

Comparison of the Antimicrobial Efficiency of Chlorhexidine And Cacao Bean Husk Extract Mouth Rinses in Children

^{1*}Dr. Rohini Dua (B.D.S, M.D.S), ²Dr. Gulsheen Kaur Kochhar (B.D.S, M.D.S),

³Dr. Ripin Garewal (B.D.S, M.D.S), ⁴Dr. Annupriyakhanna (B.D.S, M.D.S),

⁵Dr. Akanksha Thakur

¹Professor and Head, National Dental College and Hospital, Derabassi, Mohali (Punjab)

^{2,3}Reader, National Dental College and Hospital, Derabassi, Mohali (Punjab)

⁴Senior lecturer, National Dental College and Hospital, Derabassi, Mohali (Punjab)

⁵PG student, National Dental College and Hospital, Derabassi, Mohali (Punjab)

Corresponding Author: *Dr. Rohini Dua

Abstract

Aim : The aim of this study is to compare the antimicrobial efficiency of chlorhexidine and cacao bean husk extract mouth rinses in children.

Material And Methods: This study comprise of 210 children aged 10-14 year old were examined. 50 children were selected by using simple random sampling for the study. Subjects were divided into two groups. Group-a subjected to 10 ml of 0.12% chlorhexidine (CHX) mouth rinse. Group-b subjected to 10 ml of 0.1% cacao bean extract (CBHE) mouth rinse. The samples were collected from the subjects on day one (pre-rinse, post rinse) and after 15 days. Data was statistically analysed to compare the efficacy of chlorhexidine and cacao bean husk mouth rinse.

Results: Reduction in plaque and gingival index score in both groups was found to be statistically significant ($p < 0.01$). However, the difference in reduction of plaque and gingival index score between the two groups was not statistically significant at any of the time intervals ($p > 0.05$).

Keywords: Cacao bean extract, mutans streptococci, chlorhexidine.

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I. Introduction

Dental plaque is a structured, resilient, yellow-greyish substance that adheres tenaciously to the intraoral hard surfaces, including removable and fixed prosthesis. Plaque is a potential factor in development of periodontal diseases has been well studied and documented in medical literature¹. Plaque bacteria generally have a harmonious relationship with the host; they use endogenous nutrients (e.g, salivary proteins and glycoproteins, such as mucin) for their growth, from which there is little acid production, and their presence helps exclude exogenous microorganisms.²

Removal of plaque is recognized as advantageous in the maintenance of gingival health and prevention of periodontal diseases.³ The concept of plaque control is broadly based on factors of mechanical plaque control and chemical plaque control.¹ Improved mechanical plaque removal may be achieved through the use of improved toothbrushes and/or flossing. Chemotherapeutic plaque control may be readily achieved via antimicrobial dentifrices or rinses. These approaches for plaque control may be used alone or in combination with various oral hygiene products.³ ADA recommends that individual should brush twice per day and use floss or other interdental cleaners once per day to effectively remove the microbial plaque.⁴ So, for better plaque control chemical inhibitors of plaque and calculus are incorporated in mouthwashes and dentifrices to enhance the effectiveness of mechanical aids employed. Chlorhexidine is the most popular mouthwash which has been used in dental practice as an excellent antiplaque agent, but it carries along side effects like brown discoloration of teeth. These days researchers are going back to nature to identify anti-microbial substance. Cacao bean husk extract is a by-product generated in the chocolate industry has both antiplaque and anticariogenic properties.

So, the present study was conducted with aim to evaluate & compare the clinical efficacy of CHX mouth rinse and cacao bean husk extract mouth rinse in reducing plaque accumulation.

II. Materials And Methods

Total 210 children 10-14 year old were examined. Children who had not received any antibiotic within 3 months before the study and who were not allergic were included in the study. 50 children were selected by using simple random sampling for the study. Subjects were divided into two groups.

GROUP-A subjected to 10 ml of 0.12% CHX mouth rinse

GROUP-B subjected to 10 ml of 0.1% cacao bean extract mouth rinse.

Preparation of cacao bean husk extracts (CBHE)

The ground husks of the cacao beans (1.0 kg), outer covering of cocoa bean were first treated with 5 g of cellulose in 4.75 L of distilled water at 50°C for 4 hours. Ethanol was then added up to 50% (v/v final concentration) and the mixture was refluxed for 1 h. After filtration, the ethanol was removed by evaporation and the aqueous solution lyophilized to produce a powder. This process yielded 120 gm of powdered extract. The powder was dissolved in distilled water to obtain a mouth rinse with a final concentration of 1 mg/ml in 0.1%.⁵

The subjects of both group A and group B were subjected to rinse once daily for 30 seconds with respective mouthwash for 15 days. The plaque index (Silness and Loe) and the gingival index (Loe and Silness) were used to assess the plaque accumulation and gingivitis. The teeth were dried and examined under natural light using a mouth mirror, probe and explorer. Wherever the plaque was not visible, the explorer was passed across the tooth surface in the cervical third. The probe was made to run along the soft tissue wall near the gingival sulcus to evaluate the bleeding for the gingival index.¹⁵ The samples were collected from the subjects on day one (pre-rinse, post rinse) and after 15 days. The examinations were conducted on day one (pre-rinse, post-rinse) and after 15 days. Data was statistically analysed to compare the efficacy of chlorhexidine and cacao bean husk mouthrinse.

II. Result

The mean reduction in total plaque and gingival score was calculated from baseline to 1st day and baseline to 15th day and it was seen that Chlorhexidine mouthrinse (group A) resulted in a significant reduction from baseline to 15th day (table 1).

Table 1. Mean reduction in total plaque score and gingival score in chlorhexidine group

	Mean	N	Std. Deviation	Mean diff	S.D.	t-value	P-value	
PI	PI baseline	1.8200	25	.49413	.05200	.11225	2.316	.029
	PI 1st day	1.7680	25	.46522				
PI	PI baseline	1.8200	25	.49413	.94800	.29597	16.015	.000
	PI 15 day	.8720	25	.35299				
GI	GI baseline	1.3560	25	.43019	.02800	.06137	2.281	.032
	GI 1st day	1.3280	25	.43829				
GI	GI baseline	1.3560	25	.43019	.60000	.34400	8.721	.000
	GI 15 day	.7560	25	.25671				

Group B i.e Cacao bean husk extract mouthrinse (0.1%) also showed a significant reduction in plaque and gingival index score baseline to 15th day. (table 2)

Table 2. Mean reduction in total plaque score and gingival score in CBHE group

Time interval	Mean	N	Std. Deviation	Mean diff	S.D.	t-value	P-value	
PI	PI baseline	1.8125	25	.49547	.02083	.08836	1.155	.260
	PI 1st day	1.7917	25	.48447				
PI	PI baseline	1.8040	25	.48689	.98800	.44565	11.085	.000
	PI 15 day	.8160	25	.40996				
GI	GI baseline	1.2240	25	.45486	.01600	.05538	1.445	.161
	GI 1st day	1.2080	25	.46630				
GI	GI baseline	1.2240	25	.45486	.46800	.28390	8.242	.000
	GI 15 day	.7560	25	.25671				

The mean reduction in plaque and gingival index score were compared for both the groups and it was observed that CBHE mouth rinse showed higher reduction as compared to CHX group at all the time intervals. However, the difference in reduction between the two groups was not statistically significant at any of the time intervals. (table 3)

Table 3. Intergroup comparison of mean reduction in plaque score at different time interval

	Group	N	Mean	Std. Deviation	Mean diff	S.E.	t-value	P-value
PI baseline-1st day	CB HE	25	.0208	.08836				
	CHX	25	.0520	.11225	-.03117	.02880	-1.082	.285
PI baseline-15th day	CB HE	25	.9880	.44565				
	CHX	25	.9480	.29597	.04000	.10700	.374	.710
GI baseline-1st day	CB HE	25	.0160	.05538				
	CHX	25	.0280	.06137	-.01200	.01653	-.726	.472
GI baseline-15th day	CB HE	25	.4680	.28390				
	CHX	25	.6000	.34400	-.13200	.08920	-1.480	.146

III. Discussion

Studies have examined the effect of mouthwashes as an anti-plaque and anti-inflammatory agent. Mouthwashes are very useful in reducing bacterial plaques. Chlorhexidine among the available mouthwashes has been found to be very effective for the reduction of bacterial plaque and pathogenicity of microorganisms, including *Streptococcus mutans*. It is considered as the gold standard antimicrobial agent. Despite the above advantages, this mouthwash has dental complications such as dental stain, changes in taste, irritation and dryness of mouth⁶. i.e. why there have been an increased interest in the effect of natural compounds, especially food extracts (CBHE), on the resident oral microbial flora, 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.⁷

Glucosyltransferase is one of the *mutans streptococci* products that play a role in plaque-forming and facilitate enamel demineralization.⁸ Cacao bean husk has polyphenol substances that contain strong antiglucosyltransferase activity. The main substance of polyphenols found in cacao bean husk is catechin and epicatechin. Besides that, there are free fatty acids as well such as oleic acid and linoleic acid that showed strong bactericidal activity against *mutans streptococci*.

In the present study both groups resulted in marked reduction in plaque and gingival index scores in intervals from baseline to 1st day and baseline to 15th day but statistically significant ($p < 0.01$) reduction was seen from baseline to 15th day. However, the difference in reduction of plaque and gingival index score between the two groups was not statistically significant any of the time intervals ($p > 0.05$).

IV. Conclusion

This study showed there was no significant difference between both mouth rinses in terms of antimicrobial properties. However considering the side-effects of CHX mouth rinse and the similar antibacterial properties of cacao bean husk extract mouth rinse reveals that cacao bean husk extract mouth rinse may be considered as valuable alternative for children.

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