

# Effect of Consumption of Probiotics on Salivary Bacteria Causing Dental Caries

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**Abstract:** *This is a short term randomized clinical trial assessing the effects of consumption of probiotic bacterium on salivary streptococcus mutans. Streptococcus mutans is one of the primary organisms causing dental caries. Over the years, probiotics are being consumed by the humans on a day to day basis for a healthy gut. The use of probiotics is much economic than other dental caries preventive and treatment modalities. A breakthrough in the research involving probiotics and its effect on dental caries will benefit the world at large. This study shows a promising result.*

**Keywords:** Probiotic, mutans streptococci, bacillus coagulans, dental caries

## 1. Introduction

Dental caries is one of the major public health problems affecting the entire world.<sup>1</sup> It is an infectious disease of the oral cavity resulting in the loss of mineral content of the tooth and when not arrested or treated can progress and involve the pulp as well, compromising the tooth vitality. Industrialized nations have been quite successful in limiting the problem with fluoride treatment and use of various oral hygiene aids.<sup>2</sup> Though the research in cariology is skyrocketing the predominant mode of caries management is still “drill and fill”.

In order to make continued progress in eliminating this disease, new strategies are required. There is now an intense focus on preventive strategies. Essentially all preventive strategies either alter or modify the causative factors for dental caries such as diet, host, salivary and microbiological factors.<sup>3</sup>

A suggested approach is to use inexpensive, effective, stable, novel and natural products to manage this traditional disease. This short-term randomised clinical trial makes use of one such approach. A probiotic bacterium was ingested by 20 healthy individuals and the count of salivary mutans streptococci was assessed before and after the ingestion.

## 2. Materials and Methods

Forty medically fit adult volunteers between the ages 20-25 years were selected. These participants had DMFS  $\leq$  6, had no history of any preventive dental therapy or orthodontic treatment or antibiotic therapy for past 6 months. A written consent was signed by all the participants. They were randomly divided into two groups of 20 each. Group A was given placebo (10 ml of distilled water) and Group B was given probiotic bacterium - 250 million spores of bacillus coagulans (Lactospore®, Sabinsa's Corporation, Bangalore, India) mixed in 10 ml of distilled water for 14 consecutive days. All the participants were asked to swish the solution for a minute and then swallow the same.

All the participants and the samples were assigned code numbers. Saliva samples were collected on Day 1 baseline

and one hour after the consumption of the solution and on Day 15. These samples were sent to microbiology lab. Salivary mutans streptococci were cultured on mitis salivarius agar. Identification was done using Gram staining and catalase test. A digital colony counter was used to assess the bacterial counts.

## 3. Results

Streptococcus mutans counts of both the groups were compared using Mann-Whitney U-test (Table 1). A statistically significant difference ( $p \leq 0.01$ ) was seen among the two groups after intervention. The intra-group readings were subjected to Wilcoxon signed Rank test (Table 2). Statistically significant difference was seen in the counts of salivary mutans streptococci among the same group, i.e. before and after intervention Group B ( $p \leq 0.01$ ). There was no significant variation in the counts of the bacteria after intervention in Group A.

## 4. Discussion

High risk of dental caries, a multifactorial disease, has been associated with high levels of streptococcus mutans.<sup>4,5</sup> Over the years various preventive measures or prophylactic aids have been quite successful in reducing the incidence of the same.<sup>2,3,6</sup> One of the measures which can be implemented on a large scale and is showing promising results in the recent times is the use of probiotics.<sup>7,8</sup> Probiotics are “Live microorganisms which when administered in adequate amounts confer a health benefit on the host”. Apart from having a beneficial effect on intestinal health, probiotics have also shown a positive effect on the regression of cariogenic bacteria.<sup>9</sup> There are many commercially available probiotic strains. Lactospore- Bacillus coagulans-ATCC 7050 (SAMI, Sabinsa, Bangalore, India) was utilized in this study. Bacillus coagulans is a non toxicogenic, rod-shaped, Gram positive, endospore forming bacteria. Its use in the food industry is well known.<sup>10</sup>

This study showed that there was a significant reduction of the cariogenic bacteria, S.mutans after the consumption of bacillus coagulans for fourteen consecutive days. This was in accordance with other similar studies carried out. However,

previous studies<sup>8,11</sup> had not targeted young adult population. This adds the edge to this study as this is the age group which is drawn to the food habits which are most favourable for the occurrence and prevalence of dental caries.<sup>1,5</sup>

Probable mechanisms due to which the probiotics have a detrimental effect on the growth of this caries causing bacteria might be the increased production of mucin, bacteriocins, peroxides etc by the probiotic. Probiotic competing against the pathogen for adhesion -aggregation thereby enhancing the clearance or by depleting the nutrition and decreasing the survival rate of the pathogen.<sup>7,9</sup>

Among the various management modalities for dental caries present in today's world, the use of probiotic emerges as a unique, novel, economic, user-friendly mode. Further long-term clinical studies have to be carried out before it is considered as a standard caries management modality.

### 5. Conclusion

There is a definite reduction in the counts of salivary streptococcus mutans growth upon the consumption of bacillus coagulans probiotic. This short term clinical study shows promising results of combating dental caries. However, long term clinical studies on larger population are required to make this a necessary protocol for caries prevention and management.

**Table 1:** Mann-Whitney U-test - After intervention

CFU*	GROUP A (PLACEBO)	GROUP B (PROBIOTIC)	Level of significance = 0.01  z score = -5.3965  U value at p<0.01 = 105
<10 <sup>3</sup>	10	18	
10 <sup>4</sup>	4	1	
>10 <sup>5</sup>	6	1	

**Table 2:** Wilcoxon Signed Rank test

GROUP A (PLACEBO)			Level of significance = 0.01 Mean = 105 Standard deviation = 26.79 z VALUE = -3.9199 p<0.01
CFU*	BEFORE	AFTER	
<10 <sup>3</sup>	9	10	
10 <sup>4</sup>	6	4	
>10 <sup>5</sup>	5	6	
GROUP B (PROBIOTIC)			
CFU	BEFORE	AFTER	
<10 <sup>3</sup>	9	18	
10 <sup>4</sup>	4	1	
>10 <sup>5</sup>	7	1	

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