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# Evaluation of Clinical Efficacy of Subgingivally Delivered Propolis in Treatment of Chronic Periodontitis: A Case Control Study

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**Abstract:** ***Background: Periodontal diseases represent a group of microbial induced infections that cause progressive loss of attachment and formation of periodontal pockets. They are routinely treated by meticulous mechanical procedures. Sometimes to completely eliminate the periodontopathic bacteria in deeper pockets, systemically or locally delivered antimicrobials are also required. Thus, the aim of the present study is to evaluate the clinical efficacy of Propolis in treating chronic periodontitis when delivered subgingivally. Materials and Methods: A total of 100 subjects (150 sites) were recruited for the study. The sites were randomly divided into two groups – group I (n=50, sites = 70) and group II (n=50, sites = 80). The sites in group I received SRP alone and the sites in group II received SRP followed by subgingival Propolis. The clinical parameters of Gingival index (GI), plaque index (PI), probing pocket depth (PPD) and clinical attachment level (CAL) were recorded at baseline and 3 months. Results: The results revealed that there is a significant reduction in the PI and GI in both the groups with significantly more reduction seen in group II compared to group I. Also, the PPD and CAL showed significant improvement in both the groups with better results in group II. Conclusion: The results of the present study suggest that the Propolis is effective in treating chronic periodontitis when delivered subgingivally.***

**Keywords:** SRP, Propolis, subgingival delivery, chronic periodontitis

## 1. Introduction

Periodontal diseases represent a group of localized microbial induced infections involving gingiva and supporting tissues of the teeth. It is multifactorial and the role of microorganisms in the etiology and progression of periodontitis is now well documented.[1] Periodontal diseases are routinely treated by mechanical procedures which include meticulous scaling and root planing in conjunction with patient's proper plaque control. Although mechanical therapy may provide long term stability for many patients, but it fails to eliminate the pathogenic bacteria completely and may not always result in complete elimination of the disease.[2]

Scaling and root planing (SRP) is the considered to be the gold standard, but the mechanical debridementalone may not be able to eliminate the putative pathogens from the pockets completely because of the invasion of these organisms within the gingivalt issue or in deeper areas inaccessible to periodontal instrumentations and thus, recurrence of periodontal disease may result.[3]

Putativepathogens associated with periodontal disease are susceptible to a variety of antiseptics and antibiotics. Methods employed to convey antimicrobial agents intoperiodontal pockets include rinsing, irrigation, systemic administration and local application using sustained and controlled delivery devices.[3-4]The use of locally delivered antimicrobials is a relatively new addition in the management of periodontitis. The treatment method is primarily the result of more than 20 years of research pioneered by Goodson.[5-7]

Local delivery of antimicrobial agents into periodontal pocket has been extensively developed and investigated since late 1970's.[8] Methods employed to convey antimicrobial agents into periodontal pockets include rinsing, irrigation, systemic administration and local application using sustained and controlled delivery devices.[9]

Success of a drug delivery system designed to target periodontal infections is governed by its ability to deliver the antimicrobial agents to the base of the pocketat a bacteriostatic or bactericidal concentration.[10] It must also facilitate retention of the medicament long enough to ensure an efficacious results. Since a local drug delivery agent can achieve the above requirements, it is critical to critically assess the ability of such treatment methods to attain or maintain periodontal health.[9]

Many agents have been used clinically as LDD agents like – tetracycline fibres, metronidazole gel, chlorhexidine chip, minocycline gel etc. Propolis, sometimes called bee glue, is a natural resinous substance collected by honey bees (Apis mellifera L.) from plant buds and bark exudates. Propolis is a very complex mixture and its chemical constituents vary according to its source. A broad analysis reveals approximately 55% resinous compounds and balsam, 30% beeswax, 10% ethereal and aromatic oils, and 5% bee pollen.[11]Various studies have shown it to possess antimicrobial property and substantivity when delivered subgingivally.[12]

Thus, the present study was aimed at evaluation of the efficacy of subgingivally delivered Indian propolis extract in the treatment of chronic periodontitis.

## 2. Materials and Methods

The study was a randomized controlled clinical trial conducted at the Department of Periodontology, Rajarajeswari Dental College & Hospital, Bangalore. Ethical clearance was obtained prior to the study. A total of 100 patients were recruited for the study. The patients were explained about the procedure and a written informed consent was obtained from them.

**Group I(control):** - SRP (no. of patients = 50, no. of sites = 70)

**Group II(test):** - SRP followed by subgingival placement of Indian propolis. (No. of patients = 50, no. of sites = 80)

**Inclusion Criteria:**

1. All subjects between 20-60 years of age, willing to participate in the study.
2. The subjects must have atleast 20 teeth in case of chronic periodontitis with probing depth of ≥ 5mm on at least 1 tooth per quadrant.
3. All the patients should be systemically healthy and should not have received periodontal treatment for at least 6 months prior to the clinical examination and sampling.

**Exclusion Criteria**

Patients with systemic diseases, pregnant and lactating women, alcoholics and smokers were excluded from the study.

## 3. Screening Examination Includes

All the participants will be explained about the need and design of the study. Written informed consent for the study will be obtained from each patient. Those who have been selected for the study will undergo a full mouth periodontal probing, charting and will be screened for their suitability for the study. A proforma will be designed for the present study so as to have a systematic and methodical recording of all observations and information. The relevant data will be recorded in the proforma.

**Recording of Clinical Parameters:**

1. Gingival index (GI) (Loe H and Silness - 1963).
2. Plaque index (silness and loe)
3. Probing pocket depth (PPD) measured using graduated Williams periodontal probe from the crest of gingival margin to base of the pocket.
4. Clinical attachment level (CAL) measured from CEJ to base of the pocket.

In every patient, the selected sites will be marked and assigned randomly either to Group 1 or Group 2 by a flip of a coin. On their first visit, all the clinical measurements will be performed at six sites per tooth. After baseline examination sites will be treated with SRP followed by subgingival administration of Propolis. The clinical measurements will be recorded at baseline and 3 months.

**Technique for Drug Delivery**

A plastic filling instrument will be used to carry and place propolis into the test sites, after completion of SRP. The drug will be placed such that it is not exposed to the oral cavity. Normal oral hygiene will be observed. Patient will be advised to avoid proximal cleaning until seven days after treatment of the test sites.

## 4. Results

The age and gender wise distribution of the patients included in the study is listed in table 1.

**Table 1:** Age and gender wise distribution of the study

| Total no. of patients | Gender | No. of patients | No. of sites | P* value |
|---|---|---|---|---|
| 100 | M | 50 | 70 | 0.05 |
| | F | 50 | 80 | |

The data was analysed using student paired t test for intergroup comparison and Wilcoxon signed rank test for intragroup comparison. The clinical parameters of PI, GI, PPD and CAL, recorded from patients in both the groups are shown in table 2 and 3.

The intergroup comparison revealed that there was a significant reduction in the all the parameters from baseline and at 3 months and the difference was higher in the group II (Propolis) when compared with the group I (control) at all intervals. Also the intragroup comparison revealed that there was a significant difference in the value of PI and GI at baseline and 3 months. There was a significant reduction in the PPD from baseline to 3 months and significant increase in the CAL from baseline to 3 months.

**Table 2:** Gingival and plaque indices of patients in test and control groups

| | | Mean value at baseline | Mean value at 3 months | Mean difference between baseline and 3 months |
|---|---|---|---|---|
| Group I | PI | 1.992±0.379 | 1.211±0.130 | 0.781±0.249 |
| | GI | 1.835±0.247 | 1.029±0.203 | 0.806±0.044 |
| Group II | PI | 1.960±0.358 | 0.902±0.176 | 1.058±0.182 |
| | GI | 1.743±0.258 | 0.941±0.142 | 0.802±0.116 |

Significant value (P) set at = 0.05

**Table 3:** Probing pocket depths and clinical attachment level of patients in test and control groups

| | | Mean value at baseline | Mean value at 3 months | Mean difference with standard deviation |
|---|---|---|---|---|
| Group I | PPD | 6.000±0.594 | 4.333±0.479 | 1.667±0.115 |
| | CAL | 7.966±0.754 | 6.433±0.727 | 1.533±0.027 |
| Group II | PPD | 6.400±0.894 | 3.766±0.626 | 2.634±0.268 |
| | CAL | 8.020±0.900 | 6.266±0.868 | 1.754±0.032 |

Significant value (P) set at = 0.05

## 5. Discussion

The bacterial plaque is considered to be principal etiological factor involved in the initiation and progression of periodontitis. These bacterial plaque or biofilms are difficult therapeutic targets as they are not easily disrupted.[13] Essential goal of current periodontal therapy is successful management of the suspected bacterial pathogens to the extent that destruction of the periodontium is arrested. Various non-surgical and surgical methods have been employed since time immemorial for eliminating these pathogenic bacteria.

Scaling and root planing in conjunction with proper plaque control results in alteration of the subgingival environment which is sufficient, in most instances, to improve periodontal health and arrest further loss of attachment.[14]Mechanical debridement with or without surgical manipulations had been the therapy to treat periodontal diseases till the early 1970s. Mechanical therapy may however fail to completely eliminate the pathogenic bacteria because of their location deep within gingival tissues or in other areas inaccessible to periodontal instruments.[15]Repopulation of scaled teeth from bacterial reservoirs in dentinal tubules may also be responsible for recurrence of the disease.[16]

Antimicrobial agents have been administered systemically and locally as an adjunct to SRP for achieving better results in periodontitis patients. However, systemic agents have shown to cause side effects. Thus topically or locally delivered agents were introduced as a part of treatment modality. Recently, advances in local delivery technology have resulted in control release of drugs that are successful in maintaining effective drug concentration at alower dosage in the periodontal pocket.[17]

The present study also aims at evaluating the efficacy of one such local drug delivery agent prepared from Propolis. The effects of Propolis as LDD have been assessed with and without SRP in improving the periodontal health. The results of this study have shown significant reduction in the clinical parameters with both the groups and more so with the group treated with Propolis as LDD.

The sites in group I were treated with SRP alone. The improvement in GI and PI in the group I can be attributed to the mechanical debridement which removes the calculus and altered cementum from the tooth which contribute the most to periodontal disease. The sites in group II were treated with propolis delivered locally in the periodontal pocket sites. The flavonoids present in Propolis are held responsible for its antibacterial activity.[14]The antimicrobial action of Propolis, though not completely understood, seems to be a complex mechanism and may vary according to its composition. This property could have contributed to the improvement in the clinical parameters in this group.

Pocket depth might change from time to time even in untreatedperiodontal disease because of changes in gingival margin, while changes in the level of attachment canbe caused only by gain or loss of attachment and thus provide a better indication of the degree of periodontal destruction. In the present study, a significant increase in CAL was observed at 3 months recall check-up in both the groups but more gain was seen with group II sites.

Koo *et al*. carried a study to evaluate the effect of a mouthrinse containing propolis on 3day dental plaque accumulation. They concluded that Propolis was efficient in reducing supragingival plaque formation and insoluble polysaccharide formation under conditions of high plaque accumulation.[18]

Another study conducted by Sanghani NN in 2014, concluded that subgingival delivery of propolis shows promising results when used as an adjunct to SRP in patients with chronic periodontitis as suggested by clinical and microbiological parameters assessment.[19]

## 6. Conclusion

The results of the present study suggest that Propolis is effective in treating chronic periodontitis when delivered subgingivally. It acts as an adjunct to SRP in treatment of chronic periodontitis.

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