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### WOUND HEALING ACTIVITY OF BARRK OF ERYTHRINA INDICA LINN (FEBACEAE)

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**Abstract:** The aim of present study was to evaluate wound healing activity of methanol extract of bark of *Erythrina indica* Linn. (Fabaceae) by using excision wound model in Wistar albino rats. In excision model, treatment was continued till the complete healing of wound. For topical application 2.5%w/w, 5%w/w and 10%w/w ointment of methanol bark extract was prepared by using simple ointment. The wound healing activity was assessed by the percentage of wound contraction, period of epithelialization. Methanol extract showed significant wound healing activity at 10%w/w dose when compared to standard 1% Framycetin sulphate. The fraction wound contraction of control, standard, 2.5%w/w, 5%w/w and 10 %w/w on 18 day was found to be  $82.01 \pm 0.71$ ,  $100 \pm 0.0$ ,  $97.51 \pm 0.67$ ,  $98.88 \pm 0.27$ ,  $100 \pm 0.0$ . The results confirmed that methanol extract of bark of *Erythrina indica* Linn (Fabaceae) showed important wound healing activity.

**Keywords:** *Erythrina indica* Linn (Fabaceae), excision wound model, wound contraction, epithelialization.



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## INTRODUCTION

Wounds are main cause of physical disabilities. They arise due to physical, chemical or microbial agents. Healing is a continued existence mechanism and represents an attempt to maintain normal anatomical structure and Function.<sup>1</sup> Many immunosuppressant, cytotoxins and non-steroidal anti-inflammatory drugs

Suppress the wound healing.<sup>2</sup> Restoration of damaged tissue (wound) is an important method which plays vital role in survival of life. It is imminent for the basis of all surgical manipulations.<sup>3</sup> Many plants have proved to possess major healing properties in different types of wounds. Using certain plants, possessing antiseptic, astringent, anti-inflammatory, antimicrobial property the rate of wound healing can be improved.<sup>4</sup> Such plant can increase the rate of tissue healing by providing different essential substances, required at various steps of wound healing. Plants being cheaper and safer than allopathic drugs, so action by ordinary ways may be useful in veterinary practice, especially in India where these are found in *Erythrina indica* Linn. (Fabaceae) is a medium-sized, spiny, deciduous tree normally growing to 27 m tall, found in Bengal and many parts of India especially in southern India. It is usually known as Indian coral tree or tropical coral tree in English, Pangara in Marathi, Paribhadra in Sanskrit & Mandara in Hindi.<sup>5</sup> The leaves are pinnate with a 20 cm petiole and three leaflets, each leaflet up to 20 cm long and broad. It has dense clusters of scarlet or crimson flowers and black seeds. Flowers bright red on leafless branches, in dense stout racemes. Sepals 5, Petals 5, papilionaceous corolla. Stamens 10, alternately longer and shorter. Ovary one celled, many ovuled.<sup>6</sup> Special parts of plant are used in traditional medicines as a nervine sedative, collyrium, in ophthalmia, anti-asthmatics, antiepileptic, antiseptic and as an astringent. Bark is used in fever, liver ailment and rheumatism', wound heal.<sup>7,8</sup> Leaf paste useful for muscular pain in cattle. The root extract possess antimicrobial action. An Indian preparation said to destroy pathogenic vermin and relieve joint pain. Juice from the leaves is mixed with honey and ingested to kill tapeworm, round-worm and threadworm.<sup>9</sup>

## MATERIALS AND METHODS:

### COLLECTION OF PLANT & AUTHENTICATION:

The bark of plant *Erythrina indica* were procured from local market of Kolhapur and authenticated in our Pharmacognosy Department and a voucher specimen of Ph-12 is preserved.

### ANIMALS:

Healthy Wistar albino rats of either sex and of about the same age, weighing among 150-250 gm were used for the study. They were independently housed, maintained clean

polypropylene cages containing paddy pod bedclothes and fed with standard diet and water *ad libium* in animal house facility and maintained under usual experimental conditions. The experimental protocol has been approved by institutional animal ethical committee, SGM College of Pharmacy, Mahagaon.

#### DRUGS AND CHEMICALS:

Framycetin 1% w/w (soframycin, Aventis Pharma) was procured from local retail pharmacy, which is used as standard drug. Simple ointment used as the ointment base. By using this, ointment is prepared in three concentrations (2.5%w/w, 5%w/w and 10%w/w).

#### EXPERIMENTAL PROCEDURE:

Excision was inflicted on the rats according to methods described by Morton and Malone (1972) under light ether anesthesia. The dorsal fur of the animals was shaved with an electric cutter. Full skin thickness was excised from the clear area to get a wound measuring about 500 mm<sup>2</sup> by using toothed forceps and pointed scissors.<sup>11</sup>

The animals were divided into five groups of six animals each as mentioned below

**Group I-** Control group with wound and treated with ointment base.

**Group II-** Standard group with wound and treated with ointment framycetin 1% w/w.

**Group III-** Test group with wound and treated with methanol extract of 2.5%w/w *Erythrina indica* Linn (Fabaceae)

**Group IV-** Test group with wound and treated with methanol extract of 5%w/w *Erythrina indica* Linn (Fabaceae)

**Group V-** Test group with wound and treated with methanol extract of 10%w/w *Erythrina indica* Linn (Fabaceae)

All the formulations were applied once a day till the complete epithelialization preliminary from the day of cutting. Wound healing property was evaluated by wound contraction percentage and wound closure time. The wound surface area was measured at once by placing a transparent paper over the wound and tracing it out, area of this impression was calculated using the graph sheet. The same procedure is employed every third day until healing was complete.<sup>12, 13</sup>

### Extraction of Plant Material:

The barks were shade dried and were ground to coarse powder. Powder was first defatted with petroleum ether and then extract with methanol which was further evaporated to dryness to obtain dry residue (yield 13.8 % w/w).

### Preliminary Phytochemical Analysis & percentage yield

A preliminary phytochemical screening was carried out for both the extract employing the standard procedure to reveal the presence of alkaloids, glycosides, carbohydrates, steroids, flavonoids, saponins, tannins & amino acids.<sup>10</sup>

**Table 1: Data for percentage yield of bark of extract of *Erythrina indica* Linn (Fabaceae) bark**

Name of extract	color	Consistency	Percentage yield
Methanolic extract	Dark brown	Stick mass	13.8

**Table 2:-Phytochemicals Present in the Extracts of *Erythrina indica* Linn (Fabaceae) bark**

Sr. No	Phytoconstituents	Methanolic Extract
1.	Alkaloids	+++
2.	Glycosides	+++
3.	Flavonoids	+++
4.	Tannins	++
5.	Carbohydrates	++
6.	Phytosterols	++
7.	Fixed oil	++
8.	Saponins	++
9.	Gums and mucilage	++
10.	Proteins and amino acids	++
11.	Terpenoids	++

**Key:** +Present, - absent, ++ appreciable present, +++ very appreciable present.

### Evaluation of parameters

#### Epithelialization Period:

It was monitored by noting the number of days required for the mark to fall off from the wound surface without leaving a raw wound behind.

#### Wound Contraction:

It was noted by following the progressive changes in wound area planimetrically, excluding the day of wounding. The evaluated surface area was then engaged to calculate the percentage of wound contraction, taking the initial size of the wound, 500mm<sup>2</sup> as 100% by using the following equation:

$$\% \text{ of wound contraction} = \frac{\text{Initial wound size} - \text{specific day wound size}}{\text{Initial wound size}} \times 100$$

Initial wound size

#### STATISTICAL ANALYSIS:

All the values are expressed as mean  $\pm$  S.E.M for groups of six animals each. Analyzed by one way ANOVA and compared by using Bonferroni- comparison test. The values are statistically significant at three levels, \*\*\* $p < 0.001$ . \*\* $p < 0.01$ . \* $p < 0.05$ . But ns if  $p > 0.05$ .

#### RESULTS AND DISCUSSION:

The result of the colour and consistency for the methanol extract of *Erythrina indica* Linn (Fabaceae) bark was given in table 1. Dark brown was the colour observed and the uniformity was found to be sticky in nature with the methanolic extract of *Erythrina indica* Linn (Fabaceae) bark. The tests for the presence of Phytoconstituents revealed that the highest number of constituents such as Flavonoids, alkaloids, tannins, glycosides, amino acids and gums were present in the methanolic extract. The results were given in table 2.

Significant promotion of wound healing activity was observed in all three doses of methanol extract in excision wound model. The mean percentage of wound contraction was calculated on 3, 6, 9, 12, 15 and 18 postwounding days in all three groups. On 3rd day there is no significant difference between groups apart from standard group treated with Framycetin 1% w/w. A rapid increase in percentage wound contraction shown in standard and methanol extracts of *Erythrina indica* Linn (Fabaceae) bark (2.5% w/w, 5% w/w and 10% w/w) treated groups between 3, 6, 9, 12 days postwound when compared with control group. On the day 15, *Erythrina indica* wound healing (EIWH) (2.5% w/w, 5% w/w and 10% w/w) shows significant related to that of

the standard group. On the day 18, mean percentage wound contraction of control, and EIWH (2.5% w/w, 5% w/w and 10% w/w) treated groups were  $81.73 \pm 0.71$ ,  $93.51 \pm 0.67$ ,  $96.88 \pm 0.27$  and  $100 \pm 0.0$  respectively whereas standard group shows  $100 \pm 0.0$  indicating that EIWH (2.5% w/w, 5% w/w and 10% w/w) treated groups shows significant wound healing property comparable to that of standard group and highly significant with control group and showed in table: 3.

**Table: 3: Effect of methanol extract of *Erythrina indica* bark Linn (Fabaceae) on**

**Percentage of wound contraction of experimental group of rats**

GROUP	TREATMET	DOSE	PERCENTAGE OF WOUND CONTRACTION						PERIOD OF
			(Original wound area 500mm <sup>2</sup> )						
			Day	Day	Day	Day	Day	Day	
			3	6	9	12	15	18	
I	Control	--	5.28 $\pm 0.35$	21.62 $\pm 0.24$	29.83 $\pm 0.12$	45.30 $\pm 0.65$	62.24 $\pm 0.37$	81.73 $\pm 0.71$	24.42 $\pm$ 0.51
II	Framycetin	1% w/w	20.83 $\pm 0.46^{**}$	37.21 $\pm 0.78$ **	49.70 $\pm 0.49$ **	72.75 $\pm 0.09$ **	97.37 $\pm 0.29$ ***	100 $\pm 0.0$ ***	16.17 $\pm$ 0.26***
III	EIWH	2.5% w/w	8.25 $\pm 0.14^{**}$	32.27 $\pm 0.44^{**}$	46.57 $\pm 0.53^{**}$	65.59 $\pm 0.64^{**}$	82.69 $\pm 0.48$	93.51 $\pm 0.67^{***}$	20.08 $\pm$ 0.21***
IV	EIWH	5% w/w	13.77 $\pm 0.63^{**}$	34.77 $\pm 0.63^{**}$	48.35 $\pm 0.79^{**}$	69.12 $\pm 0.39^{**}$	85.69 $\pm 0.17^{***}$	96.88 $\pm 0.27^{**}$	19.17 $\pm$ 0.48***
V	EIWH	10% w/w	16.87 $\pm 0.75^{**}$	35.60 $\pm 0.19^{***}$	49.09 $\pm 0.42^{**}$	71.13 $\pm 0.89^{**}$	89.25 $\pm 0.68^{***}$	100 $\pm$ 0.0***	17.82 $\pm$ 0.34***

Each value represents mean  $\pm$  S.E (n=6) and was analysed by ANOVA Bonferroni- comparison test. \*  $P < 0.05$ , \*\*  $P < 0.01$ , \*\*\*  $P < 0.001$ . MSG treated groups (III, IV and VI) and standard group (II) were compared with control group (I).

Figure: 1: Methanol extracts of *Erythrina indica* Linn (Febaceae) bark on epithelialization period of Experimental group of rats

PERIOD OF EPITHELIALIZATION

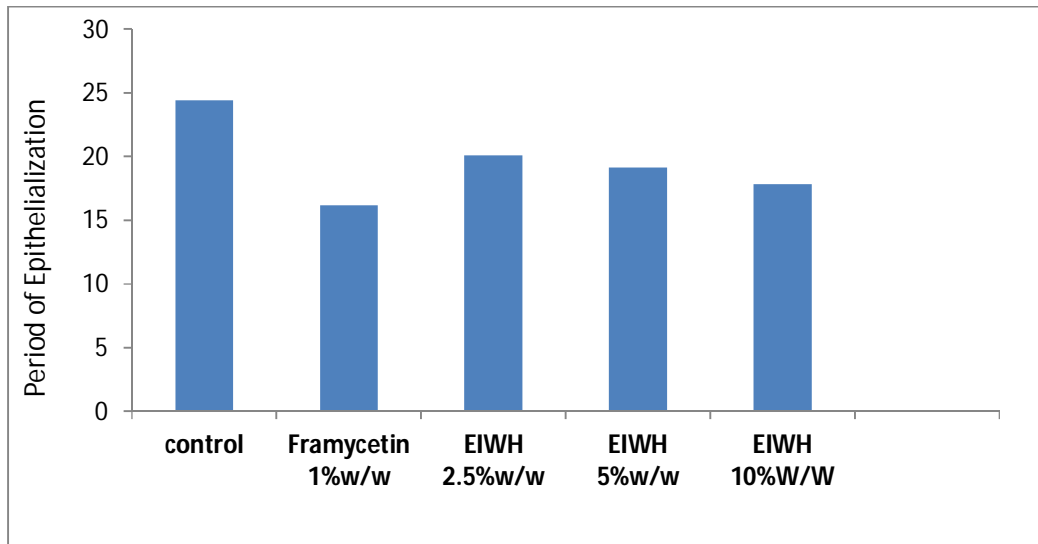
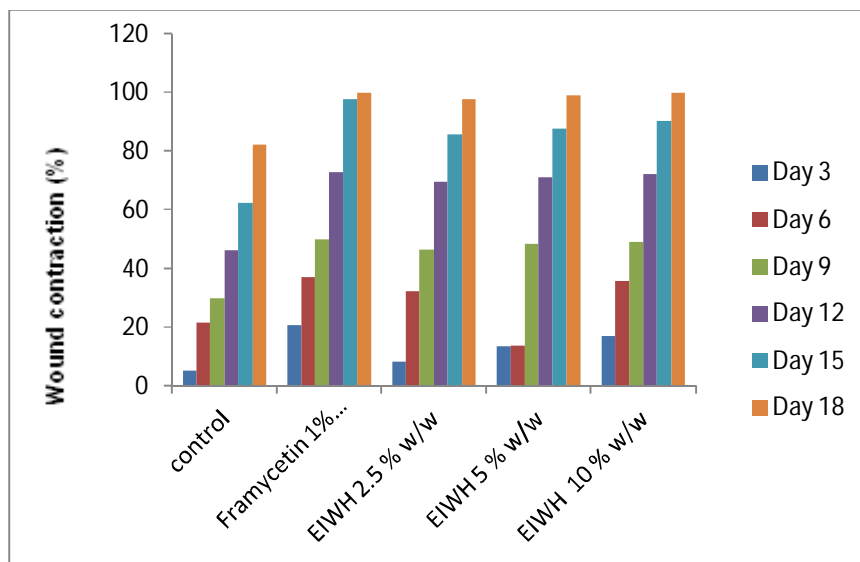


Figure: 2: Effect of methanol extract of *Erythrina indica* Linn (Febaceae) bark on percentage wound contraction of experimental group of rat

PERCENTAGE WOUND CONTRACTION



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