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A REVIEW ON DENTAL PLAQUE

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ABSTRACT

Dental plaque is a biofilm usually a pale yellow colored that develops naturally on the teeth. Dental plaque is a cluster of colonized bacterial growth which attaches itself to the tooth structure. Plaque detection is usually detected clinically by plaque disclosing agents. Disclosing agents contains dye which turns bright red to indicate plaque buildup.

Keywords: Plaque, Composition, Consequences etc.

INTRODUCTION

Dental plaque is a biofilm usually a pale yellow colored that is formed naturally on the teeth surfaces [1]. Dental plaque is formed by colonizing bacteria which attach themselves to the smooth surface of the tooth. Plaque forms a part of the defense systems of the host by helping in prevention of colonization of microorganisms which may be pathogenic in nature and which may harm the host. The teeth help in attachment of numerous amounts of microorganisms to the surface for long periods of time due to improper brushing habits [2]. Different species of bacterias when combined together forms a dental biofilm. Such species of bacteria also takes part in the complex ecosystems of the mouth. The factors present in the environment of the oral cavity are related to the species richness and biodiversity. The main factors are pH, saliva, temperature and redox reactions [3]. Neutral pH levels is ideal for maximum of the organisms. Saliva acts as a buffer and also maintains the pH in the mouth between 6.75 and 7.25. In addition to acting as a buffer and is also a main source of nutrients for the thousands of bacteria. 35°C to 36°C is the normal temperature of the mouth. Aerobic bacteria carry out redox reactions. This keeps the oxygen levels in the mouth at a semi-stable homeostatic condition allowing other bacteria to survive easily.



Basic Plaque Formation [4]: The mechanisms of plaque formation include:

- A film on the tooth surface is formed due to the adsorption of proteins and bacteria.
- Reversible adhesion to the teeth is created due to the effect of van der Waals and electrostatic forces between microbial surfaces and the film formed.
- Intermolecular interactions between cell surfaces and the pellicle results in formation of a Irreversible adhesion.
- Primary colonizers help secondary colonizers to attach on themselves by the means of intermolecular interaction.
- A biofilm is generated by cells division.

Dental Biofilms Formation: It includes a series of steps may form on a variety of tooth surfaces including fissures, smooth surfaces and gingival crevices [5]. Additionally, through the growth process of the plaque biofilm, the microbial composition changes from one that is primarily gram-positive to gram-negative anaerobes.

1. Adsorption of Host and Bacterial Molecules to the Tooth Surface: Immediately after tooth eruption or a cleaning, pellicle formation begins. The pellicle acts like an adhesive by sticking to the tooth surface and encouraging a conditioning film of bacteria to attach to the pellicle beginning the initial colonization process [6].

2. Oral Bacteria's Passive Transport to the Tooth Surface: There occurs passive transport of oral bacteria to the tooth surface which involves a reversible adhesion process. An area of weak attraction is formed that encourages the microbes to reverse their previous adhesion

to the pellicle and come off the tooth surface by using weak, long-range physicochemical interactions between the pellicle coated tooth surface and the microbial cell surface. This reversible adhesion then leads to a much stronger irreversible attachment [7].

3. Co-Adhesion of Later Colonizers to Already Attached Early Colonizers: This leads to involvement of many specific interactions between bacterial receptors and adhesions leading to build up of the biofilm to create a more diverse environment [8].

4. Attached Microorganisms Multiplication: A three-dimensional mixed-culture biofilm is formed due to microorganism's division. Polymer production causes the development of the extracellular matrix which is one of the key structural aspects of the plaque biofilm. Biofilms like this are very thick and may consist upto 300 cell layers. The number of gram-negative cocci, rods and filaments increasing as more anaerobic bacteria appears. As the biofilm thickens and becomes more mature, these anaerobic bacteria can live deeper within the biofilm [9].

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Components of Plaque

Microorganisms and extracellular matrix forms plaque. *Streptococcus mutans* and anaerobes form biofilm mainly with some other micro organism in small quantity. Examples of such anaerobes include *Fusobacterium* and *Actinobacteria*. The extracellular matrix contains proteins, long chain polysaccharides and lipids. The microorganisms present in plaque are all harmless [10]. However, failure to remove plaque by regular tooth brushing results in their larger buildup which produces acid. Acids released from plaque lead to demineralization of the tooth surface. Saliva cannot penetrate such large buildups and thus isn't helpful in such conditions. They cause irritation of the gums leading to gingivitis, periodontal disease and tooth loss. Plaque buildup can also become mineralized and form calculus.

CONCLUSION

It has been seen that plaque forms part of the defense systems of the host by helping to prevent colonization by microorganisms which may be pathogenic still improper oral hygiene may lead to conversion of plaque to calculus which may in turn lead to gingivitis and periodontitis and other periodontal conditions.