

Evaluation of antioxidant-essential toothpaste as a treatment for gingivitis in orthodontic patients

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ABSTRACT

Introduction: Gingivitis is an immuno-inflammatory process resulting from the interaction of a bacterial attack and host inflammatory response. Saliva is the natural antioxidant with uric acid, albumin, ascorbic acid, glutathione, and other enzymes. For the defense mechanism against the oral pathogens, the release of chemicals brings about inflammation to the delicate gingival tissues. Hence, effective and homemade remedies can be put forward to reduce gingivitis in orthodontic patients. The aim of the study is to evaluate the treatment effect of antioxidant-essential toothpaste on orthodontic patients with generalized chronic gingivitis and to imply this anti-oxidant essential toothpaste for the betterment of orthodontic patient's oral health. **Materials and Methods:** A clinical trial is conducted among 42 orthodontic patients with generalized chronic gingivitis undergoing orthodontic treatment in Saveetha Dental College. Each patient is examined for gingivitis using the gingival index, probing depth, bleeding on probing, and oral hygiene index (OHI) at the first visit after getting approval of the Institutional Ethics Committee. Subjects who opted for treatment were informed of voluntary nature of trial, and written consent was obtained. Later the demonstration of the modified Brass brushing technique using complete care herbal toothpaste is advised. Again, the patients were assessed for gingival status through the same index used and compared in the second visit after 3 weeks. **Inclusion Criteria:** Patients between the age group of 14 and 30 years who undergo orthodontic treatment in the Saveetha Dental College were selected for this study. The patient should have started his/her treatment at least 4–5 months before. **Exclusion Criteria:** Patients with any systemic disease, congenital deformity, pregnant women, and patients who were already using complete care herbal toothpaste were excluded in the study. **Statistical Analysis:** SPSS version 20 was used to analyze the data, using $P = 0.05$ significance level. Mean and standard deviation was utilized as descriptive statistics because the data were normally distributed. Chi-square test has been used to compare the groups. **Results:** The pre-treatment and post-treatment gingival index and pre-treatment and post-treatment OHI index have been calculated for patients undergoing orthodontic treatment at Saveetha Dental College, with the period difference of 3 weeks. The gingival index score $P = 0.33$ and for OHI index score is 0.25. The post-gingival index score and the post-OHI index score seem to be little higher than the pre-treatment gingival index score and the pre-OHI index score, respectively, but both were not statistically significant. **Conclusion:** However, the study is not favorable the herbal method of treatment will be beneficial with no adverse effects. People practice herbal remedies for relief from simple diseases and get beneficial from it. It is believed that the ancient practice of herbal method still proceeds in the modern pharmacology.

KEY WORDS: Antioxidant, Gingivitis, Orthodontic patients, Toothpaste

INTRODUCTION

Nowadays, the need for orthodontic treatment has been drastically increased due to more awareness spread among the common people. However, orthodontic appliances involve either a combination of acrylic base and wires or wires and bands; it is been

universally accepted that patients undergo gingival changes during orthodontic treatment. A number of authors have reported the pathological changes of the gingiva following the use of the orthodontic appliances, but only a few investigations are related to the extent, frequency, and severity of gingiva alterations.^[1] Gingivitis is associated with poor oral hygiene, and increased mechanical plaque retention associated with fixed orthodontic appliances is one of the major reasons for higher rates of gingivitis among orthodontic patients.^[2,3]

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There are three major stages in plaque formation, with the microbial aggregation increasing in complexity over time. The first stage is the pellicle formation or acquired saliva pellicle which is a thin, bacteria-free, and pellicle that protects the surface of the tooth by regulating the mineral ions exchanged between the tooth and saliva. It is formed rapidly after tooth cleaning by selective absorption of glycoprotein's from saliva. The second stage is the initial colonization, which occurs within minutes to hours after the pellicle is deposited and it refers to the stage where the pellicle is populated with bacteria. These bacteria are predominantly Gram-positive facultative (*Streptococcus sanguinis*, *Streptococcus oralis*, *Streptococcus mitis*, and *Actinomyces viscosus*). Initially, there are a few plaque deposits that increase with time. The last stage is the development of complex flora where the early supra-gingival plaque changes from simple Gram-positive coccal bacteria to a complex flora with Gram-positive and Gram-negative rods and spirochetes.^[4] More recently, oxidative stress and cytotoxic effects of materials in fixed appliances and bonding agents have been implicated as factors causing gingival inflammation.

MATERIALS AND METHODS

A clinical trial is conducted among 42 orthodontic patients with generalized chronic gingivitis undergoing orthodontic treatment in Saveetha Dental College. Each patient is examined for gingivitis using the gingival index, probing depth, bleeding on probing, and oral hygiene index (OHI) at the first visit after getting approval of the Institutional Ethics Committee. Subjects who opted for treatment were informed of voluntary nature of trial, and written consent was obtained. Later the demonstration of the modified Brass brushing technique using complete care herbal toothpaste is advised. Again the patients were assessed for gingival status through the same index used and compared in the second visit after 3 weeks.

Inclusion Criteria

The patients between the age group of 14–30 years who undergo orthodontic treatment in Saveetha Dental College were selected for this study. The patient should have started his/her treatment at least 4–5 months before.

Exclusion Criteria

The patients with any systemic disease, congenital deformity, pregnant women, and patients who were already using complete care herbal toothpaste were excluded from the study.

RESULTS

The gingival index score $P = 0.33$ and for OHI index score is 0.25 [Tables 1 and 2]. The post-gingival index

score and the post-OHI index score seem to be little higher than the pre-treatment gingival index score and the pre-OHI index score, respectively, but both were not statistically significant.

DISCUSSION

OHI Index Score

The post-treatment OHI index scores have no significance compared to the pre-treatment OHI index scores, but a very little difference with decreased

Table 1: Standard deviation of pre-treatment and post-treatment oral hygiene index score

	Pre treatment - OHI score	Post treatment- OHI score
	1.6	1.2
	1.6	1.2
	0.6	0.6
	0	0
	0.6	0.6
	1.2	0.6
	1	0.4
	1.2	0.8
	1.8	0.6
	1.2	0.8
	2.4	1.6
	0.6	0.6
	0.2	0.2
	2	1.2
	1.2	0.6
	1.2	0.6
	1.2	0.8
	0.6	0.6
	0.6	0.4
	2	1.4
	0.8	0.2
	2	1.2
	0.6	0.4
	0.4	0.4
	0.6	0.6
	0	0
	0.6	0.4
	1	0
	1	0.2
	0.6	0.2
Standard deviation	.61685	.41996

Table 2: Standard deviation of the pre- and post-treatment gingival index score

	Pre treatment - Gingival index	Post treatment gingival index
	1.2	1.2
	1.4	1.2
	1.2	0.8
	0.3	0.3
	0.3	0.3
	0.8	0.6
	0.8	0.6
	1.4	1.4
	1.2	1.2
	1.2	1.1
	1.4	1.4
	0.3	0.3
	0.8	0.6
	1.6	1.2
	1.4	1.4
	0.6	0.8
	0.8	0.8
	0.3	0.4
	0.8	0.8
	1.2	1.2
	1.4	0.8
	1.8	1.6
	1.4	0.8
	1.2	0.9
	0.4	0.5
	0.3	0.3
	0.6	0.6
	1	0.9
	1.4	1.2
	1.8	1.2
Standard deviation	.46709	.37911

OHI index scores can be seen. The oral hygiene of the patient may not be drastically increased but might have a positive effect of the antioxidants and the demonstration of the modified brass tooth brushing technique.

Gingival Index Score

The post-treatment gingival index scores have no significance compared to the pre-treatment gingival index scores. A difference of 0.09 of the standard deviation is seen between the scores which do not yield must quality to the gingival tissues.

The oxidative stress, cytotoxicity, and increased plaque retention associated with orthodontic appliances may also account for the smaller effect size in the present study.

The toothpaste is based on herbal ingredients that process strong anti-inflammatory, antioxidant, and antiplaque activity with an adequate balance of all essentials that ensure proper oral hygiene was incorporated in the complete care oral toothpaste by Himalaya. It not only protects the teeth from bacteria but also acts through its unique antioxidant formulation acts on various toxins to help maintain healthy teeth and gums. Complete care herbal toothpaste contains antioxidants with the following herbal ingredients – extracts of *Punica granatum*, *Zanthoxylum armatum*, *Acacia arabica*, *Triphala*, *Embelia ribes*, *Vitex negundo*, *Salvadora persica*, *Acacia farnesiana*, *Acacia catechu*, *Mimusops elengi*, *Trachyspermum ammi*, and *Azadirachta indica*.^[4] The efficacy of the complete care herbal toothpaste can be attributed to the synergistic activity of the potent herbs which have analgesic, antimicrobial property, astringent, and anti-inflammatory property.

- a. *P. granatum*: Topical applications of *P. granatum* (Pomegranate) seemed to be effective towards controlling oral inflammation and microbial counts in periodontal disease.^[5]
- b. *Z. armatum*: Synonym: *Z. armatum* Fruit of *Z. armatum* is used to cure toothache and other diseases of teeth. The plant possesses antioxidant, anti-inflammatory, antimicrobial, and antifungal activities.^[6]
- c. *A. arabica*: *A. arabica* stem bark is considered as an astringent and credited with the antimicrobial activity.^[7]
- d. Triphala (*Terminalia chebula*: *Terminalia bellerica*: *Embelia officinalis*)
- e. Triphala has potent antioxidant and antimicrobial activity and inhibited the growth of *Streptococcus mutans*, Gram-positive cocci, involved in plaque formation when it adsorbed to the tooth surface. The extract of Triphala is an effective agent to treat dental caries and to prevent the formation of dental plaques.^[8]
- f. *E. ribes*: *E. ribes* is reported to possess antioxidant,

anti-inflammatory, and analgesic properties. Embelin, a major constituent of *E. ribes* represents a promising lead compound for designing a new class of analgesic and anti-inflammatory.^[9]

- g. *V. negundo*: *V. negundo* possesses numerous biological activities proved by many experimental studies. Antimicrobial and anti-inflammatory activity of *V. negundo* has been successfully demonstrated through various experimental studies.^[10]
- h. *S. persica*: *S. persica* L. has been reported to have antimicrobial, anti-plaque, analgesic, anti-inflammatory, and astringent activities. It has great medicinal use in the treatment of toothache.^[11]
- i. *A. farnesiana*: Because of its effective astringent and anti-inflammatory properties of *A. farnesiana* bark, it is beneficial in the dental conditions such as swollen gums and dental caries.^[12]
- j. *A. catechu*: *A. catechu* has been credited with the properties such as antibacterial, anti-inflammatory, antioxidant, and astringent, which may be useful in dental conditions.^[13]
- k. *M. elengi*: Studies have shown that *M. elengi* or some part of its phytochemicals possess analgesic, anti-inflammatory, antimicrobial, and antioxidant which is highly beneficial in oral conditions like gingival bleeding.^[14]
- l. *Trachyspermum ammi*: *T. amiss* extracts especially ethanol; n-hexane showed significant antimicrobial potential against all pathogens and reported with the analgesic activity which may be beneficial in the oral conditions such as toothache.^[15]
- m. *A. indica*: Synonym: *Melia Azedarach* Bark extract of *A. indica* has been reported with the antimicrobial property, which may be used in oral care preparations.^[16-20]

Adverse Effects

No adverse effects were noted either in the patient's oral cavity or systemically.

CONCLUSION

However, the study is not favorable; the herbal method of treatment will be beneficial with no adverse effects. People practice herbal remedies for relief from simple diseases and get benefited from it. It is believed that the ancient practice of herbal method still proceeds in the modern pharmacology.

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