Review Article

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Dentistry Section

Effectiveness of Subgingival Irrigation as an Adjunct to Scaling and Root Planing in the Treatment of Chronic Periodontitis: A Systematic Review

SREENIVAS NAGARAKANTI[1], SUMANTH GUNUPATI[2], VIJAY KUMAR CHAVA[3], BHUMANAPALLI VENKATA RAMESH REDDY[4]

ABSTRACT

Aim: Subgingival applications of various chemotherapeutic agents have been used as an adjunct to nonsurgical periodontal treatment and preventive periodontal therapy. Their use in regular clinical practice, however, is less, perhaps due to concerns about clinical success or probably due to a lack of knowledge of their effectiveness or cost. The aim of this systematic review is to obtain overall quantitative estimate of effectiveness of subgingival irrigation (SI) in the treatment of chronic periodontitis.

Materials and Methods: A literature search of electronic database was performed for articles published through December 31, 2014, followed by manual search of dental journals. Randomized controlled trails (RCTs) assessing the effect of SI as an adjunct to scaling and root planing (SRP) in the treatment of chronic periodontitis evaluated by changes in the clinical and microbiological outcomes were included.

Results: This literature search yielded only two randomized, placebo-controlled studies that evaluated the efficacy of SI as an adjunct to SRP in patients with chronic periodontitis. The studies were methodologically not perfect (in terms of mediocre quality) with a risk of bias to come to any final conclusions to be reached. These studies didn't clearly mention about randomization, allocation concealment, blinding, dosage and formulation of irrigants, severity of periodontal disease, patient-centered outcomes and results data.

Conclusion: Due to insufficient evidence supporting the efficacy of SI as an adjunct to SRP in treating chronic periodontitis, more rigorous scientific research is required to assess the efficacy of SI as an adjunct to SRP in the treatment of periodontal diseases.

Keywords: Gingival inflammation, periodontal diseases, Periodontal pocket

INTRODUCTION

Chronic periodontitis is an infectious disease resulting in inflammation within the supporting tissues of the teeth, progressive attachment and bone loss and is characterized by pocket formation and/or recession of the gingiva [1]. Non surgical periodontal therapy generally aims to eliminate subgingival microbes and to remove their deposits from the root surfaces, thereby controlling the progression of periodontal destruction, reducing aetiologic agents and creating a healthy subgingival environment [2,3]. Scaling and root planing (SRP) is the most common periodontal treatment [4] which has proven clinical effectiveness in terms of reducing inflammation, decreasing the probing pocket depth and improving the clinical attachment level (CAL) [5,6]. But, SRP has some limitations, such as difficulties in accessing deeper pockets, furcation areas and root concavities [7,8] and difficulty to remove microbial pathogens that are penetrated into dentin tubules and which are residing in lacunae and concavities[9].

Antiseptics and antibiotics delivered locally had been used as adjunct to SRP procedures in order to control the subgingival microbes and thereby improve the treatment outcome because mechanical root debridement alone is a technically demanding procedure. The results presented in the literature, however, are in conclusive [10].

RATIONALE

In an effort to determine the efficacy of SI, as an adjunct to scaling and root planing in the treatment of chronic periodontitis, this systematic review was done.

The main objective of supragingival irrigation is to remove microbes coronal to the gingival margin, which are primary aetiological factors for the development of gingivitis or progression of existing gingivitis, thereby preventing gingivitis or decreasing existing gingival inflammation.

In contrast, the biologic rationale for performing subgingival irrigation is to reduce subgingival microbiota quantitatively that initiates and progress periodontal diseases. It is important, therefore, to determine the usefulness of SI in the treatment of chronic periodontitis.

MATERIALS AND METHODS

Focused question

The focused question was: In patients with chronic periodontitis what is the effect of SI with or without SRP on clinical and microbiological outcomes?

Search Strategy

The following data bases were searched from their earliest records through December 31,2014: 1) the computerized scientific literature PubMed (MEDLINE) database from National Library of Medicine using the Ovid interface; 2) the Cochrane Oral health Group Specialized Trails Registry (The Cochrane Library); 3) manual searching of issues in Journal of Periodontology, Journal of Clinical Periodontology, Journal of Periodontal Research and Periodontology 2000 from the last 15 years. The search was done by using Boolean operator and the asterisk symbol (*) was used as truncation. All searches were confined to studies published in English.

The PubMed (MEDLINE) and Cochrane Library databases were searched using the following Medical Subject Headings (MeSH): periodontitis OR chronic periodontitis OR periodontal pocket v periodontal attachment loss OR clinical attachment level OR pocket depth OR periodontal disease OR periodontal therapy OR periodontal treatment OR periodontal non-surgical treatment OR periodontal debridement OR scaling and root planing OR dental prophylaxis OR oral prophylaxis OR ultrasonic scaling OR subgingival irrigtion.

Inclusion criteria: The study selection process was performed by two blinded reviewers (NS and GS) in two phases. In the first

phase studies were analysed according to the following inclusion criteria: 1) randomized controlled trails (RCTs); 2) systematic review of randomized controlled trials; 3) studies comparing SRP + SI versus SRP; 4) patients diagnosed with chronic Periodontitis; 5) patients age >20 years; 6) studies having a duration of minimum three months.

Exclusion criteria: Only studies that met all inclusion criteria after first phase were admitted to second phase, which consisted of analysis of the following exclusion criteria: 1) studies treating periodontitis as manifestation of systemic disease(s); 2) patients taking medication that are known to effect periodontal tissues or treatment; 3) recent history of patients undergoing periodontal therapy; 4) endodontic associated periodontal diseases; 5) periodontal disease associated with a developmental or acquired condition; 6) numerical data not available.

Data Collection and Analysis

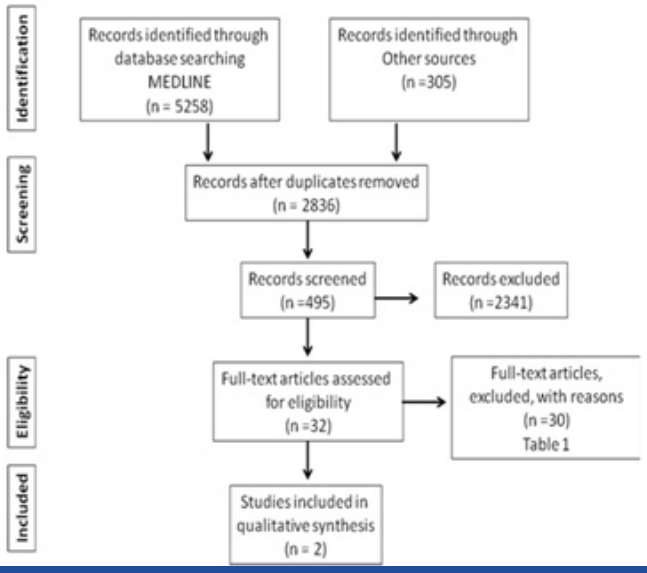
Initially, titles and abstracts of studies identified by the previously described search strategy were screened to determine if they should be included in the review. Any disagreement was resolved by discussion between the reviewers. Full-text studies were selected after the abstracts were agreed upon by both reviewers and were subsequently evaluated. Once again, only those studies agreed upon by both reviewers were included in the systematic review. Information collected included general parameters (author, title, reference features) and specific information (study eligibility/design, participant data, intervention, outcomes and methodological quality).

Study	Reason For Exclusion
Kruck C et al.2012 [11]	SRP alone was not taken as seperate group
Leonhard A et al. 2007 [12]	SRP alone was not taken as seperate group
Leonhard A et al. 2006 [13]	SRP alone was not taken as seperate group
Ehmke B et al. 2005 [14]	Systemic administration of antibiotics
Pistorius A et al. 2003 [15]	SRP was not done
Hoang T et al. 2003 [16]	Only 5 weeks study
Stabholz A et al. 1998 [17]	SRP alone was not taken as seperate group
Vandekerckhove BN et al. 1996 [18]	Along with SI, additional disinfection was done
Bollen CM et al. 1996 [19]	Along with SI, additional disinfection was done
Asari AM et al. 1996 [20]	SRP alone was not taken as seperate group
Chaves ES et al. 1994 [21]	SRP was not done
Shiloah J & Patters MR 1994 [22]	Only one month study
Fine JB et al. 1994 [23]	SRP alone was not taken as seperate group
Stabholz A et al. 1993 [24]	Post operative recordings were done on extracted teeth
Chapple IL et al. 1992 [25]	SRP alone was not taken as seperate group
Reynolds MA et al. 1992 [26]	Subgingival irrigants were used under cavitation which were delivered through the tip of ultrasonic activated scaler.
Walsh TF et al. 1992 [27]	SRP alone was not taken as seperate group
Itic J & Serfaty R.1992 [28]	SRP was not done
Linden GJ & Newman HN 1991 [29]	SRP alone was not taken as seperate group
Vignarajah S et al. 1989 [30]	SRP was not done
Ciancio SG et al. 1989 [31]	Did not include chronic periodontitis patients
Listgarten MA et al. 1989 [32]	SRP alone was not taken as seperate group
Silverstein L et al. 1988 [33]	SRP along with SI was not taken as separate group
Wennstrom JL et al. 1987 [34]	No mechanical debridement of subgingival area was carried out
Watts EA & Newman HN 1986 [35]	SRP alone was not taken as seperate group
Lander PE et al. 1986 [36]	SRP was not done
Boyd RL et al. 1985 [37]	SRP was not done
Soh LL et al. 1982 [38]	SRP alone was not taken as seperate group

[Table/Fig-1]: Excluded articles which did not satisfy one or more inclusion criteria

Study	Reason For Exclusion
Ernst CP et al. 2004 [39]	Details regarding past periodontal therapy was not mentioned
Jolkovsky DL et al. 1990 [40]	Details regarding past periodontal therapy was not mentioned

[Table/Fig-2]: Excluded articles which met one or more exclusion criteria



[Table/Fig-3]: Study Selection Procedure

Study	Tseng & Newcomb 1991 [41]	Southard SR 1989 [42]
Design of study	RCT	RCT
Number of subjects	12	8
Number of subjects lost to follow up	0	0
Age	Not clearly mentioned	35 – 65 years
Site	Probing depth ≥ 4mm	Probing depth ≥ 6mm
Diagnosis	Chronic inflammatory periodontal disease	Adult periodontitis
Evaluation period	3 months	15 weeks
Randomization	Yes	Yes
Masking	Not clearly mentioned	Double masking
Intervention	Control: manual SRP alone; SRP + SI (saline); SRP + SI(Chlorhexidine)	Control: no treatment; SRP alone; 2.0% chlorhexidine irrigation; SRP + 2.0% chlorhexidine irrigation
Outcomes	Reduction in probing depth; Gain in clinical attachment level; Reduction in bleeding on probing;	Reduction in plaque index; Reduction in gingival index; Reduction in probing depth; Reduction in bleeding on probing; Gain in clinical attachment level; Reduction in levels of Bacteroides gingivalis;
Analysis	Site	Site
Setting	University based; Wales	University based; USA

[Table/Fig-4]: Characteristics of included studies

RESULTS

Study Selection

The study selection process was performed by two blinded reviewers (NS and GS) in two phases. In the first phase studies were analysed according to the following inclusion criteria. Only studies that met all inclusion criteria after first phase were admitted to second phase, which consisted of analysis of the exclusion criteria.

A total of 5563 articles were found through the electronic and manual searches. After duplicates were removed, 2836 articles

were selected. A total of 2804 articles were excluded after the title and abstract were evaluated. Therefore, 32 articles were evaluated for eligibility, of which 28 articles were excluded because they didn't satisfy one or more inclusion criteria [Table/Fig-1]. Of the 4 remaining articles 2 papers were excluded because they met one or more exclusion criteria [Table/Fig-2]. Finally, two articles were included in the systematic review [Table/Fig-3]. The main characteristics of the included studies are illustrated in [Table/Fig-4].

Clinical and Patient Outcomes

The primary outcome measures include changes in probing depth (PD), clinical attachment level (CAL), bleeding on probing (BOP). Secondary outcome measures include changes in plaque index, gingival index, suppuration, microbiological outcomes and occurrence of adverse events.

DISCUSSION

The current evidence of the use of subgingival irrigation alone or as an adjunct to scaling and root planing in the treatment of periodontitis remains controversial [43,44]. During the past decade numerous studies addressed the impact of subgingival irrigation on clinical and microbiologic parameters. Investigations using subgingival irrigation as a monotherapy and in combination with root planing provided a perspective on the benefits and limitations of this treatment method.

This systematic review addressed the focused question, in patients with chronic periodontitis, what is the effect of SI with and without SRP? For this, a manual and electronic search was performed, up to a defined period of December 31, 2014, to explore the randomized, blinded clinical trials that evaluated the clinical & microbiological outcomes following SI in chronic periodontitis patients. Using the above-mentioned search strategy and inclusion criteria, only two randomized controlled studies were retrieved for inclusion in the present review.

The present systematic review found that the adjunctive use of SI to SRP may provide additional clinical benefits compared to SRP alone. However, given the low number of studies and limitations, future well-designed RCTs are needed to confirm these findings.

As a result of limited data available from the two studies included in this review, it would seem inappropriate to make definitive statements regarding the efficacy of treatment modalities based on available information. Future studies should include a large sample size, a high methodological quality and adverse event analysis.

FUTURE DIRECTIONS

There is need to assure development and implementation of randomized controlled trails which are designed in accordance with standardized investigation guidelines.

LIMITATIONS

There is a chance of risk of bias and incomplete statistical analysis due to limited studies. More chances of incomplete retrieval of data.

CONCLUSION

As a result of limited data available from the two studies included in this review, it would seem inappropriate to make definitive statements regarding the efficacy of treatment modalities based on available information. Future studies should include a large sample size, a high methodological quality and adverse event analysis.

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PARTICULARS OF CONTRIBUTORS:
1. Associate Professor, Department of Periodontics, Narayana Dental College & Hospital, Chinthareddypalem, Nellore, Andhra Pradesh, India.
2. Senior Lecturer, Department of Periodontics, Narayana Dental College & Hospital, Chinthareddypalem, Nellore, Andhra Pradesh, India.
3. Professor & Head, Department of Periodontics, Narayana Dental College & Hospital, Chinthareddypalem, Nellore, Andhra Pradesh, India.
4. Professor, Department of Periodontics, Narayana Dental College & Hospital, Chinthareddypalem, Nellore, Andhra Pradesh, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Srenivas Nagarakanti,
Associate Professor, Department of Periodontics, Narayana Dental College & Hospital,
Chinthareddypalem, Nellore, Andhrapradesh-524001, India.
Email: sreenivasnagarakanti@gmail.com

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