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Original Article

Dentistry Section

Effect of Subgingival Irrigation with Natural Products as an Adjunct to Scaling and Root Planing in the Treatment of Chronic Periodontitis- A Systematic Review

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ABSTRACT

Introduction: Various chemotherapeutic agents such as 'Chlorhexidine' (CHX), 'Metronidazole', 'Povidone-iodine' are used as a subgingival irrigant for management of periodontitis, but they have their own drawbacks. There has been renewed interest in naturally occurring products such as 'Curcumin', 'Honeybee extract' etc., which claim to have the same or even more anti-microbial effect and anti-inflammatory effect without adding any chemicals.

Aim: To systematically review the role of subgingival irrigation of natural products as an adjunct to scaling and root planing in chronic periodontitis based on clinical and microbiological outcomes.

Materials and Methods: A Search was performed on electronic databases, such as PUBMED, Cochrane central register of controlled trials, Google scholar and Science, direct using various search terms such as "Sub gingival irrigation", "Natural products", "Plant products", "Herbal products", "Non-surgical therapy", "Scaling and root planing". Literature search of articles was done from October 2006 to October 2016. No language restrictions were applied during the electronic search to include all the possible clinical trials. The article search was then narrowed down by the reviewer according to the inclusion criteria of the present systematic review to include all the RCTs in English language only and the article involving management of chronic periodontitis by using natural products for subgingival irrigation. Additional search was also carried out in all relevant journals from October 2006 to October 2016.

Results: The literature search resulted in 91 articles out of which 87 articles were excluded based on title, in-vitro studies, chemical plaque control used during the study period, studies in which control group was not present. Finally, four studies which satisfied all the inclusion criteria were included and evaluated. Out of four studies, there was lack of homogeneity among the studies, hence pooling of data was not possible. Three studies showed significant difference in clinical parameters on using natural products as subgingival irrigant.

Conclusion: Based on the results obtained from present systematic review it can be concluded that natural products when used as a subgingival irrigant along with scaling and root planing in management of chronic periodontitis, there is significant reduction in microbial count (found in three studies) and a significant difference in clinical parameters (found in two studies). But further studies evaluating various other natural products and long term randomised control trial are needed to give strong conclusive evidence.

Keywords: Chemotherapeutic agents, Chlorhexidine, Non-surgical periodontal therapy

INTRODUCTION

Chronic periodontitis is a multifactorial disease resulting in inflammation in the supporting tissues of the teeth, leading to progressive attachment and bone loss and is characterised by pocket formation and/or recession of the gingiva [1]. Non-surgical periodontal therapy aims to eradicate subgingival micro flora and deposits on the root surfaces, hence controlling periodontal disease progression and maintaining a healthy subgingival environment [2,3]. Scaling and Root Planing (SRP) is the most common periodontal treatment which has proven clinical effectiveness in terms of reducing inflammation, decreasing the probing pocket depth and improving the Clinical Attachment Level (CAL) [4-6]. SRP is said to have its own drawbacks, which includes accessing furcation, root concavities and deep pockets and challenges in removing microbial pathogens that are penetrated into dentin tubules [7-9].

Antiseptics and antibiotics such as 'Chlorhexidine', 'Metronidazole' etc., are delivered locally as an adjunct to SRP procedures in order to eradicate the subgingival microbes, hence creating a healthy subgingival environment. The results presented in the literature, however, are in conclusive [10].

Various anti-bacterial agents such as chlorhexidine, metronidazole, tetracyclines and povidone iodine have been tried in the recent past years and were proven to be effective as subgingival irrigants in the management of shallow periodontal pockets [11-16].

In recent times, there has been renewed interest in naturally occurring products. There are several natural products and herbs that claim to have better properties and less side effects than chemical irrigants. They claim to have the same or even more anti-microbial effect and anti-inflammatory effect without adding any chemicals. But there is no adequate scientific evidence to support this hypothesis. The aim of the present review was to systematically review the role of subgingival irrigation of natural products as an adjunct to scaling and root planing in chronic periodontitis based on clinical and microbiological outcomes.

PICO Analysis

Population: Patients with chronic periodontitis

Intervention: Treated with subgingival irrigation of natural products along with SRP

Comparison: SRP + Placebo

Outcome: Reduction in pocket depth

Reduction in microbial count

MATERIALS AND METHODS

Search Strategy

The following data bases were searched from their earliest records through October, 2016 the computerised scientific literature Pubmed (MEDLINE) database from National Library of Medicine, Cochrane Oral Health Group Specialised Trials Registry (Cochrane library), Science Direct and Google scholar. Manual searching of issues in Journal of Periodontology, Journal of Periodontal Research, Contemporary Clinical Dentistry, Journal of Clinical Periodontology from October 2006 to October 2016.

The PubMed (MEDLINE) and Cochrane Library databases were searched using the following Medical Subject Headings (MeSH): periodontitis OR chronic periodontitis OR periodontal pocket OR periodontal attachment loss OR periodontal disease OR clinical attachment loss OR periodontal debridement OR periodontal non-surgical treatment OR scaling and root planing OR ultrasonic scaling OR subgingival irrigation OR plant extracts OR medicinal herbs.

The study selection process was performed by two reviewers (SA and SR).

Inclusion criteria: 1) Randomised Controlled Trials (RCTs) either of parallel or split mouth study design; 2) Studies having one experimental group, in which natural product was used as a subgingival irrigant as an adjunct to scaling and root planing procedure for the therapy of chronic periodontitis; 3) Presence of appropriate control group; 4) Report of microbial count at baseline and at the end of follow-up period as the primary outcome variable and pocket depth as secondary outcome variable; 5) Studies with more than one month follow-up.

Exclusion criteria: Only studies that met all the inclusion criteria were taken to second phase, which consisted of the following exclusion criteria: 1) Patients on medication which are known to have effect of periodontium or the treatment; 2) Studies in which chemical plaque control systems were used during the study period, since it might interfere with the outcome results; 3) studies in which control (placebo) was not used.

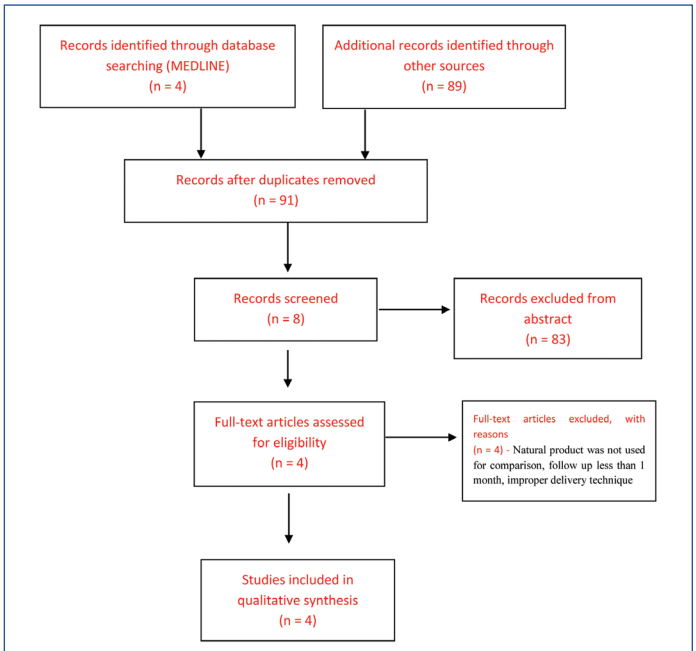
Data collection and analysis: During the initial stages, titles and abstracts of studies identified by the mentioned search strategy were screened and were then included for the review. After the abstracts were agreed upon by the reviewers, the studies were taken up for full text evaluation. Finally, only those studies which met the inclusion criteria and were agreed by both the reviewers were included in the study.

Included studies were scrutinised for general information such as author, title, groups included in the study and specific information such as study design, randomisation, blinding, methodology, participant data, and intervention outcome data.

The quality assessment for each study was done based on four major criteria and four minor criteria. Major criteria included; method of randomisation, allocation concealment, outcome assessors blinded to intervention and completeness of follow-up. Minor criteria included; presence or absence of sample size calculation, comparability of groups at start, clear inclusion and exclusion criteria, presence/absence of estimate of error. The study was categorised to have a "High risk" of bias if it did not record a "Yes" in three or more of the four main categories as mentioned above, "Moderate" if two out of four categories did not record a "Yes", and "low" if randomisation, assessor blinding and completeness of follow-up were considered adequate.

RESULTS

Through Medline database four articles and through other sources 89 articles were obtained. A total of 91 articles were found through both electronic and manual searches after duplication was removed. These records were screened for their titles and abstracts and 83 articles were excluded based on title and abstract. Eight articles were included for full text screening and four articles were excluded later [Table/Fig-1]. Finally, four articles were included for full text assessment as they met the inclusion criteria [17-20]. The data extraction is elaborated in [Table/Fig-2].



[Table/Fig-1]: Article selection procedure.

Variable of Interest

The primary outcome measure included reduction in periodontal probing depth and secondary outcome measure included microbial outcome.

DISCUSSION

Various studies have been done to prove the effect of subgingival irrigation on clinical and microbiological parameters. The use of subgingival irrigation in addition to root planing showed better results than the time when used as a monotherapy. The present systematic review unveils that adjunct use of natural products as subgingival irrigant in treatment of chronic periodontitis has added clinical and microbiological benefits compared to scaling and root planing alone.

The studies included in the present systematic review involved three different types of natural products. Out of which two studies used honeybee propolis extract as subgingival irrigant [17,18]. Both their clinical and microbial parameters show that they are more effective when compared to placebo and scaling and root planing alone. In another study, Streblus asper leaf extract as a subgingival irrigant, in which there was decrease in gingival inflammation and reduction in microbial count in the test group when compared to placebo [19]. The other study used curcumin solution as subgingival irrigant, which proved curcumin was as effective as chlorhexidine and better when compared to positive control [20].

The present systematic review included four studies out of which three studies have low strength of evidence and showed high risk of bias as randomisation method, assessor blinding and allocation concealment was not explained [17-19]. Study done by Gottumukkala SNVS et al., revealed that the use of natural products as subgingival irrigant has questionable long term effect when compared to chlorhexidine [20]. So, limited number of studies with high risk of bias makes it inappropriate to give a definitive statement. The use of natural products as subgingival irrigant as an adjunct to scaling and root planing seems controversial.

Study	Gebara EC et al., [17]		Coutinho A, [18]		Taweechaisupapong et al., [19]		GottumukkalaSN et al., [20]	
Design of study	Clinical trial-split mouth		Clinical trial-split mouth		Randomised control trial-parallel design		Randomised control trial-split mouth design	
Number of subjects	20 patients (14 females and 6 males)		20 patients (11 females and 9 males)		42 patients (26 males and 16 females)		26 patients (12 male and 14 female)	
Evaluation period	24 weeks		1 month		3 months		6 months	
Randomisation	No		No		Yes		Yes	
Blinding	No		No		Yes		Yes	
Intervention	Honey bee propolis		Honey bee propolis		Streblus as per leaf extract		Curcumin	
Parameters	PI, GI, PPD, CAL, BOP Total anaerobic microbial colony count		PI, GI, PPD, CAL, BOP Total anaerobic microbial colony count		PPD, CAL, PI, and GI Microbial colony count of Pg and Aa		PI, BOP, PPD BANA enzymatic test	
Statistics used	Proportion comparison and chi-square test.		Pearson's correlation coefficient		Paired t-test ANOVA		Paired t test ANOVA	
Outcome values (Probing depth) * % of sites with <3 mm	Control (*) Baseline-0 % 24weeks- 93%	Test (*) Baseline-0% 24weeks-64%	Control (*) Baseline-10% 4 weeks-20%	Test (*) Baseline-35% 4 weeks-80%	Control Baseline-5.52±0.493 months-4.53±0.5	Test Baseline-5.43±0.50 3 months-4.51±0.70	Control Baseline-5.52±0.67 6m-3.83±0.58	Test Baseline-5.70±0.70 6m-3.83±0.72
(Microbial count) *% of sites having >10^5 CFU	Baseline-80% 24 weeks-100%	Baseline-85% 24 weeks-50%	Baseline-70% 4 weeks-90%	Baseline-90% 4 weeks-50%	Baseline-2.5×10^5 CFU/mL 3 months-2×10^5 CFU/mL	Baseline-1.5×10^5 CFU/mL 3 months-0.15×10^5 CFU/mL	Baseline-100% 6 months-30.4%	Baseline-100% 6 months-13%
p-value	PPD- 0.05 BOP- 0.05 Total viable count- 0.07		PPD- 0.001 BOP- 0.001 Total anaerobic count- 0.007		PI- 0.66 GI- 0.045 PPD- 0.65 CAL- 0.17 Microbiological outcome- 0.17		PI- 0.01 PPD- 1.00 BANA test- 0.01	
Interpretation	Significant decrease in clinical probing depth and microbial count (p=0.007)		Significant decrease in clinical probing depth in test group (p=0.001) and microbial count (0.007)		No statistical significant difference in PPD (p=0.05) and reduction in total viable colony count (0.17)		Significant reduction seen in PPD in 3 m (p=0.02) and microbial count at 3 m (p=0.04)	

[Table/Fig-2]: Data extraction table.
PI: Plaque index; GI: Gingival index; PPD: Periodontal probing depth; CAL: Clinical attachment loss; BOP: Bleeding on probing; BANA: Bezoyl-DL-Argingine naphthylamide

LIMITATION

The present systematic review considers only the published data for result interpretation. Due to the heterogenous nature of various intervention and study design included in the review the pooling of data was not possible. Moreover, low sample size and lack of sample size calculation in the studies included is a major limitation. Most of the studies included in this systematic review are of split mouth design, which has cross over effect, leading to improper result interpretation.

CONCLUSION

Based on the results obtained from present systematic review it can be concluded that natural products when used as a subgingival irrigant along with scaling and root planing may have beneficial effects in management of chronic periodontitis, Though, natural products when used as a subgingival irrigant in periodontal therapy is said to have beneficial effect, the sustainability is questionable. Further studies evaluating various other natural products and long term randomised control trial are needed to give a strong conclusive evidence.

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