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## RESEARCH ARTICLE

# EFFICACY OF *PUNICAGRANATUM*: "NATURE'S HERBAL SOLUTION" IN THE TREATMENT OF CHRONIC GINGIVITIS: A CLINICAL STUDY

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**ABSTRACT**

**Introduction:** Periodontal diseases are chronic bacterial infections that lead to gingival inflammation, periodontal tissue destruction, and alveolar bone loss. Gingivitis is one of the most prevalent dental diseases. Scaling and root planning along may not achieve best clinical outcome therefore use of adjuncts like mouthwashes, laser, LDD etc can lead to better results. Pomegranate a medicinal fruit, used as an astringent, hemostatic, antidiabetic, antihelmintic, and for diarrhoea and dysentery too.
**Aim:** This research was aimed at investigating antigingivitis and antiplaque effect of a mouthwash containing pomegranate extract,1 month post scaling, in patients with chronic gingivitis.
**Materials and Methods:** Fifty subjects diagnosed with generalized chronic gingivitis were selected and divided into two groups: A and B, with 25 subjects in each group. Group A subjects underwent single sitting of oral prophylaxis while group B subjects were advised 15ml of Pomegranate mouthwash (undiluted) twice daily for 1 month post scaling. Clinical parameters: gingival index (GI), plaque index (PI) and bleeding on probing (BOP) were recorded at baseline and 1 month post scaling.
**Results:** Use of *Punicagranatum* mouth wash showed significantimprovement in bleeding and gingivitis score in Group B subjects (P value <0.001).
**Conclusion:** *Punicagranatum* mouthwash improves gingival status with its profound styptic action, sufficiently reducing the plaque scores.



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## INTRODUCTION

Periodontal diseases are ubiquitous, affecting all dentate animals. Among various periodontal disease affecting humans, the most prevalent is gingivitis, affecting more than 90% of the population, regardless of age, sex, or race. Gingivitis is a chronic inflammatory process limited to the gingiva without either attachment loss or alveolar boneloss. It is one of the most frequent oral diseases, affecting more than 90% of the population, regardless of age, sex, or race (Salgado, 2006). Plaque is the primary etiological factor in gingival inflammation (Loe, 2012). So, daily and effective supragingival plaque control using tooth brushing and dental floss is necessary to arrest its progression to periodontitis. Although mechanical plaque control methods have the potential to maintain adequate levels of oral hygiene, clinical experience and population-based studies have shown that such methods are not being employed as accurately as they should be by a large number of people.

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In order to overcome the shortcomings of mechanical plaque control methods, various chemotherapeutic agents have been employed and developed to improve the efficacy of daily oral hygiene. Chemotherapeutic agents including systemic antibiotics, antiseptic mouth was hes, local drug delivery of antiseptics and antibiotics, host modulating agents have been used as an adjunct to the conventional periodontaltherapy (Somu, 2012). Herbs are nature's gift to humans, having bioactive components which possess enormous medicinal value with least side effects (Sangeetha, 2011). Synthetic antimicrobial agents and antibiotics are known to cause antimicrobial resistance, emergence of previously uncommon infections probably due to the inappropriate or widespread overuse of antimicrobials. Natural phytochemicals have proven to be good alternatives to such synthetic agents (Abdollahzdeh, 2011). Natural products like *Curcuma zedoaria*, calendula, aloevera and other herbs have been used effectively to treat oral diseases in the past (Somu, 2012). Among these, one of the recent herbal products is *Punicagranatum, which belongs to family Punicaceae, mostly known as* "pomegranate." It is a shrub native from Asia where several of its parts have been used as an astringent, haemostatic, and for diabetes control (Menezes, 2006). The genus name, *Punica,* was the Roman

name for Carthage, where the best pomegranates were known to grow. Pomegranate juice contains an thocyanins, glucose, ascorbic acid, ellagic acid, gallic acid, caffeic acid, catechin, epigallocatechin, quercetin, rut in, iron and amino acids possessing anti-atherosclerotic, antihypertensive, antiaging and potent antioxid ative properties. Seed oil is composed mainly of punicic acid and sterols having nephro protective properties. The pericarp (peel, rind) contains punicalagins, flavones, flavonones, and other flavanols possessing anti-inflammatory, antimutagenic and antifungal activity. Tannins includingpunical in and punicafolin, and flavones glycosides like luteol in and apigenin, form the major constituents of pomegranateleaves (Bhandari, 2012). The leaves are said to have excellent antioxidantproperties (Viuda-Martos, 2010). The most beneficial components of pomegranate are ellagitannins, punicic acid, flavonoids, anthocyanidins, anthocyanins and estrogenicflavones (Bhandari, 2012).


**Table/Fig. 1. Major functional and medicinal effects of pomegranate**

The aim of the present research was to investigate antigingivitis and antiplaque effect of a mouthwash containing pomegranate extract, one month post scaling, in patients with generalised chronic gingivitis.

## MATERIALS AND METHODS

This study was conducted in Subharti Dental college and hospitalfrom the Out Patient Department of Periodontology, on50 voluntary patients from both sexes, age ranging from 18 to 45 years, diagnosed with gingivitis. Patients with systemic disorders, subjects under antimicrobial therapy, smokers, and pregnant women were excluded from the study. Individuals were given the same type of toothbrush and toothpaste with standardized brushing technique instructions. After thorough scaling and polishing, the subjects were randomly distributed into the following 2 groups with 25 patients in each:

In group A (n = 25): Patients were treated by scaling. Patientsoral hygiene instructions were given and recalled after 1month.

Group B (n= 25): Patients were treated by scaling & instructed to use 15 ml of *Punicagranatum* mouthwash undiluted twice daily for 1 month.

Participants were informed about the objectives of the study and written consent taken.

Data was collected at baseline and 1 month post scaling utilizing the indices, i.e,

- Plaque index (PI-s) (Macgregor, 1987).
- Gingival index (GI-s) (Loe, 1963)
- Bleeding on probing (BOP) (Ainamo, 2002)

### Statistical Analysis

Student *t* test was used for inter and intra-group comparison. Pvalue was adjusted at <0.001.

## RESULTS

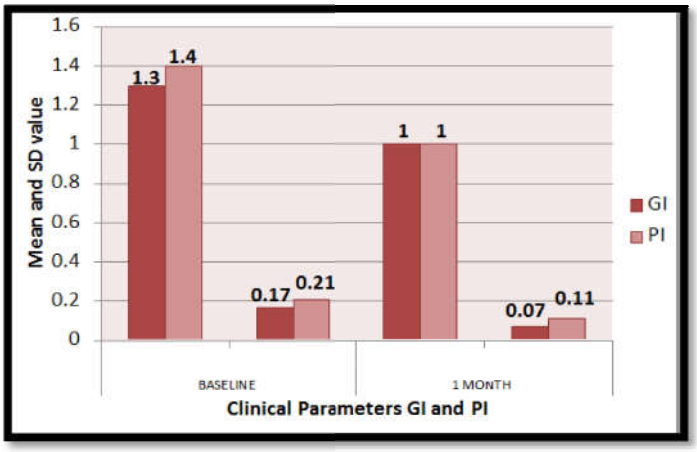
A total of 50 participants (25 females and 25 males) participated in the study between the age 18-45 years.

Intra group comparison of clinical parameters at baseline & 1 month post scaling (Group A)
On analyzing the GI, PI, BOP, it was seen that the Intra group comparison of group-A subjects led to significant reduction in (GI), (PI), (BOP).(P<0.001)

Mean decrease in gingival score for Intra group A was from1.3 ± 0.17 at baseline to 1.0 ± 0.07 post 1 month respectively. Mean decrease in plaque score for scaling group A decreased from 1.4 ±0.21 at baseline to 1.0 ± 0.11 post scaling 1 month respectively.BOP % was 57.4% ± 13.10 % at baseline which reduced to 36.9%± 8.18 % post 1 month respectively.( P <0.001). Significantly less reduction was seen in Intra group A. (Table/Fig-2,3,4).

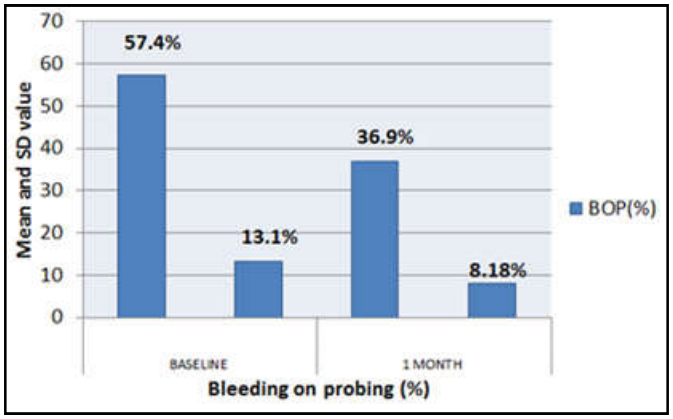
| Parameters | BASELINE | | 1 MONTH | | P-VALUE |
|---|---|---|---|---|---|
| | MEAN n=25 | SD (σ) | MEAN n=25 | SD(σ) | |
| GINGIVAL INDEX | 1.3 | 0.17 | 1.0 | 0.07 | <0.001 |
| PLAQUE INDEX | 1.4 | 0.21 | 1.0 | 0.11 | <0.001 |
| BOP(%) | 57.4 | 13.10 | 36.9 | 8.18 | <0.001 |

**Table/Fig. 2. Intragroup comparison of clinical parameters at Baseline & 1month post scaling (Group A)**




**Table/Fig. 3. Intragroup comparison of clinical parameters at baseline & 1 month post-scaling (Group A)**

[Table/Fig-3] Graph shows significant differences in mean and SD values of the clinical parameters- GI & PI, at baseline and 1 month.




**Table/Fig. 4. Intragroup comparison of clinical parameter BOP% at baseline &1 month post-scaling (Group A)**

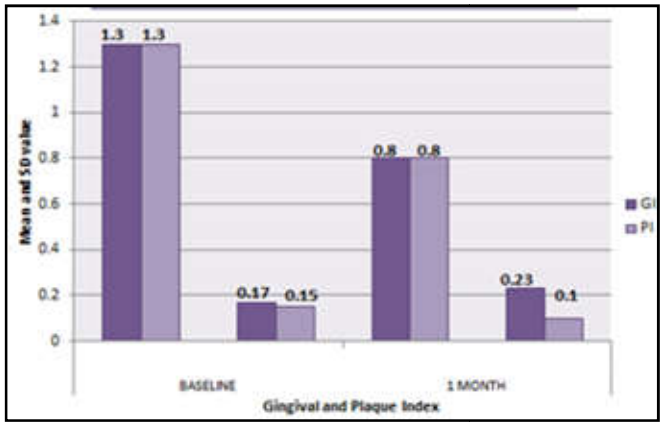
[Table/Fig-4]: Graph shows significant differences in mean and SD values of the clinical parameter, %OF BOP decrease from 57.4% ± 13.10 % to 36.9% ± 8.18 % post 1 month of scaling.

### Intragroup comparison of clinical parameters at baseline & 1 month post scaling in GroupB Punicagranatum

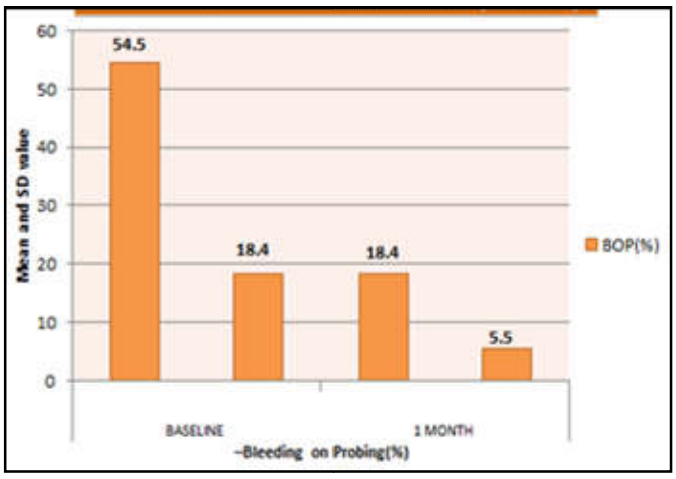
Significant reduction, with respect to GI, PI, BOP scores were seen in Group B.1.3 ± 0.17 at baseline to 0.8 ± 0.23 after 1 month respectively. Mean decrease in plaque score was from1.3 ±0.15 at baseline to 0.8 ± 0.10 after 1 month respectively. (P<0.001) [Table/Fig-5,6]. Significant reduction was seen in BOP % from 54.5%±18.40 %at baseline to 18.4% ± 5.50% post 1 month.(P<0.001) respectively. [Table/Fig-5,7].

| INDEX | BASELINE | | 1 MONTH | | P-VALUE |
|---|---|---|---|---|---|
| | MEAN n=25 | SD(σ) | MEAN n=25 | SD(σ) | |
| GINGIVAL INDEX | 1.3 | 0.17 | 0.8 | 0.23 | <0.001 |
| PLAQUE INDEX | 1.3 | 0.15 | 0.8 | 0.10 | <0.001 |
| BOP(%) | 54.5 | 18.40 | 18.4 | 5.50 | <0.001 |

**Table/Fig. 5. Intragroup comparison of clinical parameters at baseline & 1 month (Group B)**




**Table/Fig. 6. Intragroup comparison of clinical parameters at baseline & 1 month post-scaling (Group B)**




**Table/Fig. 7. Intragroup comparison of clinical parameter BOP% at baseline &1 month post scaling (group B)**

Pomigranate being a styptic, leads to significant reduction in BOP as compared with scaling patients alone, proving to be more effective anti-gingivitis agent as compared to group A subjects.

### Inter group comparison of clinical parameters at baseline & 1 month post scaling

### Gingival Index

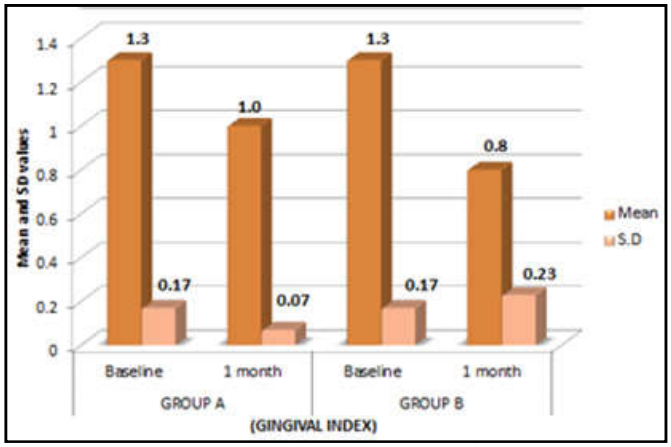
On analyzing the gingival index it was seen that both the groups led to significant reduction in gingival scores(*P*<0.001). Mean decrease in group A was from1.3 ± 0.17 at baseline to 1.0 ± 0.07 after 1 month. Significantreductionwas seen in punica granatum group B,from i.e from1.3 ± 0.17 at baseline to 0.8 ± 0.23 after 1 month respectively.*(P*<0.001).Hence, (group B) pomegranate mouthwash was a more effective antigingivitis agent as compared with group A. Intergroup comparision *(P*<0.001). [Table/Fig-8,9].

### Plaque Index

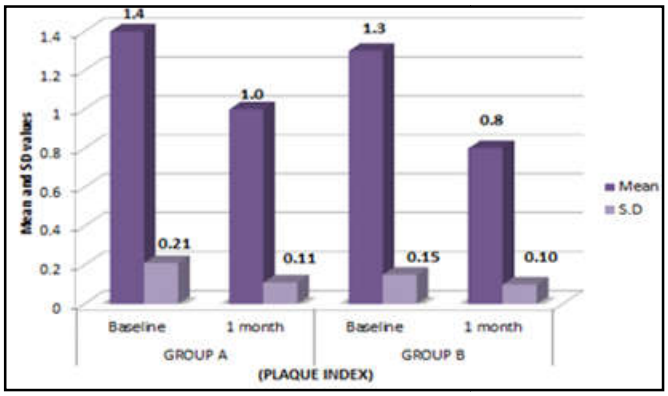
Comparison of Plaque index between Group A & Group B revealed that significantly morereduction in plaque score was seen in punica granatum group as as compared with scaling group A [P<0.001; Table /Fig 8,10]. Mean ± SD for Group A has decreased from1.4 ± 0.21at baseline to1.0 ± 0.11 after 1 month, and respectively(P<0.001). Significantly greater reductionwas seen in punica granatum group, i.e., from 1.3 ± 0.15 at baseline to 0.8 ± 0.10 after 1 month respectively, (P<0.001).

**Table/Fig. 8. Intergroup comparison of clinical parameters between Group A & B at baseline & 1 month (post scaling)**

| Variables | GROUP A n=25 | | GROUP B n=25 | | P value |
|---|---|---|---|---|---|
| | Baseline mean ± SD | 1 month mean ± SD | Baseline mean ± SD | 1 month mean ± SD | |
| GINGIVAL INDEX | 1.3 ± 0.17 | 1.0 ± 0.07 | 1.3 ± 0.17 | 0.8 ± 0.23 | <0.001 |
| PLAQUE INDEX | 1.4 ± 0.21 | 1.0 ± 0.11 | 1.3 ± 0.15 | 0.8 ± 0.10 | <0.001 |
| BLEEDING ON PROBING(%) | 57.4 ± 13.10 | 36.9 ± 8.18 | 54.5 ± 18.40 | 18.4 ± 5.50 | <0.001 |



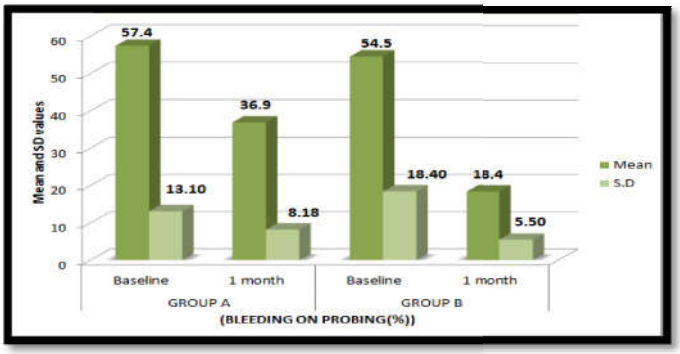

**Table/Fig. 9. Intergroup comparison of clinical parameter GI, at baseline &1 month(post scaling)**




**Table/Fig. 10. Intergroup comparison of clinical parameter PI, at baseline & 1 month (post scaling)**

### BOP

Analysis of BOP revealed mean decrease in scaling group A from 57.4% ± 13.10 % at baseline to 36.9% ± 8.18 % after 1 month, respectively ($P$<0.001). Greater reduction in bleeding scores was seen in punicagranatumgroup B, i.e., from 54.5% - 18.40% at baseline to 18.4%- 5.50% after 1 month, respectively (P<0.001). Pomegranate, being a profound styptic, leads to significant reduction in bleeding on probing as compared with scaling patient [Table/Fig. 8,11].




**Table/Fig.11. Intergroup comparison of clinical parameter BOP%, at Baseline &1month (post scaling)**

## DISCUSSION

Though around 6000 plants in India are used as herbalmedicines, little research has been conducted on efficacy, safety, and properties of herbal products. Over the decades, very few studies have been conducted to show the clinical efficacy of Punicagranatum. The purpose of this study was to determine the efficacy of Himalaya herbal Punicagranatum mouthwash as adjunct to single sitting scaling ongingival health. Himalaya herbal Punicagranatum mouthwash consist of meswak (*Salvadorapersica)*, neem (Azadirachataindica). Neem shows antiulcer, anti-inflammatory, anti-fungal, antibacterial, anti-viral, anti-carcinogenic, antiarrhythmic, antiviral, antioxidant, antidiabetic activity. In a clinical study, 50 patients with confirmed gingivitis were selected, 40 showed severe bleeding and pustular discharges from the gums. After just three weeks of brushing twice a day with paste neem leaf extracts, eight out of ten patients showed significant improvement. The patients also showed are duction in bacterial populations and elimination of halitosis with no side effects (Biswas, 2002). Benzyl isothiocyanate, a major component of Salvadorapersica, exhibited bactericidal effect against oral pathogens involved inperiodontal disease (Biswas, 2011). It is known to haveanti-bacterial, anti-fungal, anti-plaque and anti-caries activity (Parveen Dahiya, 2012). Al-Lafi and Ababneh reported that the use of miswak inhibits the formation of dental plaquechemically and also exerts antimicrobial effect against manymicroorganisms (Gazi, 1990). The most beneficial components of pomegranate are ellagitannins, punicic acid, flavonoids, anthocyanidins, an thocyanins and estrogenic flavones possessing anti-inflammatory, antimutagenic and antifungal activity. Pomegranate's active components, including polyphenolic flavonoids are believed to preventgingivit is through a number of mechanisms including reduction of oxidative stress in the oral cavity (Reddy, 2010), directantioxidant activity; anti-inflammatory effects (Piramal, 2007), antibacterial activity and directremoval of plaque from the teeth (De Oliveira, 2007). It was demonstrated that pomegranate mouthwash exerted a significant reduction in clinical parameters. Although plaque index values in both the groups were reduced, but pomegranate reduced plaque scores to greater extent as comparedwith group Menezes *et al* (Menezes, 2006), showed that after 1 minute mouth rinsing, more reduction inplaque was observed with *Punicagranatum* (84%) as compared,withchlorhexidine (79%). Few studies (Menezes, 2006 and Haffajee, 2008), revealed that *Punicagranatum* was more efficient in reducing gingival score andbleeding on probing as well due to its strong styptic action. A study by Salgado *et al.* (Salgado, 2006), is in disagreement with the present study where 10% *Punicagranatum*gel does gel was foundinefficient preventingsupragingival dental plaque formation and gingivitis (Salgado, 2006), where gelwas placed into tooth shield in a non-diluted form; it maybe speculated that gel solubilization with saliva would benecessary for its antimicrobial action to take place. In our study, direct interaction of saliva to *Punicagranatum* led to acceptable results. *Punicagranatum* is a recent herbal product used in field of dentistry therefore more clinical and microbiological studies on a long-term basis are required to know the precise effectiveness of this product.

### Conclusion

In the absence of vigilant oral care, plaque and calculus will build up, resulting in gingivitis and possibly progressing to periodontitis. So, various herbal products have been tried and have shown promising results with minimal side effects. Also, their additional effect on inflammatory pathways and antioxidant potential make them eligible to be used as effective antigingivitis agents. Our study concluded that herbal

formulation of *Punicagranatum* a better antigingivitisagent for preventing dental plaque and gingivitis in humans and also as an antimicrobial agent for preventing periodontal diseases. Although chlorhexidine still continues to be the gold standard, pomegranate-containing or herbal mouthwash can be easily substituted for long term use, avoiding the side effects of chlorhexidine. Within the limits of this clinical research, it can be concluded that Punicagranatum mouth wash improves gingival status with its profound styptic action. However further studies are necessitated to prove the efficacy of *Punicagranatum* in inflammatory state.

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