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HEALING EFFECT OF ALOE VERA ON WOUND IN ALBINO MICE

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ABSTRACT

Present study is an attempt to investigate wound healing efficiency of Aloe verajuice on excision wound model.This study was undertaken to evaluate the wound healing properties of Aloe vera, for purpose different conc. of Aloe vera juicewere applied with respect toBetadine on excision wound in albino mice.The effect of Aloe vera juice application on excision wound contraction (area in mm^2) in mice was observed on 4^{th}day, all means vary significantly ($p<0.01$) with each other. Higher wound contraction was achieved with 5% ($137.427\pm3.454mm^2$) followed by 25% ($85.068\pm1.872mm^2$) and 50% ($54.583\pm1.904mm^2$) of Aloe vera juice as compared to Betadine ($50.265\pm 1.798mm^2$). It is clears that the higher wound contraction area in mm^2) was observed in Aloe juice treated wound having maximum with5% ($192.523\pm 2.903mm^2$)followed by 25% ($179.118\pm4.511mm^2$) and 50%($152.452\pm15.577mm^2$) as compared to Betadine ($143.842\pm11.446\ mm^2$) treated group on 16^{th} day of wound creation. The treated group varied significantly with $p<0.01$ on 16^{th} day of wound creation.

Keyword: Albino mice, Aloe vera, Betadine.

I. INTRODUCTION

The wound healing process involves a highly coordinated cascade of cellular and immunological responses over a period of time. The first phase (also known as the coagulation phase) occurs immediately after the traumatic injury and serves to seal the wound with a fibrin and platelet plug and to initiate the inflammatory process. The largest organ in the body, the skin conducts a wide range of functions to support and maintain human health [1, 2]. The skin epidermis and its appendages (e.g., hair follicle, sebaceous and sweat glands) provide a protective barrier against physical, chemical and biological pathogens and also prevent dehydration. Wounds are physical injuries that result in an opening or break of the skin. Proper healing of wounds is essential for the restoration of disrupted anatomical continuity and disturbed functional status of the skin [3]. Healing is a complex and intricate process initiated in response to an injury that restores the function and integrity of damaged tissues [4].Wound healing is one of the most intricate biological processes, which requires the coordinated efforts of various cell lineages, matrix and signaling molecules to work delicately at their hierarchical levels so as to achieve perfect regeneration [5, 6, 7].Injuries are common in humans, especially in environments where there is a high prevalence of violent acts and accidents. Owing to poor or delayed wound management, these wounds often become infected with either commensal or environmental microorganisms, or both. Infected wounds heal more slowly, re-epithelialisation is more prolonged and there is a risk of systemic infection. Normal wound healing encompasses three overlapping but distinct stages, i.e., inflammation, proliferation, and remodeling [7].

Each stage contributes to the overall wound healing effect. However, more and more studies have indicated that the inflammation stage has significant impact on the outcome of wound healing [8].The macrophages promote fibroblast scaffold formation in their choroidal neovascularization wound healing model [9]. In the meantime, macrophages also clear excessive neutrophils. Mast cells later will migrate to the wounds and release pro-inflammatory growth factors that also enhance fibrosis synthesis, thus promoting scar formation [10, 11]. While these studies clearly illustrate a role for inflammatory infiltrate in wound scar development, reducing inflammation alone will not regenerate a scar-free skin.

Aloe Vera has been used medicinally for a few thousand years.*Aloe vera* is a tropical and subtropical plant of *Liliaceae*family with turgid green leaves joined at the stem in a rosette pattern. The *Aloe* leaf contains a transparent mucilaginous jelly which is referred to as *Aloe vera* juice. Orthodoxy it is used in burns units to great effect and isincreasingly being used in the treatment of dermatological lesions. Several studies on burns have been conducted in comparison trials between *Aloe* products and non-*Aloe* product. The *Aloe* seems to promote more rapid healing and pain relief. *Aloe vera* has shown multiple uses in dentistry. Some of its extreme uses have been observed in the treatment of gum diseases by reducing bleeding of the gums, acting as antiseptic in gum pockets, and its antifungal properties help greatly in the problem of denture stomatitis. *Aloe vera* consists of vitamins, enzymes, minerals, sugars, lignin, saponins, salicylic acids and amino acids [12]. The parenchymal tissue makes up the inner portion of the *Aloe* leaves and produces a clear, thin tasteless jelly-like material called *Aloe vera* juice [13]. It has good wound healing activity. *Aloe vera*have been used as an anti- inflammatory natural agent, for treatment of ulcers, hepatitis and neoplasms,and also for wound healing. It has also been used in the traditional medicine of many cultures and said to be beneficial in the treatment of disorders such as gout, acne, dermatitis and of wounds such as peptic ulcers and burns [14] and also as an anti-diabetic agent [15].

II. MATERIALS AND METHODS

2.1 Materials

2.1.1 Experimental Laboratory animals

Swiss Albino mice Swiss Albino mice, weighing around 30-35g of approx. 8 weeks old, were obtained from animal house of Mahavir Cancer Institute and Research Centre, Patna, India. Food and water to mice were provided ad libitum (prepared mixed formulated food by the laboratory itself). The experimental animals were housed in conventional polypropylene cages in small groups. The mice were randomly assigned to control and treatment groups. The temperature in the experimental animal room was maintained at 22± 2^0 C with 12 h light/dark cycle.

Swiss albino mice was selected as the experimental animals, because of:

a) Their physiological activity is almost similar to that of man (as 90% of their genes are similar to humans).

b) Rapid rate of inbreeding.

c) Small size.

d) Early puberty (sexual maturity)

e) Short gestation period

2.1.2 Test chemical: Betadine

2.1.3 Plant material*: - Aloe vera* juice.

2.2 Methods

The study was carried out in following part:

1. Extraction of *Aloe vera* juice and preparation of working formula.
2. Treatment of wounds.
3. Estimation of wound healing.
4. Statistical analysis of the data.

III. RESULTS

Average Area Healed (In Mm^2) On Application of *Aloe Vera* Juice On Excision Wound In Albino Mice On 4^{th} Day.

	NSS	Betadine	5% (v/v)	25 % (v/v)	50% (v/v)
Mean	29.3267	50.2650	137.4267	85.0683	54.5833
SE	1.08708	1.79805	3.45393	1.87196	1.90398

Analysis of Variance (Anova)

Source of Variation	Sum of Square	df	Mean square	F
Between	4.2277 E+04	4	1.0569 E+04	375.2**
Error	704.1	25	28.17	
Total	4.2981 E+04	29		

df = Degree of freedom

Referring to the table of F, for p = 0.01 against 4 df between mean square and 25 df for within mean square, we find a value of 4.18. Since the value 375.2 for F obtained in the present experiment is greater than the recorded value 4.18. Hence the wound contraction area is significant.

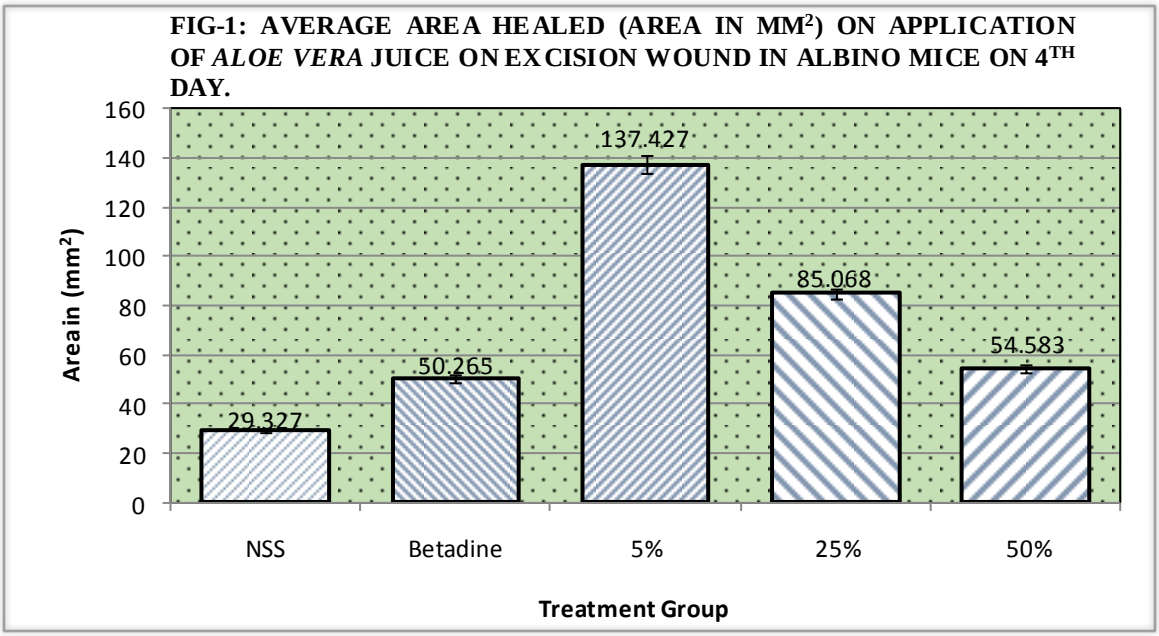


FIG-1: AVERAGE AREA HEALED (AREA IN MM^2) ON APPLICATION OF *ALOE VERA* JUICE ON EXCISION WOUND IN ALBINO MICE ON 4TH DAY.

Average Area Healed (In Mm^2) On Application of *Aloe Vera* Juice On Excision Wound In Albino Mice On 8th Day.

	NSS	Betadine	5% (v/v)	25% (v/v)	50% (v/v)
Mean	60.44	101.161	163.247	157.182	102.44
SE	4.440	3.8204	1.666	7.5476	4.133

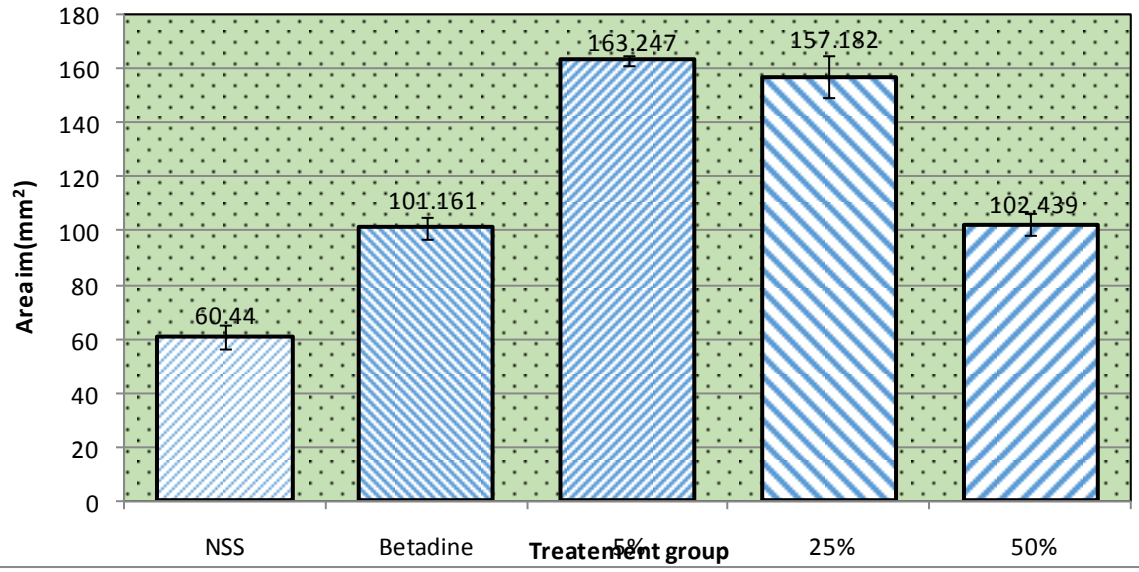
Analysis of Variance (Anova)

Source of Variation	Sum of Square	df	Mean square	F
Between	4.4491E+04 (E+04)	4	1.1123 E+04	83.40**
Error	3334	25	133.4	
Total	4.7825 E+04	29		

df = Degree of freedom

Referring to the table of F, for p = 0.01 against 4, df between mean square and 25 df for within mean square, we find a value of 4.18. Since the value 83.40 for F obtained in the present experiment is greater than the recorded value 4.18. Hence the wound contraction area is significant.

FIG - 2: AVERAGE AREA HEALED (IN MM^2) ON APPLICATION OF *ALOE VERA* JUICE ON EXCISION WOUND IN ALBINO MICE ON 8TH DAY.



Average Area Healed (In Mm^2) On Application of *Aloe Vera* Juice On Excision Wound In Albino Mice On 12th Day.

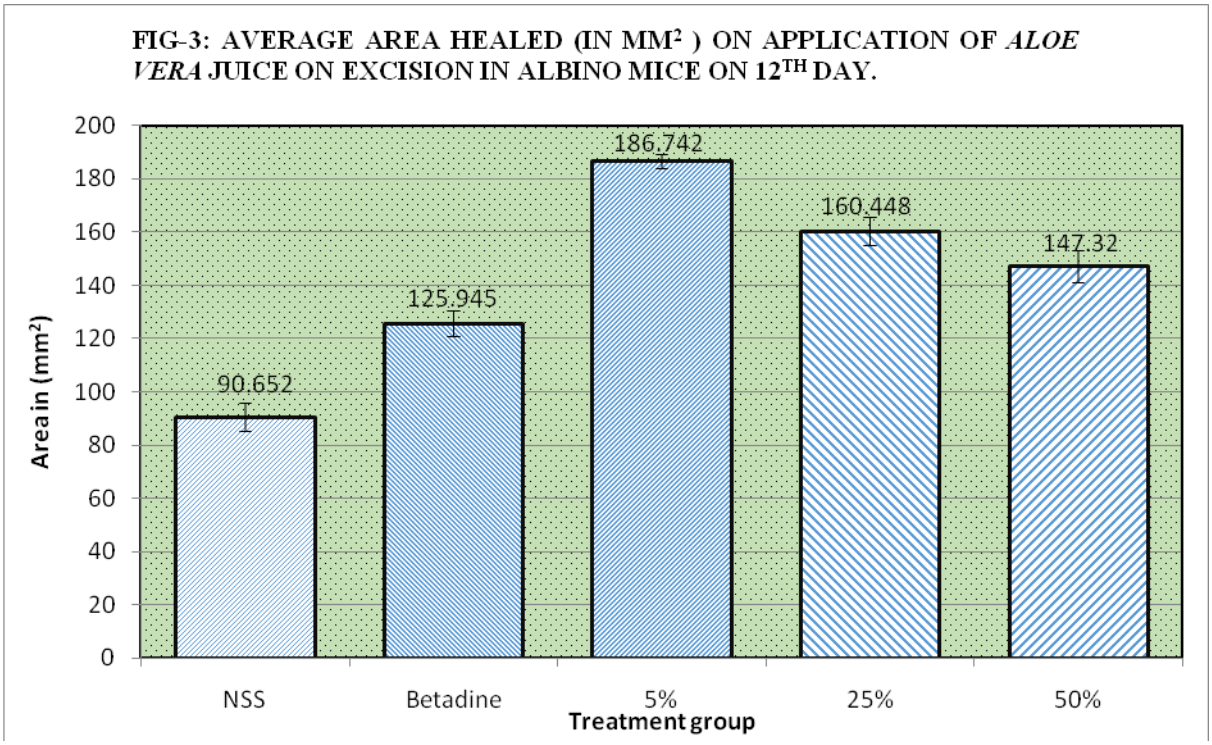
	NSS	Betadine	5% (v/v)	25% (v/v)	50% (v/v)
Mean	90.65	125.95	186.74	160.45	147.32
SE	5.2159	4.8071	2.6479	5.12798	6.0167

Analysis of Variance (Anova)

Source of Variation	Sum of Square	df	Mean square	F
Between	3.1588 E+04	4	7897	54.92**
Error	3595	25	143.8	
Total	3.5182 E+04	29		

df = Degree of freedom

Referring to the table of F, for p = 0.01 against 4, df between mean square and 25 df for within mean square, we find a value of 4.18. Since the value 54.92 for F obtained in the present experiment is greater than the recorded value 4.18. Hence the wound contraction area is significant.



Average Area Healed (In Mm^2) On Application of *Aloe Vera* Juice On Excision Wound In Albino Mice On 16th Day.

	NSS	Betadine	5% (v/v)	25% (v/v)	50% (v/v)
Mean	114.6650	143.8418	192.5233	179.1183	152.4517
SE	6.06571	11.44633	2.90289	4.51106	15.57663

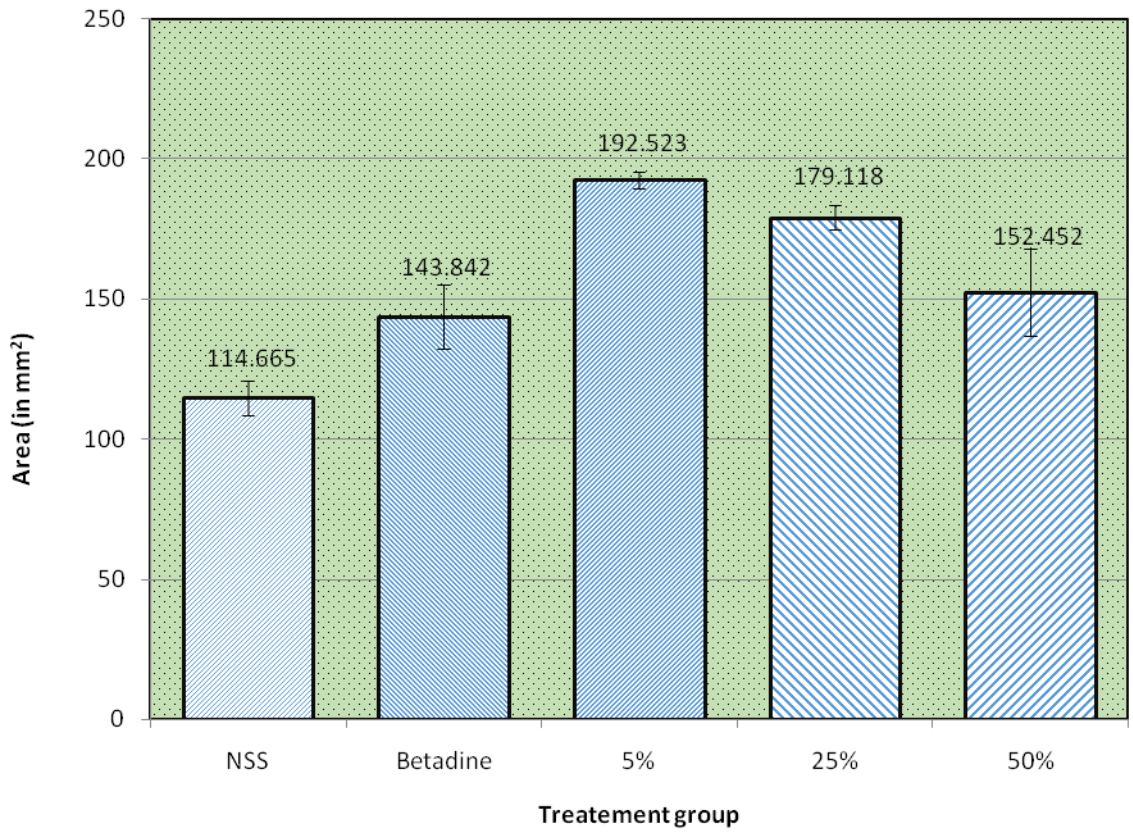
Analysis of Variance (Anova)

Source of Variation	Sum of Square	df	Mean square	F
Between	2.2418 E+04	4	5604	10.63**
Error	1.3179 E+04	25	527.2	
Total	3.5597 E+04	29		

df = Degree of freedom

Referring to the table of F, for p = 0.01 against 4, df between mean square and 25 df for within mean square, we find a value of 4.18. Since the value 10.63 for F obtained in the present experiment is greater than the recorded value 4.18. Hence the wound contraction area is significant**.**

FIG-4 : AVERAGE AREA HEALED (IN MM²) ON APPLICATION OF *ALOE VERA* JUICE ON EXCISION WOUND IN ALBINO MICE ON 16TH DAY.



As it is evident from above table, higher wound contraction was achieved in *Aloe vera*treated wound resulting in maximum with 5% followed by 25% and 50% as compared to the Betadine and NSS control group on 4th day of wound creation.

Similarly higher rate of wound contraction with topical application of *Aloe vera* as compared to control group in the diabetic albino mice has been reported by Chithra*et al.* [16]. Isao *et al.* [17] also reported that *Aloe vera*juice contains Ca, Mg, P, Mn and Si quantitatively, Ca is for homeostasis of animal physiology, good health, and helpful in wound healing.

From above Table, it is clears that the higher wound contraction area (in mm^2) was observed in *Aloe vera*treated wound having maximum with 5% followed by 25% and 50% as compared to the Betadine and NSS control treated wound on 16th day wound formation. The treated group varied significantly on 16th day

of wound creation.Our finding are also in agreement with Davis *et al*. [18] and Qui [19], who also reported that *Aloe vera* improve wound and burn healing in animal and human.

IV. CONCLUSION

On the basis of outcome of this present study, the application of *Aloe vera*gel for the treatment of traumatic or cut wound isrecommended.5% *Aloe vera* gel has better wound healing property.

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