

Health from the Hive: 5% Propolis Mouth Wash as an Adjunct in the Treatment of Chronic Generalized Gingivitis-A Randomized Controlled Clinical Trial

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Abstract

Background: Gingival diseases affect 80% of the adult population in India and are considered to be plaque initiated inflammatory conditions with the presence of pathogenic bacteria. The term, Gingivitis means inflammation of the gums or gingiva. Gingivitis is a non-destructive type of periodontal disease if left untreated gingivitis can progress to periodontitis. Thus it can eventually lead to loss of teeth. It is a well-known fact that all periodontitis are initiated by gingivitis.

Objectives: To assess the effectiveness of 5% propolis mouth wash in chronic generalized gingivitis and also to evaluate and compare the effectiveness of 5% propolis mouth wash with respect to the chlorhexidine mouth wash.

Method: A total of 45 randomly selected patients (lottery method) between the age group of 18-70 years were selected for the study and grouped as follows: Group I with 15 patients who were treated with 5% propolis mouth wash. Group II with 15 patients were treated with chlorhexidine mouth wash controlled group and Group III with 15 patients were treated with normal saline (placebo).

Result: The results indicated that there was a significant improvement in clinical parameters ($p < 0.05$) in group 1 at the end of the study.

Conclusion: Our study data showed that propolis mouthwash is more effective than other mouth washes on plaque accumulation and gingival inflammation. The study suggests that propolis can be used as a natural mouthwash, an alternative to chemical mouthwashes, e.g., chlorhexidine.

Keywords: Chronic generalized gingivitis; Propolis mouth wash; Chlorhexidine mouth wash; Alcohol-free mouth wash

Introduction

Gingivitis is considered to be a non-destructive form of the disease that causes inflammation of the gums. Most forms of gingivitis are plaque-induced and are reversible in nature with good oral hygiene; however, without treatment, however, when left untreated gingivitis can progress to periodontitis and tissue destruction [1-3].

The focus of treatment should be aimed at complete removal of plaque with the reduction of oral microbiota. The different methods employed in the treatment of gingivitis include scaling and root planning, curettage and use of mouthwashes containing chlorhexidine and flossing and use of Interdental brushes

Propolis is a resinous yellow-brown to dark brown substance collected by honey bees from sprouts, exudates of trees and other parts of plants and modified in the beehives by addition of salivated

secretions and wax. Chemically, propolis of different parts of the world is constituted by 50%-60% of resins, 30%-40% of waxes, 5%-10% of essential oils, 5% pollen and microelements like aluminum and calcium. So far, more than 300 organic compounds of different groups mainly phenolic such as flavonoids, stables, phenolic acids, and its esters have been identified from propolis. Propolis possess a variety of biological and pharmacological properties viz, anti-inflammatory, antimicrobial, antiparasitic, antiviral, antitumor, antioxidant. Propolis has a special compound called pinocembrin, a flavonoid that acts as an antifungal. These anti-inflammatory and antimicrobial properties make propolis helpful in wound healing [4,5].

The beneficial aspects of propolis, includes prevention of dental caries [6]; reduction of oral mucositis resulted from chemotherapy [7]; oral cancer [4,8]; gingival and periodontal diseases; plaque inhibition and anti-inflammatory [6]; as a constituent of dentifrice to control oral microbiota [9]; as an effective transport medium for increasing periodontal ligament cell viability of avulsed teeth [10]; direct pulp capping [11,12]; and as an analgesic [2].

Hence the present study was carried out to assess the effectiveness of 5% propolis mouth wash in chronic generalized gingivitis and also to evaluate and compare the effectiveness of 5% propolis mouth wash with respect to the chlorhexidine mouth wash among the south Indian population.

Materials and Methods

Source of data

Samples will be randomly selected from the Outpatient Department of Periodontology, Rajarajeswari Dental College and Hospital, Bangalore.

Method of collection of data

A total of 45 randomly selected patients (lottery method) between the age group of 18-70 years were selected for the study and were grouped as follows:

- Group I: 15 patients were treated with 5% propolis mouth wash.
- Group II: 15 patients were treated with chlorhexidine mouth wash controlled group
- Group III: 15 patients were treated with normal saline (placebo)

Inclusion criteria

- Patients willing to undergo treatment
- Patients with chronic generalized gingivitis
- The patient responses were quantified by using a plaque index and gingival index

Exclusion criteria

- Patients allergic to 5% propolis mouth wash
- Patients unwilling to participate in the study
- Patients undergoing treatment for chronic generalized gingivitis
- Pregnancy or breastfeeding
- Systemic conditions those are etiologic or predisposing to chronic gingivitis
- Periodontal surgery in the preceding 3 months (unless it is the effect of the agent on post-surgical sensitivity that is under study)
- Teeth or supporting structures "with any other painful pathology or defects

Procedure

- All the patients who were willing to participate in the study were explained the need and objective of the study and written consent were obtained. Forty-five patients diagnosed with chronic generalized gingivitis by using the plaque index and gingival index were included in the study
- After scaling and root planning, the subjects were advised to use respective mouth wash as follows
- Group 1 subjects were used 5% propolis mouthwash 10ml daily morning after tooth brushing and after breakfast and night after dinner and before going to bed
- Patients in group 2 were used 0.2% chlorhexidine mouth wash 10 ml (as a controlled group) daily morning after tooth brushing and after breakfast and night after dinner and before going to bed

- Whereas patients in group 3 were subjected to use saline (placebo) alone 10 ml (as a placebo group) daily morning after tooth brushing and after breakfast and night after dinner and before going to bed

Statistical analysis

- Statistical Package for Social Sciences [SPSS] for Windows, Version 22.0. Released in 2013. Armonk, NY: IBM Corp., was used to perform statistical analyses
- Descriptive analysis of all the explanatory and outcome parameters was done using frequency and proportions for categorical variables, whereas in Mean and SD for continuous variables
- One-way ANOVA test followed by Tukey's Post hoc Analysis was used to compare the mean Plaque and Gingival Index scores between 03 groups at Baseline and 6 weeks follow-up period
- Student Paired t-Test was used to compare mean Plaque and Gingival Index scores between baseline and 6 weeks period in each study group
- The level of significance [p-Value] was set at $p < 0.05$

Result

The gender wise statistical result of all the participants with classes of malocclusion i.e., Class I, Class II and Class III in relation to their respective blood groups is mentioned in Table 1.

All the patients who were selected for the study completed the study protocol. The mouthwashes given to the patients of group 1 and group 2 found to be equally effective in decreasing the gingival index and plaque index. Table 1 and Figures 1 and 2 shows no significant difference between all the 3 groups in terms of age and gender at the baseline. Table 2 and Figures 3 and 4 shows baseline values of gingival index and plaque index. The gingival index value and plaque index values of group 1 found to be statistically significant compared with group 3 ($P > 0.03$) at 6 weeks as shown in Table 3 and Figures 5 and 6 and The gingival index and plaque index at 6 weeks interval found to be statistically significant when compared to other groups ($p > 0.001$) as shown in Table 4 and Figure 7.

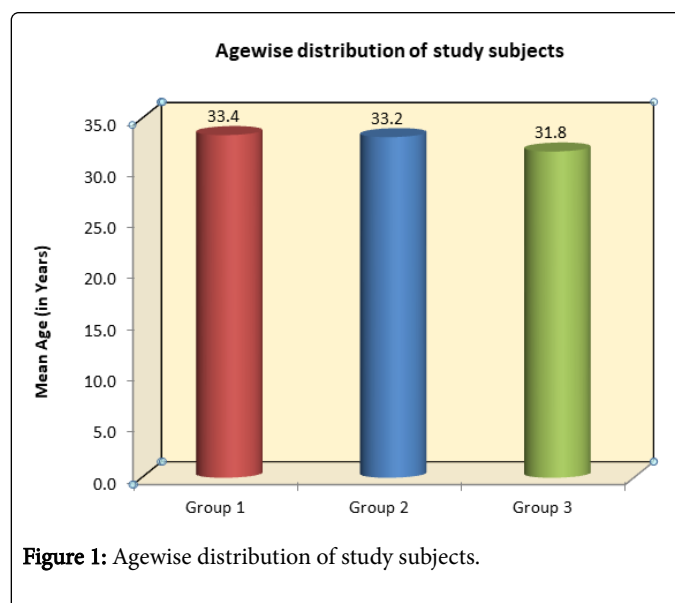


Figure 1: Agewise distribution of study subjects.

Variables	Category	Group 1		Group 2		Group 3		p-Value
		Mean	SD	Mean	SD	Mean	SD	0.68 ^a
Age	Mean and SD	33.4	10.9	33.2	14.5	31.8	14.1	
	Range	18-55		19-69		18-55		
		n	%	N	%	n	%	0.44 ^b
Gender	Males	11	73.30%	8	53.30%	8	53.30%	
	Females	4	26.70%	7	46.70%	7	46.70%	

Note: a) Kruskal Wallis Test and b) Chi Square Test
 Group 1-Propolis Mouthwash Group
 Group 2-CHX Mouthwash Group
 Group 3-Placebo Group

Table 1: Distribution of demographic characteristics of the study subjects among 03 groups.

Parameters	Groups	N	Mean	SD	Min	Max	p-Value
GI	Group 1	15	1.86	0.19	1.6	2.1	0.85
	Group 2	15	1.86	0.19	1.6	2.1	
	Group 3	15	1.89	0.17	1.6	2.1	
PI	Group 1	15	1.95	0.07	1.8	2	0.77
	Group 2	15	1.94	0.08	1.8	2	
	Group 3	15	1.96	0.07	1.8	2	

Table 2: Comparison of mean plaque and gingival index scores between 03 groups at baseline period using One-way ANOVA test.

Parameters	Groups	N	Mean	SD	Min	Max	p-Value ^a	Sig. Diff	p-Value ^b
GI	Group 1	15	1.42	0.2	1.1	1.8	0.04*	G1 Vs G2	0.21
	Group 2	15	1.53	0.14	1.4	1.8		G1 Vs G3	0.03*
	Group 3	15	1.58	0.15	1.4	1.8		G2 Vs G3	0.67
PI	Group 1	15	1.47	0.21	1.2	1.8	<0.001*	G1 Vs G2	0.04*
	Group 2	15	1.61	0.16	1.2	1.8		G1 Vs G3	<0.001*
	Group 3	15	1.73	0.08	1.6	1.8		G2 Vs G3	0.1

Note: a. p-Value obtained by One-way ANOVA test
 b. p-Value obtained by Tukey's Post hoc Analysis
 G1 - Group 1, G2 - Group 2 and G3 - Group 3
 * - Statistically Significant

Table 3: Comparison of mean Plaque and Gingival Index scores between 03 groups at 6 Weeks Follow-up period using One-way ANOVA test followed by Tukey's Post hoc Analysis.

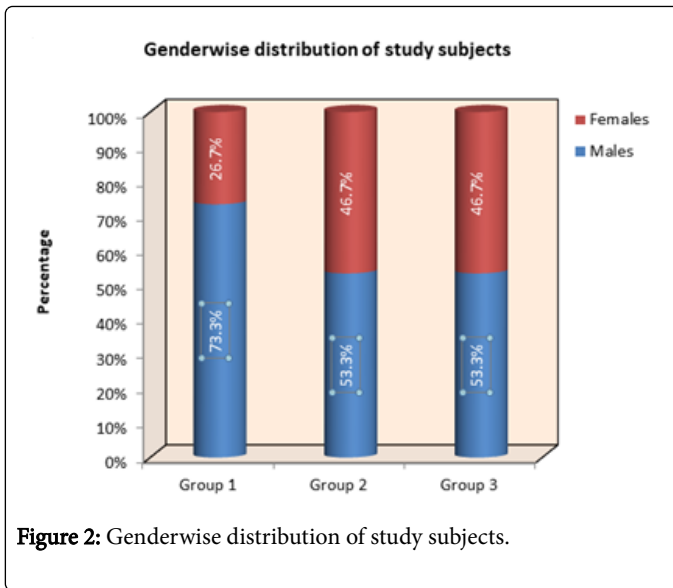


Figure 2: Genderwise distribution of study subjects.

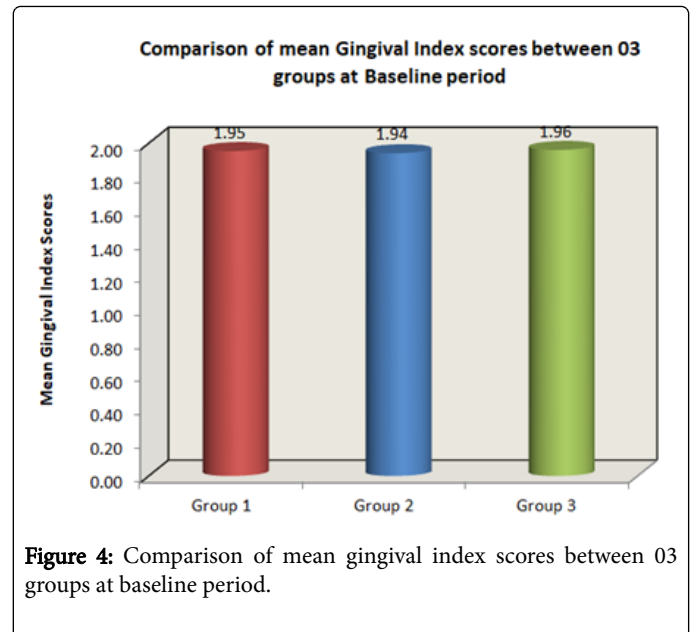


Figure 4: Comparison of mean gingival index scores between 03 groups at baseline period.

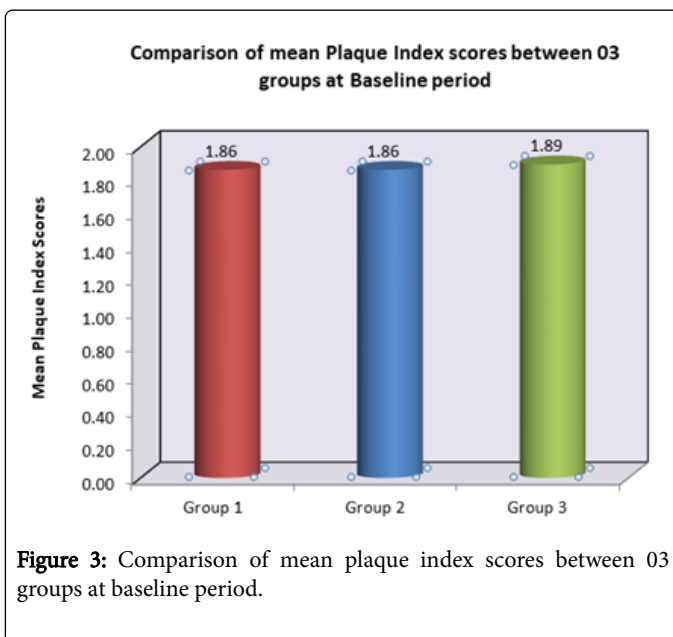


Figure 3: Comparison of mean plaque index scores between 03 groups at baseline period.

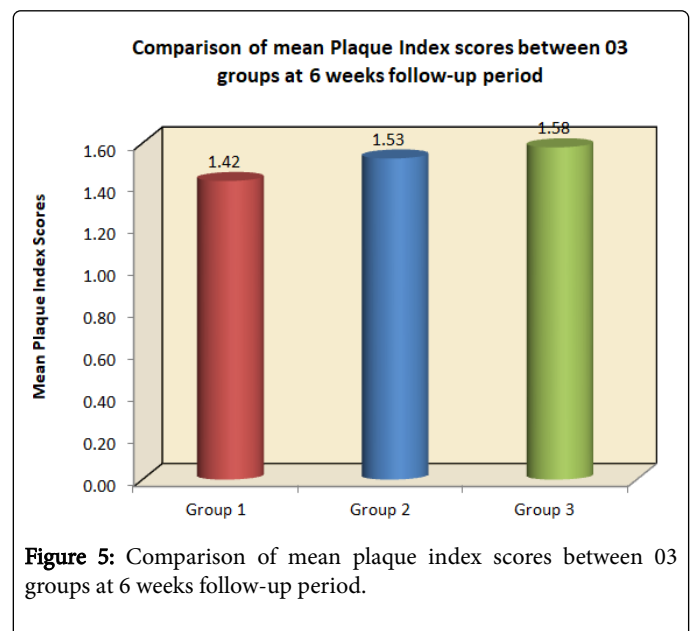
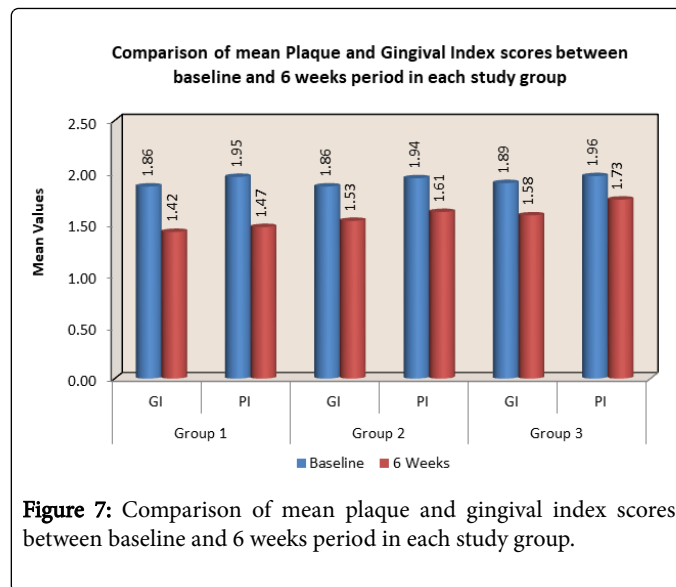
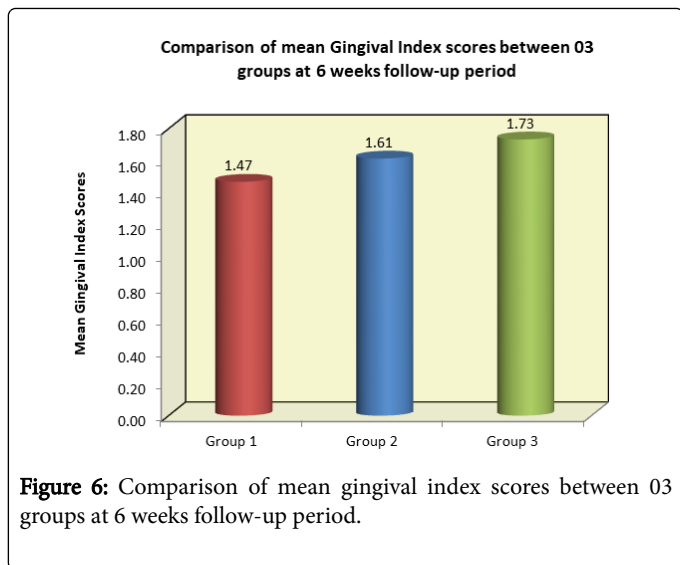


Figure 5: Comparison of mean plaque index scores between 03 groups at 6 weeks follow-up period.



Groups	Parameter	Time	N	Mean	SD	Mean Diff	p-Value
Group 1	GI	Baseline	15	1.86	0.19	0.44	<0.001*
		6 Weeks	15	1.42	0.2		
	PI	Baseline	15	1.95	0.07	0.49	<0.001*
		6 Weeks	15	1.47	0.21		
Group 2	GI	Baseline	15	1.86	0.19	0.33	<0.001*
		6 Weeks	15	1.53	0.14		
	PI	Baseline	15	1.94	0.08	0.33	<0.001*
		6 Weeks	15	1.61	0.16		
Group 3	GI	Baseline	15	1.89	0.17	0.31	<0.001*
		6 Weeks	15	1.58	0.15		
	PI	Baseline	15	1.96	0.07	0.23	<0.001*
		6 Weeks	15	1.73	0.08		

Table 4: Comparison of mean plaque and gingival index scores between baseline and 6 weeks period in each study group using student paired t-Test.

Discussion

Our study demonstrated a reduction of GI and PI in group 1 treated after scaling and root planning and propolis when compared to the other 2 groups treated after scaling and root planning. 5% propolis mouth wash as an adjunct mouth wash after scaling and root planing in the treatment of chronic generalized gingivitis has shown promising results.

As an anti-inflammatory agent, propolis is shown to inhibit synthesis of prostaglandins, activate the thymus gland, aid the immune system by promoting phagocytic activity, stimulate cellular immunity, and augment healing effects on epithelial tissues. Additionally, propolis contains elements, such as iron and zinc that are important for the synthesis of collagen [13].

Propolis contains protein, amino acids, vitamins, minerals, and flavonoids [14-16] for this reason; some people use propolis as a general nutritional supplement, although it would take large amounts of propolis to supply meaningful amounts of these nutrients. Propolis may stimulate the body's immune system, according to preliminary human studies [17-20] and a controlled trial found propolis-containing mouthwash effective in healing surgical wounds in the mouth [21]. In test tube studies, propolis has shown considerable activity against bacteria and yeast associated with gingivitis, and periodontal disease [22,23].

Koo et al. carried a study to evaluate the effect of a mouth rinse containing propolis on 3-day dental plaque accumulation. The experimental mouth rinse reduced the IP concentration in dental

plaque by 61.7% compared to placebo ($p < 0.05$). An experimental mouth rinse containing propolis was thus efficient in reducing supragingival plaque formation and IP formation under conditions of high plaque accumulation [24]. The present study evaluated the effect of propolis mouthwash on plaque accumulation and gingivitis. This was done by comparing the plaque and gingival indices at baseline and 5-day interval, and the mouthwash was compared with both positive and negative controls. Saline showed 156% increase, propolis showed 68%, and chlorhexidine showed a 16% increase in plaque index on the 5th day. Saline showed a 14% increase, propolis showed 7%, and chlorhexidine showed a 9% increase in the gingival index on the 5th day. It appears from the above data that propolis is not better than chlorhexidine in reducing plaque formation, but may be marginally better for reduction of gingival inflammation. This is in accordance with studies by Murray et al, 1997 [25-27] and Koo et al, 1999, which are in accordance with our study.

Mahmoud et al. have conducted a pioneer study on the effect of propolis on dentinal hypersensitivity in vivo. It was concluded that propolis had a positive effect on the control of dentinal hypersensitivity.

Conclusion

Our study demonstrated a reduction of GI and PI in group 1 treated after scaling and root planning and propolis when compared to the other 2 groups treated after scaling and root planning. 5% propolis mouth wash as an adjunct mouth wash after scaling and root planning in the treatment of chronic generalized gingivitis has shown promising results. It is therefore comprehensible that we should now focus on "back to nature approach" where propolis seems to be a promising alternative for the control of oral diseases in terms of antimicrobial properties and lower associated risks.

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