



## Comparing the Effect of Different Mouthrinses on *de novo* Plaque Formation

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### ABSTRACT

**Purpose:** Several antiplaque agents are being available in the market in spite of vast development of modern medical science, satisfactory treatment of 'oral diseases' by newer drugs is not fully achieved, rather the chemical compounds has exposed the patients to it is different ill effects, therefore, there is interest to find out effective remedy of any disease by harmless herbal drugs thus the aim of this study was to compare plaque formation at 24 hours after the use of Triphala, Hi ora, Chlorhexidine and colgate plax mouth washes.

**Methods:** A controlled, randomized, double-blind, crossover clinical trial was designed. Thirty subjects underwent four consecutive experimental phases with four treatments: Triphala, Hi Ora, Chlorhexidine and colgate plax. On the day of study, the subjects discontinued all other oral hygiene habits and were randomly assigned for treatment with the experimental mouthwash. Each experimental phase was preceded by a 28-day washout period. Plaque formation was recorded after one undisturbed day.

**Results:** Triphala, Hi Ora and Chlorhexidine reduced *de novo* plaque formation to a greater extent than the colgate plax mouthwash ( $p < 0.05$ ).

**Conclusion:** Triphala and Hi Ora presents an anti-plaque efficacy similar to that of chlorhexidine, and was more effective at inhibiting plaque formation than the colgate plax mouth wash.

**Keywords:** Chlorhexidine, Triphala, Plaque index, Hi ora, Plaque inhibition.

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### INTRODUCTION

Ayurveda aims at ensuring a healthy mind and healthy body by not only providing cure of illness, but also elaborating the method for maintenance of health, Ayurveda attempts to correct the imbalances and derangements of bodily

humors and to restore equilibrium conditions by the application of all spiritual and material resources available to man. In spite of vast development of modern medical science, satisfactory treatment of 'oral diseases' by newer drugs is not fully achieved, rather the chemical compounds has exposed the patients to its different ill effects, therefore, there is interest to find out effective remedy of any disease by harmless herbal drugs. This study is an attempt in that regard.<sup>1</sup>

The primary way of prevention of oral diseases is plaque control and prevention of plaque accumulation on tooth and gingival surface. In fact mechanical plaque removal is the most effective way of preventing caries, gingivitis, periodontitis and microbial systemic diseases. Mouthwashes are used to complete the process of mechanical plaque removal.<sup>2</sup>

Several antiplaque agents are being available in the market. However, due to several undesirable side effects associated with these agents stimulated the search for alternate agents.<sup>3</sup> In recent years, there has been focus on plants or plant products used in folk dental practice or presumed in Unani, homeopathic or Ayurvedic remedies. Natural compounds contained in the herbal cocktail can act in a synergetic manner within the human body and can provide unique therapeutic properties with minimum or no undesirable side effects.<sup>4</sup>

### METHODS

#### Study Population

A total of 30 subjects were invited to participate voluntarily in the project. All subjects received oral and written instructions and information about the products, objectives, reasons, duration and possible risks of the study procedures, and signed an informed consent form. The inclusion criteria were adult patients, older than 18 years old, systemically

healthy and having at least 20 teeth. The exclusion criteria were patients with cavitated caries, periodontal pockets larger than 1.5 mm, orthodontic appliances or removable prostheses, allergies to erythrosine or Chlorhexidine, use of antibiotics in the past 3 months and use of other drugs that might alter normal gingival health.

### Study Design and Clinical Procedures

The study was a double-blind, randomized, crossover clinical trial. At the baseline, the volunteers brushed their teeth using toothpaste without any active ingredient for 2 minutes. Microbial plaque on the dental surfaces was stained with erythrosine solution, and oral prophylaxis using a rubber cup without polishing paste was performed to ensure that the teeth were free of plaque, stains and calculus.

The antimicrobial products tested are described in Table 1. Each subject received a single number and was randomly assigned to the experimental groups. During the four 1-day trials, with a 4-week interval between trials, the volunteers rinsed their mouths according to the assigned random sequence of treatments: Triphala, chlorhexidine, HiOra and colgate plax.

**Table 1:** Technical description of the mouthrinses evaluated

Mouthrinses	Delivery protocol
Triphala	15 ml per 3 mins for once
Chlorhexidine	15 ml per 3 mins for once
Colgate plax	30 ml per 3 mins for once
HiOra mouthwash	15 ml per 3 mins for once

Each subject received oral and written instructions on the use of mouthrinses and was not allowed to eat or drink anything for 30 minutes following the application of the mouthrinses. A fact sheet was made available for recording of dental hypersensitivity, gingival irritation or any other comments regarding the use of mouthrinses.

Oral hygiene was suspended for 24 hours, and accumulated plaque was revealed with erythrosine. All measurements were conducted under the same conditions by a qualified, experienced examiner who had participated in similar study.

Studied using the plaque index (PI) of Quigley and Hein, modified by Turesky et al. After each trial period, the usual oral hygiene habits were resumed.

### STATISTICAL ANALYSES

The PI data from the treatment groups were analyzed using the Wilcoxon test for nonparametric data. Intertreatment data were analyzed using paired Student t-tests and analysis of variance at the 0.05 significance level and 95% confidence interval.

### RESULTS

Table 2 shows the PI values for each type of mouthrinses used in this study. Comparison between the triphala, chlorhexidine and HiOra showed no significant differences (PI = 0.66, 0.58 and 0.62;  $p > 0.05$ ), but the performance of these treatments was different from that of the colgate plax mouthrinse ( $p = 0.02$  and  $p = 0.015$ , respectively). The highest PI was recorded for colgate plax mouthrinse (PI = 1.06).

**Table 2:** Plaque index (mean and standard deviation) after 24 hours according to the mouthrinses tested

Mouthrinses	Mean PI	Standard deviation
Triphala	0.66	0.16
Chlorhexidine	0.58	0.14
Colgate plax	1.06	0.26
HiOra mouthwash	0.62	0.15

Table 3 shows the mean PI values for the different mouthrinses used. Significant differences ( $p < 0.05$ ) were found between colgate plax mouthrinse and triphala, chlorhexidine, HiOra.

**Table 3:** Application of paired-samples t-test to index plaque

	Triphala	Chlorhexidine	Colgate plax	HiOra
Triphala	–	$p = 0.77$	$p = 0.015$	$p = 0.91$
Chlorhexidine	$p = 0.77$	–	$p = 0.018$	$p = 0.87$
Colgate plax	$p = 0.015$	$p = 0.018$	–	$p = 0.038$
HiOra	$p = 0.91$	$p = 0.87$	$p = 0.038$	–

The mouthrinses triphala, chlorhexidine, HiOra were equally effective in inhibiting plaque regrowth; the lowest efficacy was recorded for the colgate plax. No dental hypersensitivity, gingival irritation or other comments regarding the use of mouthrinses were reported during the study.

### DISCUSSION

Human dental plaque was one of the ecosystems in which maximum number of microorganism were first observed. Dental plaque refers to the aggregates of bacterial cell embedded in a polysaccharide and protein matrix which adheres to the teeth.<sup>4</sup>

Several antiplaque agents are being available in the market. However, with the rise in bacterial resistance to antibiotics, there is considerable interest in the development of other classes of antimicrobials for the control of infection.<sup>5</sup> Current advancement in drug discovery technology and search for novel chemical diversity have intensified the efforts of exploring products from Ayurveda the traditional system of medicine in India. The history of knowledge about dantamulagata rogas in ayurveda is traced back to the period of sushruta, regarding these diseases we

may consider eight dantamulagata roga.<sup>6</sup> Natural herbs like triphala, tulsi patra, jeshthamadh, neem, cloveoil, ajwain and many more used either alone or combination have been scientifically proven to be safe and effective medicine against various oral health problems like bleeding gums, halitosis, mouth ulcers and decay. The major strength of these natural herbs is that their use has not been reported with any side effect till date.<sup>7</sup>

This clinical study aimed to compare the inhibition of plaque formation by a triphala, HiOra, chlorhexidine and colgate plax mouthwash. The experimental protocol consisting of no oral hygiene for 1 day has been used previously,<sup>8,9</sup> because plaque formation can be measured in a short period without causing detectable harm to the study subjects. Additionally, this technique is a useful and fast method for screening potential plaque inhibitory agents and experimental formulations. However, long-term studies on the use of these mouthrinses should also be performed.

Chlorhexidine mouthwash has been compared with different herbal mouthwashes for their antiplaque and antibiotic properties.<sup>10,11</sup> The result in this study indicates that the herbal mouth washes that is triphala and HiOra have similar efficacy in relation to chlorhexidine in preventing the plaque formation as shown in Table 2.

Triphala is among the most common formulas used in traditional ayurvedic medicine. Triphala is mentioned throughout the ancient literature of Ayurvedic medicine as a tonic, highly prized for its ability to regulate the process of digestion and elimination.<sup>12</sup> It is being used since ancient times to treat diseases. Triphala can be used for dental diseases as mentioned in sushruta samhita. Triphala, because of its haritaki fruit, amalaki fruit and vibhitaki fruit components, has wide antimicrobial and antifungal activity.<sup>13</sup>

HiOra contain herbs which acts on tooth and have protective antimicrobial activities. It contains oil of syzygium aromaticum, cinnamomum zeylanicum and extract of spinacia oleracea, triphala, trikatu and powders of yashada bhasma and surya kshara.

Syzygium aromaticum is antifungal, antiviral, analgesic/ anesthetic, antiseptic, anticoagulant and antioxidant. The antimicrobial activity is showed by volatile oil of clove.<sup>14</sup>

Cinnamomum zeylanicum is antibacterial, antiseptic. *In vitro* it showed antibacterial and antioxidant property.<sup>15</sup> It also exhibited strong anti-inflammatory effect.<sup>16</sup>

Extract of spinacia oleracea, is proved for its antioxidant property. It exhibited strong antimicrobial activity, used effectively in periodontitis and any other oral infections externally and internally.<sup>17</sup>

Triphala is a compound form of three herbs like fruits of emblica officinalis terminalia bellerica and terminalia chebula. It showed wound-healing property when applied on wounds externally.<sup>18</sup> It showed complete wound healing and incorporated collagen sponge even in fully infected dermal wounds.<sup>19</sup> So can be used safely in mouth ulcers. Triphala is analgesic, anti-inflammatory can use for better maintenance of oral hygiene.<sup>20</sup> Trikatu, the preparation containing the fruits of black pepper (*piper nigrum*), long pepper, pepper longum and the rhizomes of ginger (*zingiber officinalis*) in equal proportion is termed as Trikatu. It is widely used drug for many ailments. It is having healing property. All the ingredient, i.e zinger, long pepper, black pepper show antibacterial anti-inflammatory and healing properties.<sup>21</sup>

Yashada bhasma contains processed zinc. It has known to have antiseptic and astringent properties.<sup>22</sup>

All these in combination exhibit synergetic effect which helps to maintain the oral health.

Our study results should be interpreted in the light of certain limitations that includes a small sample size and follow-up is not widely spaced and extensive. The result could be better relied upon, if optimum sample size could have introduced and follow-up of the subjects could have been done at 15 days, 1- and 2-month intervals.

Nonetheless, it has substantial future implications that these ayurvedic mouthwashes can be promoted by dentist as they have equal plaque reduction efficacy as compared to chlorhexidine with lesser or no side effects.

## CONCLUSION

This study was conducted for comparing the effectiveness of the plaque inhibitory properties of alternative herbal medicine with chlorhexidine which is considered as gold standard.

This preliminary study proofs that triphala and HiOra mouthwashes are as effective as chlorhexidine in plaque inhibition. So these ayurvedic preparations can be used in regular dental practice for prevention of plaque formation. Further, long-term clinical studies are recommended to the scientific community for making ayurvedic products as part of regular dental practice.

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