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Original article

EFFECTIVENESS OF BROMELAIN MOUTHRINSE IN GINGIVAL INFLAMMATION AND BACTERIAL PLAQUE AMONG ADOLESCENTS: A RANDOMIZED CLINICAL TRIAL

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Abstract

Background: Mouthwashes are adjunct to regular brushing and flossing. Chlorhexidine is considered as a gold standard among mouth rinses. However, the most commonly known side effects include discolouration of teeth and the tongue particularly on the dorsum part. Hence the study was conducted to evaluate the effectiveness of Bromelain mouth rinse in gingival inflammation and bacterial plaque among adolescents.

Methods and methodology: This double-blinded, randomized controlled trial was conducted in accordance with Consolidated Standards of reporting Trials (CONSORT) in Public Health Dentistry Department at Saveetha University. The protocol was approved by the Institutional Review Board (IRB). 30 patients with moderate gingivitis were included in the study. All subjects signed an IRB-approved consent form. Participants from 15 to 19 years are recruited from the Urban health programmes through dental camps.

Results: No attempt was made for oral prophylaxis before the commencement of the study. The severity of

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gingivitis and plaque accumulation were assessed by gingival and plaque indices. Gingival index (Löe and Silness, 1963) and plaque index (Löe, 1967) were measured initially at baseline The trial was followed up for 30 days. The participants were instructed to rinse with plain water thoroughly. They were then directed to spit into a sterile plastic container after 5 minutes.At baseline, there was no significant difference in GI and PI scores among the groups (P=0.78 and 0.62) respectively. At one month follow up, there was significant difference in the mean GI and PI scores (P=0.02 and P=0.01) respectively.

Conclusion: Bromelain mouthwash is beneficial in improving gingival status due to its profound styptic action, with sufficient reduction in plaque scores without any adverse effects.

Key words: Bromelain, Sreptococcus mutans, herbal extracts, antioxidants

INTRODUCTION

Oral health has a significant impact on overall health and quality of life.[1] Poor oral health has been linked to a number of chronic and systemic diseases. The most common multifactorial diseases of the oral cavity are dental caries and gingivitis.[2] Various mechanical and chemical methods are primarily used to maintain oral health across the globe.

The oral diseases are caused by the presence of bacterial colonization in the oral cavity leading to formation of biofilms/plaque layer.[2-4] Caries, halitosis, gingivitis, and angular cheilitis are all pathological conditions caused by a colony of opportunistic bacteria.[5] Examples of bacteria that are always found in the oral cavity are the group Streptococcus (Streptococcus mutans, Streptococcus sanguis, Streptococcus salivarius, Lactobacillus sp).[6]

Dental plaque is a thin, paleyellow biofilm that forms naturally on the teeth.[7] It is formed by colonising bacteria attempting to attach themselves to the tooth's smooth surface, just like any other biofilm. Researchers have shown that many of the mouthwashes are very useful in the reduction of microbial plaque, by inhibiting the formation of plaque polysaccharide matrix. Chlorhexidine is one of the effective antimicrobial agents with excellent anti plaque mechanisms. However, excessive use can result in brownish discolouration of tooth along with augmented calculus development.[8] This emphasizes the call for further research and thereby establish herbal extracts with prominent antibacterial properties which may be effective against Streptococcus mutans.

Herbal mouthwashes have recently become more popular around the world as plants possess potent antioxidants.[8, 9, 10] Pineapple has been a part of traditional medicine and has promising therapeutic implications. Ananas comosus L., also known as, pineapple belongs to the family of Bromeliaceae. Pineapple is native to Thailand, China, Brazil and India. Pineapples comprise phytochemicals that are considered as essential bioactive compounds for health. Bromelain is a cysteine protease found in pineapples. It is employed in various therapeutic areas because of its anti-inflammatory and anti-cancer activities. The medicinal properties of pineapples are contributed by Bromelain.[11]

Very few studies have shown the use of these herbal medicines or their extracts in the maintenance of gingival health. In this clinical trial, the extract of pineapple was evaluated to assess microbial plaque and

bleeding during brushing, thus controlling gingivitis and periodontal diseases.

METHODS AND MATERIALS:

Study design and setting:

This double-blinded, randomized controlled trial was conducted in accordance with Consolidated Standards of reporting Trials (CONSORT) in Public Health Dentistry Department. The protocol was approved by the Institutional Review Board (IRB). All subjects signed an IRB-approved consent form. Participants from 15 to 19 years are recruited from the Urban health programmes through dental camps.

Inclusion and exclusion criteria:

- Participants with moderate to severe gingivitis, absence of systemic diseases and respondents with a minimum of 20 permanent teeth were incorporated.
- Participants under antibiotic and anti-inflammatory therapy in the past 6 months, those who are under orthodontic treatment, smokers and who are not willing to participate were excluded.

Randomization and allocation concealment

A simple random sampling was employed and the subjects were broadly classified into two groups by the fishbowl method. The subjects were asked to pick lots and were grouped by second investigator accordingly. This facilitates 1:1 allocation ratio. Therefore, in this study, both the respondents and the principal investigator were blinded.

Group I - Bromelain rinse
Group II - Placebo control

Both the mouth rinses were packed in a plain plastic bottle and were distributed by the departmental non-teaching assistant who was unaware of the study according to the number written on top of the bottle. After a period of 12 days participants were recalled for refill and also for a regular oral examination which could prevent loss of follow up.

Mouth rinse Preparation:

Bromelain powder was procured through an online retailer from the markets of South Chennai. The mouth rinse was prepared adding 0.05g of Bromelain powder to 50ml of distilled water and allowed to stay overnight for a period of 2 days. It was then filtered through Whatman filter paper.

Placebo mouth rinse:

Artificial flavours of pineapple was incorporated into distilled water. This was carried out to eliminate contamination bias and to maintain allocation concealment.

Study participants were requested to use 10ml of the given mouth rinse 30 minutes after brushing for a period of 1 minute for 1 month.

The severity of gingivitis and plaque accumulation were assessed by gingival and plaque indices. Gingival index (Löe and Silness, 1963) and plaque index (Löe, 1967) were measured initially at baseline. The trial was followed up for 30 days. The participants were instructed to rinse with plain water thoroughly. They were then directed to spit into a sterile plastic container after 5 minutes.

Statistical analysis:
Statistical analysis was performed using IBM Statistical Package for the Social Sciences version 23. Descriptive statistics such as mean with standard deviation (SD) were calculated. The data was found to be normally distributed ($p>0.05$), $p < 0.05$ were considered statistically significant. Data obtained from the study were represented in tables.

RESULTS AND DISCUSSION:

The primary outcome was to assess the efficacy of bromelain and placebo mouth rinse in dental plaque and gingival inflammation. When the two groups were assessed after a month, the test group showed a significant reduction in plaque and gingival scores. At baseline, there was no significant difference in GI scores among the groups (P=0.78) (Table 1). On intergroup comparison, there was significant difference in the mean GI scores(P=0.02).Likewise, at baseline, there was no significant difference in PI scores among the groups (P=0.62)(Table 1).On intergroup comparison, there was significant difference in the mean PI scores(P=0.01).

Index score		Bromelain		Placebo		P value
		Mean	SD	Mean	SD	
Gingival Index score	Pre	0.56	0.20	0.56	0.51	0.78
	Post	0.67	0.40	1.05	0.45	0.02
Plaque Index score	Pre	2.37	0.42	2.05	0.39	0.62
	Post	3.0	0.30	3.60	0.54	0.01

Table 1: Gingival and plaque scores in Bromelain mouthwash and Placebo

Over the decades, very few studies have been conducted to show the clinical efficacy Pineapples. Hence, this study was carried out to assess and compare the effectiveness of Bromelain mouth rinse and placebo mouth rinse on dental plaque and gingival inflammation.
Natural products like pineapples(bromelain) possess effective antioxidant and antimicrobial properties and are safe exhibiting fewer side effects.[12,13,14] On analyzing plaque and gingival index, bromelain mouth rinse have less plaque and gingival score on comparing with placebo for a period of 1 month, which is in accordance with previous studies. The gingival index scores were statistically significant as compared to the placebo group. In addition, it expressed a decreasing trend throughout the study. According to DiSilvestro et al, bromelain mouth rinse used for a period of about three times a day for four weeks reduced plaque-forming microorganisms as compared to placebo.

Limitations

Participants of clinical trials might experience good improvement in oral hygiene not specifically associated with the properties of the test agent, but rather related to a behavioral change (Hawthorne effect). Participants enrolled in oral hygiene studies tend to improve their tooth brushing irrespective of the product they receive.

Baking soda also helps in face and body scrub and soften skin and helps to relieves skin itching from insect bites and pain from sunburn.

CONCLUSION:

This study concluded that Bromelain mouth rinse was effective against dental plaque and gingivitis at the follow-up of one month. Therefore, we recommend the use of bromelain mouthwash since it is beneficial in improving gingival status due to its profound styptic action, with sufficient reduction in plaque scores without any adverse effects.

SOURCE OF FUNDING:

Nil

CONFLICTS OF INTEREST:

The authors declare no conflicts of interest.

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