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RESEARCH ARTICLE

COMPARATIVE EVALUATION OF EFFECT OF PAPAIN AND BROMELAIN CONTAINING TOOTHPASTE AND COMMERCIALLY AVAILABLE FLOURIDATED TOOTHPASTE

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ABSTRACT

A randomized, double blind, pilot clinical study was performed to compare the effectiveness of a herbal – based test toothpaste on reduction of existing plaque, gingivitis and extrinsic dental stains with a normal commercially available fluoridated toothpaste, over six weeks. 40 subjects were instructed to brush twice daily with the assigned toothpaste (either of the toothpaste) and toothbrush using modified bass method of brushing and refrain from other unassigned forms of oral hygiene aids. No prophylaxis was undertaken prior to commencement of the study. Subjects were assessed at baseline, and 6 weeks using plaque index, gingival index and Macpherson *et al*. modification of Lobene stain index and bleeding index. Immediately after completion of six weeks, subjects received a professional prophylaxis. The present study concludes there is significant reduction in the dental plaque accumulation and thus significantly reducing the chances of gingivitis in the subjects which used toothpaste having papain and bromelin. Also these natural extracts in the toothpaste showed significant reduction in stains after 6 weeks when compared to a regular fluoridated toothpaste.

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INTRODUCTION

Toothbrushing is the most commonly practiced oral hygiene measure worldwide for the effective control of the supragingival plaque which is a causative factor for gingivitis. It can be dated back to 3000 BC, the ancient Egyptians constructed crude toothbrushes from twigs and leaves to clean their teeth. Similarly, other cultures such as the Greeks, Romans, and Indians cleaned their teeth with twigs. Some would fray one end of the twig so that it could penetrate between the teeth more effectively. Modern day toothbrushing as a regular habit became prevalent in Europe from the end of the 17th century. The first mass-produced toothbrush was developed in England in 1780. In the United States, although toothbrushes were available at the end of the 19th century, the practice did not become widespread until after the Second World War, when US soldiers continued the toothbrushing that had been required during their military service. There is a wide range of research going on in the manufacture of these toothpastes using different ingredients. It has been estimated that less than one third of the population of developed nations can be expected to practice adequate mechanical plaque removal. Therefore it could be argued that supplementation of mechanical brushing with effective adjunctive chemotherapeutic agents would be beneficial to gingival health (Frandsen, 1986; Mandel, 1988).

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Because of obvious interest in the field of esthetics, there is a much more awaited demand for whitening toothpastes to reduce or remove extrinsic dental stains, with more and more products becoming commercially available which claim whitening effect on teeth. The mode of action of many of these products would appear to rely on the incorporation into the formulation of an effective abrasive system and /or chemicals that could help to inhibit or remove stain (White, 2001). However the implementation of herbal medicines and extracts in various commercially available products are catching interest. These products can provide a safe and long term use (Takahashi *et al*., 2003). Many toothpastes make whitening claims. Some of these toothpastes contain peroxide, the same ingredient found in tooth bleaching gels (Pontefract *et al*., 2001). The abrasive in these toothpaste remove the stains, not the peroxide. Whitening toothpaste cannot alter the natural color of teeth or reverse discoloration by penetrating surface stains or decay. To remove surface stains, whitening toothpaste may include abrasives to gently polish the teeth, and/or additives such as sodium tripolyphosphate to break down or dissolve stains. When used twice a day, whitening toothpaste typically takes two to four weeks to make teeth appear more white. Whitening toothpaste is generally safe for daily use, but excessive use might damage tooth enamel. Teeth whitening gels represent an alternative. However, the whitening process can permanently reduce the strength of ones' teeth—the process scrapes away a protective outer layer of enamel.

Many herbal toothpastes do not contain fluoride or sodium lauryl sulfate. The ingredients found in natural toothpastes vary widely but often include baking soda, aloe, eucalyptus oil, myrrh, plant extract (strawberry extract), and essential oils. Recent studies have shown that natural extracts like papain and bromelain help in reduction of these biofilms causing gingivitis and aid in natural whitening of teeth. Thus, the present randomized, double blind, pilot clinical study was designed to evaluate the effectiveness of a herbal based toothpaste at reduction of existing plaque, gingivitis and extrinsic dental stains in comparison to a commercially available fluoridated toothpaste over a six weeks period.

MATERIALS AND METHODS

40 healthy dentate (mean age 30-34 years) subjects who reported to the department of Periodontics, JSS Dental college and Hospital, Mysore, Karnataka were recruited for the study. Ethical approval was obtained from the institutional ethical committee. The inclusion criteria included systemically healthy subjects of either gender, aged 18 years or older and having a minimum of 20 teeth including all the anterior teeth. Each subject had to have gingivitis as defined by bleeding on gentle probing at more than 30 % of the sites and a gingival index of > 1 at more than 60 % of the sites examined.

All subjects who have a plaque index of > 2, subjects having periodontal pockets greater than 3mm, dental defects, intrinsic discoloration of teeth, gross oral pathology, esthetic restorations which could become discolored, those wearing orthodontics appliances or prostheses or full coverage restorations, those using tobacco products or chromogenic oral products such as chlorhexidine and those under medications that could stain the dentition were excluded from the study. Subjects who had a history of known sensitivity or oral mucosal tissue reaction to the ingredients of toothpaste and who had undergone oral prophylaxis in the four week period prior to the baseline examination were also excluded. Each subject was assigned to either test group (test toothpaste) or control group (flouride toothpaste) randomly by toss of a coin after obtaining the informed consent. To ensure blinding, the two products were similar in terms of taste, texture and color. The toothpaste along with the soft bristled toothbrush were dispensed to subjects by a dental assistant. Subjects were instructed to brush twice daily with the supplied toothpaste and toothbrush using modified bass method of brushing and refrain from all other unassigned forms of oral hygiene aids including non study toothbrush or toothpaste, dental floss, chewing gum or oral rinse during the study.

No prophylaxis was undertaken prior to commencement of the study. The same clinician conducted all the examination and scorings. Subjects were assessed for plaque, gingivitis and extrinsic stains in the same dental unit under identical conditions at baseline and 6 weeks. Gingival index according to the criteria of Loe and Silness (1963) and plaque index of Silness and Loe (1964) were assessed at the midbuccal, mesiobuccal, distobuccal, mesiopalatal/lingual, midpalatal/ lingual and distopalatal/lingual surfaces of each tooth and the mean of these values was calculated for each subject. Using the Macpherson *et al*. modification of Lobene index (Macpherson *et al*., 2000; Lobene, 1968) the intensity of stain on the gingival ,body and proximal surfaces of the tooth on the buccal and lingual surfaces of each assessable incisor teeth were observationally scored using four point scale.

The area (extent) of the stain (A) was recorded for approximal, intensity score of 2 or 3 was given. An average stain score was calculated for each patient by the adding the product of stain intensity and area scores of labial and lingual surfaces and then dividing by total number of sites examined. From the individual scores, mean group stain index was calculated. At each scoring visit, the examiner directly questioned as to the adverse events during individual periods before conducting the soft tissue examination. Immediately after completion of six weeks, subjects received a professional prophylaxis.

RESULTS

Table 1. Descriptive statistics of Test group and Control group for all parameters

Parameter	Visits	Test group	Control group
Plaque index	Baseline	1.90	1.90
	6 weeks	1.50	1.52
Gingival index	Baseline	1.75	1.67
	6 weeks	1.40	1.42
Stain index	Baseline	1.77	1.77
	6 weeks	1.37	1.62
Bleeding index	Baseline	1.72	1.65
	6 weeks	1.30	1.47

Table 2. Inter group comparison of mean values of parameter between baselines and 6 weeks using Value Mann whitney test. Comparison between Test group and Control group

		Mean rank	Z-value	p-value
PI baseline	Test group	19.89	-0.06	0.95
	Control group	20.10		
GI baseline	Test group	20.00	0	1
	Control group	20.00		
SI baseline	Test group	20.18	-0.12	0.91
	Control group	19.83		
BI baseline	Test group	19.53	-0.34	0.73
	Control group	20.45		
PI 6 weeks	Test group	19.63	-0.21	0.83
	Control group	20.35		
GI 6 weeks	Test group	17.68	-1.5	0.14
	Control group	22.20		
SI 6 weeks	Test group	15.26	-3.03	0.002*
	Control group	24.50		
BI 6 weeks	Test group	16.50	-2.4	0.017*
	Control group	23.33		

*significant

Table 3. Wilcoxon mean –rank test Intra group comparison between baseline & 6 weeks - Test group

		Mean rank	Z-value	p-value
PI	Baseline	8.00	-3.97	0*
	6 weeks	.00		
GI	Baseline	7.08	-2.97	.003*
	6 weeks	6.00		
SI	Baseline	5.00	-2.72	0.006*
	6 weeks	.00		
BI	Baseline	5.00	-2.75	0.006*
	6 weeks	.00		

*significant

Table 4. Intra group comparison between baseline & 6 weeks - Control group

		Mean rank	Z-value	p-value
PI	Baseline	9.00	-3.64	0*
	6 weeks	9.00		
GI	Baseline	4.50	-2.64	0.008*
	6 weeks	.00		
SI	Baseline	2.00	-1.73	0.083
	6 weeks	.00		
BI	Baseline	4.00	-2.53	0.011*
	6 weeks	.00		

DISCUSSION

The current study evaluated the clinical stain removal efficacy of a novel dentifrice containing papain and bromelain in comparison with a control dentifrice. Periodontal diseases are infections initiated by bacterial biofilms that form on the surfaces of teeth in close proximity to their supporting tissues. The inflammatory and immune responses to these bio-films are primarily responsible for the subsequent destruction of the periodontal tissues. Gingivitis and periodontitis are a continuum and although the susceptibility of an individual to periodontitis is influenced by many factors, such as smoking, diabetes and genetics, the weight of evidence indicates that the prevention of gingival inflammation prevents periodontitis (Kinane, 2010). The principle and benefits of adding chemical agents to dentifrices is exemplified by the inclusion of fluoride in dentifrices, which has been a major factor in reducing the prevalence of dental caries worldwide (Bratthall, 1996). Given the importance of plaque bacteria in initiating periodontal disease, the incorporation of an agent into toothpaste that would reduce the formation of plaque and/or its pathogenicity is a logical development. The most widely used metals in oral health care products are tin (Sn2+) and zinc (Zn2+). They have the ability to limit bacterial growth and plaque formation (Giersten, 1989). Tin Stannous fluoride dentifrices were launched initially in the 1950s to deliver the anticaries benefit of fluoride and it was only found later that Sn2+ had antimicrobial effects (Tinanoff, 1990).

Toothpastes containing triclosan / copolymer and triclosan / zinc citrate improve plaque control and gingival health, both safely and effectively, in studies of 6 months duration. A recent systematic review questioned the public health significance of such relatively short term improvements (Watt, 2005). However, the unsupervised use of a triclosan / copolymer toothpaste has been shown to prevent the onset and progression of periodontitis in studies of at least 3 years duration (Cullinan *et al*., 2000; Ellwood *et al*., 1998; Renvert, 1995). However, the data supporting the effectiveness of triclosan / pyrophosphate are weak. Stannous fluoride toothpastes have been inconsistent in their effect on dental plaque but have consistently improved gingival health. Their use, however, is accompanied by staining of the teeth. The data on toothpastes containing zinc citrate and amine fluoride / stannous fluoride are insufficient to make firm recommendations regarding their efficacy.

According to a study conducted by Abdulwahab *et al* in 2011 herbal extracts in the toothpaste which is available commercially as Paradontax which contains chamomile, Echinacea, sage, myrrh, rhatany and peppermint oil provided significant reduction of dental plaque accumulation and inflammation as gingival bleeding in 42 days of their follow up (Abdulwahab, 2011). Papain is a sulfhydryl protease derived from papaya (Carica papaya). The unique property of the papain is the proteolytic activity. Papain is claimed to remove plaque by hydrolyzing the peptide bonds of protein pellicle and prevents the bacteria from adhering to the tooth surface. Surface stains stick to the pellicle first, so papain helps to break down the protein pellicle and disperse all the stains. Bromelain is also a proteolytic enzyme derived from Pineapple (Ananas comosus). Bromelain is a non abrasive whitening agent. Proteolytic action of Bromelain is also claimed to remove plaque and stains on the teeth. Bromelain also reduces inflammation associated with gum disease.

Papain and Bromelain work synergistically to break down the protein pellicle layer and removes all the stains. Papain and Bromelain effectively remove enamel Pellicle thereby preventing bacteria and stain accumulation on tooth surface. A comparison between the two groups are summarized in table 2. The intra group comparison of both samples at baseline and six weeks are summarized in table 3 and table 4. The current study shows there are no significant changes in Plaque index and Gingival index between the groups at six weeks. There is a significant change in all parameters in Test group between baseline and six weeks. However in Control group the stain index is not showing any significant change between the timelines whereas the other parameters showed significant change.

Conclusion

The present study concludes there is significant reduction in the dental plaque accumulation and thus significantly reducing the chances of gingivitis in the subjects which used toothpaste having papain and bromelin. Also these natural extracts in the toothpaste showed significant reduction in stains after 6 weeks when compared to a regular fluoridated toothpaste.

REFERENCES

Abdulwahab, I., Al-Kholani. 2011. Comparison between the Efficacy of Herbal and Conventional Dentifrices on Established Gingivitis. *Dent Res J,* 8(2): 57-63

Bratthall, D., Hansel-Petersson, G., Sundberg, H. 1996. Reasons for the caries decline: what do the experts think? *Eur J Oral Sci.,* 104: 416–422.

Cullinan, M.P., Westerman, B., Hamlet, S.M., Faddy, M.J., Seymour, G.J. 2003. The effect of a triclosan containing dentifrice on the progression of periodontal disease in an adult population. *J Clin Periodontol,* 30: 414–419.

Ellwood, R.P., Worthington, H.V., Blinkhorn, A.S., Volpe, A.R., Davies, R.M. 1998. Effect of a triclosan/copolymer dentifrice on the incidence of periodontal attachment loss in adolescents. *J Clin Periodontol,* 25: 363–367.

Frandsen, A. 1986. Mechanical and hygiene practices. In dental plaque control measures and oral Hygiene Practices Eds. Loe Hand Kleintnan D V, pp.93-116,Oxford:IRL Press.

Giersten, E., Scheie, A.A., Rolla, G. 1989. Plaque inhibition by a combination of zinc citrate and sodium lauryl sulphate. Caries Res 1989: 23: 278–283.

Kinane, D.F., Attstrom, R. 2005. Advances in the pathogenesis of periodontitis. Consensus Report. *J Clin Periodontol* 32(Suppl. 6): 130–131.

Lobene, R.R. 1968. Effects of dentifrices on tooth stains with controlled brushing. *Journal of the American Dental Association*:77: 849855.

Loe, H. and silness, J. 1963. Periodontal disease in pregnancy (1) .Prevalence and severity. Acta odontologica scandinavica 21:533-551.

Macpherson, L.M.D., Stephen, K.W., Joiner, A., Schafer, F., Huntington, E .2000. Comparison of a conventional and modified tooth stain index. *Journal of clinical Periodontology*.27(11): 854 859.

Mandel, I.D. 1988. chemotherapeutic agents for controlling plaque and gingivitis. *Journal of clinical Periodotology,* 15:488-498

Pontefract, H., Sheen, S., Moran, J. 2001. The benefits of toothpaste real or imagined tooth whitening products. Dental update 28;6774.

Renvert, S., Birkhed, D. 1995. Comparison between 3 triclosan dentifrices on plaque, gingivitis and salivary microflora. *J Clin Periodontol,* 22: 63–70.

Silness, J., Loe, H. 1964. Periodontal disease in pregnancy II: Correlation between oral hygiene and periodontal conditions. Acta Odontol Scand.24:747–59.

Takahashi, K., Fukazawa, M., Motohira, H., Ochiai, K. Nishikawa, H. 2003. Miyata. A pilot study on antiplaque effects of mastic chewing gum in the oral cavity. J periodontal74 :501-505.

Tinanoff, N. 1990. Review of the antimicrobial action of stannous fluoride. *J Clin Dent.,* 2: 22–27.

Watt, R.G., Marinho, V.C.2005. Does oral health promotion improve oral hygiene and gingival health? Periodontol 2000 37: 35–47.

White, D.J. 2001. Development of an improved whitening dentifrice based upon stain –specific soft silica" Technology Journal of clinical Dentistry:12 (spec Iss.2): 2529.

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