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RESEARCH ARTICLE

COMPARATIVE EVALUATION OF CHLORHEXIDINE MOUTHRINSE AND CACAO BEAN HUSK EXTRACT MOUTHRINSE AS ANTIPLAQUE AGENTS IN CHILDREN

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ABSTRACT

Purpose of study: The aim of this study is to compare the antiplaque efficiency of chlorhexidine mouthrinse and cacao bean husk extract mouthrinse in children. **Materials and methods:** This study conducted on 50 children of both sexes aged 6- 10 years.The group of 25 children were given 10 ml of 0.2% Chlorhexidine mouth rinse,and another 25 children were given 10 ml of 0.1% Cacao Bean Extract mouth rinse,to rinse the mouth twice daily for 30 seconds. The plaque samples were collected in Dentocult SM vials on pre rinse and after seven days, 1 month and 2 months. In the same intervals plaque index were recorded. The readings were tabulated and subjected to statistical analysis. **Results:** Results of the study showed that there was significant reduction in streptococcus mutans count in plaque in all follow up intervals for both mouthrinse group and also reduction in plaque index readings for both the mouthrinse groups. But there was no significant difference in reduction of streptococcus mutans count in plaque, and also plaque index between chlorhexidine mouthrinse group and cacao bean husk extract mouthrinse group. **Conclusion:** It was concluded that cacao bean husk extract mouthrinse can be used in children alternative to chlorhexidine mouthrinse as it has same antiplaque property and avoids the side effects of latter.

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INTRODUCTION

Dental plaque isone of the most common etiological factor of dental caries and periodontal diseases. It aids in the accumulation of acids which leads to localized demineralization of the tooth structure. Dental caries can be prevented by the inhibition of each step in the process of caries formation. Chemotherapeutic agents can be used as an adjunct to mechanical methods to prevent the dental plaque accumulation. Mouthwashes are recommended after the patient has brushed and flossed his teeth. Mechanical brushing supplemented with effective antimicrobial mouthwash has proven to be beneficial in the control of plaque (Mandel, 1988; Kornmann, 1986; Mandel, 1988). Plaque inhibition by chlorhexidine was first investigated in 1962 and is now considered as the gold standard method when compared to the other potential antiplaque agents (Kornmann, 1986; Mandel, 1988; Schroeder, 1969; Heasman, 1995). However, side effects such as discoloration of the teeth or unpleasant aftertaste may occur when these chemicals are used for an extended period (Greenstein *et al*., 1986).

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It has been shown to possess two types of cariostatic substances, one showing anti-GTF activity and the other antibacterial activity (Osawa *et al*., 2001). The observed effect in dentistry could be due to the inhibitory action of cocoa water extract on the synthesis of water-insoluble glucans. Considering the side effects of chlorhexidine mouthrinse and promising effect of cacao bean husk extract mouthrinse, this study was designed to compare the efficiency of both mouthrinses in children. The aim of the study was to compare the efficacy of 0.1% cacao bean husk extract mouth rinse and 0.2% chlorhexidine mouth rinse as antiplaque agents in children.

MATERIALS AND METHODS

The study includes 50 children of both sexes aged 6- 10 years were divided into two groups each group consisting of 25 children. The first group was given 10 ml of 0.2% Chlorhexidine mouth rinse and in second group 10 ml of 0.1% Cacao Bean Extract mouthrinse was given to rinse the mouth twice daily for about 30 seconds. Children receiving any antibiotics during the study and at least two months before the study were excluded from the study. Signed written informed parental consent and institutional ethical committee clearance was obtained.

Cacao bean husk extract mouthrinse was prepared from ground husks of cacao beans was obtained from CAMPCO factory, Puttur, Dakshin Karnataka according to the method prescribed by Matsumoto M *et al*. (2004). The plaque samples were collected from each child in a Dentocult SM vials (Orion Diagnostics, Finland) on four occasions. Sampling was done on day one before the use of mouth rinse, after seven days, 1 month and 2 months after the use of mouthrinse. In the same intervals plaque index according to Turesky – Gilmore-Glickman modification of Quigley -Hein plaque index was recorded (Soben Peter, 2003). Plaque samples were collected from Buccal surface of the maxillary right molar, Labial surface of the maxillary incisor, Lingual surface of the mandibular incisor, Lingual surface of the mandibular left molar by using tooth picks (Asokan *et al*., 2008). These samples were spread thoroughly but gently on the four sites of the plaque strip and strips were placed in selective culture broth. These vials were incubated in an upright position at 37^0 for 48 hours with the cap opened one quarter of a turn to allow growth of microorganisms. The presence of streptococcus Mutans was confirmed by the detection of light- blue to dark blue raised colonies on the inoculated surface of the strip.Inspection of the growth was done with the strip held sideways against light and with a magnifying glass. The results obtained by culture in the thermostat, were read using the model chart supplied by the manufacturer. Plaque index was recorded using Turesky – Gilmore- Glickman modification of Quigley -Hein plaque index at four intervals of prerinse, after seven days, one month and two months. Plaque index was recorded after applying the disclosing solution (plakcheck) over buccal or labial surfaces and lingual surfaces of all teeth in the oral cavity with the help of cotton applicator. Children were asked to rinse the mouth after five minutes of application of disclosing solution. The streptococcus mutans count in plaque for baseline and three follow up intervals of both mouthrinse groups were compared and plaque index of baseline and three follow up intervals of two groups of mouth rinses were also compared. The results of the study were statistically analyzed by using Mann-whitney test and t paired test.

RESULTS

Streptococcus mutans count in plaque of chlorhexidine mouthrinse group at time intervals of seven days, one month and two months were compared with pre-rinse streptococcus mutans count.

Reduction in streptococcus mutans in plaque of CHX mouthrinse group at time intervals of seven days, one month and two months were statistically significant (28.4%). The plaque index was recorded by using Turesky – Gilmore-Glickman modification of Quigley -Hein plaque index in CHX mouthrinse group at time intervals of seven days, one month and two months were compared with pre-rinse plaque index and at intervals from seven days to one month and two months and from one month to two months was found to be statistically significant. The reduction in streptococcus mutans count in plaque of CBHE mouthrinse group (31.7%) from pre rinse to seven days, one month and two months, and at intervals from seven days to one month, two months and also from one month to two months was found to be statistically significant ($P<0.001$). The reduction in plaque index of CBHE mouthrinse group from pre rinse to seven days one month , two months and at intervals from seven days to one month, two months and also from one month to two months was found to be statistically significant ($P<0.001$).

Higher mean streptococcus count in plaque at pre rinse, one month and two months time interval, was recorded in CHX mouthrinse group compared to CBHE mouthrinse group. At seven days time interval, slightly higher mean streptococcus mutans count in plaque was recorded in CBHE mouthrinse group compared to CHX mouthrinse group. The difference in streptococcus count in plaque between the two groups was not statistically significant at any of the time intervals ($P>0.05$) (Table-1). Plaque index was recorded as per Turesky – Gilmore- Glickman modification of Quigley -Hein plaque index between CHX and CBHE mouthrinse groups at prerinse and three follow up intervals. At all the time intervals, higher mean plaque index was recorded in CBHE mouthrinse group compared to the CHX mouthrinse group. But the difference in plaque index between the groups was not found to be statistically significant ($P>0.05$) (Table-2).

DISCUSSION

Chlorhexidine (CHX) digluconate has a 30- year history in dental medicine and is the most effective antiplaque and anti-gingivitis agent known till date (Löe and Schiött, 1970). However there are studies which shows that positive effects of chlorhexidine have been accompanied by side effects, like extrinsic tooth staining, unpleasant taste and burning sensation. There is increasing interest in the effect of natural compounds, especially food extracts, on the resident oral microbial flora,

Table 1. Comparison of streptococcus mutans count in Plaque between two groups

Time interval	Mouthrinse Used	n	Mean	Std dev	Mean difference	Z	P-Value
Pre Rinse	CBHE	23	1.70	0.76	-0.119	-0.563	0.574
	CHX	25	1.81	0.62			
7 days	CBHE	23	1.30	0.70	0.045	-0.193	0.847
	CHX	25	1.26	0.53			
1 Month	CBHE	23	0.74	0.69	-0.039	-0.192	0.848
	CHX	25	0.78	0.70			
2 Months	CBHE	23	0.39	0.66	-0.186	-0.902	0.367
	CHX	25	0.58	0.76			

Table 2. Comparison of Plaque Index between chlorhexidine mouthrinse group and cacao bean husk extract mouthrinse group at 4 intervals

Time interval	Mouthrinse Used	n	Mean	Std dev	Mean difference	Z	P-Value
Pre Rinse	CBHE	23	1.45	0.37	0.208	-1.808	0.071
	CHX	25	1.24	0.52			
7 days	CBHE	23	1.15	0.26	0.140	-1.941	0.052
	CHX	25	1.01	0.38			
1 Month	CBHE	23	0.85	0.20	0.140	-1.835	0.066
	CHX	25	0.71	0.29			
2 Months	CBHE	23	0.59	0.21	0.111	-1.894	0.058
	CHX	25	0.48	0.18			

both in terms of their ability to promote the growth of beneficial organisms and by their inhibition of the growth and metabolism of species associated with diseases. In the present study Comparative evaluation of efficiency of chlorhexidine mouthrinse with Cacao Bean husk extract mouth rinse in children in terms of reduction of streptococcus mutans count in plaque and reduction in plaque index score of two mouthrinse groups were done. In the present study the reduction in streptococcus mutans in plaque of chlorhexidine mouthrinse group at time intervals of seven days, one month and two months were statistically significant. Statistically significant decrease in streptococcus mutans count in plaque was observed from seven days to one month, from seven days to two months. The decrease in streptococcus mutans count in plaque from one month to two months was not statistically significant .This study showed that there was significant reduction of streptococcus mutans count in plaque, from pre rinse to two months follow up intervals (28.4%) which is similar to the study by Neeraja *et al*. (2008). where there was significant reduction in the streptococcus mutans count in plaque at different time intervals of first day, 15 days, one month and 3 months after using 10ml of 0.2% chlorhexidine mouthrinse.
Another similar study by S Asokan *et al*(2008)[10) showed the significant reduction in streptococcus mutans count in saliva and plaque at the four time intervals 24 h, 48 h, one week, and two weeks after chlorhexidine mouthrinse use. Study by Sharma U *et al*. (2004).

Showed that 0.2% chlorhexidine is the most effective antiplaque agent. In the present study, the plaque index, which was recorded by using Turesky – Gilmore- Glickman modification of Quigley -Hein plaque index in chlorhexidine mouthrinse group at time intervals of seven days, one month and 2 months were compared with pre-rinse plaque index. This method of recording plaque was selected due to the ease of use and objective definitions of each numerical score. However Jayaprakash K *et al*. (2007). Conducted a study on plaque index using Silness and Loe plaque index and reported that reduction in mean plaque index after 6 months follow up of chlorhexidine mouthrinse. In the present study the reduction in plaque index from pre rinse to seven days, one month and two months was found to be statistically significant. Decrease in plaque index was observed from seven days to one month and two months and from one month to two months was found to be statistically significant. In the present study the streptococcus mutans count in plaque of cacao bean husk extract mouthrinse group at time intervals of seven days, one month and two months were compared with pre-rinse streptococcus mutans count. The reduction in streptococcus mutans in plaque from pre rinse to seven days, one month and two months was found to be statistically significant ($P<0.01$). Statistically significant decrease in streptococcus mutans in plaque was observed from seven days to one month, two months ($P<0.001$) and also from one month to two months .There was a reduction in streptococcus mutans count in plaque (31.7 %) which was similar to the results obtained by the earlier study carried out by Shrikanth *et al*. (2008). Where in reduction in streptococcus mutans count in plaque was 49.6%. These findings show that CBHE significantly reduced plaque deposition and mutans streptococci counts when used as mouth rinse. The plaque index of cacao bean husk extract group at time intervals of seven days, one month and two months were compared with pre-rinse plaque index. The reduction in plaque index from pre rinse to seven days one month , two months was found to be statistically significant ($P<0.001$).

Statistically significant decrease in plaque index was observed from seven days to one month, two months ($P<0.001$) and also from one month to two months. The present study was designed for the comparative evaluation of the antimicrobial effects and antiplaque effects of 0.2% chlorhexidine gluconate (Hexidine) and a mouth rinse which is prepared from the waste product of chocolate industry (Cacao bean husk extract). This present study is a pioneer study in comparing the cacao bean husk extract mouthrinse with any of the mouthrinses reported. Comparison made in the streptococcus mutans count in plaque between chlorhexidine mouthrinse group and cacao bean husk extract mouthrinse group at prerinse and three follow up intervals. During Pre rinse, at one month and two months time interval, higher mean streptococcus count in plaque was recorded in CHX mouthrinse group compared to CBHE mouthrinse group.

At seven days time interval, slightly higher mean streptococcus mutans count in plaque is recorded in CBHE mouthrinse group compared to CHX mouthrinse group. The difference in streptococcus count in plaque between the two groups was not statistically significant at any of the time intervals ($P>0.05$). Comparison made in plaque index recorded as Turesky – Gilmore- Glickman modification of Quigley -Hein plaque index between chlorhexidine both the mouthrinse groups at prerinse and 3 follow up intervals. At all the time intervals, higher mean plaque index was recorded in CBHE mouthrinse group compared to the CHX mouthrinse group. But the difference in plaque index between the groups was not found to be statistically significant ($P>0.05$). The results of this study showed that, there was no significant difference between both mouth rinses in terms antiplaque effecti,e reduction in the streptococcus mutans count in plaque. And also there was no significant difference in reduction of plaque index score between the two groups.

Conclusion

This invivo study concludes that

- There was a significant reduction in the streptococcus mutans count in plaque and also reduction in plaque index when chlorhexidine mouth rinse used in children.
- There was a significant reduction in the streptococcus mutans count in plaque and also reduction in plaque index when cacao bean husk extract mouth rinse used in children.
- There was no significant difference in reduction of streptococcus mutans count and plaque and plaque index between chlorhexidine mouthrinse group and cacao bean husk extract mouthrinse group.

It is concluded that naturally occurring waste product of chocolate industry can be recycled and easily prepared as mouth rinse which has got all beneficial effects of anticariogenic and antimicrobial properties. It can be popularized as it is economical and is having all health benefits and avoids the side effects of chlorhexidine mouthrinse in children. This is the first study to compare the efficacy of CBHE as mouthrinse with any of the other mouthrinses. Further study is recommended for a longer duration and in a large group of children.

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