

## Evaluating the Effect of Aloe Vera Plant Ointment on Pain Reduction of CABG Surgery Ulcer in Diabetic Patients

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CABG surgery is commonly used in the treatment of cardiovascular diseases in diabetic patients. This treatment procedure causes severe pain and large sores in the sternum of diabetic patients. The effect of Aloe Vera's plant on healing of the wound and reducing the pain of the surgical wound in patients was investigated. 60 patients from the diabetic patients, who referred to Imam Ali Hospital in Kermanshah for CABG operation, were randomly divided into two groups of intervention and control groups. Wound healing was evaluated on days 4, 7, and 14 after operation and daily washing with % Aloe Vera ointment, by means of Bates-Jensen wound healing scale. The amount of pain was evaluated with Visual Analog Scale (VAS) on days 3, 4, and 7 after intervention. SPSS 16 was used to analyze the data. In this research, in order to describe the methods, descriptive statistics including frequency distribution, mean, standard deviation, and in relation to the objectives and research fields and the homogeneity of the samples Chi-square and independent T-test were used. The mean and standard deviation of the total score of wound healing was compared between the two groups on days 7 and 14 after dressing were  $P < 0001$ , which shows the significant difference between the healing of two groups. The rate of healing was more in Aloe Vera group. The present study shows that using Aloe Vera ointment for at least 3 days reduces the pain of the surgical wound and at least 1 week of using Aloe Vera ointment promotes the healing of surgical wound in diabetic patients.

**Keywords:** Aloe Vera ointment, Wound healing, coronary artery bypasses surgery, diabetic patients.

Diabetes mellitus is the most common disease caused by metabolic disorders. The pathogenicity of this disorder, both in terms of medical costs and severity of disability, is one of the main human health issues (Khani Jeyhooni *et al.*, 2010).

Its global prevalence is very high and still rising. Approximately 150 million people

worldwide are affected, and it is expected that this figure will double in the next 20 years. Nowadays, more than 3 million people in Iran have diabetes, which is expected to reach nearly 7 million by 2030 if no effective action is taken, according to the WHO (Welschen, 2008). This disease has micro-vascular and macro-vascular complications in such a way that cardiovascular complications, stroke and

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lower limbs are the main causes of its treatment costs (Freeman and Cox, 2006). Diabetes, as a health problem threatening the quality of life of patients, can lead to acute and severe given that the life expectancy of diabetics is 10 years less than the general population due to its complications and complications and it is one of the major causes of disability in many countries. Some of these years have very poor quality due to the likelihood and fear of premature death due to illness and a number because of their life with diabetes-related disabilities. 15% of people with diabetes mellitus suffer from lower limb ulcers due to the lack of molecular cellular signaling required for the wound healing process, such as the formation of granulation, epithelization and fibroplasia. Diabetes has many side effects, such as delayed stomach healing, cardiovascular disease, acute diabetic ketoacidosis, side effects of the eye and atherosclerosis and neuropathy and retinopathy. Diabetic patients are twice more likely to suffer from coronary artery disease and three times more likely to suffer from stroke than normal people. The medical plant *barbadensis* with its scientific name Aloe Vera is a plant of the Liliaceae, from flowering plant and the family and the rank of Monocotyledons. This native North African herb has healing effects, anti-inflammatory, analgesic, antibacterial, bacterial, antifungal, laxative, anti-irritation and anti-inflammatory properties (Choi *et al.*, 2001). Saponin, found in *barbadensis*, naturally has cleansing property as well as antifungal and anti-bacterial properties. Laboratory studies have shown that the carboxy peptidase found in *barbadensis*, inactivates Bradykinin, which is the powerful factor that forms the pain in acute inflammation, and reduces pain in the treatment site (Schmidt and Greenspoon, 1991). Salicylic acid acts as an inflammatory drug by inhibiting the production of prostaglandin. In addition, the *barbadensis* of collagen content increases tissue granules and it appears effective with Anti-inflammatory properties in wound healing process (Barcroft *et al.*, 2003).

A study has shown that *barbadensis* not only helps to improve the cell structure of the fibroblasts, but also accelerates the collagen production process (*ibid*).

About the effect of Aloe Vera gel on the subcutaneous wound, it has shown that the Aloe

Vera gel is much more cost effective than the current treatment in terms of the quality and speed of wound healing (Schmidt and Greenspoon, 1991).

It has been shown that the use of the Aloe Vera ointment significantly reduces the pain of episiotomy ulcers and significantly reduces the need for pain killers (Khayat-zadeh and Ranjbar, 2011).

Given the above, it is clear that two of the main problems of diabetic patients are cardiovascular disease and delay in healing wounds (Harris and Bates-Jensen, 2010). Since CABG is the main treatment for cardiovascular disease in diabetic patients, definitely diabetic patients who have performed CABG surgery have a problem with delayed healing of surgical wounds. In many studies, the beneficial effects of Aloe Vera Gel and extract on healing of other non-diabetic wounds have been confirmed. Therefore, the researcher decided to review the effect of 2% ointment on reducing the pain and wound healing of diabetic patients and compare them (Gaede *et al.*, 2003).

## METHODS AND MATERIALS

This is a randomized clinical trial including an intervention group and a control group. In this study, the type of intervention (Aloe Vera ointment) performs as independent variable and the wound healing of dependent variable. The research sample consisted of 60 diabetic patients who implemented coronary artery bypass surgery in Imam Ali (AS) Hospital of Kermanshah, had the entry requirements in the study, and divided into two groups with the consent of the company. Entry requirements include the following cases:

- Coronary artery bypass graft surgery
- type 2 diabetes mellitus for at least 2 years
- lack of underlying diseases such as malnutrition, skin diseases and endocrine glands diseases
- The lack of allergy to the Aloe Vera ointment, which was determined by scrubbing the ointment to the right arm for 20 minutes.
- Lack of consuming effective drugs for wound healing, such as corticosteroids, immunosuppression and cytotoxic drugs.
- Lack of consuming alcohol
- Lack of catching post-CABG surgery complications such as diaphragmatic paralysis,

**Table 1.** Compare the healing rate on days four, seven and fourteen after dressing

Healing Group	4 <sup>th</sup> day after dressing M±SD	7 <sup>th</sup> day after dressing M±SD	14 <sup>th</sup> day after dressing M±SD
Aloe Vera	23/9±/82	22/9±/82	16/4±1/6
Control	23/4±1/3	20/2±1/5	20/8±/88
Test	Independent T	Independent T	Independent T
P-Value	P=/071	P</0001	P</0001

**Table 2.** Comparison of pain in days 3, 4 and 7 after dressing

Pain Group	3 <sup>th</sup> day after dressing M±SD	4 <sup>th</sup> day after dressing M±SD	7 <sup>th</sup> day after dressing M±SD
Aloe Vera	5/7±1/6	3/9±1/4	2/1±1/2
Control	7±1/3	6±1/3	4±1/3
Test	Dependent T	Dependent T	Dependent T
P-Value	P=/001	P</0001	P</0001

myocardial infarction, pneumothorax, hemotourax and respiratory failure

- Lack of addicting drugs and psychotropic drugs
- Lack of previous history of scars and surgery in the sternum area, and withdrawal of patient from continuing to participate in the research.
- Excessive need for painkiller and its prescription by the doctor
- And need for re-surgery

The survey tool consisted of three parts: the first part was related to demographic information such as age, gender, income, level of education, daily exercise. The tool to analyze wound healing is Bates-jensen wound assessment tool or BWAT. This tool is designed to investigate all types of wounds, designed in 2010, and its reliability and validity has been approved by the study of Malek Hosseini *et al.* This tool contains 13 items of which 12 items are evaluated below. The items include the size of the wound, the wound depth, the wound edges, the underlying tissue damage, the type of necrotic tissue, the amount of necrotic tissue, the type of exudate, the amount of exudates, the color of the skin around the wound, the edema around the wound, the granulation, and the wilting of the wound. Visual Analog Scale (VAS) was used to assess pain. This scale was prepared by Maxwell 60 years ago and used to determine the severity of

pain. It has a high confidence and it is in the form of a 10 cm ruler of which the left side shows the lack of pain and its right end shows the pain. This scale is used in patients with Acute, chronic and progressive clinical pains and it is easy for the patient to learn. The procedure was performed on the second day after the surgery after thawing of the wound with povidone-iodine and removing the dressing with a two-three-millimeter layer of Aloe Vera 2% ointment on the wound of the sternum area of the patients. In the control group, the wound only washed daily with povidone-iodine. Dressings were changed every 24 hours and this was done for 14 days. Since several factors such as age, exercise etc. affect the wound healing process, the distribution of samples in two groups was done randomly to homogenize the samples of the study. Aloe Vera ointment was developed in the Research Institute of Medicinal Plants of the University Jihad in Karaj, in collaboration with a researcher in 25 grams jars. The wound healing rate was evaluated in three groups 4, 7, and 14, some days after the intervention using the tool BWAT. The wound pain rate was evaluated on the 3<sup>rd</sup>, 4<sup>th</sup>, and 7<sup>th</sup> days after the intervention using visual analog scale.

SPSS 16 was used to analyze the data. In this research, in order to describe the samples descriptive methods including descriptive statistics, frequency distribution, mean, and standard deviations are used and about the objectives and

research fields and the homogeneity of the samples chi square test and independent T test were used.

## RESULTS

According to Chi-square test, samples were homogeneous in terms of age, gender, income, education, and daily exercise. The mean and standard deviation of total wound healing score on day 4 after dressing was calculated with independent T-test and compared between two groups, which is  $P = / 71$  and it does not show significant difference between the two groups. On the days 7 and 14, after dressing,  $P < 0.0001$ , which showed a significant difference in the healing rate of the two groups and the healing rate in the Aloe Vera group was higher.

The mean and standard deviation of pain in two groups were compared on the 3<sup>rd</sup> day after dressing by independent t-test and  $P = / 001$ . On day 4 and 7, dressing was  $p < / 0001$ , indicating a significant difference in the pain rate of the two groups in these three days. The pain was less in Aloe Vera group. The amounts are shown in tables 1 and 2.

## DISCUSSION AND CONCLUSION

This study showed that Aloe Vera ointment can be useful at least three days after use in reducing pain in the surgical wound. It also indicates that the consumption of this product can speed up the healing of surgical wound in diabetic patients at least 7 days after use and, therefore, it solves one of the main problems which are delay in wound healing for diabetic patients. In a study by Fereshteh Jahdi *et al.* in 2011, titled "Effect of Aloe Vera and marigold on the severity of episiotomy pain in primiparous women", there was no significant decrease in pain intensity 8 and 12 hours after episiotomy compared to control group. But on the 5<sup>th</sup> day after the intervention of the mothers, the Aloe Vera group had a significant decrease compared to the control group. However, this study is not complete because the dosage of Aloe Vera ointment is unclear, and since Aloe Vera Ointment is made by pharmaceutical companies and is not made by the researcher itself, it is unlikely to be pure and contains other herbal and

chemical soothing substances. But in the current study, the ointment dosage is determined and additive material is not used in the ointment. On the 4<sup>th</sup> day after intervention, there was no significant difference in the healing rate between the three groups. In a non-consistent study, by Eghdam Pour *et al.*, 2011, entitled "the effect of Aloe Vera plant ointment on episiotomy healing in primiparous women, there was a significant different between the healing of Aloe Vera and control group on day 5 and Aloe Vera group had better recovery. As noted above, this study did not mention the dose of Aloe Vera ointment. Perhaps a higher dosage has been used in this study, and every 8 hours dressing has been repeated with ointment. While in the current study, 2% Aloe Vera ointment was used daily. In a study by Smith *et al.*, 1991, entitled "Investigating the effect of Aloe Vera Gel on restoration of longitudinal and transverse cuts due to abdominal surgery in women", it was shown that Aloe Vera gel does not have an effect on surgical wound healing. On day 7 and 14, the intervention group had more healing. In a coherent study by Ghaffarzagdegan *et al.* (2013) entitled "the comparison of the effect of Aloe Vera gel and sulfadiazine 1% cream on the healing of grade 2 ulcer wounds from mucilage, Aloe Vera (gel) was applied to grade 2 burn wounds for 15 days and healing of the wound was examined with Bets Johnson tool. This trial was performed at Vali-Asr Hospital in Arak. 32 patients were dressed with Aloe Vera gel and 32 patients with silver sulfadiazine cream 1% daily. The healing of the wound was investigated on days 7 and 15. The results showed that healing with Aloe Vera gel on days 7 and 15 was significantly different from the control group and the wound healing of Aloe Vera group was better.

In a study of the comparison of the effects of Aloe Vera gel and lanolin ointment on the treatment of nipple fissure in lactating mothers used two products for one week. In the comparison that was done at the 3<sup>rd</sup> and 7<sup>th</sup> days after the intervention, it was shown that the group that consumed Aloe Vera Gel was better in healing of fissure and the two groups had significant statistical differences. In this study, Aloe Vera gel was used which its effective amount is much less than the ointment of 2% and it suggests that perhaps the lower doses of Aloe Vera could be effective in

healing the wound. Therefore, it is advisable for further researchers to consider the therapeutic effects of other doses of Aloe Vera ointment.

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