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A Review on the Human Oral Microflora

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Review Article

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ABSTRACT

The Human oral cavity contains numerous habitats such as teeth, cheeks, tongue, gingiva, palates which are colonized by bacteria. The microflora in oral cavity has the capacity to defense and plays an important role in healthy oral environment. If the microflora in the oral cavity rises then it leads to the development of caries and dental diseases.

INTRODUCTION

In an healthy animal, the internal tissues are free of microflora, but the external tissues such as oral cavity may effect with different types of microorganisms [1].

Oral cavity is the initial part of the gastrointestinal tract, due to the regular supply of food it makes an environment for the growth of microorganisms.

Oral Microflora has numerous organisms which include Bacteria, Fungi, Protozoa mostly and rarely virus. Among these organisms, bacteria play a vital role in causing diseases [2-5].

The ecological condition changes from primary to permanent dentition. The microorganisms vary depending on the food intake, saliva and antibiotics consumed [6-10].

The gingival crevice area (which supports the structures of teeth) provides a habitat for broad group of anaerobic species. Oral microorganisms cause major dental diseases namely periodontal disease and dental caries.

Factors which affects the growth of microorganisms in the oral cavity

1. Temperature
2. Anaerobiosis
3. pH
4. Nutrients
5. Host Defences
6. Host genetics
7. Antimicrobial agents and inhibitors

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CLASSIFICATION

1. Oral Bacteria Classification has been classified based on Gram's Staining
   - Gram Positive
   - Gram negative
2. Based on the effect of oxygen bacteria are classified as:
   - Obligate aerobe
   - Micro aerophilic
   - Facultative anaerobes
   - Obligate anaerobe

Based on the Gram's Staining the bacteria can be classified into the following **(Table 1)**:

Gram positive		Gram Negative	
Cocci	**Rods**	**Cocci**	**Rods**
Abiotrophia	*Actinomyces*	*Moraxella*	*Campylobacter*
Peptostreptococcus	*Bifidobacterium*	*Neisseria*	*Capnocytophaga*
Streptococcus	*Corynebacterium*	*Veillonella*	*Desulfobacter*
Stomatococcus	*Eubacterium*		*Desulfovibrio*
	Lactobacillus		*Eikenella*
	Propionibacterium		*Fusobacterium*
	Pseudoramibacter		*Haemophilus*
	Rothia		*Leptotrichia*

Table 1. Classification of bacteria.

ORAL MICROFLORA

The human oral cavity allows to grow the characteristic microorganisms by providing source of nutrients, water and moderate temperature [7]. Few microbes which are resident on the mouth will adhere on the surface of the teeth and gums which can resist the mechanical flushing i.e from mouth to stomach as stomach consists of hydrochloric acid (HCl), these microbes which are acid-sensitive will be destroyed by HCl [11] **(Figures 1 and 2)**.

Few examples of anaerobic bacteria that are present in the oral cavity are: *Bifidobacterium, Lactobacillus, Actinomyces, Propionibacterium, Treponema, Veillonella, Arachnia, Bacteroides, Eubacterium, Fusobacterium, Leptotrichia, Peptococcus, Peptostreptococcus, Selenomonas.*

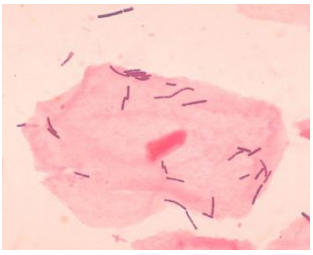

Figure 1. A view of the *Lactobacillus* under microscope.

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Figure 2. A view of the *Bifidobacterium* under microscope.

The oral cavity of infant is free from bacteria but rapidly normal flora will be colonized such as Streptococcus *salivarius*. As these microorganisms colonise the dental surface and gingiva, Colonization of *Streptococcus sanguinis* and *Streptococcus mutans* are formed on the teeth. Other strains of streptococci adhere strongly to the cheeks and gums but not to the teeth **(Figure 3)**.

Figure 3. A view of the *Streptococcus salivarius* under microscope.

Oral flora of an Adult is Due to the Characteristics

Dental plaque formation

The dental plaque formation involves huge colonies of bacteria. Dental Plaque is a biofilm on the surface of the teeth [12-18]. Due to the large number of colonies of microorganisms, they produce more amount of metabolites which results in dental disease on the teeth and gingival tissues. If the teeth is not hygienated through brushing or flossing, then the plaque forms into tartar (its hardened form) and leads to periodontal disease or gingivitis [19,20].

Biofilm formation

Some of the indigenous bacteria construct biofilm on a surface tissue or they colonize a biofilm by taking the help of another bacterial species. Biofilm is the group of microbes which will be initiated by a single microbe **(Figure 4)**.

Figure 4. Biofilm formation in teeth.

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Development of the Resident Oral Microflora

Generally, the foetus in the mother's womb will be sterile. In children below 3 years of age, their mouth comprises of microbes, which are passed by passive transfer from mother i.e; through milk, microbes which are present in water, milk and the general environment will be transferred to children including saliva, it is the main vehicle for transmission [21-23]. Microorganisms such as *candida* and *lactobacilli* are acquired transiently from the birth. The mouth is highly selective for microorganisms even during the first few days of life. Only few species are common to the oral cavity for adults, and less number of bacteria which are found in the environment, are able to colonize the mouth of the infant. In mouth, the predominant organisms are streptococci i.e; *S. mitis*, *S. oralis* and *S. salivarius*.

Functions of the resident Oral Microflora in Health

The resident microflora plays an important in health of human. Microflora acts against the pathogens and protects the body from entering of several microbes. Resident Microflora helps in the metabolism of the body.

Some strains such as *Streptococcus salivarius* produces bacteriocin called as salivaricin. It shows activity against Lancefield Group A streptococci [24-26]. Production of bacteriocin by such strains in the pharynx will reduce bacterial colonies in the mouth. Similarly, many oral bacteria produce other inhibitors such as hydrogen peroxide, volatile fatty acids, they change local environmental conditions (e.g. redox potential or pH), which may exclude exogenous species and suppress opportunistic pathogens. For example, the production of hydrogen peroxide by the members of the *Streptococcus mitis* which can suppress the growth in the dental plaque of periodontal pathogens, such as *A. actinomycetemcomitans*.

CONCLUSION

Resident oral microflora takes part in the normal development of the oral cavity and in the maintenance of healthy life. Oral cavity is one of the parts of the body which consists of large variety of microbes. Any change in the oral normal flora may lead to occur disease. The ecological balance should be maintained to keep the human oral cavity healthy.

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