

Effect of Triclosan Containing Tooth Paste and Conventional Fluoride Tooth Paste on Plaque and Gingivitis: A Randomized Clinical Trial

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Abstract

Background: Oral hygiene is the important component of personal hygiene. Tooth brushing is the most common and effective method of oral hygiene practice among all methods. To improve the efficacy and effectiveness of tooth brushing certain chemicals such as triclosan and fluoride are being incorporated into the dentifrices.

Aim: This study was aim to assess the effect of triclosan containing tooth paste and conventional fluoride tooth paste on plaque and gingivitis.

Materials and Methods: 12-year-old schoolchildren were involved in the study. A total of 56 children were randomly divided into two groups, Group 1 (28 children): Triclosan containing tooth paste and Group 2 (28 children): Fluoride containing tooth paste. Clinical examination was carried out using Silness and Loe plaque index (PI) and Loe and Silness gingival index (GI). Independent *t*-test and paired *t*-test was used for the intergroup and the intragroup comparison.

Results: There were totally 56 children included, 34 (60.7%) boys and 22 (39.3%) girls. Moreover, there was a statistically significant difference was found between the Group 1 and Group 2 after intervention ($P < 0.001$) with respect to the PI and GI. There was also a statistically significant difference between the baseline and after intervention score in Group 1 ($P < 0.001$) with respect to the PI and GI.

Conclusion: This study concluded that triclosan containing tooth paste has shown better in reduction of plaque scores when compared to the conventional fluoride containing tooth paste.

Key words: Dental plaque, Fluoride, Gingivitis, Tooth paste, Triclosan

INTRODUCTION

Dental caries and periodontal diseases, the two arch criminals of the oral cavity, are essentially caused by the microorganisms present in the dental plaque.¹ The use of toothpaste has ancient roots. Ancient Greeks, Egyptians, and Roman civilization were known to develop their own tooth “powder” containing pumice, talcum, coral powder. W.D. Miller ushered a new era in the science of preventive dentistry in 1890 when he described his chemico-parasitic

theory of tooth decay. This new theory created a boom in the toothpaste industries with each manufacturer adding special agent/agents. The more modern aspect of dentifrice came after the Second World War and with greater understanding about the pathogenesis of periodontal disease.²

Dental plaque is a microbial biofilm which is invariably present on the hard and soft tissues of oral cavity and it contains a complex blend of various microorganisms. It is considered as the precursor of dental caries, gingivitis, and periodontitis. The prevention and control of dental caries and as well the periodontal disease is dependent on optimal plaque control.³

The role of plaque accumulated at the gingival margin in the initiation and progression of gingivitis and periodontitis has been well documented.³ The mechanical

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removal of such deposits on a regular basis is one of the principal methods advocated by the researchers and clinicians. However, mechanical plaque removal is not always performed to an adequate standard as many surfaces on the teeth and gingiva are relatively inaccessible for mechanical cleansing and added to this fact, it also depends on the manual dexterity of the performer. As a result, chemotherapeutics have been introduced as adjunct to mechanical removal of plaque. The supplementation of mechanical brushing with effective adjunctive chemotherapeutic agent was found to have a beneficial effect on gingival health as the chemicals used could prevent the growth of dental plaque on human teeth.⁴

The triclosan molecule in dentifrices seems to possess several properties: Plaque-reducing and antigingivitis effects are documented which are based on antibacterial action combined with the potential of triclosan to influence several mediators of inflammation. No side effects are described in the corresponding literature.⁵ Fluoride is another antimicrobial agent in addition to its anticariogenic effect, which has been incorporated in tooth pastes and mouth rinses since long time to prevent the plaque accumulation on the tooth surface. Hence, this study was aim to assess the effect of triclosan containing tooth paste and conventional fluoride tooth paste on plaque and gingivitis.

MATERIALS AND METHODS

Ethical approval was obtained from the Institutional Review Board SJM Dental College and Hospital, Chitradurga, and informed consent was obtained from all the parents/guardians before the study conducted. This study comprised 12-year-old schoolchildren.

Children who were regular users of toothbrush and toothpaste for maintaining oral hygiene and willing to participate were included in the study. Students with known systemic illness, recent antibiotic and anti-inflammatory therapy, history of allergy to toothpaste, who were undergoing orthodontic treatment and who wore prosthodontic appliances were excluded from the study.

56 children were divided into two groups:

- Group 1 (28 children): Triclosan containing tooth paste
- Group 2 (28 children): Fluoride containing tooth paste.

Initially, all the subjects in both the groups underwent a wash out period of 2½ days to rule out any possible carry over effects of the previously used oral hygiene products. The wash out was done by brushing with water alone and then followed by a treatment period of 30-day. Baseline

clinical examination was carried out to assess plaque using Silness and Loe plaque index (PI) and gingivitis by Loe and Silness gingival index (GI) by a single trained, calibrated examiner. After recording, the indices participants were subjected to prophylaxis to render them plaque, stain, and calculus free. Following the prophylaxis, the study participants were randomly allocated into Group 1 triclosan containing tooth paste and Group 2 fluoride containing tooth paste.

The tubes containing the dentifrices were previously packed similarly and coded to warrant that neither the examiner nor the volunteers knew their content. The participants were given similar type of toothbrush and taught tooth brushing technique for the purpose of standardization. Furthermore, participants were instructed to brush twice daily (morning immediately after waking up and night before going to bed) for 2 min using the toothbrush and toothpaste given to them.

Randomization, allocation concealment, and distribution of the toothpaste were done by the coresearcher who was not involved in the clinical examination. The subjects were recalled for clinical examination after 30 days. The coresearcher revealed the content of each tube only after completion of the study.

Statistical Analysis

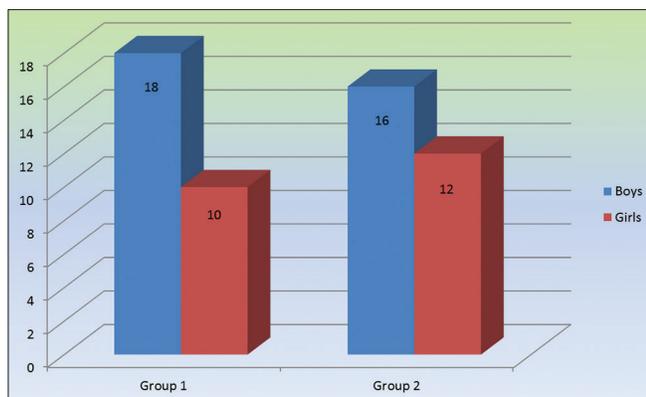
SPSS version 20 was used to analyze the data. Descriptive analysis has been done, and data were analyzed using independent *t*-test and paired *t*-test. The level of significance was set at 5%.

RESULTS

Graph 1 shows that there were totally 56 children included 34 (60.7%) boys and 22 (39.3%) girls. In that 18, 16 boys and 10, 12 girls were randomly allotted to Group 1 and Group 2, respectively.

Table 1 shows that there was a statistically significant difference was found between the Group 1 and Group 2 after intervention ($P < 0.001$) with respect to the PI. There was also a statistically significant difference between the baseline and after intervention score in Group 1 ($P < 0.001$) with respect to the PI.

Table 2 reveals that there was a statistically significant difference was found between the Group 1 and Group 2 after intervention ($P < 0.001$) with respect to the GI. There was also a statistically significant difference between the baseline and after intervention score in Group 1 ($P < 0.001$) with respect to the GI.



Graph 1: Distribution of gender

Table 1: Intra and inter group comparisons of PI at baseline and after intervention

| Variables | Group 1 | Group 2 | P value |
|--------------------|-----------|-----------|---------|
| Baseline | | | |
| N | 28 | 28 | 0.124 |
| Mean±SD | 0.86±0.16 | 0.78±0.18 | |
| After intervention | | | |
| N | 28 | 28 | 0.001* |
| Mean±SD | 0.46±0.20 | 0.70±0.19 | |
| t-value | 6.41 | 4.37 | |
| P value | 0.001* | 0.142 | |

*Significant. SD: Standard deviation, PI: Plaque index

Table 2: Intra and Inter group comparisons of GI at baseline and after intervention

| Variables | Group 1 | Group 2 | P value |
|--------------------|-----------|-----------|---------|
| Baseline | | | |
| N | 28 | 28 | 0.530 |
| Mean±SD | 0.44±0.12 | 0.43±0.18 | |
| After intervention | | | |
| N | 28 | 28 | 0.001* |
| Mean±SD | 0.36±0.10 | 0.42±0.14 | |
| t-value | 3.10 | 2.40 | |
| P value | 0.001* | 0.06 | |

*Significant. SD: Standard deviation, GI: Gingival index

DISCUSSION

A majority of oral diseases exhibit multifactorial etiology. The interplay of host, agent and environmental factors ultimately determine the oral health status of an individual. Dental caries and periodontal disease are two major and most common oral diseases which show widespread distribution among different populations in the world.

Dental caries is the most prevalent chronic disease affecting the human race when unchecked in its incipient stage it destroys the tooth structure leaving an indelible mark on tooth form and structure. Periodontal disease is the generic name given for a group of diseases which affect the periodontal apparatus, and initially it appears as

simple gingivitis, if not checked it may extend to deeper tissues resulting in periodontal destruction leading to tooth loss. Dental plaque is considered to be the precursor for both dental caries and periodontal disease. The complex microbial ecosystem of dental plaque along with the metabolic byproducts poses a profound challenge on the integrity of hard and soft tissues of the oral cavity.

This study shows statistically significant difference between the baseline and after intervention score in Group 1 ($P < 0.001$) with respect to the PI and GI. Similar results were obtained in other studies published in the literature such as Lindhe *et al.*,⁷ Rosling *et al.*,⁸ Cullinan *et al.*⁹ This may be attributed to the triclosan present in the dentifrice which is a potent antiplaque agent. The studies of Ramberg *et al.*¹⁰ have confirmed the potent antiplaque effect of triclosan. Since triclosan has plaque inhibitory property, obviously it reduces the gingival inflammation. Moreover, triclosan acts on the cyclooxygenase and lipooxygenase pathways of inflammation and inhibits the inflammatory mediators. The parallel reduction in gingival scores may be attributed to dual role of triclosan as a potent antiplaque agent and also anti-inflammatory agent.¹¹

In this study, there was no intra and inter group significant difference was found in the Group 2 with respect to the PI and GI. There are other studies in conformity with this result.^{11,12} These studies have also shown that there are significant reduction in the plaque scores at the end of the study when compared to the baseline. This result shows that the fluoride containing dentifrice has antiplaque activity. Fluoride alone also acts as a bacteriostatic in lower concentrations by affecting the metabolism of the bacteria.

The strength of the study was its randomized controlled design. The limitation of the study is its small sample size. In future, such a study has to be designed with larger sample size to further validate this study results. Besides, experimental period of 30-day may not be sufficient to show conclusive evidence of superiority of the test toothpaste over the control dentifrice.

CONCLUSION

Within the limitation, this study concluded that triclosan containing tooth paste has shown better in reduction of plaque scores when compared to the conventional fluoride containing tooth paste.

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