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Wound Healing Activity of *Pongamia Pinnata* in Albino Wistar Rats

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ABSTRACT

The entire wound healing process is a complex series of events that begins at the moment of injury and can continue for months to years. The objective of our study is to investigate wound healing activity of the methanolic leaf extract of *Pongamia pinnata* in albino rats using excision and incision wound models. 200 mg/kg/day of leaf extract of *pongamia pinnata* was evaluated for its wound healing activity and compared with povidone iodine (Standard). The present investigation may be concluded that the plant *Pongamia pinnata* is endowed with significant wound healing activity due to the presence active constituents, there by justifying its use in the indigenous system of medicine.

Keywords: *Pongamia pinnata*, Wound healing, Excision wound, Incision wound, Povidone iodine.

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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. In folklore medicine, *Pongamia pinnata* is used as a wound healing medicine[1]. In Ayurveda and Siddha medicine *Pongamia pinnata* used to treat various kinds of diseases/disorders [2]. All parts of the plant have been used as a crude drug for the treatment of tumours, piles, skin diseases, itches, abscess, painful rheumatic joints wounds, ulcers, diarrhea etc [3,4]. Ayurvedic medicine described that the root and bark used as alexipharmic, anthelmintic; useful in abdominal enlargement, ascites, biliousness, diseases of the eye, skin and vagina, itch, piles, splenomegaly, tumours, ulcers and wounds and the sprouts; considered alexiteric, anthelmintic, aperitif and stomachic. The flowers used for biliousness and diabetes. The fruit and seed used for keratitis, piles, urinary discharges and diseases of the brain, eye, head and skin, the oil for biliousness, eye ailments, itch, leucoderma, rheumatism, skin diseases, worms and wounds. Unani system uses the ash to strengthen the teeth, the seed, carminative and depurative, for chest complaints, chronic fevers, earache, hydrocele and lumbago; the oil is used as fuel for cooking and lamps[5]. The oil is also used as a lubricant, water-paint binder, pesticide and in soap-making and tanning industries. The oil is known to have value in folk medicine for the treatment of rheumatism, as well as human and animal skin diseases. It is effective in enhancing the pigmentation of skin affected by leucoderma or scabies. Traditionally the leaves of the plant were used externally in skin diseases and healing of wounds. The leaves used as anthelmintic, digestive and laxative; for inflammations, piles and wounds. Hence, it was worthwhile carryout the wound healing activity of methanolic leaf extracts with a view to justifying the use of the plant.

MATERIALS AND METHODS

Collection of Plant Materials

The leaves of *Pongamia pinnata* were collected from cherlapally village region in Nalgonda District of Andhra Pradesh, India. The plant was authenticated by Prof K. Raju, Professor, Department of Botany, Kakatiya University, Warangal, A.P, India. The collected leaves were dried at room temperature and powdered.

Preparation of Extracts

The extracts of *P. pinnata* were prepared by maceration with methanol as a solvent. The shade dried leaf powder was kept in the macerator apparatus and extraction was allowed to run successively using the solvent methanol. Extract was concentrated and were weighed.

Animals used

Healthy wistar albino rats of either sex and of approximately the same age, weighing about 180-230 g were used for the study. They were fed with standard diet and water ad

libitum. They were housed in polypropylene cages maintained under standard conditions like 12 hrs light and 12 hrs dark cycle at $27\pm 3^{\circ}\text{C}$ temperature. Animal experiments were carried out following the guidelines of the animal ethics committee of the institute.

Wound healing activity

Screening for wound healing activity was performed by excision wound model [6,7]. Adult albino rats of either sex were divided into three groups, each containing six animals. They were depilated at the desired site and wounding was performed under light ether anesthesia. A circular wound of approximately 2.5 cm diameter was impressed on the skin from the demarked area. The skin was excised to get a wound measuring approximately 300 mm^2 and 2 mm depth. After achieving full haemostasis by blotting the wound with cotton swabs soaked in saline, the animals were placed in their individual cages. The animals were treated daily as follows, from 0 to 16th post – wounding day. Group I was treated with control (ointment base), group II with standard (povidone iodine ointment) and groups III were treated with 5% ointments of leaf extracts (200mg/kg). The wound contraction rate was monitored by planimetric measurement of wound area of each animal on 0, 4th, 8th and 16th post wounding day. This was achieved by tracing the wound area on a graph paper. Reduction in the wound area was expressed as percentage of the original wound size.

Incision wound model [8]

The incision wound model was studied under light ether anesthesia. The animal was secured to operation table in its natural position. Paravertebral straight incision of approximately 6 cm diameter was made on either side of the vertebral column with the help of scalpel blade. Wounds were cleaned with 70% alcohol soaked with cotton swabs. They were kept in separate cages. Group I was treated with control (ointment base), group II with standard (povidone iodine ointment) and groups III were treated with ---% ointments of leaf extracts (200mg/kg) for 10 days. The sutures were removed after 8 days, on tenth day the tensile strength was measured by continuous constant water supply technique.

Statistical Analysis

The mean of wound area measurement and wound breaking strength between groups at different time intervals were compared using one-way ANOVA, followed by Tukey's tests.

RESULTS AND DISCUSSION

The methanolic leaf extract were screened for wound healing activity. Table 1 shows the results of the wound healing activity of extract ointment formulations by excision method. The results were expressed as mean percentage closure of excision wound area. The studies on excision wound healing model reveal that the test group showed a decrease in wound area from 1st day to 16th day. Ointment prepared from methanolic leaf extract has shown significant wound healing activity, which was comparable to that of standard marketed

preparation. However, the rate of contraction is less when compared to standard. On 16th day complete healing of wound was observed with standard marketed ointment, and ointment of methanolic leaf extract produced 83.48% healing of wound as compared to control. The control (ointment base) has shown 76.22% healing.

Table 2 and Figure 1 shows the results of the wound healing activity of extract ointment formulations by incision method. The results were expressed as mean breaking strength of incision wound area. The studies on incision wound healing model reveal that the test group showed high breaking strength in wound area from 1st day to 10th day. Ointment prepared from methanolic leaf extract has shown significant wound healing activity, which was comparable to that of standard marketed preparation. The rate of breaking strength is more when compared to standard. On 10th day complete healing of wound was observed with standard marketed ointment, and ointment of methanolic leaf extract produced 485.17g healing of wound as compared to control. The control (ointment base) has shown 293.17g healing.

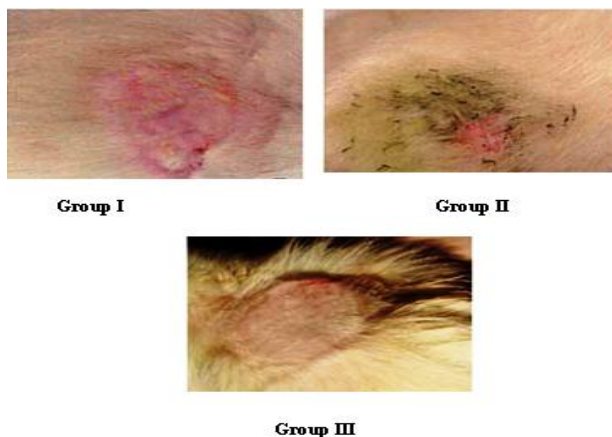
Table-1: Effect of leaf extract of *Pongamia pinnata* on excision wound (% wound closure)

Day	Group-I	Group-II	Group-III
0	0	0	0
4	10.78 %	22.42 %	17.86 %
8	25.36 %	35.68 %	35.27 %
16	76.22 %	87.86 %	83.48 %

Table-2: Effect of leaf extract of *Pongamia pinnata* on wound healing in incision wound

Groups	Incision wound breaking strength (g)
Groups -I	293.17 ± 31.9
Groups -II	421 ± 81.14
Groups -III	485.17 ± 34.64
Mean ± SD	

Figure 1: Wound healing activity by Incision method.





CONCLUSION

It may be concluded that the plant *P.pinnata* is endowed with significant wound healing activity due to the presence active constituents, there by justifying its use in the indigenous system of medicine.

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