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Studies on the efficacy of fresh *Tridax procumbens* leaves on wound healing in calves

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Abstract

Present study was conducted on 12 calves having fresh wound of size 16-25 cm² anywhere on the body except joints to evaluate the wound healing using fresh *Tridax procumbens* leaf paste. These were randomly divided into two groups for further treatment. Wounds of group I were treated with normal saline solution whereas, that of group II were applied with *Tridax procumbens* leaf paste. Temperature pulse and respiration were recorded from 0 to 5th post-treatment day of each animal in both the groups. All the values fluctuated within the normal physiological range. Exudates and pain were of the lower degree in cases treated with *Tridax procumbens* as compared to normal saline solution treated group. Observation of wound on 20th day showed intense red colouration in wounds of normal saline solution treated group suggesting proliferative phase but the colour of the wound treated with *Tridax procumbens* were whitish brown suggesting almost healed wound. There was a significant difference between the treatment and control group in wound contraction rate on 5th, 10th, 15th, 20th and 25th post treatment day. An accelerated wound contraction was seen in *Tridax procumbens* treated group during all stage of wound healing wounds, which might be due to its property of initiating early angiogenesis, fibroblastosis and stimulating proliferation of keratinocytes.

Keywords: *Tridax procumbens*, calves, exudate, pain, wound contraction, wound healing

Introduction

Early healing of the wounds depends on the way the wound is managed; however, slight negligence on the part of the surgeon makes the treatment a complete failure and endangers the life of the animal (Kumar, 2003) [8]. Since time immemorial man has used various parts of the plant in the treatment and prevention of different ailments (Chah *et al.*, 2006) [3]. During the last two decades, traditional medicine has re-emerged as one of the important pillars for the treatment of various diseases and disorders. It is a well-known fact that the modern drugs have their origin in plant before they are chemically synthesised (Newman *et al.*, 2016) [9]. Many medicaments, indigenous preparations and variety of methods have been used to stimulate wound healing such as topical application of herbal remedies, natural honey, electromagnetic pulses, fibroblast growth factors and collagen with topical antibiotics. Though various agents have been identified as a wound healer, still there is a need of cheaper therapy which can accelerate the rate of healing, without affecting the normal physiological process along with its socio-economical acceptance and minimal side effects (Sharma, 2018) [12]. *Tridax procumbens* is a common plant found throughout the country and is in abundance during rainy season. It has been claimed to promote wound healing in folk medicine (Anitha *et al.*, 2008) [11] and used as immunomodulation, wound healing, antidiabetic, hypotensive, antimicrobial, insect repellent activity, anti-inflammatory and antioxidant property (Pingale 2012) [11]. Therefore, the present study was conducted to evaluate the efficacy of *Tridax procumbens* as a potent wound healing agent.

Materials and Methods

The work was approved by the institutional ethical committee. It was conducted on twelve calves aged between six months to one year and weighing approximately 60 to 100 kg that were presented for treatment of the wound. Calves having fresh wound of size 16-25 cm² with a depth of 0.4-0.5 cm were selected for the present study. The wounds selected were anywhere on the body except joints. The age of the wound was decided based on appearance, and granulation tissue i.e. Lustre, colour, and texture. Moreover, all the wounds were debrided and freshened up when it was included in the study.

The leaves of the plant of *Tridax procumbens* were collected locally, authenticated in Department of Pharmacology and Toxicology. Fresh leaves of these plants were washed and cleaned with distilled water. Leaves were taken out and grinded in a fine paste using a mortar and pestle aseptically for its application on the wound surface. Calves selected for the present study were randomly divided into two groups for further treatment. Wounds of group I were treated with Normal Saline Solution, whereas those of group II were treated with *Tridax procumbens* leaf paste. The wounds were cleaned with hydrogen peroxide solution regularly, followed by topical application of Normal Saline Solution in group I and leaf paste of *Tridax procumbens* in group II respectively, till the wound healed. The wound was assessed for general appearance, presence, or absence of exudates, pain, peripheral contraction, and extent of cicatrization. Peripheral contraction of the wound was assessed, using trace paper. Progressive decreases in wound area were recorded on 5th, 10th, 15th, 20th and 25th post treatment day based on the formula given by Singh *et al.* (2010)^[14].

$$\text{Percentage of wound contraction} = \frac{a-b}{a} \times 100$$

a = Wound area on day zero

b = Wound area on nth day

Clinical examination

Temperature, pulse, and respiration were recorded from 0 to 5th post-treatment day of each animal in both the groups. All the values fluctuated within the normal physiological range. These findings were like the findings of Kumar *et al.* (2006)^[7] in calves. Fluctuation of temperature, pulse, respiration, and complete blood count between normal physiological ranges might be because all wounds were localized and none of it became infectious and systemic throughout the observation period.

Gross examination of wound healing

General appearance

The wounds of most of the cases irrespective of the groups were lustreless white when presented at the clinics for treatment excluding those cases which were reported on the same day of injury. Appearance of the wound was suggesting that most of the cases were presented at the clinics between 5-10 days of the incidence. Gross examination on 5th day of treatment revealed moist pink coloured wound in all the groups revealing that proliferative phase had started at this interval. These findings were in accordance with the findings of Singh and Singh (2020)^[13], who reported the initiation of proliferative phase after 12 hours of injury. On 15th day all the wounds in both the groups were dry and intense red; however, the intensity was more in *Tridax procumbens* group as compared to normal saline solution. Observation of wound on 20th day showed intense red colouration of wounds of normal saline solution treated group suggesting proliferative phase but the colour of wound treated with *Tridax procumbens* were whitish brown suggesting almost healed wound. Wounds of all groups on 25th day were dry with blackish brown crust indicating complete healing. These findings were like the findings of Kumar *et al.* (2006)^[7].

Exudates

Maximum exudation was observed on 0th day in both the groups. 5th day observation depicted less exudation in group II as compared to group I. Complete absence of exudation in the group treated with *Tridax procumbens* was observed on 10th

day, however, slight amount of exudation was still present at this interval in group I, which became absent on 15th post treatment day in this group. These findings were like the findings of Das (2013)^[4] and Sharma (2018)^[12] who observed a reduction in exudation during later stages of wound healing.

Pain

Marked pain in both the groups was observed in the initial day of treatment irrespective of medicaments used which decreased at a later stage. Observation on 5th day revealed more pain in group I in comparison to group II. An absence of pain on 10th day was observed in group II which was treated with *Tridax procumbens* leaf paste. Absence of pain in group I was observed on 15th post treatment day. A decreasing trend in pain was too observed by Sharma (2018)^[12] during wound healing in dogs.

Adherence and fly repellent property

Both groups show firm and complete adherence on 0, 5th, 10th, and 15th post treatment day in Normal Saline solution and *Tridax procumbens*. Moderate and partial adherence on wound surface was observed on 20th post treatment day in Normal Saline solution and *Tridax procumbens*. *Tridax procumbens* adherence might be due to adherent property of the leaves of the plant itself. Maximum fly repellent property was observed in *Tridax procumbens* as compared to other. Fly repellent property of *Tridax procumbens* was also reported by Bhalariao and Kelkar (2012)^[2] Pingale (2012)^[11] and Talekar *et al.* (2012)^[15].

Wound Contraction

Mean wound contraction in *Tridax procumbens* treated group on 5th day was 7.06 ± 3.50 which was higher than the mean wound contraction of the group treated with a normal saline solution which was 1.95 ± 0.95 . These findings are similar to the findings of Oryan *et al.* (2010)^[10].

On 10th day wound contraction in *Tridax procumbens* (35.61 ± 5.84) group was significantly higher than the normal saline solution (21.13 ± 0.99) treated group. These findings are in agreement with the findings of Talekar *et al.* (2012)^[15] who found higher wound contraction in treatment groups as compared to control.

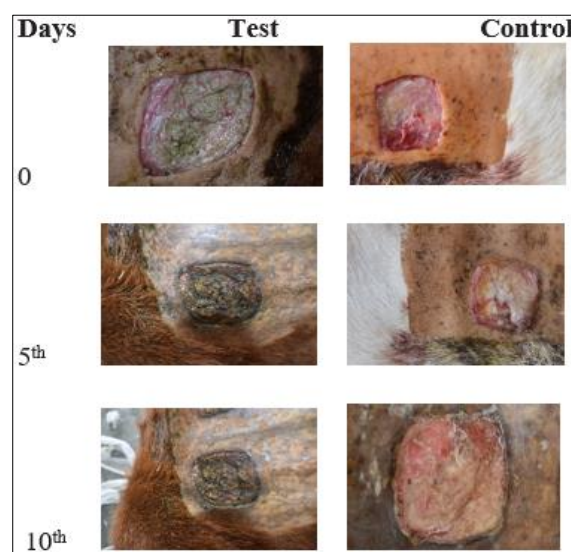


Fig 1: Photograph showing wound healing at a different stage of treatment

Lower wound contraction (44.78±2.63) was observed in normal saline solution treated group on 15th post treatment day and it differed significantly from the group treated with *Tridax procumbens* leaf paste which was 59.84±2.34. These findings corroborate the finding of Talekar *et al.* (2012) [15] who observed a significant difference in wound contraction on 15th post-treatment day while treating the wound with *Tridax procumbens* and Normal Saline Solution.

Data of wound contraction on 20th day revealed maximum contraction in *Tridax procumbens* treated group (74.55±2.89) which differed significantly with Normal Saline Solution treated group which showed a contraction of 60.45±1.01. These findings are contrary to the findings of Diwan *et al.* (1982) [5] who reported a wound contraction of 76 and 92 percent using *Tridax procumbens* and Normal Saline solution on 21st post-treatment day.

Observations of 25th post treatment day showed a wound contraction (81.96±1.69) in the group treated with *Tridax procumbens* leaf paste and a contraction of (71.92±1.4) in normal saline solution. There was a significant difference between treatment and control group on 5th, 10th, 15th, 20th and 25th post treatment day. An accelerated and maximum wound contraction was seen in *Tridax procumbens* treated group during every stage of wound healing. These findings were similar to the findings of Kumar (2003) [3] who observed a wound contraction of 77.38, 71.82, 70.15 and 53.74 percent in wound treated with *Tagetes erecta*, *Blumea lacera*, *Charmil* ointment and Normal saline solution.

Escalated wound healing by *Tridax procumbens* has been described by Gubbiveeranna and Nagaraju (2015) [6] who reported that wound healing activity of *Tridax procumbens* is due to increased lysyl oxidase and hexosamine levels that are reported to stabilize the collagen fibres by increasing the cross-linking of collagen during the healing process.

From the above discussion, it can be assumed that increased rate of wound healing in *Tridax procumbens* treated wounds might be due to its property of initiating early angiogenesis, fibroblastosis and stimulating proliferation of keratinocyte.

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