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Research Article

EVALUATION OF METHANOLIC BARK EXTRACT OF *TECOMA STANS* LINN, FOR WOUND HEALING IN ALBINO RATS

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ABSTRACT

The different extracts of the bark of *Tecoma stans* Linn. (Bignoniaceae) was evaluated for its wound healing potential in two different types of wound models in albino rats viz., incision and excision. The different extracts of *Tecoma stans* are obtained by successive soxhlet extraction with petroleum ether, chloroform and methanol. The methanolic extract showed significant increase in wound contraction and formation of scar in excision wound model. The extract showed significant increase in the breaking strength of resutured incision wound as compared to control group($p<0.05$). The result of the present study indicate that methanolic extract of *Tecoma stans* bark has more significant wound healing property than the petroleum ether and chloroform extracts in excision and incision wound model. The presence of phytoconstituents like phytosterols, triterpene, glycosides, phenols, flavonoids, saponins, and tannins either individually or combined together may exhibit the synergistic effect towards healing of wounds. The wound healing property of *Tecoma stans* has been attributed to its antimicrobial effects. From the result obtained, it may be concluded that the methanolic extract has significant wound healing property.

KEYWORDS: Methanolic extract, *Tecoma stans,* Excision and incision wound model.

INTRODUCTION:

Wound healing processes are well organized biochemical and cellular events leading to the growth and regeneration of wound tissue in a special manner. Healing of wounds involves the activity of an intricate network of blood cells, cytokines, and growth factors which ultimately leads to the restoration to normal condition of the injured skin or tissue [1]. The aim of wound care is to promote wound healing in the shortest time possible, with minimal pain, discomfort, and scarring to the patient and must occur in a in a physiologic environment conducive to repair and regeneration [2]. Some medicinal plants have been employed in folk medicine for wound care.

Tecoma stans Linn. is a shrub or small tree. It is a Central and South American tree that grows to 25 ft. leaves are opposite, odd-pinnate, up to 20 cm in length; barklets 5 or 7 in number, lanceolate to oblong-lanceolate, 6-13 cm long, and slenderly acuminate, base acute or acuminate, margins sharply serrate. The twigs are green, turning brown, and the older bark is light gray and very furrowed. Its primary applications have been in treating diabetes and digestive problem [3]. Extracts from *Tecoma stans* Linn. leaf has been found to inhibit the growth of the yeast infection. Flower infusion can be taken orally for diabetes and stomach pains [4]. A strong flower and root decoction is taken orally as a diuretic, to treat syphilis or for intestinal worms.The plant is considered in the Satara District an effective remedy for snake and rats bites and for scorpion sting, diuretic, vermifuge and tonic [5]. Flower and bark have some medicinal value for the treatment of various cancers. The phytochemical report on *Tecoma stans* Linn. indicates that the plant contain triterpenes, hydrocarbons, resins and a volatile oil. The leaf contains flavonoid, the alkaloids, tecomine and tecostidine. It was observed that the extracts of stem bark generally showed better antimicrobial activity than those of the leaves and some organisms were selectively more sensitive to the extracts than others [6]. The flower contains beta-carotene and zeaxantin [7]. In the present study the possible effect of methanolic bark extract of *Tecoma stans* Linn. on healing of excision and incision wounds are examined.

MATERIALS AND METHODS

Plant material

The whole plant of *Tecoma stans* was collected in the locality of Barpali at Bargarh District of Orissa, India, during the month of December, identified and authenticated by Prof.P.Jayaraman, PARC Chennai. The voucher specimen was given the No. PARC/2008/97 and deposited at department of pharmacognosy.

Preparation of extract

The fresh barks were washed, air-dried under shade at room temperature and then crushed into coarse powder (sieve no.10/40).The dried powder (250gm) was extracted successively with petroleum ether (60-80˚C), chloroform, and methanol by using a Soxhlet apparatus for 16-18 hrs.The solvent was removed under reduced pressure and the extracts were concentrated under vacuum at 40-60˚C and weight of the dried mass was recorded. (Pet.ether-3.59%, chloroform-2.6%, and methanol-17.88%) [8].The methanol extract was incorporated in simple ointment base (5% w/w) and used for excision wound model externally. 2% Gum acacia was used as a vehicle to suspend the extract for incision wound model internally. Preliminary phytochemical tests of different extracts were performed by using specific reagents through standard procedures [9].

Animals

Healthy adult wisterstrain of albino rats weighing approximately 180 to 250gms were procured from an in-house animal facility Ghosh Enterprise, Kolkota. The animals were maintained under controlled conditions of temperature (23±2°C), humidity (50±75%), with a 10-14hr light dark cycle. The animals were housed in sanitized polypropylene cages containing sterile paddy husk as bedding. All animals were allowed free access to distilled water and fed on a commercial diet (Lipton India Limited, Banglore). All the studies conducted were approved by the Institutional Animal Ethical Committee (1200/ac/08/CPCSEA), Dadhichi college of pharmacy, Vidya vihar,Cuttack, according to prescribed guide-lines of the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), Government of India.

WOUND MODEL

Excision wound

For the excision wound study, animals were divided into 4 groups of six rats in each group. Group-I served as control and applied with Vaseline, Group-II, Group-III, Group-IV, were treated with petroleum ether, chloroform, and methanol extracts respectively.

An impression was made on the dorsal thoracic central region 5mm away from the ears, by using a round seal of 2.5 cm diameter as described by Morton and Malone [10] .The skin of the impressed area was excised to the full thickness to obtained area of about 500 mm^2 under light ether anaesthesia in aseptic condition. The animals were housed indivisualy.

The methanol extracts in simple ointment base (5% w/w) were applied on the wound once a day for 18 days starting from the day of wounding. The percentage wound closure was observed on 4^{th}, 8^{th}, 12th, 16th, 18th post wounding day. Epithelization time (in days) and size of the scar area was noted.

Incision wound

Incision wound model was performed according to Ehrlich and Hunt [11]. The animals were divided into 4 groups of six rats in each group, and kept in separate cage. Group-I served as control, received only 2% gum acacia suspension (1 ml/kg,p.o), and petroleum ether, chloroform and methanol extracts (250 mg/kg) were given orally once a day to group-II, III and IV respectively for 10 days.

Under light ether anesthesia, the animals were secured to operation table in its natural position. Two paravertebral straight incisions of 6 cm each were made through the entire thickness of the skin, on either side of the vertebral column with help of sharp blade. Removal of the sutures was done on 8^{th} post wounding day. Tensile strength was determined on both wounds by continuous constant water flow technique of Lee [12].

Statistical analysis

The results are reported as Mean±SE. Statistical analysis was done using ANOVA (Tukey-Multiple Copmarision Test).When probability (p) was less than 0.05 was considered as significant.

RESULT

The preliminary phytochemical studies of different extracts showed the presence of alkaloids, carbohydrates, glycosides, saponins, sterols, phenolic compounds and flavonoids.

In the study using excision wound model, animals treated with methanol extract of bark of *Tecoma stans* showed significant decrease in epithelization period as evidenced by shorter period for fall of eschar as compared to control group($p<0.05$) Fig-1. The extract also facilitated the increase in rate of wound contraction than control group. The petroleum ether extract treated animal (Group-II) showed wound contraction by 70.25% as compared with control (Group-I) by 65.36%. The chloroform extract treated animals (Group-III) showed wound contraction by 76.25% as compared with the control (Group-I) by 65.36%. The methanol extract treated animal (Group-IV) showed wound contraction by 82.63% as compared with the control (Group-I) by 65.36%. Fig-2

The result of present study reveals that methanolic bark extracts of *Tecoma stans* possess a prominent prohealing activity in incision wound model. This was demonstrated by significant increase in the skin tensile strength in methanol extract treated groups ($p<0.05$) on 10^{th} post wounding day are presented in Table-1.

Fig-1:

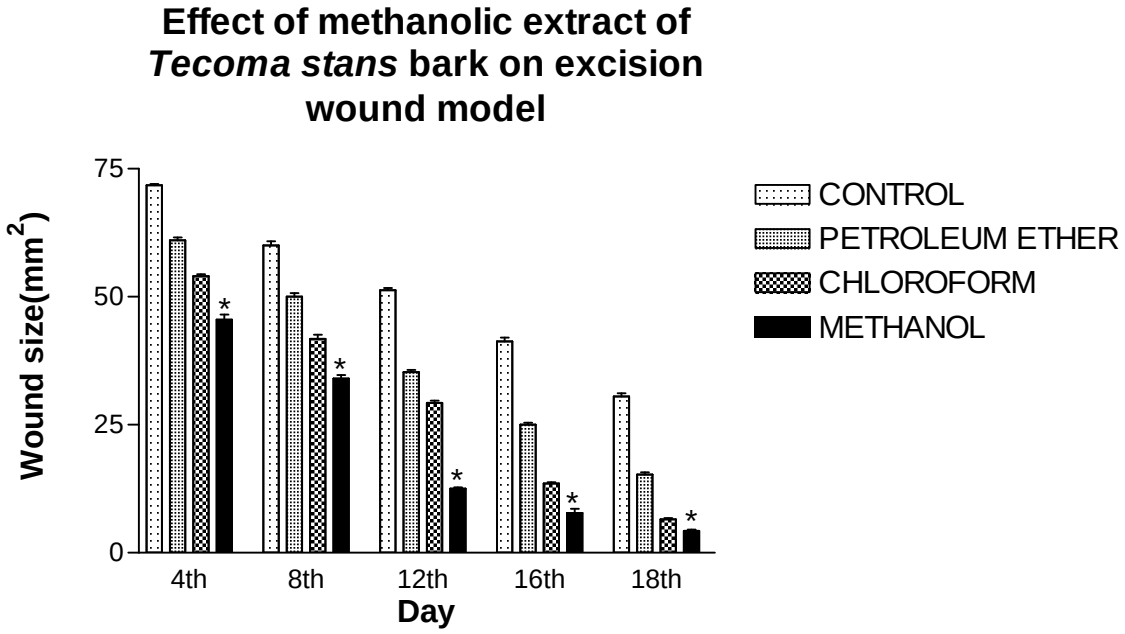

Fig-2:

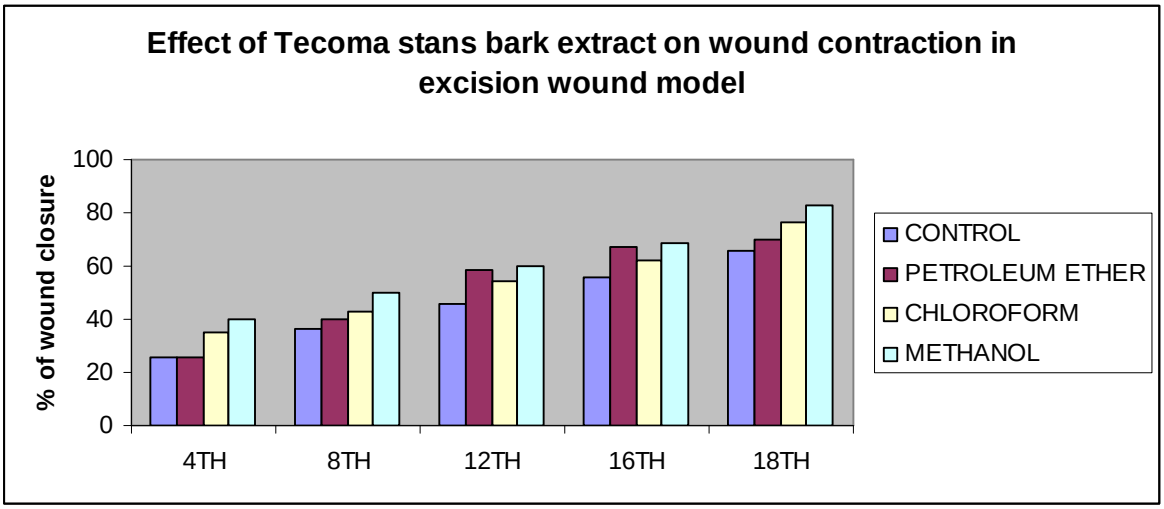

Table-1: Effect of extracts of *Tecoma stans* bark on the breaking strength in incision wound

SL.NO	Group	Breaking strength
1	Control	268.16 ± 20.08
2	Petroleum ether	319.22 ± 12.32
3	Chloroform	345.25 ± 13.56
4	Methanol	436.88 ± 18.36*

Values are mean ± SE (n=6)* p<0.05 vs control

DISCUSSION

In the present study, wound healing activity of *Tecoma stans* was studied and the results of the present study suggest that local application and systemic administration of methanol extract of the bark has shown more significant wound healing activity in excision and incision wound models and support the popular use of plant to open wound in folk medicine.

The plant contains triterpenes, hydrocarbons, resins and volatile oil. Bark of *Tecoma stans* yielded the major alkaloidal compound (-)-delta-n-norethylskytanthin [13]. The methanolic bark extract of *Tecoma stans* was studied for their antimicrobial activity using a wide range of Gram-positive and gram-negative bacteria and fungi. The wound healing property of *Tecoma stans* has been attributed to its antimicrobial effects [14].

Quantitative and qualitative analysis of phenolic compounds were made. UV absorption profile indicates the presence of simple phenolic [15].

The presence of phytoconstituents like phytosterol, triterpene, glycosides, phenols, flavonoids, saponins, and tannins either individually or combined together may exhibit the synergistic effect towards healing of wounds. However, further investigation employing isolation of constituents and screening models are needed for further confirmation of wound healing potential of *Tecoma stans.*

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REFERENCES

1. Clark R.A.F. Cutaneous wound repairs. Physiology, Biochemistry and Molecular Biology of Skin. Goldsmith L.A. (Ed), Oxford University Press, New York, 1991, pp.576.
2. P.G Bowler, B.I Duerden, D.G Armstrong.Clin.Microbiol.Rev, 2001, vol 14, pp 244-269.
3. Kirtikar K.R, Basu B.D. Indian Medicinal Plants. Vol-III, International Book Distributor, Dehradun, 2006, pp 1852.
4. L.Costantino, L.Raimondi, R.Pirisino, T.Brunetti. Farmaco 2003, vol 58, pp 781-785.
5. Thangadurai D. Ethno medicinal plants used as antidote for poisonous bites among the tribals of southern Western Ghats, India. National Conference on Recent Trends in Spice and Medicinal Plant Research, Calcutta, WB, India. 1998.
6. O.A Binuti, B.A Lajubutu. Afr J Med Sci ,1994, vol 23, pp 269-273.
7. B.K Srivastava, M.V.R.K Reddy. A J Chem, 1995, vol 7, pp 679-680.

8. Houghton, Peter, Raman, Amala. Laboratory handbook for the fractional of natural extracts. Springer, Berlin, 1998.

9. Harborne J.B. Phytochemical Methods. Jackman H.(Ed.), London, 1973, pp 70.

10. J.P Morton, M.H Malon. Arch Int Pharmacodyn Ther, 1972, vol 196, pp 117.

11. H.P Ehrlich, T.K Hunt. J Ann of Surg, 1969, vol 170, pp 203-205.

12. K.H Lee. J Pharmacol Sci, 1968. vol 57, pp 1042.

13. G.H Harris, E.C Fixman, F.R Stermitz. J Nat Prod, 1988, vol-51(3), p-534-548.

14. O.A Binutu, B.A Lajubutu. Afr J Med Med Scie,1994, vol 23 (3), pp 269-73.

15. S.V Chauhan, J.Singh, S.Tahara. Ind J Exp Bio, 2004, vol 42(2), pp 197-201.

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