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DENTURE STOMATITIS

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Denture stomatitis

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ABSTRACT

Denture stomatitis is the most occurring problem of denture wearers and presents in more than two-thirds of the patients wearing removable dentures with the prevalence rate increasing with age. The objective of this review was to present a succinct discussion on the prevalence, aetiology, classification, clinical features, and management of denture stomatitis based on conventional and recently published works of literature. To review denture stomatitis, a search was made in the databases and electronic search tools such as PubMed, SciELO, Google Scholar, ResearchGate, Medscape, and Web of Science for literature written in the English language and published from 2017 – 2021 only, using keywords, such as denture stomatitis, management of denture stomatitis, *Candida albicans*, antifungal, and oral candidiasis. The study revealed that the aetiology of denture stomatitis was not clearly defined though it was linked to multifactorial causes with local and systemic predisposing factors playing key roles in the occurrence of the condition. About 80-90% of denture stomatitis was associated with microorganisms. Particularly, yeast of the genus, Candida, was implicated as the causative organism. Comprehensive management involving good oral and denture hygiene together with antifungal therapy is effective in the rapid healing of the inflammatory lesions whereas, maintenance of good oral and denture hygiene, correction of denture faults, quitting of bad oral habits like smoking, and discouragement of denture wearing at night are very effective in preventing denture stomatitis.

Keywords: *denture Stomatitis, Candida species, prevalence, oral hygiene*

INTRODUCTION

Denture stomatitis also referred to as denture-induced stomatitis, prosthetic stomatitis, denture sore mouth, and inflammatory papillary hyperplasia is the inflammation of the oral mucosa beneath the denture base (Garbacz et al., 2019; Malhotra et al., 2020; Yano et al., 2019). The soft tissue under the denture undergoes an array of pathological changes characterized by erythema, inflammation, ulceration, oedema, and hyperplasia (Sardari et al., 2021; Srivastava et al., 2018). Its prevalence ranges from 15% to more than 70% making it the most occurring problem of denture wearers (Fayad et al., 2018). Some studies suggest denture stomatitis is present in more than two-thirds of the patients wearing removable dentures (Čanković et al., 2017). The condition is more common in women, and the prevalence rate increases with age (Menon & Ganapathy, 2020).

The aetiology of denture stomatitis is multifactorial and not clearly understood. However, denture trauma, poor denture hygiene, continual and nocturnal denture wearing, accumulation of dental plague, ill-fitting denture,

and mucosal trauma are all factors that facilitate the colonization of Candida genus yeast on the denture and the oral mucosal surface resulting to stomatitis (Gauch et al., 2018; Souza et al., 2017; Sugio et al., 2020a). This condition most frequently does not present with symptoms; however, certain clinical features like change in colour and texture of the mucosa, xerostomia, dysgeusia, burning sensation, halitosis, and painful symptomatology may be present (Gual-Vaqués et al., 2017; Ribeiro et al., 2019).

Denture stomatitis has remained a longstanding problem for denture wearers. Therefore, this review focuses on discussing the condition and highlighting its possible management strategies. To review denture stomatitis a search was made in the databases and electronic search tools such as PubMed, SciELO, Google Scholar, ResearchGate, Medscape, and Web of Science for literature written in the English language and published from 2017 – 2021 only, using keywords, such as denture stomatitis, management of denture stomatitis, *Candida albicans*, antifungal, and oral candidiasis.

PREVALENCE OF DENTURE STOMATITIS

Several studies have indicated that denture stomatitis is the most common denture-related mucosal lesion with suggestions that it affects about 35-50% of complete denture wearers (Milica et al., 2018; Sciubba, 2020; Surgio et al., 2020b). several studies have estimated the prevalence of denture stomatitis. It was pegged at 23.4% by Fayad et al. (2018), 26.7% among patients older than 60 years (Čanković et al., 2017), 30.64% (Morel et al., 2019), and Ogunrinde and Kolawale, (2020) in their study on the prevalence of denture-related mucosa lesions reported a prevalence of 13.5% among the patients studied. The occurrence of denture stomatitis lesions is predominantly associated with the female gender, elderly people, smokers, and patients with poor denture hygiene (Ghita et al., 2020; Kaomongkolgit et al., 2017).

ETIOLOGY OF DENTURE STOMATITIS

The etiology of denture stomatitis is not clearly defined but several studies have shown that denture stomatitis is multifactorial with predisposing factors, which could be local or systemic, contributing largely to its occurrence (Martorano-Fernandes et al., 2020; Meltem & Tosun, 2018; Muhvic-Urek et al., 2020; Sanabani et al., 2018).

Local factors

The local factors are important to favour the accumulation of biofilm in the oral environment. Different factors like trauma, denture lining materials, microorganism, and dental plaque are all classified under the local factors contributing to denture stomatitis.

Trauma

Denture stomatitis results from ill-fitting or rocking total or partial dentures characterized by diffuse erythema, edema, and white spots (De Sennaa et al., 2018). Trauma caused by dentures is the most dominant factor in denture stomatitis. The incorrect vertical dimension of occlusion has also been suggested as a contributing factor in denture stomatitis with an increased vertical dimension infringe below the sulcus (Kawanishi et al., 2021). Research suggests that traumatic occlusion results in an inflammatory reaction, which creates a favorable environment for commensals to act, causing denture stomatitis (Brantes et al., 2019).

Denture lining materials

Denture lining materials are used in the prosthodontic management of traumatized oral mucosa (Mahboub et al., 2017). These lining materials include tissue conditioners and soft denture liners which are associated with the mandibular denture. Materials like hydrophilic polymethacrylates, silicone elastomers, fluoropolymers, or plasticized higher methacrylate polymers have been much available recently. Candida species colonize the lining material and destroy the surface properties of the liner resulting in irritation of the oral tissues. The fungal colonies produce endotoxins in high concentrations and metabolic products which increase the surface roughness of the liners (Bhat et al., 2020).

Microorganism

In about 80-90% of cases, denture stomatitis is associated with microorganisms, particularly yeast of the genus, Candida (Reinhardt et al.,

2020). This organism is part of the normal microflora of the rima oris. However, when the general resistance of the organism (Candida species) is reduced or there is a disturbance of the normal flora, it may cause inflammation on the mucosa surface, which manifests as denture stomatitis (Sethi, 2018). Other bacterial species, like Staphylococcus species, Streptococcus species, Neisseria species, Fusobacterium species, and Bacteroides species have been found present in patients with denture stomatitis, although a direct relationship between bacteria and the cause of denture stomatitis cannot be proven.

Denture plaque

Poor oral hygiene and carbohydrate-rich diet favours the development, adhesion, and proliferation of microorganisms, chiefly Candida species. Other factors like reduced salivary flow, saliva composition, prosthetic design, and continuous wearing of the denture can facilitate the pathogenicity of denture plaque (Jerônimo et al., 2020).

Systemic factors

Systemic conditions (like diabetes mellitus), physiological factors (like old age), endocrine dysfunctions, nutritional deficiencies (lack of vitamin B12, folate, and iron), neoplasm, long-term use of antibiotics, and corticosteroids can all facilitate the development of denture stomatitis (Settavanit, 2020).

CLASSIFICATION OF DENTURE STOMATITIS

The classification of denture stomatitis is based on the reference proposed by Newton in 1962, which is based on clinical criteria (Menon & Ganopathy, 2020; Reinhardt et al., 2020; Srivastava et al., 2018). Newton classified denture stomatitis into 3 types namely:

a) Type I – localized simple inflammation with pinpoint hyperaemic lesions and is induced by trauma.
b) Type II – diffused erythema and oedema that covers the denture bearing areas of the palatal mucosa (generalised simple inflammation)
c) Type III – granular type (inflammatory papillary hyperplasia of the central part of the hard palate and alveolar ridge).

CLINICAL FEATURES OF DENTURE STOMATITIS

Denture stomatitis is characterized by inflammation and erythema, mouth soreness, bad breath, and burning sensation of the oral mucosal areas covered by the denture (Caldeira et al., 2021). Some patients complain of angular cheilitis, bad taste, and xerostomia (Swamy et al., 2018). The symptoms of denture stomatitis might start mild, but escalate quickly causing larger problems.

MANAGEMENT OF DENTURE STOMATITIS

The management of denture stomatitis depends on the cause of the disease due to the multifactorial etiology of the condition. The holistic approach for the management of denture stomatitis is based mainly on the removal of predisposing agents by meticulous plaque control and enhancement of good oral hygiene procedures (Martins & Gontijo, 2017; Sartawi et al., 2021). Removal of the denture at night, correction or re-fabrication of ill-fitting dentures, use of topical antifungal agents, antiseptic mouth rinses, use of denture lining materials containing antifungal agents, and microwave disinfection are other ways considered for the management of denture stomatitis.

Denture cleaning

The most important treatment is the removal of the dentures at night and thorough cleaning of the dentures (Cankaya et al., 2020). Denture cleanliness is essential to prevent malodor, poor esthetics, and the accumulation of plaque and calculus. Several approaches have been considered for denture cleaning. They are clinically used to reduce plaque and are generally divided into two major techniques (mechanical and chemical techniques).

a) Mechanical cleaning: Manual denture cleaning methods (with neutral soap or dentifrice) is a very popular means of cleaning dentures. Dental replacement wearers by and large join a brush with cleaner, toothpaste for dental replacement cleaning, or powder containing Calcium carbonate or Calcium phosphate (Oussama, 2018). The fine-grained synthetic agent

should be joined with the right brush to reduce rough impacts of cleaning.

b) Chemical cleaning using preservatives and disinfectants: antiseptics such as chlorhexidine gluconate 0.2% when used 3 to 4 times a day and sodium hypochlorite diluted with water for 10 minutes are capable of decreasing the amount of Candida species and bacteria plaque on the surface of the denture (Pires et al., 2017).

The practice of good oral hygiene

Oral hygiene is the practice of keeping one's mouth clean and free of disease and other problems by regular tooth brushing and cleaning (Mlenga & Mumghamba, 2021). Local factors contributing to the growth of yeasts like overnight wearing of dentures, smoking must be discouraged.

Antifungal agents

Antifungal agents come in various forms such as gels, creams, tablets, suspensions, pastilles, lozenges, and powders which could be applied topically or systemically.

Topical application

The topical application of anti-fungal agents like nystatin, miconazole, amphotericin B, clotrimazole, fluconazole, and ketoconazole on the surface of tissue containing denture is highly recommended.

i. Nystatin: topical application of nystatin 4 times/day for two weeks is effective in the treatment of denture stomatitis. It is well-tolerated by patients with very rare side effects (Shaikh et al., 2021).

ii. Miconazole: the gel is administered two or three times daily for a week or two. The medication can be applied directly on the denture surface previously cleaned by brushing such that the medication has direct contact with the lesions, thus promoting a better response and faster healing (Martins & Gontijo, 2017).

iii. Amphotericin-B: 5ml Amphotericin-B suspension is applied thrice daily for 14 days. This is effective in the complete abatement of symptoms. It is a drug of choice due to its poor absorption by the intestinal tract when ingested. It also has an unpleasant taste (Baskaran, 2017).

iv. Clotrimazole: one clotrimazole lozenge (10 mg) is applied 5 times daily for 7-14 days. It is also available as a cream or solution form. Clotrimazole 1% cream is only used topically as it produces gastrointestinal and neurological toxicity (Jaisinghani & Bhoosreddy, 2021).

v. Fluconazole: it produces satisfactory clinical results. It has also been observed that it is more tolerable and complaint with patients due to its pleasant taste and dosage. The dosage for oral suspension is 2 mg/ml, 3 times daily while for the oral suspension is 10 mg/ml, once daily (Malhotra et al., 2020).

vi. Ketoconazole: it is not often preferred due to its sides effects but about 2% is applied topically two times daily along with 200 mg ketoconazole tablets once a day (Sharma et al., 2017).

Systemic antifungal agents

Systemic antifungal agents like fluconazole, itraconazole, and ketoconazole are recommended for patients with poor compliance such as patients with special needs or debilitating illness. It is also recommended for immunocompromised patients such as HIV-positive individuals (Martins & Gontijo, 2017; Shaikh et al., 2021).

Microwave disinfection

Microwave disinfection has been proven to be an effective antifungal therapy for the treatment of denture stomatitis (Khiyani et al., 2019; Santos-Sousa et al., 2020). This method is quick, cheap, and as well as bactericidal and fungicidal, making it very effective for denture disinfection (Da Costa et al., 2020).

Denture lining materials

Antifungal agents (like fluconazole and ketoconazole) when incorporated into denture lining materials have proven effective against denture stomatitis (An et al., 2020; Bhat et al., 2020).

Photodynamic therapy

Photodynamic therapy has positive effects in the fight against denture stomatitis caused by

Candida species. This is because of the ability of the photosensitizers to damage the cells of both bacteria and fungi. The most commonly used photosensitizers are methylene blue, porphyrin, and toluidine blue (Davoudi et al., 2018; Jaisinghani & Bhoosreddy, 2021; Kellesarian et al., 2017).

CONCLUSION

Denture stomatitis is the inflammation of the mucosa bearing denture, the commonest inflammatory reaction affecting carriers of dental prostheses. The aetiology of denture stomatitis is multifactorial though yeast infection of the genus Candida is the most associated with the condition. The management of denture stomatitis depends largely on the aetiology. Therefore, oral and denture hygiene, correction or re-fabrication of ill-fitting dentures, avoidance of bad habits like smoking, discouragement of denture wearing at night, and administration of antifungal drugs (topical or systemic) should be encouraged. These are effective in the rapid healing of the inflammatory lesions for most patients.

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