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MICROBIAL BIOFILMS AND ITS ASSOCIATED ORAL DISEASES

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ABSTRACT

The Human body contains approximately ten times more microbial cells than mammalian cells. A large number of microbes are non-harmful and constitutes the normal microbial flora within the human body. The digestive tract and the skin are the most microbial rich sites containing approximately 1000 species of bacteria. The oral cavity is another site harbouring a diverse and abundant microbial community. Microorganisms in the mouth accumulate on both the hard and soft oral tissues and are frequently organised as microbial biofilm. This biofilm is usually harmless but may be the source of infection sometimes. This review article focuses on oral biofilm formation and its associated diseases.

INTRODUCTION

The human body is host to a significant number of microorganisms [1]. These microorganisms organise themselves into a biofilm that adheres to a favourable support and interacts to produce a matrix [2]. Following this irreversible attachment, the microorganisms in the biofilm proliferate and optimally interact to ensure their sustainability in the imposed environment. Following the proliferative phase is the production and deposition of thick extracellular matrix (mature biofilm) which procures chemical as well as physical protection for the microorganisms. The formed biofilm then undergoes focal dispersion through specific signals leading to microbial release.

Dental caries is characterized by localized destruction of the tooth following long contact/interaction with acidic products that result from the bacterial fermentation of dietary carbohydrates [3]. Dental caries is a chronic disease that progresses slowly in most individuals [4]. Caries is the primary source of tooth loss in children and results from an ecological imbalance in the physiological equilibrium between tooth minerals and dental plaque/biofilm.

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REVIEW OF LITERATURE

Various studies have established a clear link between caries and the quality of life of both children and adults. In developing countries, this health issue is widespread in young as well as adult populations. Showed that 70% of a student population aged between 18 and 22 years had caries [5, 6]. Because biofilm is a major player in the disease, dental research must seek to understand the homeostatic mechanisms that maintain a normal and beneficial relationship between the resident oral micro flora and the host, thereby preventing biofilm formation.

The periodontium is a key structure surrounding and supporting the teeth. Inflammation, trauma, tumours, and genetic/metabolic changes are all forms of dysregulation that open the door to periodontal disease. Periodontal disease is a serious health issue in the adult population worldwide. Studies have shown that bacterial species such as Porphyromonas gingivalis, Tannerella forsythensis, and the spirochaete Treponema denticola cohabit at subgingival locations and are associated with

disease. Bacterial damage to the periodontium thus occurs through direct contact and also via multiple bacterial mediators/ enzymes.

CONCLUSION

Microbial biofilms are critically involved in human pathogenesis due to their potential resistance to antimicrobial molecules. Indeed, one of the most important and intriguing properties of biofilms is their increased resistance to challenging environmental conditions. In particular, biofilms exhibit increased resistance to chemical disinfection, antimicrobial therapy, and human immune responses [7].

Technological advances have provided new tools to study microbial cells within biofilms, and as a result have produced some preventive/curative strategies. Further investigations are thus required to shed light on how microbial cells interact in mature biofilm.

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