

## DENTURE STOMATITIS – A REVIEW

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### ABSTRACT

Denture stomatitis is the most prevalent and long standing problem in denture wearers. The etiopathogenesis of denture stomatitis is multifactorial and complex to understand. The placement of denture produces significant changes in the oral environment and adversely affects the integrity of oral tissues. The combination of entrapment of yeast cells in irregularities in denture-base and denture-relining materials, poor oral hygiene and several systemic factors is the most probable cause for the onset of this infectious disease. Hence colonization and growth on prostheses by *Candida* species are of clinical importance. This article gives a comprehensive review of etiopathogenesis and management and current trends in management of denture stomatitis.

**KEYWORDS:** Denture stomatitis; denture wearers; candida albicans

### INTRODUCTION

Denture stomatitis is a term used to indicate a inflammatory response of the denture bearing mucosa. It is also known as denture sore mouth, denture induced stomatitis, inflammatory papillary hyperplasia, and chronic atrophic candidiasis. It is more commonly seen in elderly patients wearing complete or partial dentures. It is more commonly seen in palatal and gingival mucosa which is in direct contact with the denture base.<sup>[1]</sup> The prevalence of denture stomatitis in edentulous patients has been reported as 62%, 39% and 23% respectively by different researchers.<sup>[2]</sup> No racial or sex predilection exists, although some authors have described a higher prevalence among women.<sup>[3]</sup> Denture stomatitis is recognized as having a multifactorial etiology including such causative factors as: *Candida* yeast infections, bacterial infections, poor oral and denture hygiene, unrelieved denture use, denture trauma, allergic reactions to denture

materials, immunological factors, dietary factors, various medications and predisposing systemic pathologies.<sup>[4]</sup>

### CLASSIFICATION:<sup>[5]</sup>

Different classifications have been proposed, but the reference classification for denture stomatitis is the one suggested by Newton in 1962, based exclusively on clinical criteria:

**Type I:** A localized simple inflammation or pinpoint hyperemia.

**Type II:** An erythematous or generalized simple type seen as more diffuse erythema involving a part or the entire denture covered mucosa.

**Type III:** A granular type (inflammatory papillary hyperplasia) commonly involving the central part of the hard palate and the alveolar ridges.

- Type III often is seen in association with type I or type II.
- Type III denture stomatitis involves the epithelial response to chronic inflammatory stimulation secondary to yeast colonization and, possibly, low-grade local trauma resulting from an ill-fitting denture.

### ETIOPATHOGENESIS

*Candida albicans* has been shown to be the principal *Candida* strain responsible for inflammatory pathology, though various species of candida like *C.dubliniensis*, *C. Parapsilosis*, *C. Krusei*; *C. Tropicalis* and above all *C. glabrata* have been isolated from the inflammatory lesion<sup>6</sup>. The pathogenesis of candida – associated denture stomatitis is elaborate and multifactorial. *C.albicans* is a normal oral microorganism, and upto 67% of people carry this organism without clinical evidence of infection. Local and systemic factors can determine the transformation of *C.albicans* from a commensal to a pathogenic organism. The line between its status as yeast and hyphae is very thin and as the host cell becomes immunocompromised, it becomes active and starts secreting several hydrolytic enzymes such as proteinases and phospholipases which help in

their adherence to host cells and digesting their cell walls for nutrient supply to assist further invasion.<sup>[7]</sup>

### **PREDISPOSING FACTORS**

The predisposing factors of denture induced stomatitis included systemic and local factors such as microbial factors, denture cleaning methods, wearing dentures through the night, ill fitting denture, poor oral hygiene and denture hygiene, xerostomia, smoking, quality and quantity of saliva, occlusion, parafunctional habits and carbohydrate rich diets, denture age and possibly a defect in host's defense mechanism.

### **LOCAL FACTORS**

#### **a) Micro organisms**

The presence of the denture on the oral mucosa alone serves as a catalyst for the initiation of denture stomatitis by altering the local microenvironment by decreasing pH, saliva flow and mechanical cleansing, serving as a reservoir for harbouring microorganisms. Of these microorganisms, it is generally regarded that *Candida* species, particularly *Candida albicans*, is one of the most common causative agents of denture stomatitis. In fact, they have been found to comprise approximately eighty percent of the microorganisms recovered from the oral mucosa of denture wearers.<sup>[8]</sup> Certain bacterial species, like *Staphylococcus* species, *Streptococcus* species, species, *Fusobacterium* species or *Bacteroides* species has been identified in patients with denture stomatitis.

#### **b) Trauma**

Denture trauma due to ill fitting dentures is believed to be one of the etiological factors in denture stomatitis. Nyquist<sup>[9]</sup> considered that trauma caused by dentures was the dominant factor in the occurrence of denture stomatitis. Cawson<sup>[10]</sup> concluded that the trauma and candidal infection are significant causes of denture stomatitis. Immunohistochemical analysis of the mucosal tissue also has demonstrated a possible role of trauma in denture stomatitis.<sup>[11]</sup> Trauma caused incorrect vertical dimension of occlusion, unstable dentures, occlusal alterations, nocturnal wear of dentures are also considered as risk factors for denture stomatitis.

#### **c) Denture lining materials**

Denture lining materials, which include tissue conditioners and soft denture liners, are widely

used as adjuncts in the prosthodontic treatment and management of traumatized oral mucosa, and are most commonly used in association with the mandibular denture.<sup>[12]</sup> Recently materials which are available are either silicone elastomers, plasticized higher methacrylate polymers, hydrophilic polymethacrylates or fluoropolymers.<sup>[13]</sup> Even though these materials exhibit excellent tissue tolerance, one of the problems is the colonization of *Candida* species on and within the material. Fungal growth is known to destroy the surface properties of the liner and this may lead to irritation of the oral tissues. This is due to a combination of increased surface roughness and high concentrations of exotoxins and metabolic products produced by the fungal colonies.<sup>[14]</sup>

#### **d) Denture plaque**

Poor denture hygiene is considered to be one of the etiologic factor for denture stomatitis. Various factors stimulating yeast proliferation, such as poor oral hygiene, high carbohydrate intake, reduced salivary flow, composition of saliva, design of the prosthesis and continuous denture wearing can also enhance the pathogenicity of denture plaque.<sup>[15]</sup>

#### **e) Surface Texture and Permeability of Denture Base**

The tissue surface of the dentures usually shows micropits and microporosities. Such irregularities of surface make possible the yeasts to nest and make difficult to eliminate bacteria by mechanics and chemical hygiene manoeuvres; therefore, in presence of poor oral hygiene, *Candida* can penetrate, stick and aggregate with the bacterial communities. Substrate surface properties, as surface charge, surface free energy, hydrophobicity, and roughness have all been reported to influence the initial adhesion of microorganism.<sup>[16]</sup>

#### **f) Saliva**

The role of the saliva in the colonization of *C. albicans* is still controversial. Some studies have shown that it reduces the adhesion of *C. albicans*. In fact, the saliva possesses defensive molecules as lysozyme, lactoferrine, calprotectin, IgA that decrease the adhesion of *Candida* to the oral surfaces. The decrease or the complete absence of saliva in individuals with xerostomia induces the change and the imbalance of the normal microbial communities favouring the proliferation of

bacteria as *Staphylococcus aureus* that inhibits the normal adaptation of the commensals.<sup>[17]</sup>

### SYSTEMIC FACTORS

Certain systemic conditions such as diabetes mellitus, nutritional deficiencies (iron, folate, or vitamin B12), hypothyroidism, immunocompromised conditions (HIV infection), malignancies (acute leukemia, agranulocytosis), iatrogenic immune suppressive drugs, e.g. Corticosteroids, may also predispose the host to candida-associated denture stomatitis.<sup>[13]</sup>

### PREVENTION

It is mandatory to include denture stomatitis prevention in oral health care programmes. Dental professionals working with geriatric patients must promote these preventive programmes among all health care workers, home caregivers, members of the patient's family and, of course, the patients themselves. A preventive programme should include.<sup>[18]</sup>

A routine basis inspection of the oral cavity for screening for this disorder, even when the lesions are asymptomatic. Proper denture sanitization and perform good oral hygiene. Appropriate denture-wearing habits, instructing the patient to take his/her denture out of the mouth for 6-8 hours each day. Patients with partial dentures should undergo periodic professional plaque control procedures.

### TREATMENT

Good oral hygiene is mandatory. The mouth must be kept as clean as possible and a thorough rinse after meals should be performed. Local factors which promote growth of yeasts, such as smoking or wearing the dentures throughout the night, must be discouraged. Dentures should be removed for as long as possible and definitely overnight. Correction of ill-fitting denture is considered important for the treatment of denture stomatitis.<sup>[19]</sup> Denture fitting and occlusal balance should be checked to avoid trauma. A new prosthesis should be made, if necessary. Dentures should be brushed in warm, soapy water and soaked overnight in an antiseptic solution.<sup>[18]</sup> Antifungal medications are recommended when yeasts have been isolated, or when lesions do not resolve with hygiene instructions. First choice of treatment is the topical application. They are available in many forms like pastilles, troches, creams, ointments and oral suspensions. The antifungal treatments more used are antifungal

suspensions based on nystatin, amphotericin B, miconazole and fluconazole. On the other hand, Clotrimazole is usually presented in a cream or solution form; the cream form also has an antistaphylococcal activity. Almost all drugs generally produce a complete remission of symptoms within 12-14 days. Clotrimazole (1% cream) is only used topically, because of gastrointestinal and neurological toxicity; Miconazole (2-4% cream) can be used topically.<sup>[20-22]</sup> Systemic antifungal agents have been recommended for patients with poor compliance such as patients with special needs. They are also recommended for immunocompromised patients.<sup>[23]</sup> Among systemic antifungal drugs, fluconazole and itraconazole have been the most extensively studied and proven as efficient antifungal drugs. Fluconazole is usually used in the form of 50 – 100 mg capsules, and itraconazole in the form of 100mg capsules. ketoconazole is given 200-400 mg, orally once daily.<sup>[24]</sup> More encouraging results are obtained when the dentures are immersing into 2% chlorhexidine as aid to topical therapy. Another antiseptic substance used is sodium hypochlorite.<sup>[6]</sup> It is proven that by diving the denture in a solution of 0.02% sodium hypochlorite, the number of Candida and bacteria amount on the denture surface effectively decrease. Unfortunately, sodium hypochlorite may not be used for an indeterminate period of time according to its ability to damage the prosthetic handiwork.<sup>[18]</sup> Irradiation with microwave has been proposed as a quick effective and cheap method for the denture disinfection. In vitro the exposure to the microwaves was able to cause the cell death of *Candida albicans*.<sup>[6]</sup> Photodynamic therapy (PDT) appears to be a promising method of treatment compared with antifungal agents. A study conducted by using PDT was shown to be an alternative method of treatment for denture stomatitis.<sup>[25]</sup> Recent study showed that the prevalence of denture stomatitis is reduced when mandibular dentures are stabilized by implants and concluded that implant over dentures could be an effective in controlling denture stomatitis by preventing trauma to the oral mucosa in edentulous elders. Better maxillary oral mucosal health may result when mandibular dentures are supported by minimum of two implants.<sup>[26]</sup>

## CONCLUSION

This article reviews the etiopathogenesis and various approaches of preventive and management aspects of denture stomatitis. Though candida albicans was thought to be the principal cause in the etiology of denture stomatitis, it may not be present in all cases. Hence it is important not to prescribe antifungal drugs without mycological investigations. As denture stomatitis is generally asymptomatic; patients wearing dentures should be examined periodically.

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