

Local Drug Delivery of Aloe Vera Gel in Chronic Periodontitis Patient

Abstract:

Background: Aloe vera (AV), have been used for both medical and dental therapy.

AV has anti-inflammatory, antioxidant, antimicrobial, hypoglycaemic, healing promoting and immune boosting properties. This study aims at investigating the clinical effectiveness of locally delivered AV gel as an adjunct to scaling and root planing (SRP) in the treatment of chronic periodontitis (CP).

Material And Methods: Sixty patients with probing depth (PD) ≥ 5 mm and clinical attachment (CA) level ≥ 3 mm were randomly allocated into two groups. All patients underwent SRP. Aloe vera gel was locally delivered in Group 1 patients and placebo gel in Group 2 patients. Clinical recording of full mouth plaque index (PI), Bleeding index (BI), probing depth (PD) and clinical attachment (CA) level was done first at baseline and then at intervals of 3 months and 6 months.

Result: Patients in AV group showed significantly greater mean reduction in PI, BI and PD and mean gain in CA level compared to those in placebo group from baseline to 3 months. Gain in CA level was significantly greater in AV group at all time intervals than the placebo group.

Conclusion: Aloe vera gel an herbal product is proved to be advantageous as adjunctive use of Aloe vera gel in comparison to placebo gel, is associated with greater mean reduction in PI, BI and PD as well as more gain in CA level in chronic periodontitis

Key-words: Chronic periodontitis, scaling, Regeneration, Aloe vera

Introduction:

Chronic periodontitis (CP) is the inflammation of periodontium caused by microbes leading to gingival inflammation, periodontal tissue destruction and alveolar bone loss[1].

These microbes modulate the inflammatory response, various host-response modulation therapies and local drug therapies have been developed to block the exaggerated host response responsible for periodontal tissue breakdown[2].

Local drug delivery (LDD) systems, is a effective adjunct to SRP, which provide controlled release of an agent at specific subgingival sites, thus translating into high concentrations at the target site with reduced dosage, fewer side effects compared to systemic drugs, and high patient acceptance.

Aloe vera is natural therapeutic agent which has antiseptic, antiviral and antifungal properties as the inner gel is surrounded by polysaccharides which are able to defend our body from all microbial attacks and the use of this plant is proved beneficial, as it is non allergic and improves immunity[5].

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Aloe vera is gaining popularity in dentistry as it is completely natural and there is no side effects being reported with its use. It is the source of 19 out of 20 essential amino acids which is required by our body and these amino acids help in smooth functioning of our complex enzyme system . Another benefit of aloe Vera is its source of vitamins, which includes A,B C,E and folic acid Aloe vera gel has anti-inflammatory effect as the extracts of this gel has inhibitory action on the arachidonic acid pathway via cyclooxygenase inhibiting inflammation. Hence it could be helpful in the treatment of inflammatory Gingival diseases like gingivitis, periodontitis[6].

There are evidence that Aloe vera gel also inhibits the growth of candida albicans, which is the most common candida species in the oral cavity.

Studies have demonstrated that the following constituents of aloe vera gel possesses antioxidant properties. The Three aloesin derivatives are isorabaichromone, feruoylaloetin, and p-coumaroylaloetin) showed potent free radical and superoxide anion activity[7].

There is scarcity of evidence showing the adjunct effect of aloe vera gel in periodontal treatment. Best of knowledge there is no study conducted in Rajasthan as adjunct to scaling and root planning.

Thus, this study is done to clinically evaluate the effects of local application of aloe vera gel as an adjunct to SRP in patients with chronic periodontitis.

Material and Method Source of Data:

This is a randomized controlled clinical trial, the patients were selected from the outpatient section of the Department of periodontology, Government Dental college and hospital Jaipur, Rajasthan. The ethical committee, RUHS COLLEGE OF DENTAL SCIENCE gives the ethical clearance for the study.

Selection Criteria :

Inclusion criteria- Patient with chronic periodontitis with moderate to deep pocket (probing depth >5mm, and clinical attachment loss>3 mm) .

Exclusion criteria were- Allergy to Aloe vera, smoking, alcoholism, immunocompromised patient, pregnant or lactating women.

Patients were randomly allocated into two groups (30 patients in each treatment group). One site per patient i.e. the site with the maximum probing depth, and CA loss received SRP at baseline until the root surface appear smooth and clean, followed by the LDD (In Group 1) OR AV GEL (In Group 2). No medications were prescribed after treatment . clinical parameters include Bleeding Index , PD and CAL were recorded at baseline(before SRP) and at 3 Months, and 6 Months after LDD. A university of North Carolina (UNC 15) Probe was used to measure the PD AND CA Level.

Formulation of Aloe Vera Gel:

The Aloe vera gel was prepared at LAL BAHADUR SHASTRI COLLEGE OF PHARMACY RAJAPARK JAIPUR, (RAJASTHAN)

Local Drug Delivery:

A blunt cannula was used to deliver 0.1 ml of the prepared placebo or Aloe vera gel into the periodontal pockets at control and the test site. After the delivery of placebo and Aloe vera gel into the periodontal pocket, we applied periodontal dressing. After insitu gel placement, patient were instructed to avoid brushing or using any interdental aids near the treated area or chewing hard or sticky foods for 1 week. At recall visits, supragingival deposits were removed and adverse effects , if any were noted.



Results:

All the 60 patients completed the study. No patients showed any adverse reaction or reported any discomfort.

Inter-group comparison shows that there was a significantly greater mean reduction in all parameters from baseline to 3 months in the AV group than the placebo group. AV group also showed significantly greater mean reduction in PI and BI in the 3-6 months interval as well as in PD from baseline to 6 months. Mean gain in CA level was significantly greater in the AV group at all time intervals than the placebo group.

Group	N	Mean	Std. Deviation	Std. Error Mean	Median	Mann-Whitney U value	Z value	p value of Mann-Whitney U test
PD B to 3M	1	31	1.35	.551	.099			
	2	30	.63	.999	.182	273.500	-2.992	0.003**
PD B to 6M	1	31	2.77	.805	.145			
	2	30	1.13	1.106	.202	115.500	-5.218	0.000**
PD 3M to 6M	1	31	1.42	.564	.101			
	2	30	.50	.509	.093	142.500	-5.181	0.000**
PI B to 3M	1	31	.84	.374	.067			
	2	30	.17	.791	.145	228.000	-3.871	0.000**
PI B to 6M	1	31	1.61	.495	.089			
	2	30	.57	.838	.157	154.500	-4.819	0.000**
PI 3M to 6M	1	31	.77	.425	.076			
	2	30	.40	.498	.091	291.000	-2.946	0.003**
BI B to 3M	1	31	1.23	.425	.076			
	2	30	.17	.747	.136	123.500	-5.391	0.000**
BI B to 6M	1	31	2.10	.539	.097			
	2	30	.57	.898	.164	75.500	-5.922	0.000**
BI 3M to 6M	1	31	.87	.428	.077			
	2	30	.40	.498	.091	255.000	-3.362	0.000**
CAL B to 3M	1	31	1.29	.461	.083			
	2	30	.47	1.137	.208	273.500	-2.980	0.003**

Discussion:

Periodontitis is a infectious inflammatory disease. Various host-response modulation therapies and local drug therapies are developed to block the pathways responsible for periodontal tissue breakdown[1].

The first treatment goal in periodontal disease is changing or removing microbial origin and risk factors[13].

Mechanical plaque control is used to remove local factors responsible for gingivitis and periodontitis.

Chemical plaque control agents are used as an adjuvant as they have the ability to inhibit growth and metabolism as well as colonization of bacteria but , all are associated with various side effect². So, Use of herbs for dental care is very common in

indigenous system of medicine and herbs like Terminalia chebula, Aloe vera, Azadirachta indica, piper betle[12].

Aloe Vera is the most accepted species for various medical, cosmetic, and nutraceutical purposes. The composition of Aloe Vera is complex[14].

Aloe vera is a cactus-like plant containing 75 active ingredients such as vitamins, enzymes, minerals, sugars, lignin, saponins, salicylic acids, and amino acids[13].

The pharmacological actions of Aloe Vera gel are anti-inflammatory, antibacterial, antioxidant, immune-boosting and hypoglycaemic properties[14].

Similar oral hygiene instructions was given in subjects of both the group by a Blinded investigator.

Aloe vera contains various anti-inflammatory agents such as carboxypeptidase, which reduce prostaglandin synthesis, magnesium lactate, which inhibits histidine decarboxylase preventing mast cell activity, sterols, and lupeol as pain modulators[1].

As in our study, **probing depth and Bleeding index** was reduced in Test group as compared to control group. This is because aloe vera reduces edema of the soft tissues and consequently reduces the bleeding of the gums and exhibits strong antiseptic action in gingival pockets where normal cleaning is difficult[17,18].

The results of the present study are similar to the studies by **Harjit Kaur Viridi, (2012)**[19] on Effect of locally delivered aloe Vera gel as an adjunct to scaling and root planning in the treatment of chronic periodontitis

Aloevera also shown its anti-microbial potential against Streptococcus pyogenes and Streptococcus faecalis¹⁵.It exhibits strong antiseptic action in gingival pockets where normal cleaning is difficult[15].

The main active ingredients in the Aloe vera gel is acemannan.It also contains aloin , aloemodin, aloemannaan aloeride, naftoquinones, methylchromones, flavonoids, saponin, sterols, amino acids and vitamins in trace amounts[1].

Aloe vera applied in test site resulted in significant reduction in pocket depth when compared to controls and reduction in gingival index, which can be attributed to its anti-inflammatory, antibacterial, wound-healing properties.

Aloe vera can be applied topically, is easily available, safe to use, cost effective, non-invasive and effective treatment modality for periodontitis[14].

The decrease in gingival index can be attributed to presence of sterols as anti-inflammatory agents and lupeol as an antiseptic analgesic also.

Effect of aloe vera mouthwash on periodontitis reduces prostaglandin synthesis from arachidonic acid, thus reducing inflammation[15].

Aloe vera is also shown to provide relief in swelling, bleeding gums and is an antiseptic for pockets and antifungal for thrush. The low plaque index observed in these subjects could be explained by the fact that Aloe vera is a good antibacterial.

There was no discomfort, hypersensitivity or abnormal tissue reactions observed in the present study.

Considering these facts, direct subgingival delivery of AV as an adjunct to SRP can be proposed as a better approach for treatment of periodontal pockets

Conclusion:

It has been demonstrated for this clinical trial that AV Gel, delivered locally into periodontal pocket as an adjunct to SRP with chronic periodontitis patients. Aloe vera stimulated a significant improvement in clinical parameters as compared to placebo Gel.

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