

Comparative Evaluation of Effect of Locally Delivered Aloe Vera Gel With Turmeric Gel As An Adjunct To Scaling And Root Planing in The Treatment of Chronic Periodontitis: A Clinical Study

*Nitin Sangwan¹, C.S Baiju², Sumidha Bansal³, Gunjan Gupta⁴, Sunny Mavi⁵

Department of Periodontics, Sudha Rustagi College of Dental Science & Research, Faridabad, Haryana, India

Corresponding author: *Nitin Sangwan

Abstract: Periodontitis is a bacterial initiated but host modulated chronic infection that leads to destruction of the connective tissue supporting the teeth. Use of Herbal and Ayurvedic drugs has increased in recent times, for their better therapeutic value as they have fewer adverse effects as compared to modern medicine. Most commonly used products are aloe vera and turmeric. Both Aloe vera and turmeric are beneficial in many oral conditions due to their anti-bacterial, anti-inflammatory, antioxidant, chemopreventive properties. This study focus on the use of turmeric and aloe vera as a medicament in the periodontal pocket.

Aim: The aim of this study is comparative evaluation of the effect of aloe vera and turmeric gel as an adjunct to scaling and root planing (SRP) in the management of chronic periodontitis.

Materials and Methods: A total number of 15 subject were evaluated for clinical parameters like plaque index, gingival index, probing pocket depth at baseline, followed by scaling and root planing (SRP). Test sites were divided into following groups C, T₁ and T₂. Control group C (SRP) alone T₁ SRP with intra pocket placement of aloe vera gel and T₂ SRP with turmeric gel. clinical parameters were compared between test sites at one month from baseline.

Results: Results exhibited significant reduction in clinical parameters of Aloe vera gel (T₁) group in comparison to turmeric(T₂) and control (C) groups.

Conclusion: In pocket depth reduction subgingival administration of Aloe vera gel has shown superior results as compared to turmeric gel while comparing reduction in gingival inflammation both are equally effective.

Key-words: aloe vera, periodontitis, subgingival medicament, turmeric

Date of Submission: 17 -08-2017

Date of acceptance: 28-08-2017

I. Introduction

Dental bio-film formed from pathogen such as Porphyromonas gingivalis, Aggregatibacter actinomycetemcomitans, treponema causes periodontal diseases. The most common therapy for periodontal inflammatory diseases consists of repeated professional supra- and subgingival plaque and calculus removal. Various chemotherapeutic agents such as chlorhexidine, quaternary compounds, triclosan are used for improving periodontal health but due to undesirable side effects such as tooth staining, taste alteration, and cost of these substances, the use of natural products has increased recently for their better therapeutic values.[1] Aloe-vera and turmeric have antibacterial, anti-inflammatory property and can be used as adjunct to periodontal treatment.

Aim : The aim of this study is to comparatively evaluate the effect of aloe vera and turmeric gel as an adjunct to scaling and root planing (SRP) in the management of chronic periodontitis as a medicament in the periodontal pocket.

Objective: Clinical effects of subgingival application of Aloe vera gel® (Sri Nath Pharma) and turmeric gel® curenext oral gel (Abbott pharma) in periodontal pockets of adult periodontitis patients after mechanical debridement.



Fig 1: armamentarium used in study



Fig 2: T₁ aloe vera gel sites



Fig 3: T₂ turmeric gel sites

II. Materials And Methods

Sampling and sample size : The study group was comprised of 15 systemically healthy patients with chronic periodontitis aged between 25-45 years visiting the Department of Periodontics and Oral Implantology, Sudha Rustagi College of Dental Sciences and Research, Faridabad.

Inclusion criteria:

The study population comprised of 15 patients (7 females, 8 males) aged 25 to 45 years. All participants were provided with information about the study, and an informed consent was obtained. A split mouth design was planned. The Subjects having minimum one tooth or site in a quadrant (maxilla or mandible each) with probing depth of 5 mm along with bleeding on probing, with mild to moderate attachment loss in localized chronic periodontitis were selected. Subjects did not receive any antibiotics or periodontal treatment in the previous 6 months and a negative history of any systemic diseases.

Exclusion criteria:

The following patients were excluded-Patients who are current smokers, pregnant, Systemic diseases such as diabetes, Systemic or topical antibiotic therapy. Antioxidants such as vitamin C, vitamin E, or β carotene within the last 6 months .Patient who had undergone periodontal therapy within last 6 months.

III. Methodology

Stabilization And The Preparation Of Aloe Vera Gel

Cut leaves are washed with sterile water then soaked in suitable bactericide and fungicide such as microphene for 5 to 10 min. The gel is separated from the leaf by peeling away the outer green cortex of the leaf

carefully. Separated gel matrix is prepared for solution treatment by homogenizing it to break up the interstitial fibers running through it. Stabilization of the gel is achieved by addition of non-toxic oxidant. The non-toxic oxidant such as hydrogen peroxide is preferred for catalytic oxidation and is added by stirring and heating for about 30 min until the solution assumes a lighter appearance. Lighter appearance indicates that oxidation is complete.[2]

Turmeric gel is available commercially as turmeric gel ® Curenex oral gel (Abbott Pharma).

The following clinical parameters were recorded at baseline and after 1 month

1. Plaque index (Loe and Silness 1967)
2. Gingival index (Sillness & Loe 1963)
3. Probing depth of pocket was measured from the marginal gingiva to the depth of the pocket using UNC 15 probe.

Immediately after recording all the indices at baseline and prior to drug application, all the patients were undergone scaling and root planing. Test sites were divided into following groups T₁ and T₂ and Control group C (SRP) alone T₁ SRP with intra-pocket placement of aloe vera gel and T₂, SRP with turmeric gel The Aloe vera gel was injected into the pockets with a syringe with blunt needle around the selected teeth in the treatment test sites T₁. The pockets were filled until the materials were detected at the gingival margin. To ensure that the Aloe vera gel stayed long enough to be effective in the pocket, a periodontal dressing (Coe Pak) was placed over the treated sites. The test T₂ site received turmeric gel and in similar way Coe Pak was placed over it. Clinical parameters were compared between test sites at one month from baseline.

IV. Statistical Analysis

Data was entered into Microsoft Excel spreadsheet and then checked for any missing entries. It was analysed using Statistical Package for Social Sciences (SPSS) version 21. All the variables were continuous variables like GI, PI, PPD and their (absolute & percent reductions) which were summarized as mean and standard deviation. Graphs were prepared on Microsoft Excel. Normality of the data was checked by Shapiro Wilk test. Data was not found to be normal. Thus, inferential statistics were performed using non-parametric tests of significance. Intragroup comparison was done using Wilcoxon test. Intergroup comparison was done using Kruskal Wallis test & Mann whitney U test. The level of statistical significance was set at 0.05.

V. Results

Mann Whitney U test was used for statistical analysis . No statistically significant difference could be found between the mean age of males & females.

Tables

Table 1: mean gingival index(GI) score value at baseline and after 1 month

GI	At baseline		At follow up		P ^a value of Intragroup analysis
	Mean	SD	Mean	SD	
• Aloe vera sites (T ₁)	1.62	0.34	0.48	0.11	0.001, S
• Turmeric sites (T ₂)	1.67	0.41	0.53	0.13	0.001, S
• Control sites C	1.60	0.36	0.82	0.22	0.001, S
P ^b value of Intergroup analysis	0.677, NS		<0.0001, S		
P ^c value of post hoc pairwise comparison	NA		1*2 – 0.180 1*3 – 0.002 2*3 – 0.002		

Mean GI score value of aloe vera (T₁) at base line and after 1 months are 1.62 ± 0.34 and 0.48 ± 0.11. Mean GI (gingival index) value of turmeric sites (T₂) at baseline and after 1 month are 1.67± .41 and .53 ± .13. Mean GI valve at control sites (C) at base line and after 1 months are 1.60 ± .36 and 0.82 ± 0.22. At baseline, no statistically significant difference could be found between mean GI scores of AV, Turmeric & Control gr. At follow up, there was an overall statistically significant difference between the mean GI scores of AV, Turmeric & Control gr. Post hoc pairwise comparison showed that the mean GI scores at follow up in control group was significantly higher than that among AV gr & Turmeric gr. So in other words, Both Aloe vera & Turmeric are equally effective in reducing GI scores.

Mean plaque (PI) scores:

At baseline, no statistically significant difference could be found between mean plaque (PI) scores of T₁, T₂ & Control sites. At follow up also, no statistically significant difference could be found between mean PI score of Aloe-vera (T₁), Turmeric (T₂) & Control sites .In other words aloe-vera ,turmeric and control (SRP) are equally effective in reducing plaque level.

Table 2: mean periodontal probing depth (PPD)

PPD					
	At baseline Mean	SD	After 1 month Mean	SD	P ^a value of Intragroup analysis
• Aloe vera sites (T ₁)	4.97	0.39	2.63	0.33	0.001, S
• Turmeric sites (T ₂)	4.80	0.64	3.12	0.31	0.001, S
3. Control sites (C)	4.65	0.45	3.47	0.35	0.001, S
P ^b value of Intergroup analysis	0.123, NS		<0.0001, S		
P ^c value of post hoc pairwise comparison	NA		1*2 – 0.001 1*3 – 0.004 2*3 – 0.004		

At baseline, no statistically significant difference could be found between mean PPD of AV, Turmeric & Control gr. At follow up, there was an overall statistically significant difference between the mean PPD of AV, Turmeric & Control gr. Post hoc pairwise comparison showed that the mean PPD at follow up in control group was significantly higher than that among Turmeric gr which was further significantly higher than that in AV group.

At baseline, no statistically significant difference could be found between mean GI scores of AV, Turmeric & Control gr. AT follow up, there was an overall statistically significant difference between the absolute reduction in GI scores of AV, Turmeric & Control gr. Post hoc pairwise comparison showed that the absolute reduction in GI scores at follow up in aloe vera (T₁) 1.13 ± 0.36 and turmeric sites (T₂) 1.13 ± 0.45 was significantly lower than that among control sites (C) 0.78 ± 0.31 . So in other words, Both AV & Turmeric are equally effective in reducing GI scores.

Table 3:

Absolute reduction in PD	N	Minimum	Maximum	Mean	Std. Deviation
• AV sites (T ₁)	15.00	1.50	3.00	2.33	0.41
• Turmeric sites (T ₂)	15.00	0.75	2.50	1.68	0.55
• Control sites (C)	15.00	0.50	2.00	1.18	0.48
P ^b value of Intergroup analysis	<0.0001, S				
P ^c value of post hoc pairwise comparison	1*2 – 0.001 1*3 – 0.001 2*3 – 0.008				

Fig 5

At baseline, no statistically significant difference could be found between mean PPD of Aloe vera, Turmeric & Control gr sites. AT follow up, there was an overall statistically significant difference between the absolute reduction in PPD of AV, Turmeric & Control gr. Post hoc pairwise comparison showed that the absolute reduction in PPD at follow up in aloe vera sites (T₁) was found to be 2.33 ± 0.41 which was significantly higher than that among Turmeric gr (T₂) 1.68 ± 0.55 was further significantly higher than that in control C sites 1.18 ± 0.48 .

Discussion

Inflammatory mediators such as interleukin (IL)-1β, IL-6, Tumour necrosis factor (TNF-α), Interferon, prostaglandin (PGE2) released by host immune cells like neutrophils and macrophages orchestrate the destruction of periodontal tissues.[3] Common therapy for periodontal diseases includes repeated professional supra- and subgingival plaque and calculus removal (scaling and root planing, SRP) (Badersten et al. 1981). After non-surgical therapy, several deep periodontal pockets may persist and treatment of choice in that case consists of surgical procedures (Barrington). However antibiotics and antiseptics have been successfully used to treat moderate-to-severe periodontal disease (Rams & Slots 1996), both with systemic (Noyan et al. 1997, Palmer et al. 1998) and local administration.[1]

Periodontal pockets less than 3mm in depth can be maintained plaque-free by home care and that regular professional non-surgical care can maintain the stability of deeper pockets over the years (Berkey et al. 1995, Kaldahl et al. Aloe vera has various defensive functions and it has a variety of anti-inflammatory factors to combat in dental diseases.[4] It has strong antiseptic, antibacterial, fungicidal and virucidal properties. It promotes cell growth and is neurologically calming and acts as a detoxifying agent.[5] The composition of aloe vera is complex. It consists of 75 different ingredients including vitamins, minerals, enzymes, sugars, anthraquinones or phenolic compounds, lignin, saponins, sterols, amino acids and salicylic acid.[6] *Streptococcus pyogenes* and *Streptococcus faecalis* are two microorganisms that have been inhibited by aloe vera gel Hegggers et al suggested that the antibacterial effect of the aloe vera gel in vivo could promote the wound healing process by eliminating the bacteria which increase inflammatory component .[7] Turmeric (also known as *Curcuma longa*) is a member of the ginger family, Zingiberaceae. curcumin is the main component of turmeric . Curcumin action in suppressing the activity of Toll like receptors (TLRs) and expanding its therapeutic potential in limiting or halting the destruction in periodontitis.[8] Additional anti-microbial property can come in useful in bacterial induced periodontitis .[9]

To the best of our knowledge no study has been reported in literature which has compared effect sub gingival application aloe vera gel with turmeric gel as an adjunct to scaling and root planing (SRP) in the management of chronic periodontitis. Aloe vera gel sites as well turmeric sites shows better reduction in gingival index score (GI) than control sites. The significant improvement in gingival inflammation in the SRP–Aloe vera group may be attributed to the excellent healing and anti-inflammatory properties of aloe vera due to the presence of vitamins, anthroquinones, glycoproteins, minerals, and amino acids. Similar results were also reported by Sudworth in 1997 who found aloe vera to be a powerful antiseptic in gum pockets.[10] De Oliveira et al. also reported significant reduction in plaque and gingivitis with use of dentifrice containing aloe vera.[11] Dilip et al. demonstrated that aloe vera was as effective as two commercially popular toothpastes against *Candida albicans*, *Streptococcus mutans*, *Lactobacillus acidophilus*, *Enterococcus faecalis*, *Prevotella intermedia*, and *Peptostreptococcus anaerobius*. [12] Davis studied the topical anti-inflammatory activity of A.vera .He concluded that small amounts of A. vera given topically would inhibit inflammation. A. vera inhibits the cyclogenase pathway and reduces prostaglandin E2 production from arachidonic acid. Recently the novel anti-inflammatory compound called C-glucosylchromone was isolated from gel extract.[13]

Choonhakarn et al used 70% Aloe vera gel for recurrent apthous ulcers and lichen planus, which showed that healing was better and fast. [14] Mandeville in 1939 used Aloe vera for the treatment of radiation ulceration of mucous membrane of the mouth.[15] Bovik in 1966 used Aloe vera for the gingivectomy sites and showed that healing was better and fast.[16] Turmeric gel® curenext oral gel (Abbott pharma) is also available commercially and also found to be effective in reducing gingival inflammation and reducing pocket depth as compared to SRP alone. The main component of turmeric is curcumin. Curcumin 1% as sub gingival irrigant resulted in significant reduction in bleeding on probing and redness , when compared with chlorhexidine and saline group as an adjunctive therapy in periodontitis patients.[17] Local drug delivery system containing 2 % whole turmeric gel form as an adjunct to scaling and root planning treatment showed significant reduction in plaque index ,gingival index. There was significant reduction in trypsin – like enzyme activity of “red complex “micro-organisms, namely *Bacteroides forsythus*, *Porphyromonas gingivalis* and *Treponema denticola* .[18] In this study Post hoc pairwise comparison showed that the absolute reduction in Probing depth was highest at the aloe vera sites T₁ followed by the turmeric site T₂ which was further significantly higher than control C sites in which only SRP has performed.

There was no discomfort, hypersensitivity or abnormal tissue reactions occurred in the present study. The experimental gels were found to be acceptable by all the patients in our study. The local drug-delivery system used in the present study is simple and easy to use. Its suitability for use with a syringe allows easy insertion into the pocket.

VI. Conclusion

Both Aloe vera & turmeric gel can become an important part of the preventive and therapeutic treatments available for the periodontal diseases because of their various therapeutic benefit. This study suggest that the subgingival administration of Aloe vera gel has shown superior results in comparison to turmeric gel in pocket depth reduction while comparing reduction in gingival inflammation both are equally effective. Both the gels can be used as an adjunct to scaling and root planning.

References

- [1]. Benakanakere M, Kinane, DF Innate cellular responses to the periodontal biofilm. *Front Oral Biol.* 2012; 15: 41-55.
- [2]. Smita singh, Jindal R, Singh S. Aloe Vera: Boon to Dentistry. *Indian Dent Res Rev* 2010;4:138-41.
- [3]. Perinetti G, Paolantonio M, Cordella C, Clinical and microbiological effects of subgingival administration of two active gels on persistent pockets of chronic periodontitis patients. *J Clin Periodontol* 2004; 31: 273–281

- [4]. Reynolds T, Dweck AC, Aloe vera leaf gel: A review update, *J Ethnopharmacol*, 68, 1999, 3-37
- [5]. Vogler BK, Ernst E. Aloe vera: A systematic review of its clinical effectiveness. *Br J Gen Pract* 1999; 49:823-828
- [6]. Agarry OO, Olaleye MT, Bella-Michael CO. Comparative antimicrobial activities of Aloe vera gel and leaf. *Afr J Biotechnol* 2005;4:1413-4.
- [7]. Hegggers JP, Kucukcelibi A, Stabenou CJ, Ko F, Broemeling LD, Robson MC, Winters WD. Wound healing effects of aloe gel and other topical antibacterial agents in rat skin. *Phytotherapy Res* 1995; 9:455-457.
- [8]. Gokhale SR, Padhye AM (2013) Future prospects of systemic host modulatory agents in periodontal therapy; *Br Dent J* 214: 467-471
- [9]. Nagpal M, Sood S Role of curcumin in systemic and oral health: An overview. *J Nat Sci Biol Med* 2013 ; 4: 3-7.
- [10]. Sudworth R. The use of Aloe Vera in Dentistry. Philadelphia: Positive Health Publications Ltd; 2002.
- [11]. De Oliveira SM, Torres TC, Pereira SL, Mota OM, Carlos MX. Effect of a dentifrice containing Aloe vera on plaque and gingivitis control. A double blind clinical study in humans. *J Appl Oral Sci* 2008; 16:293-6.
- [12]. Dilip G, Bhat SS, Beena A. Comparative evaluation of the antimicrobial efficacy of Aloe vera tooth gel and two popular commercial toothpastes. *Gen Dent* 2009; 57:238-41.
- [13]. Davis RH, Kabhani JM, Maro NP. Aloe vera and wound healing. *J Am Podiatr Med Assoc* 1987;77:165-9.
- [14]. Choonhakarn C, Busaracome P, Sripanidkulchai B, Sarakarn P. The efficacy of aloe vera gel in the treatment of Oral lichen planus: A randomized controlled trial. *Br J Dermatol* 2008; 158:573
- [15]. Mandeville FB. Aloe vera in the treatment of radiation ulcers of mucous membranes. *Radiology* 1939;32:598-9.
- [16]. Bovik EG. Aloe vera: Panacea or old wives tales? *Tex Dent J* 1966; 84:13-6.
- [17]. Suhag A, Dixit J, Dhan P. Role of curcumin as a subgingival irrigant: a pilot study. *PERIO* 2007; 4:115-21
- [18]. Behal R, Mali MA, Gilda SS, Paradkar AR. Evaluation of local drug delivery system containing 2% whole turmeric gel used as an adjunct to scaling and root planning in chronic periodontitis: A clinical and microbiological study. *J Indian Soc Periodontol* 2011;15:35-8

*Nitin Sangwan. "Comparative Evaluation of Effect of Locally Delivered Aloe Vera Gel With Turmeric Gel As An Adjunct To Scaling And Root Planing in The Treatment of Chronic Periodontitis: A Clinical Study." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)* 16.8 (2017): 78-83