

**Reduction of Streptococcus Mutans Bacteria After Consumption of Probiotic Curd Around Orthodontic Brackets**

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**Conflicts of Interest:** Nil

**Abstract**

The aim of the study is to evaluate the effects of systemic consumption of probiotic curd on the colony of the Streptococcus family around the orthodontic bracket

**Material & Method:** the study which was conducted \*consist of 80 patients, undergoing orthodontic treatment; the patients were divided into two groups. The patient in group 1, the experimental group was given probiotic curd once daily for 3 month and group 2 was the control group. The sample was collected at four time interval at 21 days and 3 month with the help of the sterile cotton swab and is rubbed over the prepared MS Agar media and later the colony was counted with the help of the bacterial colony counter Statistical analysis was performed, and comparisons were made using a 2-tailed chi-square test for categorical data (P\0.05).

**Result:** both the groups were compared after 3 months and result shows statistically significant reduction in Streptococcal family bacterial count in the experimental group.

**Conclusion:** the consumption of probiotic curd causes reduction in the Streptococcus family in the plaque around the lateral incisor brackets.

**Keywords:** White Spot Lesions, Probiotic Curd, Streptococcus Mutans

**Introduction**

Oral cavity consists of the variety of heterogeneous microbial community and it resides almost everywhere in the oral cavity. Orthodontic treatment helps in correction of the irregular teeth and the treatment duration is usually prolonged. oral hygiene depends upon patient's compliance and regular oral prophylaxis measures. Orthodontic brackets can act as a niche for the microbial

flora especially Streptococcus bacteria<sup>2,3</sup> which is a caries causing agent. It is quite evident that after the removal of the brackets demineralized area could be present around the orthodontic bracket. So, to remove this caries causing agent and to avoid demineralized area regular removal of the plaque and oral hygiene measures should be incorporated.

Dimineralised areas are the result due to improper oral hygiene and usually evident after removal of brackets they are termed as white spot lesions. WSLs have always been a concern to the orthodontist and patients. The overall prevalence of white spot lesions among orthodontic patients has been reported to be between 4.9% and 84%.<sup>1</sup>

Various methods have been suggested to inhibit or reverse enamel demineralization. Fluoride delivery systems,<sup>3</sup> casein phosphopeptide amorphous calcium phosphate,<sup>1</sup> and enamel surface attenuation with an argon laser<sup>4</sup> have proved to be useful. Continuous fluoride release from fluoride-containing sealants, elastomeric chains, primers, and adhesives in bonding brackets is also useful. Often, the application of fluoride not only requires frequent visits to the dentist but also causes discoloration of the teeth, leading to decreased esthetics.

The use of antimicrobial therapy and broad spectrum antibiotic can reduce the growth of the bacteria but cannot completely suppress it. None of these medicaments has been able to successfully preclude the regrowth of residual pathogens or reinfection from external sources; this means that antibiotic and antimicrobial therapies must be given at regular intervals for effective long-term results.

In 20th century, Elie Metchnikoff, a Nobel Prize-winning Russian, made the revolutionary discovery of probiotics. According to the currently adopted definition, by WHO/Food and Agriculture Organization (2002), probiotics are: "Live micro-organisms, which when administered in adequate amounts confer a health benefit

on the host" International Life Science Institute Europe suggested a definition according to which a probiotic is "a live microbial food ingredient that, when consumed in ample volume, exerts health-benefits on the consumer."<sup>6,7,8</sup>

- Probiotics are usually consumed as part of diet in the form of yogurts, soy yogurt, or as dietary supplements with added active live cultures.

### Material and method

The study was conducted in Department of Orthodontics and dentofacial orthopedics, I.T.S Dental College, Hospital & Research Centre, Greater Noida in patients undergoing fixed orthodontic treatment.

### Inclusion criteria

- Orthodontic treatment with the straight wire appliance
- Permanent dentition,
- Good general health (no significant medical history or drug use during the last month),
- Non- smokers, Non tobacco chewers.
- No anti-inflammatory or antibiotic medications taken in the month before the study,
- No chewing gum or mouthwash used in the last week and during the study,
- Habit of brushing twice daily with fluoride toothpaste, and
- age between 14 and 29 years

### Exclusion criteria

- Uncooperative patients
- Patients with poor oral hygiene.

Patients included in the study have minimal gingival inflammation and maintains fair oral hygiene. There were 100 patients in the study, 62 females and 48 males and were asked to brush twice daily with regular fluoride based tooth paste. During the study the patients were asked to avoid chewing gums and antibiotics.

The patients were randomly and double blindly were allocated in two groups 50 each.

Group 1 (control group) - consisted of patients who received no probiotic treatment.

Group 2 (experimental group) – patients were instructed to consume 2 packs of yakult probiotic curd daily for 3 months.

Samples were taken at two time intervals 21 days, and 3 month. Plaque specimen was collected from the lateral incisors brackets with the help of the sterile swab and was rubbed gently over the prepared MS Agar media using four pass technique as suggested by Pellegrini et al.<sup>9</sup>

Four passes, each along the tooth at the bracket interface at the gingival, mesial, distal, and occlusal aspects, were used to prevent overloading the instrument tip (fig. 1).

Streptococcus species are mostly commensal residents of the mouth and throat, though several may act as opportunistic pathogens and a few as primary pathogen<sup>10</sup>. Streptococcus “viridans” group consists of Streptococcus salivarius and Streptococcus mitis . They exhibit different types of haemolysis when grown on Blood Agar Base. Therefore it is difficult to differentiate these organisms found in saliva from the other accompanying flora.

Mitis Salivarius Agar Base is used for the isolation of S.mitis , S. salivarius and Enterococcus faecalis from mixed cultures. E. faecalis is the most common member of the Enterococci to cause infections in humans and is also a cause of human endocarditis. Mitis Salivarius Agar is formulated as per Chapman<sup>11-13</sup>. This medium (with 1% potassium tellurite) is a highly selective medium, which enables to isolate streptococci from highly contaminated specimens like exudates from body cavities and faeces etc., as it inhibits a wide variety of bacteria. Some authors have also used sodium azide in this medium to inhibit the growth of gram-negative bacteria like Proteus.

The culture plates were prepared and the plaque sample is rubbed gently over the media and the plates were isolated with the adhesive tapes and were inoculated in the autoclave for 3 days. (fig. 2)

After 3 days the tapes were gently removed and blue colour streptococcal colony were present in cluster. The colony was counted under the colony counter machine with the help of the magnifying glass. (fig 3)

The procedure was repeated after 21 days , and 3 month. The plates were prepared in the same manner and patient was ask to consume the yakult probiotic curd daily till 3 months.

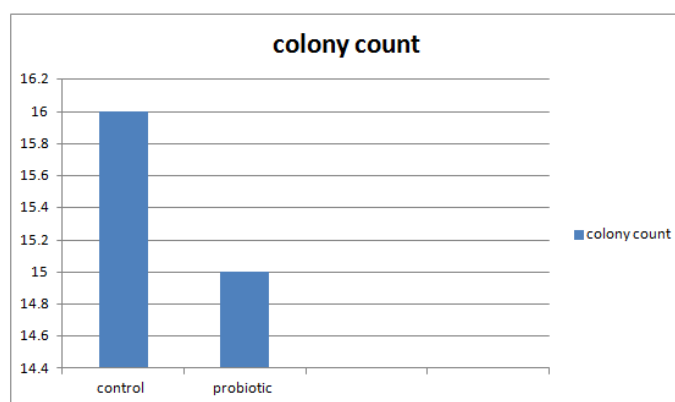
## Results

After 2 month patient in group 2 (experimental group) showed marked reduction in the number of colony present in the media and the reduction was about 50 % of the initial data.

Table 1: Summarizes the data of each data collection. (T1)

S.N	Sample	Number of Patients	Mean Streptococcus /UI	Std. Deviation
1.	Control Group	40	1732.4	2028.67
2.	Experimental Group	40	1573.6	1987.32

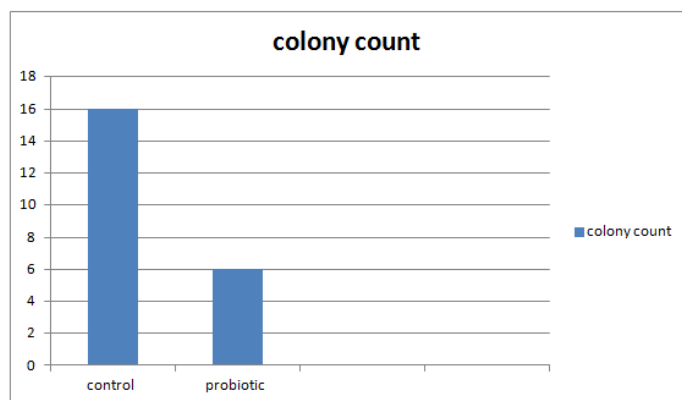
P value 0.808 which is not significant.



After 2 months, the levels of streptococcus bacteria in both the groups were evaluated using ANOVA test and post hoc test. The result reveals that there were significant differences among the groups when compared with the previous group. ( table 1 )

Table 2: ANOVA test at T2

S.N	Sample	Number of patients	Mean streptococcus /ul	Std. deviation
1.	Control group	40	1893.4	2028.67
2.	Experimental group	40	1034.2	1234.6



## Discussion

Dental caries is one of the most common oral infectious in humans. The low pH in dental biofilms favors the development of cariogenic bacteria such as *S. mutans*. During orthodontic treatment stagnation of food is a common problem which can lead to white spot lesions after the removal of the braces. White spot lesions are the radio opaque lesions which are demineralized area around the orthodontic brackets. WSLs are mainly due to action of the cariogenic bacteria such as *S. mutans* which demineralizes the area around the brackets. A study by Cildir *et al.*<sup>14</sup> in which the effect of probiotic yogurts was evaluated on *S. mutans* count decreased to 63 to 21 % within 2 weeks.

A study conducted by Caqlar E (2008)<sup>15</sup> The Daily consumption of ice- cream containing probiotic bifido- bacteria may reduce the salivary levels of mutans streptococci in young adults. CILDR SK (2009)<sup>16</sup> suggested that Short-term daily consumption of fruit yogurt containing bifido- bacterium animal is subsp. lactis DN-173010 may reduce the levels of mutans streptococci in saliva during orthodontic treatment with fixed

appliances. Zhu y, Xiao l, Shen D , Hao Y (2010)<sup>17</sup> states that Bio-yogurt and the probiotics that it contains are capable of inhibiting specific periodontal pathogens but have no effect on the periodontal protective bacteria.

Ferranzo GF (2011)<sup>18</sup> concluded in his study that a statistically significant reduction in mutans streptococci counts was observed in the test group compared with the control group. No effects on the levels of lactobacilli were noted. Daily consumption of yogurt for 2 weeks may decrease the salivary levels of mutans streptococci. Jubin Easo Jose, Sridevi Padmanabhan, Arun B.Chittaranjan ( 2014)<sup>19</sup> states that The consumption of probiotic curd and use of probiotic toothpaste caused a significant reduction in *S.mutans* levels in the plaque around brackets in orthodontic patients. Although probiotic toothpaste was more effective than systemic consumption, this was not statistically significant.

Devasya Ashwin et al<sup>20</sup> mention in his study that Probiotic ice-cream containing Bifidobacterium lactis Bb-12 and Lactobacillus acidophilus La-5 can cause reduction in caries causative organism. The dosage of the probiotic organisms for the long term or synergetic effect on the oral health are still needed to be explored.

Priya Nimish Deo, Revati Deshmukh (2015)<sup>21</sup> concludes that that Bacterio-therapy, which is a novel concept, is a non-invasive method for combating infection and caries.

## Conclusion

Systematic consumption of probiotic curd significantly reduceces the level of Streptococcus bacteria level from the plaque of the patient undergoing orthodontic treatment. when the two groups were compared the bacteria count was significantly decreased in the experimental group. Long term evaluation is required to observe the effect of systematic consumption of probiotics on white spot lesions.

## Legends Figures

Fig. 1: Collection of sample with the help of cotton swab.



Fig. 2: Culture of Streptococcus bacteria on MS Agar Media

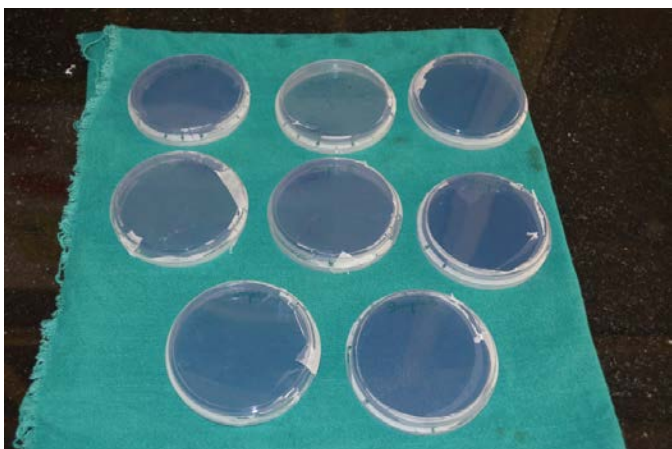


Fig. 3: Colony counter machine



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