



Research Article

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CLINICAL EFFICACY OF *ALOE VERA* CHIP AS AN ADJUNCT TO NONSURGICAL THERAPY IN THE TREATMENT OF CHRONIC PERIODONTITIS

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Received on: 12/03/15 Revised on: 13/05/15 Accepted on: 20/05/15

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DOI: 10.7897/2277-4343.06498

ABSTRACT

Periodontitis is an infectious inflammatory disease. Turmeric and aloe vera has been used in dentistry for treating various oral conditions. In recent years various therapies like host response modulation and local drug delivery have been developed to block the pathways responsible for periodontal tissue breakdown. Although much information are there on the medical uses of *Aloe vera* and turmeric, limited literature is available regarding its use in field of dentistry. The purpose of this study was to evaluate the efficacy of *Aloe vera* as an adjunct to scaling and root planing (SRP) in patients with chronic periodontitis. The study included 20 subjects each with at least two periodontal pockets with PPD (probing pocket depths) \geq 5-6 mm. The subjects were randomly divided into two groups. Scaling and root planning was performed for both the groups. Group I received turmeric chip and Group II received an *Aloe vera* chip. The clinical parameters including plaque index, gingival index, probing pocket depths and relative attachment levels were recorded at baseline, 21 days and 90 days. Both group showed improvement in site specific & full month plaque scores. Improvement in plaque score was significantly greater in the aloe group compared to turmeric group at 3 months. The GI in both group showed no difference at baseline & at 21 days, but there was a significant decrease in the GI score in the Aloe group compared to turmeric group at 3 months. PPD & CAL also showed no difference in both group at baseline & at 21 days & showed significant PPD reduction & CAL at 3 months Local drug delivery of *Aloe vera* chip into the periodontal pocket stimulated a significant increase in pocket depth reduction and clinical attachment level gain compared to turmeric chip as an adjunct to scaling and root planning in chronic periodontitis patients

Keywords: Periodontitis, *Aloe vera*, turmeric, local drug delivery, probing pocket depths, clinical attachment levels

INTRODUCTION

Periodontitis is an infectious inflammatory disease. Bacterium modulates the inflammatory response and alters the diversity of periodontal disease. In recent years various therapies like host response modulation and local drug delivery have been developed to block the pathways responsible for periodontal tissue breakdown. Herbal medicine is still the mainstay of about 75-80% of the world population, mainly in the developing countries, for primary health care because of better cultural acceptability, better compatibility with the human body and lesser side effects. However, the last few years turmeric and *Aloe vera* has been used in dentistry for treating various oral condition. Turmeric comes from the rhizomes of the *Curcuma longa* Linn. plant, which is a member of the ginger (Zingiberaceae) family. This natural product turmeric can be used as preventive/therapeutic agents for the control of inflammation¹. Apart from this these products are also known for their pharmacological safety. As turmeric is used almost daily as a dietary spice.

Aloe vera is popularly known as “babosa” is a plant commonly found in north Brazil, endowed with antimicrobial, anti-inflammatory and healing properties, and also indicated in hepatic and stomach disease². It is member of tree lily family known as *Aloe barbadensis*. Two species are commonly i.e. *Aloe barbadensis* Miller and *Aloe aborecens*.

Aloe vera barbadensis consist of 2 parts which differ completely in their composition and therapeutic properties. The parenchymal tissue makes up inner portion of aloe leaves and produce the *Aloe vera* gel (or mucilage) a clear, thin, tasteless jelly like material. Other parts of plant are a group of specialized cell known as pericyclic tubules. This cell produces exudates that consist of bitter yellow latex with powerful laxative like action².

Although much information are there on the medical uses of *Aloe vera*, limited literature is available regarding its use in field of dentistry. Villalobos *et al.* in 2001 conducted a study and evaluated the clinical effects of *Aloe vera* and noted that there was significant reduction in plaque accumulation and gingivitis after use of a mouth rinse containing this natural product³. Lee *et al.* in 2004 conducted an *in vitro* study in which antimicrobial effect of dentifrice containing *Aloe vera* has been demonstrated. Phytotherapeutic agent inhibited the growth of diverse oral microorganisms, such as *Streptococcus mutans*, *Streptococcus sanguis*, *Actinomyces viscosus*, and *Candida albicans*⁴. A double-blind clinical study was conducted by De Oliveira *et al.* in 2008 on humans to evaluate the effect of a dentifrice containing *Aloe vera* on plaque and gingivitis and found that there was a significant reduction in plaque and gingivitis⁵.

Aloe vera is a medicinal product contained in herbal toothpastes, mouthwashes and gel form with commercial appeal for control of plaque and gingivitis. In the previous studies, the effect of *Aloe vera* were studied mostly in the form of toothpastes, mouthwashes and gel but there is a paucity of literature on the use of *Aloe vera* chip as a local drug delivery system in the treatment of periodontal pocket. The purpose of this study was to evaluate the efficacy of *Aloe vera* as an adjunct to scaling and root planning (SRP) in patients with chronic periodontitis

MATERIALS AND METHODS

The present study was to compare the efficacy of turmeric and *Aloe vera* dental chips placed after phase I therapy (scaling and root planning) on each site, and to evaluate and compare the differences in clinical parameters between test and control sites. The subjects for the study were selected from out patients who had received treatment at VSPMDC AND RC. Ethical clearance number granted for this study was VSPM'S DCRC/DEAN/ETHIC COMMITTEE/14/2014.

A randomized controlled clinical trial was performed on 20 subjects (10 male and 10 female) ranging in age from 20 to 40 each with two periodontal pockets. Patients who voluntarily agreed to participate in the study provided written informed consent. All subjects had clinical evidence of 5-6 mm of pocket depth. In addition, all subjects were in good general health, with no systemic conditions, with no history of previous periodontal therapy within past six months. Pregnant and lactating mothers and patients on medications were excluded from study. The subjects randomly divided into two groups. Patients in group 1 control underwent scaling and root planning and received turmeric chip, patients in group 2 underwent scaling and root planing and received and *Aloe vera* chip.

Details of Turmeric/*Aloe vera* Chips

Formulation Table:

Turmeric Chips

Ingredients	Quantity
Turmeric	5%
Hydroxy Propyl Methyl Cellulose	800 mg
Hydroxy Propyl Cellulose	200 mg
Polyethylene Glycol	100 mg
Water (Q.S.)	10 ml

Aloe vera Chips

Ingredients	Quantity
<i>Aloe vera</i>	5%
Hydroxy Propyl Methyl Cellulose	600 mg
Hydroxy Propyl Cellulose	100 mg
Polyethylene Glycol	50 mg
Water (Q.S.)	10 ml

Dimensions: 4mm in length, 2mm in width & 0.3mm in thickness

Storage: Store in a cool place at normal temperature

Shelf life: Three years

Method of Preparation

10ml of water in a 100ml glass beaker was taken and kept on a Magnetic Stirrer. Temperature was set to 0^o C. A magnetic bead was added into the glass beaker and RPM was set to 500. Required quantity of ingredients were weighed. While stirring, Hydroxy Propyl Methyl Cellulose was added in smaller quantities and RPM was increased to 1000. After addition of Hydroxy Propyl Methyl Cellulose, Hydroxy Propyl Cellulose and Polyethylene Glycol was added. Stirring was continued for 2 to 3 hours at an RPM of 1000 to 1500. Further, drug (turmeric/*Aloe vera*) was added and stirring was continued. Entire glass beaker contents were transferred to a petri-dish pre coated with glycerine and kept for drying at normal room temperature.

Clinical Procedure

Plaque index, gingival index and clinical attachment level were recorded by a William's graduated probe (Figure 1). Full mouth scaling and root planning were performed and test sites for group 2 received intra pocket placement of *Aloe vera* and control site received turmeric chip. All clinical parameters were recorded at baseline, 21 and 90 days.

RESULTS

52 sites were treated in both groups. Every patient tolerated the chips well & there were no complications or adverse reaction to the *Aloe vera* & turmeric chip. Soft tissues healed within normal limits. Both group showed improvement in site specific & full mouth plaque scores, but improvement was not statistically significant between groups at any time point for site specific plaque (Table 1). Improvement in plaque score was significantly greater in the aloe group compared to turmeric group at 3 months (Table 1). The gingival index (GI) in both group showed no difference at baseline & at 21 days, but there was a significant decrease in the GI score in the Aloe group compared to turmeric group at 3 months (Table1). PD & CAL also showed no difference in both group at baseline & at 21 days & showed significant PD reduction & CAL at 3 months (Table 2). Aloe group compared to turmeric group at 3 months showed significant mean PD reduction and CAL gain (Table 3).

DISCUSSION

Aloe vera is a plant of various medicinal properties. The medicinal value of the plant lies in a gel-like pulp obtained on peeling the leaves which is thought to contain certain substances which account for its remarkable healing, anti-inflammatory, and antiseptic properties. These substances include lignins, saponins, vitamins, minerals, enzymes, amino acids, anthroquinones, etc^{6,7}. Lignins are the cellulose-based substances which have the capacity to penetrate the tissue and carry elements with it, and saponins are the glycosides that promote cleansing and provide an antiseptic quality. Vitamins include Vit A

which is necessary for integrity of epithelial cells, Vitamin C which helps in connective tissue regeneration (collagen synthesis), and Vitamin E which is an antioxidant and neutralizes free radicals by donating one of their electrons, ending the electron stealing reaction. The antioxidant nutrient, however, does not become a free radical by donating an electron because they are stable in either form. It also contains minerals that increase tensile strength of wound, so helpful in early wound healing; anthroquinones which are similar to alkaloids produce analgesia and have healing, antibacterial, antiviral, and antifungal properties. Sugars such as polymannose, glucose, and fructose which have immune modulating and anti-inflammatory actions and amino acids that are the building blocks for repair and regeneration of traumatized tissue are also found in the *Aloe vera* gel. Thus along with the healing, anti-inflammatory, and antiseptic properties, it is bactericidal, fungicidal, and virucidal. The present study compares the clinical efficacy of *Aloe vera* and turmeric chip for the treatment of chronic periodontitis, showing significant improvement in clinical parameters to turmeric chip. To our knowledge, there have been no studies reporting the use of *Aloe vera* chip as local drug delivery in the treatment of chronic periodontitis patients.

According to a study conducted by Davis *et al.* in 1989 use of *Aloe vera* gel improve wound healing by increasing blood supply, by increasing oxygenation to the affected tissue⁸.

For both the groups, plaque index and gingival index CAL were assessed at baseline, 21 days, and 90 days.

Plaque index was assessed at seven days. Probing depth, gingival index, CAL was not determined at that time. At 21 days interval, the flora supposed to return to pretreatment pattern after 3 to 6 weeks. The 90 days interval was selected to typical patients recall after periodontal treatment. Throughout the 90 days of the study group 1 and 2 reported significant reduction in plaque and gingival index. Antibacterial and anti-inflammatory property of turmeric and *Aloe vera* is mainly responsible for reduction in the clinical parameters. Similar results were reported by Sudworth who found *Aloe vera* to be a powerful antiseptic in periodontal pockets⁹. Barrantes *et al* in 2003 reported that the effect of *Aloe vera* gel on the activity of microbial and human metalloproteinases and found that a collagenase from *Clostridium histolyticum* was dose dependently inhibited by the *Aloe vera* gel and an active *Aloe vera* gel fraction containing phenolics and aloins. They also suggested that due to some chemical structural similarity between aloins and tetracyclines, aloe derivatives could inhibit metalloproteinases through a mechanism similar to that of inhibitory tetracyclines such as doxycycline¹⁰. Similarly for gingival index, the significant difference may be due to addition of anti-inflammatory and antiseptic qualities of *Aloe vera*. Oliveria *et al* (2008) also reported significant reduction in plaque and gingivitis with use of dentifrice containing *Aloe vera*⁵. Dilip *et al* demonstrated that *Aloe vera* was as effective against *Candida albicans*, *Streptococcus mutans*, *Lactobacillus acidophilus*, *Enterococcus faecalis*, *Provetella intermedia* and *Peptostreptococcus anaerobius*¹¹.

Table 1: Plaque and mean gingival index for *Aloe vera* & turmeric group at different time intervals

Clinical parameters	Baseline		21 days		3 months	
	Aloe	Turmeric	Aloe	Turmeric	Aloe	Turmeric
Plaque score	0.89±0.50	0.92±0.37	0.56±0.41	0.62±0.33	0.30±0.27	0.51±0.35
t value	0.131		0.437		5.418	
p value	0.737		0.510		0.025	
Gingival index	2.51±0.53	2.40±0.78	1.08±0.84	1.31±0.47	0.50±0.53	0.94±0.47
t value	0.186		1.556		5.775	
p value	0.669		0.210		0.020	

Table 2: PD and CAL in *Aloe vera* group and turmeric group at different time interval

Parameters	Visit	<i>Aloe vera</i> group	Turmeric group	t value	p value
PD*	Baseline	7.65±2.10	7.69±2.22	0.06	0.803
	21 days	6.00±1.98	6.85±2.10	2.53	0.111
	3 months	3.65±1.28	6.04±1.68	25.05	<0.001
CAL†	Baseline	6.12±1.88	5.96±1.98	0.09	0.09
	21 days	4.45±2.35	5.19±2.29	1.23	0.271
	3 months	2.85±1.82	4.45±2.12	9.50	0.003

*probing depth, †Clinical attachment level

Table 3: Change in mean PD and CAL in *Aloe vera* and turmeric group from baseline to 21 days and 3 months

Parameters	Visit from baseline	<i>Aloe vera</i> group	Turmeric group	t value	p value
Mean PD	21 days	1.65±1.19	0.72±1.48	7.58	0.008
	3 months	4.00±1.30	1.65±1.25	34.20	<0.001
Mean CAL	21 days	1.65±1.03	0.78±1.69	5.06	0.029
	3 months	3.28±1.08	1.42±1.80	20.41	0.001

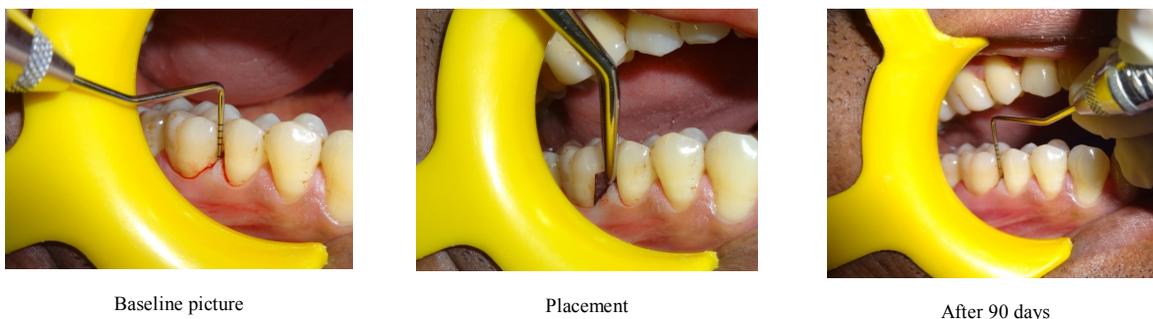


Figure 1: Clinical pictures of *Aloe vera*



Figure 2: Clinical pictures of turmeric

CONCLUSION

Under our experimental conditions, this clinical trial demonstrates that local drug delivery of *Aloe vera* chip into the periodontal pocket stimulated a significant increase in pocket depth reduction and clinical attachment level gain compare to turmeric chip as an adjunct to scaling and root planning in chronic periodontitis patients. The result of the present study suggested that the local drug delivery of *Aloe vera* and turmeric chip improved the periodontal status. However long term, multicentre randomized, controlled clinical trials are required to know its clinical histologic effect on periodontal tissues in patients with chronic periodontitis. Standardized medicinal extract such as *Aloe vera* were more effective than turmeric. The materials used in the present study were accepted biologically by the oral tissues with no side effects. All these findings encourage the use of *Aloe vera* in the treatment of periodontal problems. It can become an important part of preventive and therapeutic treatment available for periodontal disease.

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Cite this article as:

Surekha Rathod. Clinical efficacy of *Aloe vera* chip as an adjunct to nonsurgical therapy in the treatment of chronic periodontitis. Int. J. Res. Ayurveda Pharm. 2015;6(4):516-519 <http://dx.doi.org/10.7897/2277-4343.06498>

Source of support: Nil, Conflict of interest: None Declared

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