Bas.J.Vet.Res.Vol.6,No.1,2007.

STUDY OF THE EFFECT OF *ALOE VERA* OIL EXTRACT ON INCISIONAL WOUND HEALING IN FEMALS RABBITS

Methaq A.A.* Marium A. K.** Zaniab W.K.***

* ***Department of Pathology,College of Veterinary Medicine,University of Basrah,Basrah,Iraq

** department of Physiology, College of Veterinary Medicine,University of Basrah,Basrah,Iraq

(Received 13 November 2006,Accepted 17 January 2007)

Keywords: Aloe vera,Neutrophil,Shoulder region.

ABSTRACT

The influence of *Aloe vera* oil extract,on wound healing was studied topically, the study involved preparation of oil extract *of Aloe vera* ,also preparation of oil ointment was done .The study involved 18 female rabbits, they were divided

into three groups (3rd:first group animal treated for (3 days) , 7th:second group treated for (7days) and 14th day post wounding: third group treated for (14 days).2full thickness incisional open wounds were done on the shoulder region of each group animals The wound(treated and control)were treated continuously with 0.5mg oil ointment.

All wounds evaluated macroscopically to the degree of (hyperemia and exudation)and microscopically to the neutrophil and macrophages infiltration ,re-epithelization ,fibroblast proliferation with collagen deposition and new blood capillary formation. Both macroscopic and microscopic results show the efficacy Show *of Aloe vera* oil extract in healing process as compared with control wounds.

INTRODUCTION

For medicinal purpose. *Aloe vera* is most commonly used externally to treat various skin condition and burn not only does it soothe the skin ,ease pain and reduce inflammation .(1) showed that the healing of moderate sever burn was sped up by six days when covering the wound with *Aloe vera* gel, compared to the healing of the wound covered in a gauze bandage.

Previous studies have amply demonstrated the wound healing influence of *Aloe vera* (2).(3) found that 50%of rats treated with *Aloe vera* exhibited improved wound healing .(4) , reported that *Aloe vera* advanced healing with tissue regeneration .this response could explained by the fact that *Aloe vera* dilated capillaries to increase blood flow to injured area .This study attempts to show the topical activity of *Aloe vera* oil extract in improving the

healing process in full thickness incissional wounds, and the decreasing in length wound throughout the period of experiment.

Microscopically results show infiltration of neutrophils in all groups , but it was disappear in animal groups which are treated with *Aloe vera* extract as well as the macrophages cells were infiltration highly.

MATERIAL AND METHODS

-Collection and preparation of the plant leaves for study:

The leaves of *Aloe vera* had been brought from local garden in Basrha Province Iraq, after cleaning, the leaves were cuts by knife to small pits.

-Preparation of oil extract of Aloe vera:

The small pits of *Aloe vera* leaves were transferred to the thumble of Soxhiet apparatus, extracted with 250ml aceton (BDH England)for 24hrs.Then solution was concentrated by rotary evaporator (Puchi Rotavapor,RE) at 40C,the final dryness was done by the evaporation of remnant solvent by leaving the residue in room temperature, the result was 20g oil material kept in dark glass container at 4C(5).

❖ **Oil ointment preparation:**

The ointment was prepared with vaseline base by trituration method using 2 spatulas to admix the oil extract of the plant with gradual addition of vaseline to obtain a homogenous ointment ,with ratio 3:1 oil extract to Vaseline(6),then ointment had been kept at 4C until the use time.

❖ **Animal &Housing:**

Eighteen adult female rabbits of(3-4)months age were used .The animals were housed in metallic cages. They were fed on alfa alfa and bread and water

*ad libitum,*at room temperature.

❖ **Experimental design:**

in this study, oil extract of plant leaves used to study its effect on wound healing efficacy using one type of wound models(full thickness incissional open wound) in 18 rabbits which divided in to three with six animals per each group(5):

A)3rd day post wounding

B)7th day post wounding

C)14th day post wounding

All rabbits were clipped and prepared for a septic surgery. They were anesthetized with I.M administration of l0 mg / kg body weight Xylazin hydrochloride (Rompun, Haverlock

Hart, Shawnee, Ks.) and 50mg /kg body weight Ketamin hydrochloride (Ketanes, Areco. Fort Dodge, IA.).

In each animal, two standard linear skin incisions were made on both sides of back (on the shoulder, near the neck region) using a standard blade. The incisions were made by a scalpel with a septic technique through the epidermis , dermis and subcutaneous fat, the length of linear incision were 1cm . The right sided incision was used as treated wound while, the left one used as control. All wounds were covered with non-adherent occlusive gauzes to maintain the ointment, to keep the wounds clean and to prevent the animal from licking or scratching the wound .Finally, a bandage was wrapped around the trunk of animals to fix the gauze dressing; the bandage in turn was externally strengthened with cotton vest to prevent detachment and self-infliction as explained in the following figure :

Fig (1): Determine the wound area by the marker

Fig (2) The wound was done by scalpel

Fig (3): Wounds were treated

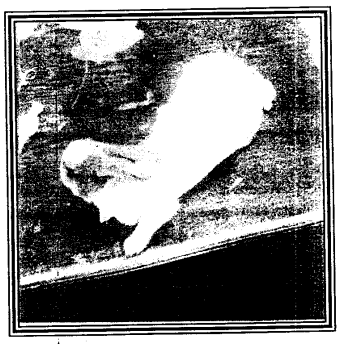

Fig (4): The external dressing by cotton cloth vest

RESULTS

❖ **Macroscopic evaluation:**

The effect *of Aloe vera* oil extract on macroscopic wound healing categories (hyperemia, &exudation) was explained in table(1-1) . On 3^T day post wounding, the severity of these categories was less in treated wound than in control Fig. (1,2). At 7^{th} day ,hyperemia and exudation showed a reduction in their severity in treated wound ,while became obvious in control wounds ,by 14^{th} day post wounding ,hyperemia and exudation had disappeared early in treated wounds than the control.

Table (l-l): The effect of *Aloe vera* oil extract on macroscopic wound healing categories:

days	groups	hyperemia	exudation
3^{rd} day	control	++	++
	treated	+	-
7^{th} day	control	+++	+++
	treated	++	+
14^{th} day	control	-	-
	treated	-	-

Note: - = absent; + = mild, ++ = moderate, +++ = severe

The decreasing in the length of the wounds :

Table (2) explains the decreasing in the length of the wounds in both treated and control through out the period of experiment.

Table (2): The decreasing in the length of the wounds (treated & control)

groups	0 day	3^{rd} day	7^{th} day	14^{th} day
control	1 cm	0.9 cm	0.7 cm	0.1 cm
treated	1 cm	0.7 cm	0.4 cm	0 cm at 10 day

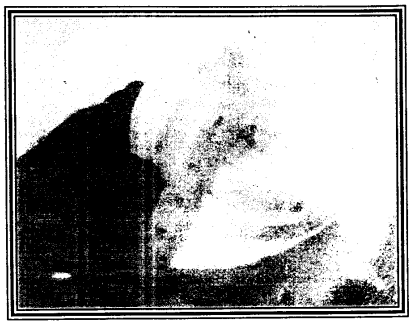

Fig (1A) : Treated wound (3rd day) the length was 0.7 cm

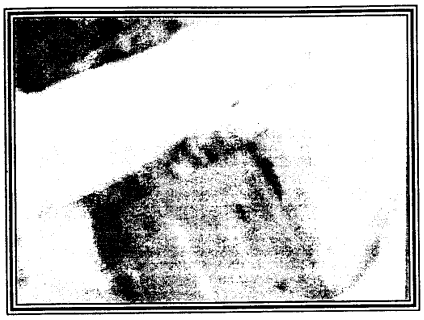

Fig (1B): Control wound the (3rd day) length was 0.7 cm

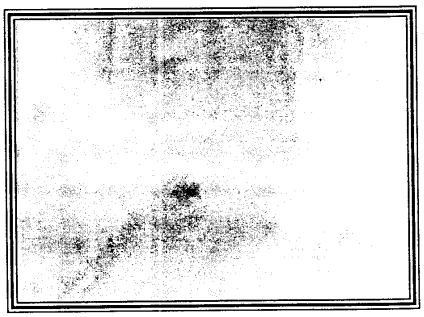

Fig (2A) : Treated wound (7rd day) the length was 0.4 cm there is no exudates

Fig (2B) : Control wound the (7rd day) length was 0.7 cm and obvious exudates

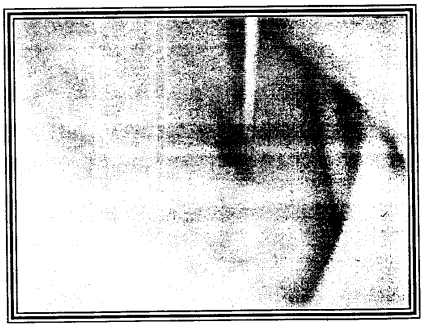

Fig (3A): Treated wound (10rd day) complete healing

Fig (3B): Control wound the (14rd day) non complete healing the length was 0.1 cm

The results of the effect of *Aloe vera* oil extract on histological elements of wound healing were showed in table (1-2) and figure (2)

On 3rd day post wounding, the infiltration of neutrophils was less in treated than in control wounds, figure (1-A),(1-B). On 7th day, the neutrophil infiltration is still lesser in treated than control wounds .figure (2-A,B). The infiltration became mild on 14th day in control wounds and disappeared completely in treated wounds, figure (3-A.B).

The infiltration of macrophages was higher in treated wounds than in control at 3rd and at 7th day and decrease in their infiltration at 14th day. The granulation tissue (new blood capillaries and proliferative fibroblast with collagen deposition) appear early at 3rd day post wounding and became more obvious on 1 Oth day post wounding. Through out the period of experiment, the progression of new epithelium to cover the defected area in treated wound is more than the control wounds .figures (1-A,B),(2-A,B),(3-A,B).

Table (3): The effect of *Aloe vera* on microscopic categories

Day	Groups	Neutrophils	Macrophages	Re-epithelization	Granulation tissue	
					New blood capillary	Proliferative fibroblast collagen
3rd day	Control	++	-	-	-	-
	Treated	+	+	+	-	-
7th day	Control	+++	+	++	++	++
	Treated	++	+++	+++	+++	+++
14th day	Control	+	+++	++	+++	+++
	Treated	-	++	+++	+++	+++

Note:- = absent, + = mild, ++ = moderate, +++ = severe

Fig (1A): Treated wound (3rd day) few inflammatory cells

Fig (1B): control wound (3rd day) more inflammatory cells (Neutrophils)

Fig (2A): Treated wound (7rd day) more macrophages with few Neutrophils and clear re-epithelization

Fig (2B): control wound (7rd day) less macrophages with more Neutrophils and less obvious re-epithelization

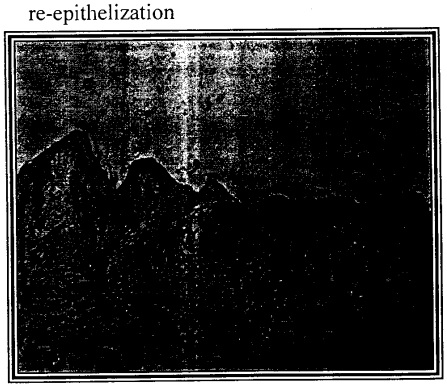

Fig (3A): Treated wound (10th day) complete re-epithelization

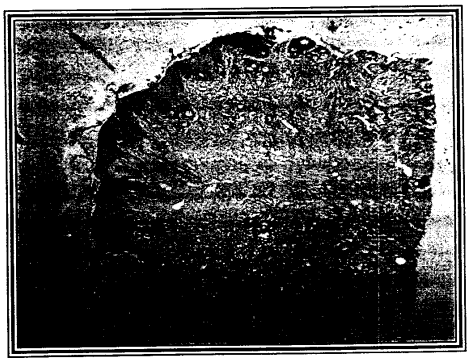

Fig (3B): control wound (14th day) completed re-epithelization

DISCUSSION

Normal wound healing occurs in three stages: inflammation, proliferation, and remodeling. The wound healing process depends on given provision of local circulation^ well as formation and deposition of collagen (7). In the present study, the topical application of *Aloe vera* oil extract on full thickness incissional wound results in more accelerated healing with complete re-epithelization at 10th day post wounding .while in control wounds the complete healing occurs till the end of experiment, *Aloe vera* contains important ingredients necessary for wound healing such as polysaccharides (8),(9).(10) found in their study that polysaccharides in *Aloe vera* ointment increase collagen activity and promote healing process (11) showed that *Aloe vera* improve the vascular supply and make more oxygen available to improve collagen formation for wound healing .

From this study observe the clearance of treated wounds from exudates as compared with control wounds. This result agreement to the opinion of (7) who conclude that the presence of *Aloe vera* seemed to reduce the amount of dead tissue at the wound site and provide better wound healing.

During the wound healing process, epithelial cells proliferate, migrate from the edges of the wound and eventually cover the wound with new epithelium (7)

In the present study .the application of *Aloe vera* oil extract results in decreasing the length of wound which become chiefly at 10^{th} day post wounding this regard to the presence of oxygen caused by *Aloe vera* improving microcirculation. should greatly improve the wound healing process (12). As a results the *Aloe vera* is effective topically in improvement the healing process and decrease the length of treated wounds as compared with control wounds.

دراسة تأثير المستخلص الزيتي لنبات الصبر على التئام الجروح الخطية في إناث الأرانب

ميثاق عبد الرضا عبد الصمد * مريم عبد الحسين كاظم** زينب وحيد خضير***

** *فرع الأمراض،كلية الطب البيطري،جامعة البصرة،البصرة،العراق.

**فرع الفسلجة، ،كلية الطب البيطري،جامعة البصرة،البصرة،العراق.

الخلاصة

تم دراسة تأثير المرهم الزيتي لنبات الصبر موضعياً على التئام الجروح. تضمنت الدراسة تحضير المستخلص الزيتي لنبات الصبر ومن ثم تحضير المرهم الزيتي. تضمنت الدراسة 18 من إناث الأرانب حيث قسمت الى ثلاث مجاميع (اليوم الثالث واليوم السابع واليوم الرابع عشر).

تم عمل جرحين خطيين مفتوحين شاملاً كل الطبقات من جلد منطقة الكتف في جميع حيوانات التجربة وعولجت الجروح (المعالجة والسيطرة) باستمرار بـ (0.5) ملغم من مرهم الزيتي وقاعدة الفازلين على التوالي لمدة 14 يوم وبمعدل

مرتين باليوم. تم تقييم الجروح عيانياً الى درجة (الاحمرار ، والنضح ، ونقصان طول الجرح) ومجهريا إلى درجة ارتشاح (العدلات والبلعمات) ودرجة تكون الغلاف الطلائي الجديد والاورمات الليفية مع ترسب الكولاجين وتكون الأوعية الدموية الجديدة.

أشارة كلا النتائج (العيانية والمجهرية) لهذه الدراسة إلى كفاءة المرهم الزيتي في عملية التأم الجروح وتقليل طول الجرح المعالجة أذا قورنت بجروح السيطرة.

REFERENCES

1- Farrar, M. M.; (2005). Skin deep. Bbetter Nutrition ; July 2005.

2-Davis, R. H ; Kabbani, J. M. ; Maro, N. P. (1986) wound healing and anti inflammatory activity of *Aloe vera. Pa Acad Sci* 60 : 79, 1986.

3- Rowe. T. D. (1940). Effect of fresh *Aloe vera* in the treatment of third degree roentgen reaction on white rats . *J. A.M. pharmacol. Assoc* 29 : 348 - 1940.

4- Crewe. J. E. (1937). The external use of Aloe. *Mm J Med* 20 : 538 - 1937.

5-Al - Ruba'ee, M. A. (2005) Study on the effect of *Loranthus eropeus* L. seed on pyogenic inflammation and skin wound healing in rabitts. Thesis Collages of Veterinary Medicine. University of Basrha, Iraq.

6- Rashed, H. A. (1982). The pharmacy. 1st Part, 2nded., Baghdad. (Arabic).

7-Davis, R. H.; Leitner, M. G.; Russo, J. M. and Byrne, M. E. (1989).Wound healing, oral and topical activity of *Aloe vera.* Journal of the *American Podiatric Medical Assoc.* Vol. 79, 11, 55 - 62.

8- Atherton, P. (1989). Magic or medicine? Nurs stand 12 : 49, 52 - 54.

9-Afzal, M.; and Ali, M. (1991). Identification of some prostanoides in *Aloe vera* extracts. Planta Medica 57: 38-40.

10- Heggers, J. P.; Kucukcelebi, A.; Listengarten, D.; Stabenau, J.; Broemeling, l.d.; Robson, M. C. and Winters ,W. D. (1996). Beneficial effect of Aloe on wound healing in an excisional wound model. J. Altern. Complement. Med., 2 (2) : 271 - 277.

11- Davis, R. H ; Kabbani, J. M.; Maro, N. P. (1987). *Aloe vera* and wound healing *JAPMA* 77 : 165, 1987.

12- Rubin, M. B.(1984). Vitamins and wound healing .*Plast Surg Nurs* 4 : 16.