



# Association of Streptococcus Mutants and Streptococcus Sanguis in Act of Dental Caries

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## Abstract

### Background:

Dental caries, otherwise known as tooth decay, is one of the most popular diseases among the people. Of all the types of microbes living in, our mouth, bacteria are more numerous. It has been estimated that more than 600 different types bacteria are present in saliva. Few among them are Streptococcus mutans, Streptococcus sanguinis, Streptococcus salivarius, Streptococcus sobrinus etc. In dental caries the most common bacteria found are Streptococcus mutans and Streptococcus sanguis. DMFS score is considered to estimate the act of both the bacterias.

### Aim and objective:

To assess the prevalence of microbial species such as Streptococcus mutans and Streptococcus sanguis in patients with dental caries. And to determine the colonies formed by Streptococcus mutans and Streptococcus sanguis in patients with dental caries.

### Materials and methods:

The study was conducted in Saveetha Dental College and hospital among 15 patients with dental caries during the month of May. Salivary samples were collected in sterile containers and the DMFS values of the subjects were also collected. To know the S. mutans and S. sanguis count, the samples were treated with mutans – sanguis agar. And for the statistical analysis Pearson's correlation was used.

### Result:

The saliva samples were found to have significant S.sanguis count and less significant S.mutans count.

## I. INTRODUCTION

Dental caries, known as tooth decay is one of the chronic diseases that is more prevalent in today's world. Dental caries develops in both crown and roots areas of the teeth. It is the destruction of the dental hard tissues by means of acidic by products from the bacteria [1]. A many number of bacterias such as Streptococcus mutans, Streptococcus sanguis, Lactobacillus species, Acitnomyces species are believed to cause dental caries. The intensity of decay is calculated based on the DMFS and DMFT index. DMFS and DMFT indices describes the amount or the prevalence of caries.

It is either calculated for 28 (permanent) teeth, excluding 18, 28, 38 and 48 which are called the Wisdom teeth or for 32 teeth. And DMFS gives a more detailed account as it is calculated per tooth surface. Molars and premolars has 5 surfaces and anteriors have 4 surface. Risk factors varies with dental caries both biological and physical risk factors like in adequate salivary flow, composition, high number of bacteria and immunological components varies [2].

Behavioral factors like the poor oral hygiene, poor dietary habits i.e., use of food containing carbohydrates and oral medications containing sugars etc, also

increases the risk. The main bacteria that is seen in dental caries is the Streptococcus mutans.

Streptococcus sanguinis is also known as Streptococcus sanguis. Streptococcus sanguis is a gram positive, non motile, non-spore forming cocci found in the healthy human mouths. This microbe is mostly found in dental plaque, which can then colonize dental cavities. It is also often found in the blood stream which allows it to inhabit the heart valves. Streptococcus sanguis is determined by the whole gene [3].

Streptococcus mutans is gram – positive, facultatively anaerobic bacteria commonly found in the human oral cavity and is a significant contributor to tooth decay. They metabolize sucrose to lactic acid [4] The microbe was first described by J Kilian Clarke in 1924. Streptococcus mutans is a Gram - positive bacterium that is the primary causative agent in the formation of dental cavities in humans.

Gram - positive bacteria are those that are stained dark - blue or violet by Gram staining. This is based on the physical properties of their cell walls, as opposed to gram – negative bacteria, which cannot retain the crystal violet stain. Streptococcus is a genus of spherical Gram - positive bacteria belonging to the phylum Firmicutes and the lactic acid bacteria group. S. mutans, a member of the human oral flora, is widely

recognized as the main causative agent of dental cavities. *S. mutans* appears to be distributed world-wide in human dental plaque.

Sucrose is the only sugar that *S. mutans* can utilize. *S. mutans* is found in dental plaque, in blood, on heart valves in subacute endocarditis, and infrequently in saliva and throat specimens. *Streptococcus sanguis* is also a part of oral flora and preferentially colonize the tooth surface [5]

## II. MATERIALS AND METHODS:

Salivary sample was collected from individuals with dental caries having DMFS index between 0-15. This is done to know the bacteria act of *Streptococcus mutans* and *Streptococcus sanguis* depending on the DMFS index we wanted to explore the association of both the bacterias in caries. The collected samples was cultured with the selective culture medium for *mutans* and *sanguis* namely *mutans sanguis* agar which is recommended for *Streptococcus mutans* and *Streptococcus sanguis*.

### The Composition.

Ingredients	Gms/Litre
Casein enzymic hydrolysate	15.000
Yeast extract.	5.000
L-Cystine	0.200
Sodium sulphite	0.100
Sodium chloride	1.000
Disodium phosphate	0.800
Sodium bicarbonate	2.000
Sodium acetate	12.000
Sucrose	50.000
Agar	12.000
Final pH ( at 25°C)	7.3±0.2

The saliva sample that is collected is diluted 1 : 20 times with saline then 10 $\mu$  of the sample is added to the *mutans sanguis* agar. with the use of inoculation loopy he diluted sample was streaked and duplicated on the agar then incubated for 24 hrs at 37°C. After incubation for 24 hours the number of cells are counted. Based on the colony characteristics the *Streptococcus mutans* and *sanguis* are identified. *S. mutans* appears as rough yellow heaped colonies with white frosty glass appearance. *S. Sanguis* had hard rubbery appearance it adheres firmly to the agar. [6]

## III. RESULTS:

The data that was collected to know the act of *Streptococcus mutans* and *sanguis* with considering the subjects in an average age between 20 - 60 yrs. And the range of DMFS index was between 0-15.

Table1 Descriptive Statistics

Variables	Mean±SD
DMFS score	5.8±3.8
<i>S.mutans</i> count	38077.3±45364.5
<i>S.sanguis</i> count	1405.3±15686.3

From the obtained values it was found that the *Streptococcus mutans* count was 38077.3 ± 45364.5 in patients with the DMFS score of 5.8 ± 3.8 and in the same patients the *Streptococcus sanguis* count was found to be 1405.3±15686.3

In the Pearson's correlation it was found that p value of *S. mutans* count was .100, which was not significant. The p value of *S. sanguis* count was .0 which was significant.

## IV. DISCUSSION:

Many researches has considered *Streptococcus mutans*, *sanguis* and other bacterial species to know their role in dental caries. Loesche et al., has found out that the strongest association was when plaque was removed from single Occlusal Fissures and Cultured. Immediately. The carious fissures, many of which appeared clinically to be incipient enamel lesions, had significantly higher proportions of *S. mutans* in their overlying plaque than did most caries - free fissures. There was a corresponding significant decrease in the proportions of *S. sanguis* in the plaques taken from carious fissures when compared to the plaques taken from caries - free fissures [7].

Certain researches has compared the occurrence of *S. mutans* and *S. sanguis* in both the caries active and caries free subjects. In such cases they have found out that in caries active subjects the occurrence is much more than the caries free subjects.

In the study conducted by Marja - Liisa Laitala it has been found that in case of any drugs that are used to reduce the activity of *mutans* or other bacteria the transmission occurs from the mother to the child [8]. They have found out that *S. mutans* and *sanguis* have an inverse action that is when *mutans streptococci* colonize the teeth, less *sanguis* is present. [9]

Most of the researches has considered DMF score to find out the incidence or prevalence of caries. In many cases the count of *mutans* is considered to be increased. In certain works it is that the values or of the count of the *mutans* and *sanguis* was more than the previous works and suggests the infection due to *mutans*. [10] A number of researches has concluded that the *mutans* count was more in many cases than the *sanguis* count.

In Gibbon et al., work they have found out that the weakest association between the caries and *mutans* was when paraffin - stimulated saliva samples were tested. In addition early colonization of *sanguis* was significantly correlated with the delayed colonization of *mutans* in children [Caufield et al., 2000] Other researches have concluded that *sanguis* is associated with healthy tooth surfaces but not with caries [Loesche et al., 1984; Becker et al., 2002; Corby et al., 2005].

It is suggested that *Streptococcus Sanguinis* provide protective role against *Streptococcus mutans*. [11]. Also another study indicates that in children *sanguis* was detected more in concentration [P.W. Caufield et al., 2008]. A number of hypotheses has been done by Loesche and many other researchers. *Streptococcus*

mutans is not alone an indicator for increased caries risk but represents the relative effect of both mutans and sanguis.

#### V. CONCLUSION :

The study conducted to know the act of mutans and sanguis in the act of dental caries shows that increased DMFS index indicates increased S . mutans and S . sanguis count in the analysis.

Thus this might help us in understand that if the DMFS increased we can assume that the bacterial count would be more. So to prevent caries chemical modality treatment antimicrobials and re mineralizing agents can be used. Even recent advancement like oral micro biome can be used .So maintaining a proper oral hygiene is required.

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