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WOUND HEALING ACTIVITY OF METHANOLIC EXTRACT OF *WALTHERIA INDICA* ROOT AGAINST BURN WOUND MODEL IN RATS

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ABSTRACT

Methanolic root extract of *Waltheria indica* was screened for wound healing by burn wound in Wistar rats. The methanolic extract was prepared by maceration process. 5% and 10% of the extract was topically applied and povidone iodine was used as reference control. Simple ointment was used as vehicle. Burn wound was induced by exposing the tissue to concentrated sulfuric acid. The test drugs were applied on the wound twice daily 14 days and the wound contraction was measured at various time intervals. Both the concentration of methanolic root extract of *Waltheria indica* were showed significant wound contraction on burn wound model. From the result it was concluded that, *Waltheria indica* exhibited wound healing property on sulfuric acid induced burn wound model.

KEY WORDS: *Waltheria indica*. Wound healing. Wound Contraction. Methanolic Extract.

INTRODUCTION

The wound may be defined as a loss or breaking of cellular and anatomic or functional continuity of living tissues. Healing of wound is a biological process that is initiated by trauma and often terminated by scar formation. The process of wound healing occurs in different phases such as coagulation, epithelization, granulation, collagenation and tissue remodeling. Wounds are unavoidable events, which arise due to physical or chemical injury or microbial infections. Research on drugs that increase wound healing is a developing area in modern biomedical sciences. Several drugs obtained from plant sources are known to increase the healing of different types of wounds [1]. Herbal medicine has become an integral part of standard healthcare, based on a combination of time honored traditional usage and ongoing scientific research.

Medicinal plants are coming in to prominence because of the overuse of conventional medicines such as antibiotics which has resulted in the 500 mm high, stalked leaves with margins shallowly and development of resistance in many infectious organisms. In India, there has been interest in the development of drugs with wound healing properties as taught in a popular form of Indian ayurvedic medicine [2].

Waltheria indica L., a member of Sterculiaceae family, is widely used traditionally to treat a variety of infections in humans. It is an erect perennial shrublet up to ± irregularly toothed. Its flowers are yellow and occur in clusters. Globally, its distribution and habitat is mostly in subtropical and tropical zones, in scrub forests, inundated savannas, riverbanks, sandy or clay soils, and in disturbed or impoverished soils [3].

Traditionally, *Waltheria indica* is used for the treatment of various minor ailments and complicated ailments. The leaves of *Waltheria indica* used in odema, eye disorders and in neurological diseases. The decoction of stem of *Waltheria indica* used as aphrodisiac [4] and the roots were used in wounds, skin infections and joint pains [5,6]. The roots has antibacterial and antioxidant activity [7,8]. In order to explore its traditional wound healing claim of *Waltheria indica* root, its necessary to prove it scientifically. Current study is carried to assess the wound healing activity of methanolic root extract of *Waltheria indica* against burn wound in rats.

Plant Collection

Waltheria indica were collected from Kolli hills with the help of tribal's. The plant was identified as *Waltheria indica* and authenticated by Scientist 'F' Botanical survey of India, Southern Regional Centre, Tamilnadu Agriculture University, Coimbatore. The Voucher specimen (BSI/SRC/5/23/14-15/Tech - 504) has been deposited in department for further references.

Preparation of Extract

The collected roots were washed and shade dried. The dried roots were pulverized to get coarse powder using mechanical blender. The coarsely powdered plant material was then subjected to exhaustive extraction by a maceration process using methanol as a solvent at room temperature for 7 days. The methanolic extract was concentrated by distillation to dry. The collected extract was stored in desiccators and used for further pharmacological study.

Animals

Male Wistar albino rats weighing between 150 – 220 gm were used for this study. The animals were obtained from animal house, Sri Lakshmi Narayana Institute of medical Sciences, Puducherry. The animals were placed at random and allocated to treatment groups in polypropylene cages with paddy husk as bedding. Animals were housed at a temperature of $24\pm 2^{\circ}\text{C}$ and relative humidity of 30 – 70 %. A 12:12 light: day cycle was followed. All animals were allowed to free access to water and fed with standard commercial pelleted rat chaw (M/s. Hindustan Lever Ltd, Mumbai). All the experimental procedures and protocols used in this study were reviewed by the Institutional Animal Ethics Committee.

Wound Healing Activity

Burn wounds were created on dorsal part of shaved rat's skin surface using concentrate sulfuric acid, exposed for 10 s. After 24 h, dead tissues were excised using sterile

surgical blade through a template designed to produce a third degree burn [1]. All the above procedures on rats were done under pentobarbitone (45 mg/kg., i.p) anaesthesia.

Totally 24 animals were used in this study. The rats were divided into four groups of 6 animals each. Burn wound was induced in all the groups. Group I, animals were treated with simple ointment base. Group II, animals were treated with standard povidone iodine ointment. Group III and IV, were treated with 5% and 10% of *Waltheria indica* methanolic extract in simple ointment base respectively. All the test drugs were applied topically on the wound, twice daily for 14 days.

Assessment of wound contraction

Wound contraction was monitored by metric measurement of the wound area once on 1st, 4th, 7th and 14th post wounding days. This was studied by tracing the raw wound area on a transparent polythene paper and the traced area was measured by using a graph paper. The wound contraction was measured from the original wound size of 500 mm² for each animal.

Statistical analysis

Results were expressed as mean \pm SEM. The data were analyzed by using one way analysis of variance (ANOVA) followed by Dunnet's t test. P values < 0.05 were considered as significant.

RESULTS AND DISCUSSION

The results of wound healing activity of *Waltheria indica* root extract in rats are showed in Table I. Topical application of both concentrations 5% and 10% of methanolic root extract of *Waltheria indica* promotes the contraction of wound in rats, when compared to control. The wound contraction after topical application of test drugs on 4th day of observation shows that in control it was 39.35 ± 2.66 In 5% and 10% of *Waltheria indicia* root extract was 103.94 ± 4.63 and 132.88 ± 7.82 respectively, whereas in standard drug povidone iodine ointment it was 146.83 ± 6.13 . Observation shows that on 7th day onwards, the topical applications of both the concentrations of *Waltheria indica* root extract promoted the wound contraction faster than control. Wound contraction progressed much faster in *Waltheria indica* root extract from 4th day than the normal control. There was significant ($p < 0.001$) contraction of wound, observed with *Waltheria indica* root extract and standard povidone iodine ointment on 4th to 14th day when compared with control. Topical applications of methanolic extract of *Waltheria indica* root extracts promoted wound contraction as that of povidone iodine treated groups.

Table 1. Effect of methanolic root extract of *Waltheria indica* on burn wound in rats.

| Groups | Drug Treatment | Wound Contraction (days) | | | |
|-----------|-------------------------------|--------------------------|----------------|-----------------|-----------------|
| | | 1 | 4 | 7 | 14 |
| Group I | Control (Simple Ointment) | 11.54 ±0.17 | 39.35±2.66 | 75.39±4.66 | 172.73± 7.54 |
| Group II | Povidone Iodine Ointment | 14.22±1.01 | 146.83±6.13*** | 235.18± 7.53*** | 453.91± 9.42*** |
| Group III | <i>Waltheria indica</i> (5%) | 12.52±1.02 | 103.94±4.63*** | 188.57± 3.19*** | 393.88± 8.88*** |
| Group IV | <i>Waltheria indica</i> (10%) | 13.62±1.00 | 132.88±7.82*** | 214.90± 9.72*** | 442.71± 7.55*** |

Values are in Mean ± SEM; (n = 6); *P < 0.05, **P < 0.01, *** P < 0.001 Vs Control.

CONCLUSION

From the result it could be concluded that the topical application of methanolic root extract of *Waltheria indica* showed significant wound healing activity against sulfuric acid induced burn wound in rats. The presence of

flavonoids, saponins and tannins may be responsible for its wound healing potential. Further wound healing study on the isolated active compounds in various models is required to prove its mechanism of action.

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