



Studying the Effect of *Aloe Vera* Ointment on Wound Healing of CABG Surgery in Diabetic Patients

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ABSTRACT

One of morbidities of diabetes is delay in wound healing. Among treatment common procedures in diabetic patients with coronary artery bypass graft. Therefore, delay in CABG wound healing is one of common problems of diabetic patients. *Aloe vera* plant contains collagen which heightens the tissue granules and contributes in wound healing process with its anti-inflammatory properties. Thus, the researcher tries to examine the effect of *Aloe vera* on wound healing. The study was random clinical trial with intervention and control groups. 60 diabetic patients who attended to Imam Ali Hospital, Kermanshah for CABG surgery have been assigned to two 30-person groups as intervention and control groups. From second day after surgery, after putting out the sternum area chip pipe of intervention group patients, after washing with betadine they were bandaged by 2% *Aloe vera* ointment which was made by Karaj academic Jihad organization medicinal herbs research center in a daily basis. In control group only daily washing with betadine and bandage has been done. This has been conducted till 14 days after surgery. Wound healing in days 7, 4 and 14 after surgery has been evaluated by Bates Jensen wound healing scale. One used SPSS version 16 for analyzing the data. In this study, for describing the samples, one used descriptive statistical methods including tables of frequency distribution, determining average, SD and when it comes to study objectives and hypothesis, determining the homogeneity of samples one uses Chi two and Mann Whitman non-parametric test. Mean and SD of total score of wound healing of two groups is calculated at day 4 after intervention by independent Mann Whitman test that $P > 0,5$ therefore two groups had no significant different in wound healing, in day 7 after intervention the mean and SD of wound healing score had significant different based on Mann Whitman test $P < 0.001$ at day 14 after intervention based on Mann Whitman test, there was a significant different between two groups in terms of wound healing $p < 0.001$. 2% *Aloe vera* ointment can speed up the healing of wound of CABG surgery in diabetic patients after at least one week use.

Keywords: *Aloe vera* Ointment, Wound Healing, CABG, Diabetic Disease

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INTRODUCTION

Diabetes Mellitus (DM) is most common chronic metabolic disorder coming with increase of blood

sugar in human that can derive from lack of insulin (type I DM) or the resistance of peripheral tissues to insulin coming with decrease of insulin secretion from pancreas islet of Langerhans beta cells (type II DM) [1]. Its global prevalence is very high and continues to increase [2]. Almost 150 million people around the world suffer from it and it is expected that this number would double in coming 20 years [3]. This disease has microvascular and macrovascular morbidities [4]. So that the cardiovascular morbidities, brain stroke and bottom organ amputation are main causes of its treatment costs [5]. During recent decades, epidemiologic studies have done on prevalence of type II DM in Iran based on which the population of individuals with type II DM in Iran is more than 1.5 million people. Based on WHO prediction it is expected that number of adults with diabetes (age 20 and older) reaches up to 300 million people in 2025 [6]. Now more than 3 million people suffer from DM in Iran that based on WHO estimation if no initiative is taken this number would reach to nearly 7 million till 2030 [7]. Concisely, the symptoms of DM include polydipsia, polyphagia, polyuria, blurred vision, and headache, drowsiness, feeling tired and prolongation of wound healing time [8].

DM is a common cause of delay or disorder in wound healing. 15% of people with DM are afflicted with lower leg wound and due to lack of required molecular cellular signals for wound healing such as granulation, epithelization and fibroplasias [9]. DM has many side effects like delay in wound healing of cardiovascular diseases acute diabetic ketoacidosis, optical and renal side effects, atherosclerosis, neuropathy and retinopathy [8]. Therefore, among the common problems of diabetic patients is affliction with cardiovascular disease that its treatment is CABG surgery, from other side, diabetic patients have problem in wound healing, and one of treatment needs of diabetic patients that underwent CABG is need to help to healing surgery wound. Various treatment approaches is proposed for treating the wounds of diabetic patients. Such as new drug named as Angipars which is introduced recently by Iranian researchers that is an herbal drug with sap of plant *Melilotus officinalis* that has preventive effect from skin aging, improvement of microcirculation and anti-inflammation effects that unfortunately the studies showed that in some patients it gives rise to retinopathy as well as intensifying renal disease and increased blood

urea and serum creatinine and increase liver enzymes [10].

Among available herbal treatments still we couldn't reach to a decisive treatment for diabetic wound healing, thus it is decided to study a new herbal drug that has proved effect in foreign studies on healing of wound of non-diabetic patients on diabetic patients in Iran to reveal the effects of this drug on diabetic patients wound. This plant is *Aloe vera*. It is a plant from lillium family from monocot flowering plant and it is native of north Africa. It has healing effects, anti-inflammatory, anti-pain, antiviral and antibacterial, antifungal, laxative, anti-itch, moisturizer. It is available in various forms such as sap, gel, ointment, capsule and powder [11].

Saponin available in aloe vera has naturally cleaning feature and moreover has antifungal and antimicrobial properties. Laboratory studies have shown that carboxy peptidase available in aloe vera inactivate bradykinin that is a powerful factor producing pain in the acute inflammation and curtails the pain in treatment place. Salicylic acid in it acts as a painkiller and anti-inflammatory by inhibition of prostaglandin production. Moreover, *Aloe vera* increases the collagen granola content of tissue and contributes with anti-inflammatory properties in wound healing [12].

In a study it has been shown that *Aloe vera* not only help in recovering fibroblast cellular structure, but also speed up collagen production [13].

Regarding the effect of *Aloe vera* gel on the bed sore it has been shown that *Aloe vera* plant gel is more effective and less costly than common treatment in terms of quality and speed of wound healing [14].

It has been shown that *Aloe vera* ointment curtail considerably the severity episiotomy wound pain and extent of need to painkiller [15]. Given the above discussion, it is obvious that two problems among main problems of diabetic patients is affliction of cardiovascular disease and delay in wound healing and as the main approaches of treatment of cardiovascular patients of diabetic people is CABG surgery, decisively the diabetic patients undergone CABG surgery faces the problem of delay in surgery wound healing. Thus,

the researcher wants to examine the effect of *Aloe vera* on diabetic patients' surgery wound healing.

MATERIALS AND METHODS

This study is random clinical trial type. It includes an intervention group and control group. In this study the type of intervention namely *Aloe vera* ointment is considered as independent variable and wound healing is dependent variable. The study sample includes 60 people among diabetic patients that have undergone in Imam Ali Hospital of Kermanshah the Coronary artery bypass surgery and have the conditions to be included in the study and by consent of participation they are divided into two groups. The criteria of entry to CABG is affliction with type II DM at least for two years, lack of affliction with background diseases such as malnutrition, skin diseases and endocrine diseases, lack of allergy to *Aloe vera* ointment is specified by applying the ointment to right arm inside region for 20 minutes, not to consume to drugs affecting the wound healing like corticosteroid, immunosuppressive drugs and cytotoxic drugs, not to consume alcohol, not to afflicted by morbidities after CABG like diaphragm paralysis, Myocardial infarction, pneumothorax, hemothorax and respiratory deficiency, not to be addicted to narcotics and psychedelic drugs, lack of scar background and surgery in sternum area and the criteria for abandoning is patient giving up to continue to participate in the study and need to repeat the surgery. The tool to examination includes two parts, first is related to demographic information such as age, gender, income amount, level of education, dairy intake of fruit and vegetable, dairy exercise, the tool for wound healing is Bates-jensen wound assessment tool or

BWAT that this tool is used for examining all kinds of wound and it is designed in 2010, and its reliability and validity is confirmed by study of Malek Hosseini *et al.*, this tool includes 13 items that following 12 items are evaluated. Items included wound size, depth, edge, underlying tissue destruction, the type of necrotic tissue, necrotic tissue amount, Exsudat type, Exsudat amount, wound surrounding skin color, wound surrounding tissue edema, granulation and epithelization of the wound. The procedure is that at second day after surgery following washing the wound with betadine and cleaning it the wound dressing with two to three mm layer of *Aloe vera* ointment 2% is applied on the wound of patient sternum area. In control group the wound is only washed and cleaned daily with betadine. The dressings were changed every 24 hours. This continued for 14 days. Since many factors such as age, fruit and vegetable consumption etc. influence on wound healing. The distribution of samples in two groups has been done randomly so that the studied samples would be homogenous. *Aloe Vera* 2% ointment is made in academic Jihad situated in Karaj with collaboration of researcher in 25-gram jars. The extent of wound healing was examined in three groups 7, 4 and 14 days after administration of intervention using BWAT tool.

The SPSS version 16 is used for data analysis. In this study, for describing the samples one used the descriptive statistics approaches including frequency distribution tables, average determination, standard deviation and for study purposes and hypotheses and determining homogeneity of the samples one used Chi two test and Mann Whitney.

Table 1: Absolute and relative frequency distribution of the demographic feature of participants

	<i>Aloe vera</i>		Control		p-value
	Absolute Frequency	Relative Frequency	Absolute Frequency	Relative Frequency	
Female	18	60	17	56.7	0.955
Male	12	40	13	43.3	0.955
Married	10	33.3	8	26.7	0.549
Single	20	66.7	22	73.3	0.549
Adequate income	15	50	13	43.3	0.811
Average income	7	23.3	7	23.3	0.811
Low income	8	26.7	10	33.3	0.811
Athlete	14	46.7	7	23.3	0.155
Non-athletes	16	53.3	23	76.7	0.155
Consumption of vegetables	23	76.7	17	56.7	0.056
The lack of Vegetables consumption	7	23.3	13	43.3	0.056

RESULTS

Given the chi two samples were homogenous regarding marital status, gender, income, fruit and vegetable consumption and doing daily exercise (Table 1). Mean and SD of total score of wound healing in day 4 after onset of intervention were calculated and compared by Mann Whitney test and had no significant different $P>/05$.

Mean and SD of total score of wound healing in day 7 after intervention onset has been calculated by Mann Whitney test and they had significant different and the healing was greater in the group of *Aloe vera* ointment use $P<0.001$. Average and SD of total score of wound healing in day 14 after intervention onset has been calculated and had significant difference and the healing was greater in *Aloe vera* ointment use group $P<0.001$ (Table 2).

Table 2: Comparison of wound healing number within two groups after 4, 7 and 14 days of intervention

Improvement	For days after the bandage (mean rank)	Seven days after the bandage (mean rank)	14 days after the bandage (mean rank)
<i>Aloe vera</i>	31.17	24	22.67
Control	38.33	37	29.83
Test	Mann-Whithney	Mann-Whithney	Mann-Whithney
p-value	$P>/05$	$P<0.001$	$P<0.001$

DISCUSSION AND CONCLUSION

Along healing in day 4 after intervention no significant different has been found among three groups. In an inconsistent study by Eqdampur *et al.*, 2011, titled as the effect of *Aloe vera* ointment on episiotomy healing in primeval women, the mothers in day 5 a significant difference of healing has been found in aloe vera and control group and the aloe vera had better healing [17]. As it has been shown, in this study, the dosage of *Aloe vera* ointment has not been mentioned maybe a higher dosage is used in this study and also it is repeated every 8 hours the dressing with ointment. While in this study the 2% *Aloe vera* ointment is used dairy. In consistent study of Smith *et al* in 1991 named as study of effect of *Aloe vera* gel on longitudinal and latitudinal cut healing from abdominal surgery in women, it has been shown that *Aloe vera* gel has no effect on healing surgery wound [18].

Along healing in day 7 the intervention group has greater healing. In a consistent study by Ghaffarzagdan *et al.*, 2013, as comparison the effect of Gel *Aloe vera* and sulfadiazine cream 1% on healing of burning wound degree 2 one applied Mucilage (gel) of *Aloe vera* plant for 15 days on the burning wound degree 2 and wound healing is examined by Bates Jensen tool, this trial has been done in Valieasr Hospital, Arak, 32 patients was applied were bandaged by sulfadiazine silver cream 1% in a daily basis. Wound healing is examined in days 7 and 15, the results showed that healing extent with *Aloe vera* gel in day 7 had a significant difference with regard to control group and healing of wound of aloe vera was better [16].

Along healing in day 14 the intervention group had better healing.

In consistent study by Ghaffarzagdegan *et al.*, in 2013, as comparing *Aloe vera* gel and silver sulfadiazine cream 1% on healing of second degree burning wound, one used mucilage of *Aloe vera* for 15 days on second day burning wound. At day 15, the average of wound healing of intervention group based on Bates Johnson tool was 13, 303 with SD 0, 516 and in control group that has been bandaged silver cream. Wound healing mean was 19,188 with SD 0, 524. At day 15 a significant different was found between two groups and *Aloe vera* group had better wound healing [16].

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