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REVIEW ARTICLE

ORAL MICROBIAL FLORA IN DENTURE WEARERS - A REVIEW

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ABSTRACT:
Denture plaque is the term used to describe the dense microbial layer on the fitting surface of a denture. Electron microscopic studies of denture plaque have shown that their structure is similar to dental plaque. Denture associated stomatitis is the condition more commonly associated with such denture wearers. No two dentures have the same spectra of microorganisms. Removal of denture plaque helps in the healing of denture associated lesions.
Key words: Denture plaque, denture stomatitis, oral microbial flora, denture wearer.

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INTRODUCTION

A denture may alter the local microbial environment in the oral cavity due to lack of cleansing effect by the tongue and saliva. Denture associated stomatitis is the commonly encountered condition associated with these changes. It is caused by the biofilm on the fitting surface of denture.[1]

Candida albicans is the commensal yeast usually found in the oral cavity. But when the body defences are depressed, these commensals change into parasitic pathogens. In denture stomatitis, enhanced proliferation of candida is noted. Non-albican candida species are more commonly associated with immune-compromised conditions.[2]Although the role of yeasts in denture-induced stomatitis has been demonstrated, several studies have shown that the bacterial flora predominates in denture plaque.[3]Removal of denture plaque by mechanical or chemical means is the main treatment part recommended for the denture associated lesions.

DENTURE PLAQUE

Oslen first used the term denture plaque to describe the dense microbial layer on the fitting surface of a denture. He was the first to sample the tissue-fitting surface of the maxillary denture for the detection of yeasts.[4]Denture plaque is a dense microbial layer consisting of micro-organisms and their metabolites. It contains more than 10^{11} organisms per gram in wet weight. Light and electron microscopic studies have revealed the structural similarity of denture plaque to dental plaque.[5]

Suspensions of denture plaque from healthy individuals have demonstrated gram positive cocci and short rods with small proportion of long filamentous rods and gram negative cocci. Gram negative rods were few in number. The most predominant species are Streptococcus milleri, S.sanguis, S.mutans, S.salivarius, Staphylococcus aureus, Actinomyces israelii, A.viscosus and Veillonella parvula.[3,6] Most studies have shown that the streptococcal flora in the denture plaque is similar to that of the tooth structure. Both the teeth and dentures appear to provide a favourable environment for Streptococcus sanguis and Streptococcus mutans. The prevalence of Streptococcus salivarius is not influenced by the dentures as its preferable habitat is the tongue.[7]

A recent study revealed that no two dentures looked alike or had the same spectra of microorganisms. They also noted microbial diversity between the maxillary and mandibular dentures of the same individual. They confirmed the anaerobic microbial growth in dentures which included A.israelii, A.naeslindii, Bacteroids spp, Clostridium spp, C.bifermentis, C.perfringens, Peptostreptococcus spp and Veilonella parvula.[8]

Scanning electron microscopic studies were done to compare the morphology of denture plaque and adjacent palatal mucosa. They showed that there were no consistent differences between the morphology of denture plaque and adjacent mucosa in the denture-

related stomatitis group and control group. Thesurface of the denture plaque was composed predominantly of coccoid and rod-shaped bacteria with only some yeast cells.[9]

CANDIDA IN DENTURE PLAQUE

Candida yeasts can be present in oral cavity without causing any pathology. It is found in about 25-50% of individuals with natural teeth. But their number is an important factor in determining the pathogenicity.[10]In superficial candidiasis, the mycelial form of C. albicans is more virulent because of hyphal invasion of the epithelium. Hyphae are found in increasing numbers in denture stomatitis patients. But intraepithelial invasion of hyphae is not seen in denture stomatitis. Once the Candida adheres to the mucosal surface, the cell wall components are released and they penetrate the epithelium to start the cycle of inflammation.[11]

All of the Koch's postulates have been found to be fulfilled by Candida in denture stomatitis.[5] Wearing of dentures produces a microenvironment with low oxygen and low pH which favours the growth of candida. This may be due to adherence of Candida to acrylic and decreased saliva flow under the surfaces of the denture. Adhesion of candida to epithelial cell walls is promoted by certain fungal cell wall components such as mannose, C3d receptors, manno-protein, and saccharins.[12]

Candida albicans is found to be more commonly associated with denture stomatitis. More than a single species of Candida may inhabit the mucosal habitats. Multispecies colonisation is more encountered in denture stomatitis as the denture provides an ideal ecosystem for their growth. Other species of candida documented include C.tropicalis, C.krusei, C.glabrata and C.guillermondii.[13,14,15]

IMMUNE-COMPROMISED PATIENTS WITH DENTURES

Candida infections are more commonly encountered in immune-compromised patients such as those with diabetes, malignancy or HIV. Non-albican candida species are more commonly associated with these conditions when compared to healthy individuals. A new species of candida, C.dubliniensis having similar phenotypic characteristic to that of C.albicans, has been found associated with HIV positive patients.[2]

INFLUENCE OF DENTURE MATERIALS

Soft lining materials are often used to coat the dentures. Tissue conditioners are sometimes applied for periods of days to a few weeks. These materials also interact with oral microbes. Soft liners are more susceptible to microbial adhesion than acrylic resin.[16] Denture adhesives are usually used by denture wearers to aid in retention. They close the space between the base of the denture and the oral mucosa and increase the surface tension of the fluid film between the denture and the supporting tissue. They may influence the oral flora since they support the growth of some organisms but not the others, resulting in an imbalance.[17]

SANITIZATION OF DENTURES

Dentures should be clean not only from debris and stains, but also from micro-organisms. Mechanical denture cleaning aids include brush, abrasive powders and pastes; and ultrasonic agitation. Chemical cleaners are categorised into alkaline peroxides, alkaline hypochlorites, dilute organic and inorganic acids, disinfectants, and enzymes. Peroxide cleansers are most commonly used in combination with other agents like detergents and sodium perborate. Hypochlorites are useful as denture cleaners since they are bactericidal and fungicidal, removing the stains and mucin. Dilute acids effectively remove calculus and stain on dentures. Disinfectants include chlorhexidine gluconate, salicylate solution, ethanol, isopropyl alcohol, formalin, and acetic acid. These substances are not suitable for daily use because of their bad odour, taste and their bleaching and crazing effects. A combination of proteinase and mutanase can reduce significant amount of denture plaque and also prevent the formation of new plaque.[18,19]

CONCLUSION

Denture stomatitis is a condition, commonly associated with colonisation of bacteria and fungi on the fitting surface of denture with frequent involvement of Candida as well as other aerobic and anaerobic bacteria. Denture sanitization is an important modality in the treatment of such denture related lesions. Tissue conditioners and denture adhesive materials that are frequently used by denture wearers also provide a favourable environment for the growth of organisms. The factors that modulate the initial attachment and colonisation of organisms over the fitting surfaces of dentures need to be thoroughly investigated.

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