Research Article

Evaluation of wound healing activity of ethanolic extract of *Lantana camara* roots

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Abstract

Background: Wound healing is an integrated cellular and biochemical process of restoring normal structure functions of damaged tissue. Healing is a natural phenomenon by which body itself overcome the damaged to the tissue but the rate of healing is very slow and chance of microbial infection is high. Several herbs and medicinal plants proved to be a wound healers were identified and formulated for treatment and management of wounds. **Objective:** In the present study wound healing activity *of Lantana camara* roots etanolic extract was evaluated by using excision wound model on albino rats. **Materials and methods:** *Lantana camara* roots were extracted using maceration technique. The extract was evaluated for wound healing activity using excision wound model on Wistar albino rats weighed about 150-200g. **Results:** The results of the study suggest the use ethanolic extract of *Lantana camara* on wounds. Results of present study showed significant wound healing activity (wound contraction on 15th day (124±5.44) compared to control (310 ± 2.20) and almost equal to standard (122±4.42). Test ointment showed complete Epithelialization 7.28±0.82 days when compared to control (12.21±0.32) and standard (6.32±0.56).

Keywords*:* Lantana camara, wound healing activity, wound infection

Introduction

The World Health Organization estimated that 80% of people worldwide rely on herbal medicines for some aspect of their primary healthcare (Velmurugan et al., 2012). The aim of herbal treatment is usually to produce persisting improvements in wellbeing. Practitioners often talk in terms of trying to treat the "underlying cause" of disease and may prescribe herbs aimed at correcting patterns of dysfunction rather than targeting the presenting symptoms (Vickers and Zollman, 1999; Patil et al., 2004). Wounds may be defined as loss or breaking of cellular and anatomic or functional continuity of living tissue. In general wounds are classified as acute wound and chronic wound (Jaswanth et al., 2001). Wound healing can be defined as a complex dynamic process that results in the results in the restoration of anatomic continuity and function. It is a finely orchestrated and overlapping sequence of events involving vascular response phase/ hemostasis, inflammation, proliferation, maturation and remodeling (Lazarus et al., 1994; Bairy and Rao, 2001). Many Ayurvedic herbal plants have a very important role in the process of wound healing. Plants are more potent healers because they promote the repair mechanisms in the natural way.

Wound healing is a process of restoring normal structure functions of damaged tissue. Healing is a natural phenomenon by which body itself overcome the damaged to the tissue but the rate of healing is very slow and chance of microbial infection is high. This creates demand of a substance that speeds up the rate of healing. Wound healers are one of the most critical requirement in the essential medicaments for soldier and may help in putting injured soldier back on the war field as quickly as possible. A wound healer also minimizes demand of other drugs like antibiotics and also their probable side effects by their use (Barua et al., 2010; Chitra et al., 1998; Chitra et al., 2002). India has a rich tradition of plant-based knowledge on healthcare. A large number of plants/plant extracts/decoctions or pastes are equally used by tribals and folklore traditions in India for treatment of cuts, wounds, and burns. Besides this, there is not a single synthetic drug formulation in the market which can claims for its wound healing properties. The drugs available are either bacteriostatic or bactericidal and in these cases healing is by a natural phenomenon (Lawrence and Diegelmann, 1994; Nguyen et al., 2009; Ghosh et al., 2011). In the present study wound healing activity of ethanolic extract of *Lantana camara* roots was evaluated by using excision wound model on albino rats.

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Materials and methods

Plant materials and preparation of extracts

Roots of *Lantana camara* collected from herbal garden of Modern Institute Pharmaceutical Sciences, Indore. Plant was authenticated by Dr. Spana Malviya, Professor, Department of Pharmacognosy, Modern Institute Pharmaceutical Sciences, Indore (Herbarium Submitted MIPS/Herbarium/Research/2017/18).

The collected roots were shade dried completely. The dried roots were then coarsely powdered. The extract was prepared by maceration method. Drug macerated in ethanol for 48 h and filtered. The collected extract was evaporated on water bath to get concentrated extract (Kokate, 1986; Khandelwal, 2005).

Preparation of ointment

Water soluble ointment base was prepared using formula given below (Mehta, 2005).

Table 1. Composition of Simple ointment base

S. No.	Ingredients	Quantity
1	Cetyl alcohol	10g
2	Soft white paraffin wax	10g
3	Liquid paraffin	29ml
4	Water	50ml
5	Ethanolic extract of *Lantana camara*	1g

Experimental study design

Wistar albino rats weighed about 150-200g were divided into three groups of six rats each. Animals were housed at a temperature of 23 ± 2 °C and relative humidity of 30–70%. A 12:12 light: day cycle was followed. All animals were allowed free access to water and fed with standard commercial rat chaw pellets.

Grouping of Animals

Group I: (Negative control) were applied only ointment base without any drug.

Group II: (Standard Group) Standard drug povidone iodine ointment applied topically twice a day

Group III: (Test Group) Test extract in water soluble ointment base topically twice a day.

Excision wound model

Excision wound models were used to evaluate the wound healing activity. Excision wound model was employed to have information about wound contraction and wound closure time on the eight groups of animals. The animals were anesthetized by using diethyl ether. An impression was making on the dorsal thoracic region 1 cm away from vertebral column and 5 cm away from ear on the anaesthetized rat. The particular skin area was shaved one day prior to the experiment. The skin of impressed area was excised to the full thickness to obtain a wound area of about 500 mm^2. Haemostasis was achieved by blotting the wound with cotton swab soaked in normal saline. Animals were treated daily with drugs as mentioned above under experimental design from 0th day to 16th post-wounding day. Wound area is measured regularly from 0th to 16th days post wounding after every 4^{th} day for determination of wound contraction and percentage wound contraction was calculated. Falling of scar leaving no raw wound behind was taken as end point of complete epithelization and the days required for this was taken as period of epithelization (Madhvan et al.2006; Nair et al., 2006).

Statistical analysis

Statistical analysis was performed using one-way ANOVA, followed by Dunnett's multiple comparisons test where appropriate. Differences were considered significant when $P \leq 0.05$.

Results and discussion

The results of excision wound model showed a significant result of test ointment on wound healing parameters like wound contraction area and epithelialization period as compared to standard group. Triterpenoids presents in the plant are also known to promote the wound healing process mainly due to their astringent and antimicrobial property, which seems to be responsible for wound contraction and increased rate of epithelialization (Scortichini and Rossi, 1991; Tsuchiya et al., 1996). Test ointment showed significant wound healing activity, wound contraction on 16^{th} day in test group was 20.20 ± 2.3 mm^2, compared to control 35.20 ± 2.5 mm^2 and to standard 8.4±1.14 mm^2 (Table 2 & table 3). Test ointment showed complete epithelialization in 17.40±0.54 days when compared to control 22±1.0 day and standard 14.80±0.8 day (Table 4).

Table 2. Effect of extract ointment on wound area (mm^2)

Days	Control group	Standard group	Test group
0	381±10.6	345.2±3.513	394±11.1
4	280.6±8.08	257.2±2.3	263.2±5.6
8	188±3.9	87.80±3.8	132±3.6
12	81.80±1.9	34.60±5.17	53.20±3.2
16	35.20±2.5	8.4±1.14	20.20±2.3

Significant difference at $P<0.05$ when compared to control. Values are Mean ± SEM from 6 animals in each group.

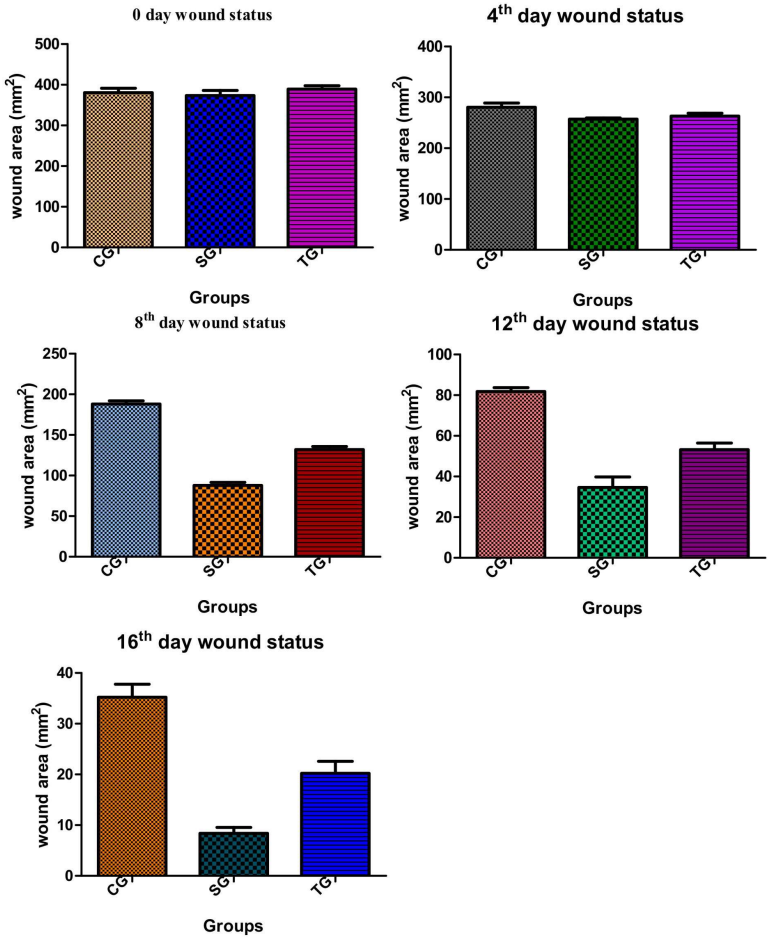

Figure 1. Effect of different treatment groups on wound area

Table 3. Effect of extract ointment on percentage wound closure

Group	Control group	Standard group	Test group
0	0	0	0
4	26.50%	31.28%	33.24%
8	50.65%	76.73%	66.41%
12	78.47%	90.90%	86.54%
16	90.81%	97.86%	94.92%

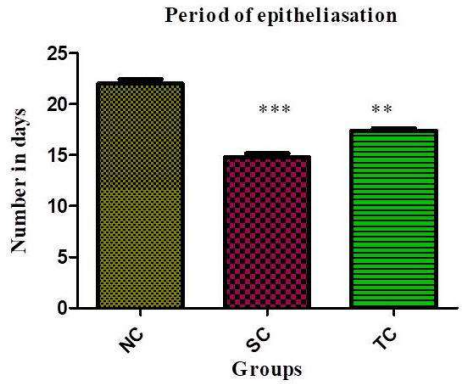

Figure 2. Period of epithelialization

Conclusion

From the present study it can be concluded that the ethanolic extract of *Lantana camara* possesses a significant wound healing activity, there by justifying its use in the indigenous system of medicine. Parameters studied during the study showed significant results of wound healing activity.

References

Bairy KL, Rao CM. 2001. Wound healing profiles of *Ginkgo biloba*. Journal of Natural Remedies, 1(1):25-27.

Barua CC, Talukdar A, Barua AG, Chakraborty A, Sarma RK, Bora RS. 2010. Evaluation of the wound healing activity of methanolic extract of *Azadirachta Indica* (Neem) and *Tinospora cordifolia* (Guduchi) in rats. Pharmacologyonline, 1:70-77.

Chitra P, Sajithlal GB, Chandrakasan G. 1998. Influence of Aloevera on collagen turnover in healing of dermal wounds in rats. Indian Journal of Experimental Biology, 36:896-901.

Chitra V, Dharani PP, Pavan KK, Narayana RA. 2009. Wound Healing Activity of Alcoholic Extract of *Buchanania lanzan* in Albino Rats. International Journal of ChemTech Research, 1:1026-1031.

Ghosh PK, Gupta VB, Rathore MS, Hussain I.

2011.Wound-healing potential of aqueous and ethanolic extracts of apamarga leaves. International Journal of Green Pharmacy, 5(1): 12-15.

Jaswanth A, Akilandewari LV, Manimaran S, Ruckmani. 2001. Wound healing activity of methanolic extract of leaves of *Gossypium herbaceum.* Indian Journal of Pharmaceutical Science, 63: 41.

Khandelwal KR. 2005. A text book of practical Pharmacognosy, 27th ed. pp.151-163 Nirali Prakashan, Pune.

Kokate CK.1986. In: Practical Pharmacognosy, Preliminary Phytochemical Screening, first ed., pp 111, New Delhi ,Vallabh Prakashan.

Lawrence WT, Diegelmann RF. 1994. Growth factors in wound healing. Clinics in Dermatology, 12(1):157-69.

Lazarus GS, Cooper DM, Knighton DR, Margolis DJ, Pecoraro RE, Rodeheave MC. 1994. Definitions and guidelines for assessment of wounds and evaluation of healing, Arch Dermatology, 130: 489-493.

Madhvan V, Tomar AT, Murali A, Yoganarasimhan SN. 2006. Wound healing and antipyretic activity of stem bark of *Wrightia tinctoria*. Journal of Tropical Medicinal Plants, 7 (1): 69- 71.

Mehta RM. 2005 Dispensing pharmacy. 2 ed. pp.237 Vallabh Prakashan Delhi.

Nair AGR, Ramesh P, Subramanian, Nayak BS, Pereira LMP. 2006. *Catheranthus roseus* flower extract has wound healing activity in Spargue Dawley rats. BMC Complementary and Alternative Medicine, 6: 41.

Nguyen DT, Orgill DP, Murphy GF. 2009. The pathophysiologic basis for wound healing and cutaneous regeneration. Biomaterials for Treating Skin Loss, 28:25-57.

Patil MB, Jalalpure SS, Nagoor VS. 2004. Wound healing activity of the roots of *Eclipta alba* Linn. Indian Drugs, 41(1):40-5.

Scortichini M and Rossi MP. 1991 Preliminary in vitro evaluation of the antimicrobial activity of terpenes and terpenoids towards Erwinia amylovora (Burrill). Journal of Applied Bacteriology, 71(2):109–112.

Tsuchiya H, Sato M, Miyazaki T. 1996. Comparative study on the antibacterial activity of phytochemical flavanones against methicillin-resistant Staphylococcus *aureus.* Journal of Ethnopharmacology, 50(1) 27–34.

Velmurugan C, Venkatesh S, Sandhya K, Bhagya Lakshmi S, Ramsila Vardhan R, Sravanthi B. 2012. Wound healing activity of methanolic extract of leaves of *Gossypium herbaceum*. Central European Journal of Experimental Biology, 1:7-10.

Vickers A, Zollman C. 1999. ABC of complementary medicine: herbal medicine. BMJ: British Medical Journal, 16; 319(7216):1050.

Ya C, Gaffney SH, Lilley TH, Haslam E. 1988. Chemistry and Significance of Condensed Tannins, Plenum Press, New York, NY, USA.