

**NOTE****Evaluation of Wound Healing Activity of Galls of *Quercus infectoria***

G.P. CHOUDHARY

School of Pharmacy, Devi Ahilya Vishwavidhyalaya  
Takshashila Campus, Ring Road, Indore-452 001, India  
E-mail: choudharygp@rediffmail.com

The wound healing activity of ethanolic extract of galls of *Quercus infectoria* evaluated on excision wound model, in wistar albino rats, in the form of an ointment with two concentrations (2 and 4 % w/w ointment of galls extract in simple ointment base). Both concentrations of the ethanolic extract showed significant response when compared with the control group. Nitrofurazone ointment (0.2 % w/w) used as standard.

**Key Words:** *Quercus infectoria*, Nitrofurazone, Wound healing activity.

*Quercus infectoria* (QI) Olivier belonging to the family-Fagaceae, is a small tree or a shrub mainly present in Greece, Asia Minor and Iran. Majuphal, widely known in Indian traditional medicine have been used as dental powder and in the treatment of toothache and gingivitis. The galls of *Quercus infectoria* have a great medicinal value and have pharmacologically documented to possess astringent, antidiabetic, antitremorine, local anaesthetic, antiviral, antibacterial, antifungal, larvicidal and anti-inflammatory activities. The main constituent found in the galls of *Quercus infectoria* are tannin (50-70 %) and small amount of free gallic acid and ellagic acid<sup>1</sup>.

*Quercus infectoria* has been used in folk medicine for the treatment of skin diseases and wound. A survey of literature revealed that no systematic approach has been made to study the wound healing activity of this plant. Thus the present study was undertaken to assess the effect of this indigenous plant on excision wound in rats.

Galls of *Quercus infectoria* obtained from Yucca enterprises, Mumbai, were authenticated and identified by Dr. A.B. Sheerwani (Retd. Prof. and Head), Department of Botany, Holkar Science College, Indore. A voucher specimen has been deposited in our laboratory for further reference.

Powdered galls were soxhlet-extracted with 70 % ethanol. The ethanolic extract was evaporated in vacuo and residue (yield: 18.5 % w/w). The phytochemical screening revealed the presence of tannis, glycoside and phytosterol.

Two types of ointment formulations with different concentration of the extract were prepared *viz.* 2 % (w/w) ointment, where 2 g of extract was incorporated in 100 g of simple ointment base; 4 % (w/w) ointment where, 4 g of extract incorporated in 100 g of simple ointment base. Nitrofurazone ointment (0.2 w/w) obtained from Smith kline Beecham Pharmaceutical, was used as standard drug for comparing the wound healing potential of the extract. Healthy wistar albino rats of either sex weighing 150-200 g were used. They were kept in a standard environment condition and fed with rodent diet and water *ad libitum*. The experimental protocol have been approved by institutional animal ethical committee. The wound healing studies were carried out using ether anaesthetized rats at two different concentrations (2 and 4 %) (w/w).

TABLE-1  
EFFECT OF ETHANOLIC EXTRACT OF GALLS OF *Quercus infectoria* ON %  
WOUND CLOSURE OF EXCISION WOUND MODEL

Group	4th Day	8th Day	12th Day	16th Day	Period of epithelization (d)
Control	15.82 ± 0.68	27.21 ± 1.02	48.21 ± 1.80	68.53 ± 2.60	24
Nitrofurazone	35.28 ± 0.15	76.80 ± 0.19	89.81 ± 0.58	97.11 ± 0.48	18*
Extract (4 %)	32.12 ± 2.10	73.22 ± 2.88	85.34 ± 2.43	93.54 ± 2.79	18*
Extract (2 %)	21.19 ± 1.44	33.35 ± 1.87	62.52 ± 2.96	79.22 ± 2.52	20

Values are mean ± SE; \* p < 0.001 vs. control; n = six animals in each group.

In excision wound four group (**group I** was considered as control, the **group II** served as the reference standard and treated with 0.2 % (w/w) Nitrofurazone ointment. The **group III** animals were treated with the 2 % (w/w) ethanolic extract and the **group IV** animals were treated with 4 % (w/w) ethanolic extract of galls of (QI) of animals containing six in each group. A circular piece of full thickness (*ca.* 500 mm<sup>2</sup>) was cut off from a predetermined area on the back fo the rat. Wounds were traced on 1 mm graph paper on the day of wounding and subsequently on alternate days until healing was complete. Changes in wound area were calculated, giving an indication of the rate of wound contraction. Number of days required for falling of the eschar without any residual raw wound gave the period of epithelization<sup>2</sup>. The ointment of the galls extract, standard drug and simple ointment was applied to the wound twice daily, until recovery to the respective groups of animals. The results are expressed as mean ±SE of six animals in each group. The data were evaluated by students t-test and the values of p ≤ 0.001 were considered statistically significant.

It was observed that the wound healing contracting ability of the extract ointment in different concentrations was significantly greater than that of the control (*i.e.* simple ointment treated group). The 4 % (w/w) extracted ointment treated groups showed significant wound healing from the fourth day onwards, which was comparable to that of the standard drug, *i.e.* nitrofurazone ointment treated group of animals. The wound closure time was lesser, as well as the percentage of wound contraction was much more with the 4 % (w/w) extract ointment treated group ( $18 \pm 1$  days for 100 % contraction which was almost similar to that of the nitrofurazone treated group). The 2 % (w/w) extract ointment treated group of animals showed significant wound contraction from the eighth day onwards and achieved 100 % with the wound closure time of  $20 \pm 2$  days.

Wound healing is a fundamental response to tissue injury that results in restoration of tissue integrity. This is mainly achieved by the synthesis of the connective tissue matrix. Collagen is a major protein of the extracellular matrix and is the component that ultimately contributes to wound strength. Tannins promote the wound healing through several cellular mechanisms; chelation of the free radicals and reactive species of oxygen, promoting contraction of the wound and increasing the formation of capillary vessels<sup>3</sup> and fibroblasts and including keratinocyte proliferation, but do not act on the differentiation towards cornified cells<sup>4</sup>. However, results revealed that tannins are one of the important phytoconstituents responsible for wound healing mainly due to their astringent and antimicrobial property.

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