

# Effect of herbal and nonherbal dentifrice on gingival health - A clinical study

B. Vaishnavi Devi, Arvina Rajasekar

Department of Periodontics, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Saveetha Dental College and Hospitals, Chennai, Tamil Nadu, India

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## ABSTRACT

The main causative factor for periodontal diseases is dental plaque. The most effective way to remove plaque is tooth brushing using dentifrice. Recently, due to the side effects of commercially available chemical dentifrices, herbal toothpaste is gaining popularity. This study aimed to evaluate the impact of herbal and nonherbal toothpaste on gingival health. The current study involved 100 outpatients reported to Saveetha Dental College and Hospitals. Each patient received oral prophylaxis and for 3 days, they were told not to use any other oral hygiene products. The subjects were assigned randomly into the test group (Colgate Herbal) and control group (Colgate). Thirty days later, the plaque and gingival indices were recorded and compared with the baseline using an unpaired *t*-test (SPSS software, version 23). The mean plaque index at baseline was  $1.4 \pm 0.6$  (herbal) and  $1.3 \pm 0.7$  (nonherbal), and after 30 days, the scores were  $1.0 \pm 0.5$  and  $0.9 \pm 0.3$ , respectively. The mean gingival index score for herbal and nonherbal dentifrice at baseline was  $1.19 \pm 0.5$  and  $0.9 \pm 0.2$ , and at 30<sup>th</sup> day, it was  $1.1 \pm 0.4$  and  $1.0 \pm 0.4$ , respectively. However, there was no statistically significant difference between the groups. Herbal dentifrices are just as effective as nonherbal dentifrices at reducing plaque and improving gingival health.

**Key words:** Dentifrice, gingivitis, green synthesis, herbal, nonherbal, toothpaste

## INTRODUCTION

Dental plaque and calculus (hardened plaque) are brownish yellow calcified structures with a firm consistency which is composed of microbial biofilm.<sup>[1,2]</sup> The bacteria found on the teeth and gingiva are known as the causative agents of plaque which leads to inflammatory reactions.<sup>[3-5]</sup> If chronic gingivitis is not treated, it can progress to periodontitis,

which results in mobility.<sup>[6,7]</sup> Hence, for maintaining good oral health, it is essential to prevent and eliminate inflammation of the gingiva.<sup>[8]</sup>

Mechanical plaque removal is one of the most popular strategies for reducing plaque accumulation and gingivitis.<sup>[9,10]</sup> Dentifrices along with toothbrushes serve as a tool for the management of plaque formation and the prevention of periodontal diseases.<sup>[11]</sup> Many chemical oral hygiene components in dentifrices are good for the reduction in gingival inflammation and halitosis.<sup>[12-14]</sup> To treat plaque and gingivitis, chemicals such as triclosan and chlorhexidine are added to mouthwashes and dentifrices.<sup>[15,16]</sup>

However, these chemical components have undesirable effects such as teeth discoloration, dysgeusia, ulcerations,

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### Address for correspondence:

Dr. Arvina Rajasekar,  
Department of Periodontics, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Saveetha Dental College and Hospitals, Chennai, Tamil Nadu, India.  
E-mail: arvinar.sdc@saveetha.com

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oral ulcers, perioral dermatitis, and so on. This has led to more attention toward adding natural ingredients in mouthwashes and toothpaste.<sup>[17]</sup> The herbal toothpaste mainly includes medicinal herbs with established uses which helps to control the biofilm-causing plaque.<sup>[18-20]</sup>

Our previous research studies have resulted in high-quality publications.<sup>[21-34]</sup> Only a few research studies have been done to compare the herbal and commercial toothpaste effect on gingival health. In this context, this study was done to assess to what extent herbal and nonherbal dentifrices affect gingival health.

## MATERIALS AND METHODS

### Study setting

The current study involved 100 outpatients (50 men and 50 women) ranging from 20 to 40 years of age who visited Saveetha Dental College and Hospitals, Chennai, Department of Periodontics between December 2020 and March 2021. The Saveetha Institutional Research Board granted its ethical approval (IHEC/SDC/UG-1724/22/PERIO/517), and all the study participants gave their informed consent.

### Criteria

The study included patients with good general well-being and generalized gingivitis with a minimum of 20 teeth present in the oral cavity. The exclusion criteria include the presence of chronic periodontitis, smokers, subjects under drug therapy, pregnant and lactating women, and systemically compromised patients.

### Study design

The study subjects were chosen randomly, and oral prophylaxis was performed. The plaque index and gingival index were recorded. The subjects were assigned into two groups – the test group is herbal group (Colgate Herbal) and the control group is nonherbal group (Colgate). Using the provided toothpaste and brush, each subject was instructed to brush their teeth twice a day for 2 min using a modified Bass approach for a total of 30 days.

### Index examination

At day 0, the clinical parameters were measured on all teeth using the plaque index (Loe and Silness) and gingival index (Silness and Loe).

### Statistical analysis

Microsoft Excel was used to compile, tabulate, and analyze the study's data and import it to the Statistical Package for the Social Sciences software, version 23 (IBM corp., NY, USA) for the statistical tests. The student unpaired *t*-test was used to evaluate group differences. Statistical significance was set up at  $P \leq 0.05$ .

## RESULTS

A total of 100 gingivitis patients were enrolled in the present study. Plaque index and gingival index scores at baseline (day 0) and at day 30 were compared using an unpaired *t*-test.

At baseline, the mean plaque index score for herbal and nonherbal groups was  $1.4 \pm 0.6$  and  $1.3 \pm 0.7$ , respectively. By 30<sup>th</sup> day, the plaque index score of the test group (herbal dentifrice) was  $1.0 \pm 0.5$ , and for the control group (nonherbal dentifrice), it was  $0.9 \pm 0.3$ . With a  $P = 0.119$ , the difference between the two groups was statistically insignificant [Table 1 and Figure 1].

In the herbal and nonherbal groups, the baseline mean gingival index was  $1.19 \pm 0.5$  and  $1.1 \pm 0.4$ , respectively. At the end of the 30<sup>th</sup> day, the gingival index score of the test group (herbal dentifrice) was  $0.9 \pm 0.2$ , and for the control group (nonherbal dentifrice), it was  $1.0 \pm 0.4$ . With a  $P = 0.184$ , the difference between the two groups was statistically insignificant [Table 1 and Figure 2]. It was observed that the plaque index and gingival index scores had significantly decreased.

## DISCUSSION

The results of the current study showed that the plaque index has reduced in nonherbal dentifrice. Ledder RG *et al.* compared a herbal mouthwash against a positive control and a placebo, herbal mouthwash showed a greater reduction of plaque over the placebo group but less than a positive control; however, the difference was not significant.<sup>[35]</sup> Researches by Saxer *et al.* and Mullaly *et al.* revealed that when herbal toothpaste was used, there was a considerable decrease in both plaque indexes but no statistical difference.<sup>[36,37]</sup> The study's findings are in agreement with earlier research which showed a reduction in plaque index score by the nonherbal dentifrice.<sup>[38,39]</sup>

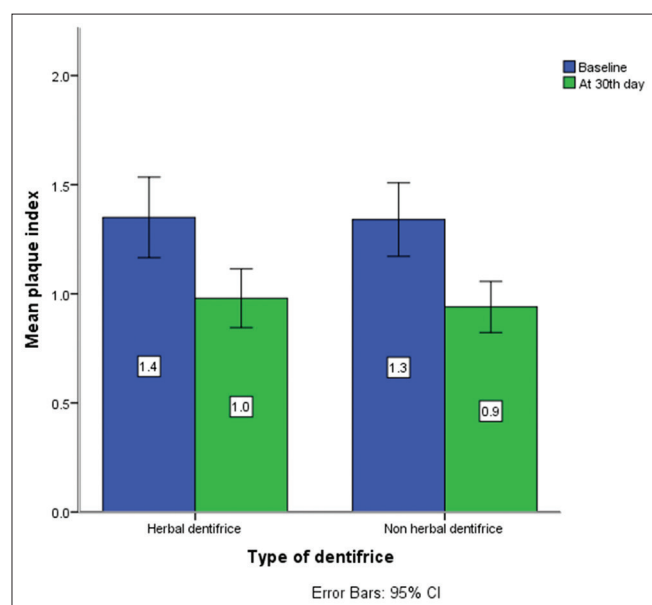
In this study, the mean gingival index has significantly reduced in herbal dentifrice. This finding is also in agreement with few other studies. Saxena *et al.* reported that inhibition zones against periodontal infections including *Prevotella intermedia* and *Porphyromonas gingivalis* were greatest when using herbal toothpaste.<sup>[40]</sup> Therefore, herbal toothpaste can help with the reduction in gingival inflammation.<sup>[41]</sup> While Hegde *et al.* noticed a reduction in gingival inflammation with an herbal dentifrice, a study by George *et al.* indicated herbal products had a lower efficacy on gingival inflammation than conventional ones.<sup>[42,43]</sup>

According to previous studies, herbal toothpaste works well in preventing plaque and gingivitis but has little effect on salivary pH.<sup>[44,45]</sup> This suggests that when compared to nonherbal toothpaste, herbal toothpaste lessens gingival

**Table 1: The comparison of mean plaque index and gingival index scores using unpaired t-test**

	Levene's test for equality of variances		t-test for equality of means						
	F	Significance	t	df	Significance (two-tailed)	Mean difference	SE difference	95% CI of the difference	
								Lower	Upper
Mean gingival index	0.108	0.742	0.447	198	0.655	0.0350	0.0783	0.1895	0.1195
Equal variances assumed			0.447	197.955	0.655	0.0350	0.0783	0.1895	0.1195
Equal variances not assumed									
Mean plaque index	1.017	0.314	0.310	198	0.757	0.0250	0.0808	0.1343	0.1843
Equal variances assumed			0.310	196.580	0.757	0.0250	0.0808	0.1343	0.1843
Equal variances not assumed									

SE: Standard error, CI: Confidence interval



**Figure 1:** Comparison of the differences in plaque index scores between herbal and non-herbal toothpaste. Both groups experienced a similar decline in plaque index score. There was no statistically significant difference between the groups with  $P > 0.05$  (unpaired *t*-test)

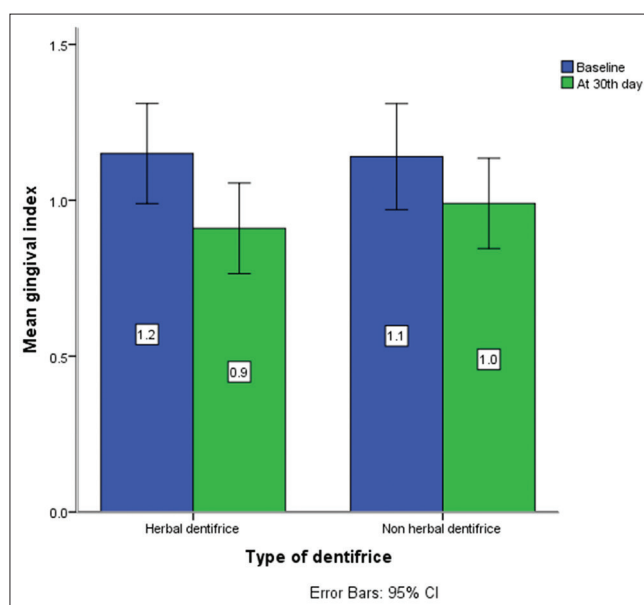
inflammation and gum bleeding. There were no adverse effects noticed on the oral tissues after the usage of the dentifrices. As a result of the study's small sample size, a clinical trial on a large age range may be necessary to prove that herbal dentifrice reduces plaque and gingivitis.

## CONCLUSION

According to the current study, herbal dentifrice is better as commercial dentifrice at reducing plaque and maintaining gingival health. Herbal dentifrices seem to be a possible alternative to conventional dentifrices in the management of gingival diseases.

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**Figure 2:** Comparison of the differences in gingival index scores between herbal and nonherbal toothpaste. Both groups showed similar decline in gingival index score. It was reported that there was no statistically significant difference between the two groups with  $P > 0.05$  (unpaired *t*-test)

- Saveetha University.

### Conflicts of interest

There are no conflicts of interest.

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