

EXPERIMENTAL EVALUATION OF ALOE VERA LEAVES PULP AS TOPICAL MEDICAMENT ON WOUND HEALING

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Abstracts

Wounds are major cause of physical disabilities. Wound healing consists of orderly progression of series of events that establish the integrity of the damaged tissues. Aloe Vera leaves pulp of Aloe arborescens species is used for medicinal purposes, including treatment of constipation, colitis, asthma, irritable bowel syndrome, diabetes, peptic ulcer, inflammation, heart burn, stress etc. The present study was undertaken on experimental evaluation of Aloe Vera leaves pulp on wound healing activity through topical route on excision wound model. The activity was compared with standard drug Povidone Iodine ointment (5% w/w). Aloe Vera leaves pulp was found to have better and faster wound healing effect than standard drug Povidone Iodine ointment on excision wound model.

Keywords: Aloe Vera, Povidone Iodine Ointment, Wound Healing Activity, Excision Wound Model

1. Introduction:

Wounds are major cause of physical disabilities. They arise due to physical, chemical or microbial agents. Healing is a survival mechanism and represents an attempt to maintain normal anatomical structure and junction¹. Many immunosuppressant, cytotoxins and non-steroidal anti-inflammatory drugs suppress the wound healing. Management of wound healing is a complicated and expensive step². Restoration of damaged tissue (wound) is an important process which plays vital role in survival of life. It is imminent for the basis of all surgical manipulations³. Many plants have proved to possess significant healing properties in different types of wounds. Using certain plants, possessing antiseptic, astringent, anti-inflammatory, antimicrobial property the rate of wound healing can be enhanced⁴. Such plant can increase the rate of tissue healing by providing different essential substances, required at various steps of wound healing. Plants being cheaper and safer than allopathic drugs, so treatment by natural ways may be useful in veterinary practice, especially in India where these are found in plenty⁵. Aloe Vera belongs to the family Aloeaceae^{6-7, 18}. Its leaves pulp is used for medicinal purposes, including treatment of constipation, colitis, asthma, irritable bowel syndrome, diabetes, peptic ulcer, inflammation, heart burn, stress etc⁸⁻¹⁰. Based on the above source of information, the present study aimed to evaluate the wound healing activity of Aloe Vera leaves pulp.

2. Materials and Methods:

2.1 Collection and Extraction of Plant

Material: The fresh mature leaves of Aloe Vera were purchased from local nursery garden during the month of August 2006. The plant material was identified and authenticated as RAU/AV//22 at Botanical Survey of India, Jodhpur. The fresh mature leaves were cleaned from outside with distilled water so as to remove dirt and foreign impurity if any present on the leaves. The rind was removed with the help of sterilized knife. The colourless pulp was grounded in the blender and the pulp with a yield of 2.5% so obtained was placed in an air tight container and then this container was stored at a cool and dry place. This pulp was later used for phytochemical investigation and for pharmacological screening.

2.2 Preliminary Phytochemical Analysis: A preliminary phytochemical screening was carried out for the extract employing the standard procedure to reveal the presence of aloin, alkaloids, steroids, terpenoids, flavonoids, saponins, tannins, glycosides, carbohydrates, phytosterols and proteins¹¹.

2.3 Animals: Adult albino rats (wistar strain) of either sex weighing 180-200 g were taken. They were placed in polypropylene cages in a controlled room environment (25°C±2°C) at a natural day night cycle and they were provided with standard laboratory food and water *ad libitum*. All the experimental procedures and protocol used in this study were reviewed and approved by the Institutional Animal Ethical Committee (IAEC), Reg No. 990, U.D.P.S., Utkal University.

2.4 Wound Healing Activity: Animals were assigned into 3 groups containing 6 animals in each group. All the wounds (control, standard and test groups) were cleaned with the sterilized normal saline solution, and then dried gently with sterilized gauze before every dressing. Group I was called as control group, was kept untreated, group II was called as standard group, was treated with market formulation (Povidone Iodine ointment), group III was called as test group, was treated with the pulp of fresh mature leaves of Aloe Vera. Excision wound model was selected for assessing wound healing activity of pulp of fresh mature leaves of Aloe Vera on topical route of administration for 15 days. Animals were anaesthetized with ether and shaved on part to be exposed. A circular piece (500 mm² area) was impressed on the dorsal thoracic region 5 cm away from ears and 1 cm away from the vertebral column. The animals were individually housed in separate cages. The test and standard preparation were topically applied once a day till epithelialisation was complete, starting from the day of the operation. The wounds were traced on 1 mm² graph paper on the day of wounding and then subsequently on the 4th, 8th, 12th and 16th post wound days and thereafter daily until healing was complete. The parameters studied were percentage of wound contraction or wound closure and period of epithelialisation^{12-13, 16,17, 19}.

3. Results and Discussion:

3.1 Preliminary Studies: The result of preliminary phytochemical screenings studies for pulp of fresh mature leaves of Aloe Vera is shown in the table 1. The Aloe Vera leaves pulp extract showed the presence of phytoconstituents like Aloe emodin, arabinose, carbohydrates, gums, saponins, steroids, amino acids, anthraquinones, lignins.

Table 1: The presence of phytoconstituents in pulp of fresh mature leaves of Aloe Vera

Extract	Presence of Phytoconstituents
Pulp of leaves of Aloe Vera	Aloe emodin, arabinose, carbohydrates, gums, saponins, steroids, amino acids, anthraquinones, lignins.

3.2 Pharmacological Screening: Wound healing involves a highly dynamic integrated series of cellular physiological and biochemical processes that occurs in living organisms¹³. The majority of world population relies on traditional medicine for their health care. This is also the case in the treatment of wounds. Many research proposed that wound healing can be improved by herbal drugs having antiseptic, antibacterial, antioxidant and anti-inflammatory properties. In the present study, the excision wound model is considered for evaluation of wound healing activity of pulp of fresh mature leaves of Aloe Vera as topical application. The rate of wound contraction in mm² was taken as a measure of wound healing.

During the initiation of the study from the day 0 there was not much difference in the healing of wounds in all 3 groups. But after day 9, the healing process was faster in the groups treated with pulp of fresh mature leaves of Aloe Vera as compared to the standard group which was treated with Povidone Iodine ointment as shown in table 2. Statistical analysis was done by ANOVA and Dunnet's multiple comparison tests. Results are expressed as mean \pm SE, n=6 in each group. Significant difference was compared to control group at p<0.01. From the results, it was observed that in the topical route, test group III shows faster wound closure and wound contraction and the results are significant (P<0.01) when compared with standard drug Povidone iodine ointment.

Table 2: Effect of topical administration of pulp of fresh mature leaves of Aloe Vera on excision wound model.

Comparative mean wound area of different groups (in mm ²)			
Post wounding days	Group I (control)	Group II (standard)	Group III (test group)
0	232.65 \pm 1.78	231.86 \pm 1.92	229.96 \pm 1.03
3	166.62 \pm 1.96	153.86 \pm 1.86	102.06 \pm 1.45
6	132.04 \pm 1.10	103.01 \pm 1.74	42.11 \pm 1.62
9	93.78 \pm 1.07	61.58 \pm 1.56	05.45 \pm 0.43
12	52.58 \pm 1.66	6.08 \pm 1.56	0.00 \pm 0.00
15	27.46 \pm 1.22	0.00 \pm 0.00	0.00 \pm 0.00

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