

Effect of Pomegranate Green Tea Mouthwash in Orogranulocyte Migratory Rate in Gingivitis Patients

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Gingivitis affects all age groups irrespective of age and sex, as it is one of the most common oral diseases. Mechanical and chemical means are used to attain maintenance of oral health. Both pomegranate and green tea have shown to have anti-inflammatory properties along with antibacterial and other properties. There have been numerous studies done to evaluate the effectiveness of each of these, but the effect of both together has not been seen. Therefore, this study was done to assess the effectiveness of pomegranate and green tea in orogranulocyte migratory rate in gingivitis patients. The aim of the study was to assess the effectiveness of pomegranate and green tea in orogranulocyte migratory rate in gingivitis patients. This study was conducted on 2 groups of patients, where group 1 patients were given chlorhexidine mouthwash and group 2 patients were given pomegranate-green tea mouthwash. Orogranulocyte migratory rate was assessed before and after the use of the respective mouthwashes. The mean orogranulocyte rate difference between pre and post in group 1 (chlorhexidine) is $4.5 \times 10^3 / 30$ seconds ($p = 0.062$) and in group 2 (pomegranate-green tea) was $4.1 \times 10^3 / 30$ seconds, ($p = 0.14$). Especially because of the added advantages provided by such herbal preparations, pomegranate and green tea-based mouthwashes can be considered an alternative to CHX mouthwashes in sustaining oral hygiene.

Keywords: Chlorhexidine; Gingivitis; Gingival Disease; Green Tea; Pomegranate.

Good oral health is necessary to attain general health. The mildest and most common of the oral diseases which can progress to periodontitis if not treated is gingivitis. Chronic periodontitis is an inflammatory disease which affects the supporting structures of the teeth.¹⁻³ Recently, the use of natural products has increased for the prevention and treatment of oral pathological conditions.⁴ Researchers have shown that many of the mouthwashes are very useful in the reduction of microbial plaque.⁵

Orogranulocyte migratory rate is a means to evaluate gingival inflammation. The number of cells migrating into the oral cavity per 30 seconds is defined as the orogranulocyte migratory rate and it is the expression of the rate of inflammatory cell migration through the gingival pocket epithelium.⁶ Pomegranate (*Punica granatum*), has proven to exhibit anti-inflammatory, antibacterial and antimutagenic effects. The constituents which are therapeutically beneficial include ellagic acid, ellagitannins, punicallagins, punic



acid, anthocyanidins, antocyanins, flavonoids, and estrogenic flavones.⁷⁻⁹ The properties of pomegranate components could reduce the risk of gingivitis and promote overall oral health.¹⁰

Green tea (*Camellia sinensis*), which contains various other polyphenol compounds and adequate amounts of catechins has been shown to possess anti-inflammatory, antibacterial, antioxidant, antiviral, antidiabetic, and antimutagenic properties.¹¹ It has been reported by various studies that green tea is efficacious against caries and periodontal diseases.¹²⁻¹⁸

Therefore, in this research, a mouthwash containing pomegranate and green tea was evaluated for its anti-inflammatory effects by evaluating the orogranulocyte migratory rate.

MATERIALS AND METHODS

This study was conducted on 2 groups of patients from both sexes, age ranging from 20 to 45 years. Group 1 (n = 5) included subjects who were given chlorhexidine mouthwash with moderate gingivitis and Group 2 (n = 5) included subjects who were given pomegranate-green tea mouthwash, both the groups included subjects with moderate gingivitis. Patients with systemic disorders, smokers, subjects under antimicrobial therapy and pregnant women were excluded from the study. Each of the patients were evaluated for gingival index.

The subjects were made to rinse their mouths 12 times with a 0.9% saline solution, and the 6th, 9th, and 12th expectorants were analyzed. The subjects were asked to use the respective mouthwashes for about a week. Then, the subjects were asked to rinse with 0.9% saline solution once again to evaluate the difference in orogranulocyte migratory rate.

The total number of polymorphonuclear granulocytes was determined, and the mean number of orogranulocytes contained in the three rinses gave the value of the orogranulocyte migratory rate.

RESULTS

A total of 12 patients were examined, and one clinical evaluation and one leukocyte

determination were made for each of the patients participating in the study.

The statistical test performed was paired t test using SPSS version 20. The mean orogranulocyte rate difference between pre and post in group 1 is 4.5×10^3 ($p = 0.062$) and group 2 was more in group 1 which was 4.1×10^3 , ($p = 0.14$).

DISCUSSION

The difference in the mean leukocyte counts were higher in the control group, but was not statistically significant. The predominant cell type in the oral rinses in both the groups was the polymorphonuclear (PMN) leukocyte.

There is evidence that a direct relationship exists between increasing OMR and increasing clinical gingival inflammation.^{6, 19-24}

Pomegranate has been shown to contain agents, with pharmacological actions that could be considered conducive to good oral health, especially in relation to gingivitis development. The mechanisms involved in this action are reduction of oxidative stress, direct antioxidative activity, anti-inflammatory effects, antibacterial activity, and direct removal of plaque from the teeth.²⁵⁻³⁰ The extract of pomegranate is effective as it inhibits prostaglandin and leukotriene formation through inhibition of the eicosanoids enzymes, cyclooxygenase and lipoxygenase, raises the possibility of use of pomegranate derivatives in anti-inflammatory preparations.³¹

In a meta analysis done by A Mathur *et al* in 2018, included included seven randomized clinical trials with a total of 292 patients and it demonstrated that green tea based mouthwashes as compared to the standard chemical-based CHX mouthwashes were not significantly different in reducing plaque and gingival inflammation. The

Group 1 (OMR, $\times 10^3/30$ seconds)		Group 2 (OMR, $\times 10^3/30$ seconds)	
Baseline	Post	Baseline	Post
2.0	0.14	1.8	0.03
0.5	0.07	3.6	0.03
2.5	0.37	1.3	0.41
0.6	0.21	1.2	0.46
2.5	0.42	1.5	0.06

results of this meta-analysis are consistent with those of a previously conducted study, wherein four studies favored the use of CHX two studies and two favored the use of herbal products, of the 11 studies that were analysed.³²

Balappannavar concluded that when compared to chlorhexidine, green tea showed equal effectiveness on gingiva.³³ Biswas *et al* concluded that use of green tea mouthwash is comparable to CHX mouthwash and is an effective antiplaque agent which can be used.³⁴ Hambire *et al* found that green tea and CHX mouthwash tea had comparable effectiveness on gingiva and oral health and better than sodium fluoride.³⁵ Daily consumption of green tea mouthwash was advocated by Jenabian *et al* to be beneficial in preventing or curing gingival inflammation, especially in the adolescent population, as they are more prone to periodontal inflammation.³⁶

CONCLUSION

Especially because of the added advantages provided by such herbal preparations, pomegranate and green tea-based mouthwashes can be considered an alternative to CHX mouthwashes in sustaining oral hygiene.

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