

Original Research Article

A comparative study between aloe vera gel dressing and conventional dressing in chronic wounds

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ABSTRACT

Background: The aim of this study was to evaluate the effectiveness and rate of healing of Aloe vera gel in treatment of chronic wounds, to compare the effectiveness of Aloe vera gel with conventional dressing (normal saline and povidone iodine) and to assess the percentage reduction of wound healing with Aloe vera gel dressing.

Methods: The study was conducted at Dr. D. Y. Patil Medical College and Hospital, DPU University, for a period of 2 months (from January 2017 to March 2017) and is a prospective and comparative randomized type of study using 50 cases (Group A and Group B, 25 each). The study was approved by the Institute's Ethics Committee.

Results: Data analysis showed that at the end of 4 weeks, mean surface area in Group A is reduced to 4.58 cm² from 9.79 cm² which is higher than that in the control group. Also, the average rate of healing in Aloe vera gel is more than control group. Percentage reduction in ulcer surface area was calculated to be much more in Group A as compared to Group B.

Conclusions: The study concluded that Aloe vera gel is highly effective in treatment of chronic ulcers and stimulates the growth of wound healing. Thus, reducing the hospital stay. Apart from being efficacious in wound healing, Aloe vera gel is safe product. No allergic reactions/infections were associated with Aloe vera gel. Aloe vera gel not only heals faster but is also cost effective.

Keywords: Aloe vera gel, Chronic non-healing ulcers

INTRODUCTION

Chronic wounds are the defect in the skin that shows no tendency to heal after 3 months of appropriate treatment or is still not fully healed at 12 months.¹ Ulcers can be defined as wounds with a "full thickness depth" and a "slow healing tendency".² A correct diagnosis is essential to avoid inappropriate treatment that may delay wound healing, cause deterioration of the wound, or harm the patient. Despite of many advances in technology and research, chronic ulcers takes a lot of time to heal by the conventional methods. Hence a newer intervention is required which not only ensures quick healing but is also cost effective. One of such agent is, Aloe vera gel.

There are various substances which can be used for dressing on chronic wounds but Aloe vera has been taken for the present research project as all it needs a plant of Aloe vera from where we can have the gel present inside the leaves as and when required.

It is a natural source which can be of huge benefit. It is not only feasible and easily available but the study is carried out to witness the reduction in healing time with the use of Aloe vera gel.

The aim of this study is to evaluate the effectiveness and rate of healing of Aloe Vera gel in treatment of chronic wounds, to compare the effectiveness of Aloe Vera gel

with conventional dressing (normal saline and povidone iodine) and to assess the percentage reduction of wound healing with Aloe vera gel dressing.

METHODS

The study was conducted at Dr. D. Y. Patil Medical College and Hospital, DPU University, for a period of 2 months from January 2017 to March 2017 and is a prospective and comparative randomized type of study using 50 cases (Group A and Group B, 25 each). The study was approved by the Institute's Ethics Committee.

Inclusion criteria

- Gender: both male and female
- Age: 15 to 70 years of age
- Type of wounds: chronic wounds less than 10 cm² diameter in size.

Exclusion criteria

- Patients with history of Diabetes Mellitus, HIV AIDS and other immune compromised patients like tuberculosis
- Pregnant women.

Protocol

A consistent protocol for patient management was followed. The protocol included:

- To maintain haemoglobin >11gm%
- Serum albumin >3g/dl
- Deep tissue culture for both aerobic and anaerobic organisms
- Systemic antibiotics according to culture sensitivity
- Periodic sharp surgical debridement
- Patients were also barred from consumption of alcohol/tobacco/smoking.

Patients with infective ulcers were given a course of antibiotics (according to culture sensitivity reports) to cure the infection.

Plan of study

The patients were divided into 2 treatment groups for prospective comparative study:

- Group A (Test Group): Dressing with topical application of Aloe vera gel
- Group B (Control Group): Normal saline and povidone iodine dressing.

For Group A Patients (patients receiving Aloe Vera gel therapy), the ulcers were first cleaned with normal saline to remove off the slough and then the already prepared Aloe vera gel of Patanjali (TN) was evenly applied over the ulcers. It was then covered with a sterile cotton gauge

and the wound was tightly bandaged with a cotton roll to keep the dressing in place daily.

For Group B Patients (control group), normal saline and povidone iodine solution dressings were done twice daily.

Wound monitoring method

Culture sensitivity swabs of all ulcers (both Group A and Group B) were taken and all the ulcers were cleaned with normal saline. Slough was removed by using hydrogen peroxide/debridement of dirty and crusted wounds was done manually under local anaesthesia. Wound measurement of ulcer was done in both test and control groups.

Method of measurement of ulcer

Using a sterile transparent A4 size sheet and a fine tipped permanent black marker, the two largest perpendicular diameters of the ulcer were measured using a ruler.

To calculate the wound area, the two diameters were multiplied to obtain the area in cm². Ulcer size was measured once a week till complete healing of the wound or up to maximum 4 weeks.

RESULTS

The study included 50 patients (25 in test group versus 25 in control group). Effectiveness of both treatment protocols of Group A and Group B was evaluated in terms of percentage healing and change in ulcer surface area at 1, 2, 3 and 4 weeks. Rate of wound healing was also calculated in both groups. Results from all patients who enrolled in the study were tabulated and expressed in mean and standard deviation. Comparison of ulcer surface area is in study groups shown in Table 1.

Table 1: Comparison of ulcer surface area in study groups.

Ulcer surface area (cm ²)	Group A		Group B	
	Mean	SD	Mean	SD
At onset	9.79	8.59	9.36	7.85
At week 1	7.894	6.42	8.192	6.09
At week 2	6.536	6.57	7.34	6.04
At week 3	5.47	5.87	6.47	5.98
At week 4	4.58	4.82	5.86	5.83

Table 1 and figure 1 shows mean surface area (in cm²) in both Aloe vera gel (group A) and control (group B) at onset and at every week up to 4 weeks.

Rate of healing

- Rate of wound healing was calculated as difference between the primary wound at onset of treatment till

4 weeks and is reported in terms of cm²/week as a marker of healing.

- After calculating the rate of wound healing, it is subcategorized as <1 cm, 1 to 2 cm, 2 to 3 cm, 3 to 4 cm, 4 to 5 cm, 5 to 6 cm and >6 cm.
- Then the number of ulcers healing with the respective rates in both group A and group B is calculated.

- Then based on it a bar graph is plotted which shows the rate of healing in both the groups at different weeks.

Mean rate of healing

It is calculated as 1.57 cm² in Group A and 0.9 cm² in Group B.

Table 2: Rate of healing of the ulcers in the study groups over a period of 4 weeks.

Rate of healing (in centimetres square)	In 1 st week		In 2 nd week		In 3 rd week		In 4 th week	
	Group A	Group B						
<1 cm	0	21	2	22	1	19	1	21
1 to 2 cm	22	2	22	2	23	5	23	4
2 to 3 cm	1	1	0	1	0	1	0	0
3 to 4 cm	1	0	1	0	0	0	0	0
4 to 5 cm	0	0	0	0	0	0	0	0
5 to 6 cm	0	0	0	0	1	0	0	0
>6 cm	1	1	0	0	0	0	1	0

Table 3: Percentage change from onset in ulcer surface area in study groups.

Ulcer surface area (cm ²)	Group A			Group B		
	Mean	SD	% change	Mean	SD	Percentage change
After 1 week	7.894	6.42	19.36	8.192	6.09	12.53
After 2 weeks	6.536	6.57	17.2	7.34	6.04	10.36
After 3 weeks	5.47	5.87	16.26	6.47	5.98	11.79
After 4 weeks	4.58	4.82	16.29	5.86	5.83	9.42

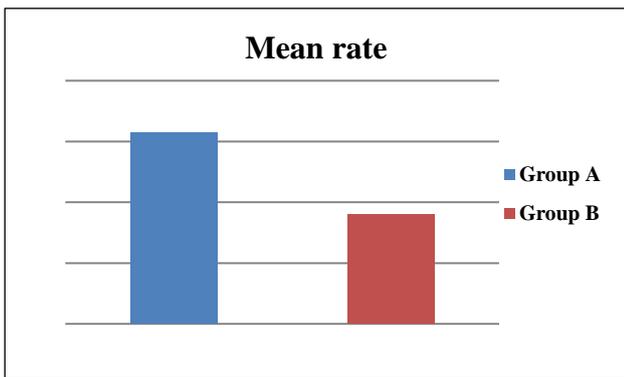


Figure 1: Mean rate of healing in both the groups under study.

Figure 1 shows a significant healing in group A as compared to Group B. Percentage change in ulcer surface area is shown in Table 3.

Results of aloe vera gel therapy observed in group A

Patient number: 1

Duration of ulcer: 6 months

Site of ulcer: ulcer is present over the medial malleolus of left foot.



Figure 4 (a): Before Aloe vera gel therapy.

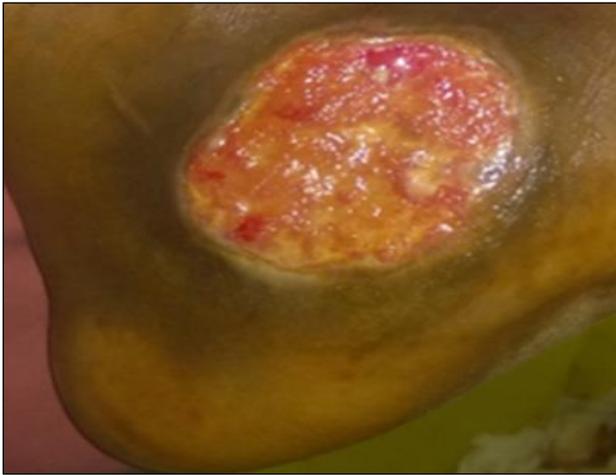


Figure 4 (b): 4 weeks after the use of Aloe vera therapy.

DISCUSSION

During the past 3 decades, the incidence of colorectal Ulcers can be defined as the breach in the continuity of the normal skin or epithelial lining. Ulcers can be acute and chronic. Chronic ulcers are the one which takes a lot of time in healing and can extend from duration of 3 months to 12 months or even more than that depending upon the site, size and type of the ulcer.

Chronic ulcers need proper treatment and attention as they may even present with certain other complications such as bacterial infections which may further delay the course of healing due to increased production of matrix metalloproteases which results in uncontrolled breakdown of ECM and growth factors. Usually seen on the lower limbs these ulcers cause a lot of pain and discomfort to the patient. Chronic ulcers are very common condition which hinders with a person's daily activities. Hence it becomes very important for a clinician to find a cure which requires lesser time and is beneficial and is cost effective.

Wound healing is a complex process that is regulated by interactions between large number of cell types, extracellular matrix proteins and mediators such as cytokines and growth factors.

The use of Aloe vera gel which is a natural product is rich in multiple growth factor and collagenases may provide better healing in a lesser duration similar to the natural wound healing process. Aloe vera (inner gel) contains the 8 essential amino acids that the human body needs but cannot manufacture.³

In a randomized, double-blind, controlled trial of Aloe vera or placebo cream in 60 patients with chronic psoriasis, the cure rate in the Aloe vera group was 83% (with no relapses at 12 months of follow-up) compared to only 7% in the placebo group.⁴

The Aloe vera gel contains fibrin that prevents the bacterial contamination into the wound bed. The growth factors trigger wound healing.

Aloe Vera is claimed to have the following properties:

- Inhibits collagenase and metalloproteinase activity in *Clostridium histolyticum*.⁵
- Exerts cytotoxic effects in normal and malignant tissues.⁶
- Suppresses bactericidal inflammation in human leukocytes.^{7,8}
- Causes antioxidant activities and enhanced phagocytosis in human neutrophils.⁹⁻¹¹
- Cell wall material stabilizes growth factors; 80 inhibits pro-inflammatory cytokines.¹²⁻¹⁴
- Acemannan enhances T cell response through monocyte activation.¹⁵⁻¹⁶
- Induces hematopoietic and hematologic activity of carbohydrate fraction.¹⁷
- Acts as antifungal.¹⁸⁻¹⁹
- Stimulates cell proliferation in keratinocytes by glycoprotein fraction.²⁰
- Accelerates wound healing in diabetic human skin fibroblasts.²¹

Present study included 50 patients (25 in Group A and 25 in Group B), within the age group of 15 to 70 years. The patient in both the Aloe vera gel group and the conventional group were compared for the following: ulcer surface area for 4 weeks, rate of healing, % change in the ulcer surface area.

Ulcer surface area

At the onset of treatment, the ulcer surface areas in both Aloe vera gel and control groups were comparable and not significant. The earliest evidence of granulation tissue formation was seen at week 1 and week 2, which was maximum in patient treated with Aloe vera gel.

By the end of week 3 and week 4, a highly significant difference in ulcer surface area was observed in between the study groups and in the Aloe vera gel groups.

Rate of wound healing

Results from the present study indicate that the rate of wound healing in the Aloe vera gel group was with a mean healing rate of 1.57 cm² which was found to be only 0.9 cm² in the conventional group showing a significant healing in group A.

Similar results were observed in the study by Roberts et al and Atiba et al.^{22,23} On the contrary, another randomized controlled trial involving women with complications of wound healing after gynecological surgery found that the mean healing time in the conventional care group (53 days) was significantly

shorter ($p < 0.003$) than in the Aloe vera gel group (83 days).²⁴

% reduction in Ulcer surface area

In the present study, percentage reduction in the ulcer surface area was calculated weekly in both the Aloe vera gel group and the conventional therapy group.

Percentage reduction was found more every week in Aloe vera gel group as compared to the conventional group.

Similar results were observed in a randomized blind controlled clinical trial which showed a cure rate of 83% with Aloe vera gel.⁵

Safety of Aloe vera gel

No allergic reactions or infection was observed in any of the patient treated with Aloe vera gel.

CONCLUSION

- Aloe vera gel is highly effective in treatment of chronic wounds. Aloe vera gel stimulates the growth of the epithelium and increases wound healing. It also stimulates the granulation tissue. Thus, decreases the hospital stay.
- Apart from being efficacious in wound healing, Aloe vera gel is also a safe product. No allergic reactions/infections were associated with Aloe vera gel.
- Aloe vera gel heals wound faster as compared to the conventional therapy.
- Aloe vera gel is very cost effective as compared to the conventional therapy.
- In addition, studies to determine whether this novel therapy is synergistic with other advanced wound care modalities could be conducted.

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Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

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