

Comparison Of The Efficacy Of Subgingival Irrigation By Aloe Vera And 0.2% Chlorhexidine (CHX) As An Adjunct To Nonsurgical Therapy In Chronic Periodontitis subjects

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ABSTRACT

Introduction: Periodontitis is an inflammatory disease of the supporting tissues of the teeth. For thousands of years, various herbal products have been used for chemotherapeutic purposes as adjunct to nonsurgical therapy.

Aim: Compare the effects of sub gingival irrigation with aloe vera and 0.2% CHX an adjunct to Nonsurgical Therapy in Chronic Periodontitis subjects pre and post therapy.

Material and methods: 60 chronic periodontitis subjects, age ≥ 30 years, pocket depth > 3 mm were included, divided into 3 groups. Group I: subgingival irrigation with aloe vera, Group II: subgingival irrigation with CHX, Subgingival irrigation performed on 0, 7, 14 and 21 day respectively. Clinical parameters were measured at baseline and 1 month.

Result: A significant improvement in all clinical parameters in both aloe vera and CHX groups post treatment.

Keywords: chronic periodontitis, subgingival irrigation

INTRODUCTION

Periodontal inflammation is the disease of periodontium, caused by one or group of microbes, which results in alveolar bone destruction and clinical attachment loss, subsequently form the periodontal pocket and decreased the width of attached gingiva.¹ According to the Global Burden of Disease Study (2016), severe periodontal disease was the 11th most prevalent condition in the world. The prevalence of periodontal disease was reported to range from 20% to 50% around the world. Periodontitis is the most common cause of tooth loss and also contributes to systemic diseases.² Phase I periodontal therapy i.e. Scaling & root planing is the cornerstone in the management of periodontal disease and advocated firstly to control the disease. Phase I therapy is defined as “plaque removal, plaque control, supragingival and subgingival scaling root planing (SRP), and adjunctive use of chemical agents.”³ A number of antibacterial agents like chlorhexidine, listerine, povidine-iodine etc., are used for subgingival irrigation as adjunctive therapy. s. Chlorhexidine is regarded as benchmark control in plaque removal, but it has numerous side effects on chronic usage such as staining of the teeth and the tongue, altered taste sensation, and increased calculus formation often deters its usage. Hence, there is a need to develop a naturally occurring, indigenous and cost-effective products which improve oral health with less side-effects. Now, many nutraceuticals like propolis, turmeric, neem, aloe vera, green tea, cinnamon etc. used in periodontal therapy and its prevention.⁴ Aloe Vera is one such product exhibiting multiple benefits and has gained

considerable importance in clinical research.⁵ Aloe Vera is a succulent, cactus like plant belonging to the Aloe cease family (subfamily of the Asphoelaceae). Among more than 400 aloe species, Aloe barbadensis Miller and Aloe aborescens are the most accepted species for various medical, cosmetic, and pharmaceutical purposes.^{6,7} The composition of Aloe Vera is very complex, consisting of 75 different ingredients including minerals, enzymes, sugars, anthraquinones, lignin, saponins, sterols, amino acids and salicylic acid.⁸ Gjerstad et al. found that the leaves of aloe vera plant contained 99.5% water and 0.0013% protein.⁹ The pharmacokinetics actions of Aloe Vera gel as studied in in vitro and in vivo include anti-inflammatory, antibacterial, antioxidant, immune-boosting and hypoglycemic properties.^{10,11} Aloe vera has shown its anti-microbial potential against Streptococcus pyogenes and Streptococcus faecalis. Three aloesin derivatives from aloe (namely isorabaichromone, feruoylaloetin, and p-coumaroylaloetin) showed potent free radical and superoxide anion-scavenging activities.¹² Hence the purpose of this study was to compare the effects of subgingival irrigation with aloe vera and 0.2% CHX an adjunct to Nonsurgical periodontal therapy In Chronic Periodontitis subjects pre and post therapy.

Materials and methods

This clinical study was conducted in the periodontology department at Rama Dental College, Hospital & Research Centre, Kanpur, Uttar Pradesh, India.

Patient selection criteria

INCLUSION CRITERIA:

- The study participants were chronic mild to moderate periodontitis
- Patients age 30-60 years for study
- Presence of minimum 20 number of natural teeth
- Subjects should have periodontal pocket depth of >3 mm and clinical attachment loss of 3–4 mm.

EXCLUSION CRITERIA:

- Immunocompromised patients and the patients on long term medication of immunosuppressant drugs.
- Patients with cardiovascular diseases, uncontrolled diabetes, chronic respiratory disorders, bleeding disorders, allergy etc.
- Patients on any medication of anticoagulant therapy or radiotherapy.
- Smokers and past smokers
- Subjects with history of antibiotic use within past 6 months
- Subjects who are pregnant and lactating
- Subjects who had undergone periodontal therapy in past 6 months

SOLUTIONS USED FOR SUBGINGIVAL IRRIGATION:

- 0.2% chlorhexidine (CHX) solution.
- 94.5% aloe vera juice [Patanjali Ayurved Ltd.]

STUDY DESIGN

60 patients that suffering from chronic periodontitis have been taken for study. Complete single-sitting scaling and root planing was done before sub-gingival irrigation.

GROUP FORMATION:

The Study was conducted for 30 days. The study participants were randomly allocated into the two study groups (30 in each group) through lottery method. Individuals were identified by code numbers throughout the study. subgingival irrigation with 94.5% aloe vera solution was used for test group 1, subgingival irrigation with 0.2% chlorhexidine gluconate solution was used for control group 2. Institutional Ethical Committee approval has been obtained and the written informed consent has been taken from all subjects and all the procedures follow standard protocol.

Treatment protocol & Application of irrigating solutions

2 ml of disposable syringe with 26 -gauge needle is use for subgingival irrigation. 1ml solution of each irrigant is used for irrigating the pocket site for 30 seconds and the process is repeated 2 times over 5 minutes. Subgingival irrigation was performed on day 0 and 7, 14 and 21 respectively for subgingival depth. we examine the clinical parameters at day '0' pre-treatment and on 30th day post-treatment - plaque index PI (Silness and Loe) and gingival index GI (Loe and Silness index), probing pocket (PPD) & clinical attachment level (CAL). All clinical parameters recorded by single examiner on each subject.

Non-surgical periodontal therapy will be performed using ultrasonic and hand instruments. The patients were recalled for regular visit and reinforced for oral hygiene maintenance therapy.

Statistical analysis

Data are analyzed by using Statistical Package for Social Sciences (SPSS) software version 22. Data are entered into Microsoft Excel spreadsheet. P- value less than 0.05 was taken as significant.

Results

In this study, Results compared the effects of aloe vera and 0.2% CHX used for subgingival irrigation an adjunct to scaling and root planing. Table 1 & table 2 showed difference between PI, GI, PPD, and CAL at baseline and post treatment has been analyzed among the aloe vera group and chlorhexidine group.

Comparison of baseline value and post treatment values showed a significant reduction in PI, GI, PPD and CAL score from baseline to post treatment in both groups. Table 3 & 4 shows that mean changes in plaque score and gingival score post treatment were non-significant in both groups.

Table 5 & 6 shows the mean changes in PPD and CAL were not significant during intergroup comparison. (0.2% chx = aloe vera)

Discussion

The most efficient way to treat periodontal disorders is non-surgical periodontal therapy via scaling and Root-planing. Mechanical non-surgical therapy is the most common means of initial treatment of periodontal diseases. In periodontal treatment, chlorhexidine is utilized due to its antibacterial and anti-inflammatory properties. Nowadays, a variety of herbal

medications are employed as adjunctive in periodontal therapy to prevent the negative effects of any chemical agent. In chronic periodontitis patients, quantity and quality of subgingival plaque can alter by irrigation with antimicrobial irrigating solution in periodontal pocket.¹³ In the periodontal treatment, effectiveness of antimicrobial irrigants directly proportional to its quantity and achieving adequate contact time among sub-gingival plaque, targeted microorganism and antimicrobial irrigants. The main objective of subgingival irrigation diminishes the bacteria and their byproducts that prevent the Progression of periodontal diseases.

In the present study, results revealed a significant decrease in values of PI, GI, PPD and CAL score from baseline to post treatment in both groups. CHX & Aloe vera showed similar clinical efficacy. Aloe Vera is a potential anti-bacterial agent which is said to be very effective in fighting the bacteria and preventing gingival and periodontal disease.¹⁴ It reduces the edema of the soft tissues and consequently decreases the bleeding of the gums. Aloe vera has strong antiseptic action in gingival pockets where normal cleaning is difficult.^{15,16} The low plaque index observed in study subjects could be explained by the fact that Aloe Vera is a good antibacterial. Heggers et al.¹⁷ showed its antimicrobial properties against *Candida albicans*, *Streptococcus pyogenes*, *Streptococcus fecalis*. Bhat et al.¹⁸ with similar findings in patients with chronic periodontitis, reported a considerable reduction of pocket depth in areas of aloe vera gel treatment combined with SRP, which was statistically significant. Verdi et al.¹⁹ have also published similar results on the effectiveness of aloe vera gel in patients with chronic periodontitis. Ashouri Moghaddam A et al.²⁰ evaluated the effects of local application of aloe vera gel as an adjunct to SRP in patients with chronic periodontitis and found that SRP combined with aloe vera as adjunctive therapy resulted in significant improvements of severe periodontitis. The notable improvements of GI and PD clinically accounted for the noteworthy efficacy of aloe vera gel in improving the condition.

Present study revealed the significant improvement in all clinical parameters in both aloe vera and CHX groups post treatment. In comparison to aloe vera group, Chlorhexidine group showed better clinical results but that was statistically nonsignificant. In favor of our study, Singhla R et al.²¹ compared the clinical and anti-microbial effectiveness of curcumin (CU) irrigation as an adjunct to scaling and root planing as compared to Meswak and CHX irrigation and concluded that all the parameters reduce significantly in all the three groups, though CHX proved to be highly efficacious in reducing the microbial load (69.10% reduction) as compared to CU and meswak. Platia et al.²² also compared the clinical efficacy of 0.12% Chlorhexidine and Turmeric as subgingival irrigants in patients of chronic periodontitis and found that out of three irrigating solutions i.e. Chlorhexidine, good results were seen with Chlorhexidine, then with Turmeric and then for distilled water as an irrigating solution. Chlorhexidine has shown to be a potent therapeutic agent which has the properties of improving the periodontal status significantly.

Aloe vera is thought to have an improvement in periodontitis because to its action on matrix metalloproteinase (MMPs). Makela et al.²³ demonstrated that MMP-2 and MMP-9, two forms of gelatinase, can both be useful on tissue and bone destruction associated with periodontal disease. Conversely, Kudalkar et al.²⁴ discovered that aloe vera decreased the indicated gelatinase in the gingival tissue samples; the findings may be enhanced by increasing the density of aloe vera. To assess how aloe vera affects MMPs immunologically, a thorough investigation using various densities of Aloe Vera, could be carried out in future.

Conclusion

According to this study, aloe vera and chlorohexidine were both effective subgingival irrigants for the treatment and prevention of periodontal disease. Effect of aloe vera is promising because they have fewer adverse effects and are more palatable to patients, herbal medications are a preferable option over the harsh drugs. In order to maximize the therapeutic advantages of these herbal and organic products in the future, research should focus on improving the substantivity of the medications and adjusting their concentrations to optimize their therapeutic effects.

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Table 1: Comparison of baseline measurements and post-test measurements in aloe vera group (Group II)

Variable	Pre		Post		Difference	p value
	Mean	SD	Mean	SD		
PI	2.15	0.64	0.91	0.65	1.24	<0.001*
GI	1.66	0.49	0.66	0.49	1.00	<0.001*
PPD mm	4.96	0.61	3.61	0.50	1.35	<0.001*
CAL Mm	4.41	0.50	2.91	0.55	1.50	<0.001*

Paired t test; * indicates significant difference at $p \leq 0.05$

Table 2: Comparison of baseline measurements and post-test measurements in 0.2% CHX group (Group II)

Variable	Pre		Post		Difference	p value
	Mean	SD	Mean	SD		
PI	2.23	0.44	0.85	0.59	1.38	<0.001*
GI	1.75	0.44	0.65	0.49	1.10	<0.001*
PPD mm	5.10	0.72	3.31	0.57	1.79	<0.001*
CAL Mm	4.50	0.51	2.78	0.62	1.72	<0.001*

Paired t test; * indicates significant difference at $p \leq 0.05$

Table3: Comparison of plaque index

Group	Mean	SD	p value	Pairwise comparisons
Aloe vera	0.91	0.65	0.314	Aloe vera = CHX: 0.969
0.2% CHX	0.85	0.59		

Table4: Comparison of gingival index

Group	Mean	SD	p value	Pairwise comparisons
Aloe vera	0.66	0.50	0.629	Aloe vera = CHX: 1.000
0.2% CHX	0.65	0.49		

Table5: Comparison of periodontal pocket depth

Group	Mean	SD	p value	Pairwise comparisons
Aloe vera	3.61	0.51	<0.001*	Aloe vera = CHX: 0.371
0.2% CHX	3.31	0.58		

Table 6: Comparison of CAL

Group	Mean	SD	p value	Pairwise comparisons
Aloe vera	2.90	0.55	<0.001*	Aloe vera = CHX: 0.877
0.2% CHX	2.80	0.62		

One-way ANOVA test; Post hoc tukey test; * indicates significant difference at $p \leq 0.05$

CAL score: 0.2% CHX=Aloe vera<NS and the difference in CAL of three groups was statistically significant.