in which some individuals believe that they have an offensive mouth odor which neither the dentist nor any other clinician can perceive [93]. There is no local or systemic disease causing oral malodor which may be found [94]. Patients who relate their emotional state to be possible cause of their oral malodor could benefit more from early referral to the mental health specialist for mental assessment and appropriate treatment [94].

6. COMPLIMENTARY MANAGEMENT TECHNIQUES FOR STRESS COPING WITH REASSURANCE AND COUNSELLING

Cognitive behavioral therapy [CBT] is one of the psychological approaches to bring a change in

thinking and behavior of an individual. CBT solves the problems by replacing dysfunctional cognitive structures with more realistic functional ones that is by cognitive restructuring. Different other modalities like music therapy, yoga, sophrology, meditation etc. can also be explored, along with reassurance and counselling therapy.

7. CONCLUSION

Over the years several theories have been proposed and rejected regarding the etiology of oral disorders associated with stress. Recent studies have documented the underlying pathogenetic mechanism related to oral psychosomatic diseases. We are much closer to the answers today than we ever were. As these oral psychosomatic disorders are reflections of psychogenic stress, it can be rightly said that sometimes mouth knows what is going inside the mind. A more behavioral approach wherein patient can seek reassurance and counselling therapy through specialists can definitely prove to be the best management for these disorders.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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