



## EVALUATION OF ANTIOXIDANT AND WOUND HEALING POTENTIAL OF *Pedaliium murex* IN ALBINO WISTAR RATS

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### ABSTRACT

The term of medicinal plants include a various types of plants used in herbalism and some of these plants have a medicinal activities *Pedaliium murex* is a member of the sesame family, *Pedaliaceae*. The present study was carried out for the characterization, physical, chemical, microbial and immunological strength of the development of new wound healing formulation for human era. The phytochemical compounds were analyzed. Twenty four male Wister albino rats (200-220 g) two months of age were used as experimental animals and were divided into four groups. In this animal model studies simple ointment of Ethanolic extract of *Pedaliium murex* fruits at a proposition of 10% (w/w) and 20% (w/w) was applied to induced wounds in rats and compared the effects with an antiseptic agent, Povidone Iodine ointment and normal control. The model selected were excision wound model so treated animals showed a significant reduction in the period of epithelization and wound contraction. It was noticed that the Ethanolic extract of *Pedaliium murex* fruits reduced the wound when compared with normal control. Our results support, at least in part, the uses of most plants in ethanopharmacological claims.

**KEYWORDS:** *Pedaliium murex*, phytochemical, wound healing.



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## INTRODUCTION

Medicinal plants consider as a rich resources of ingredients which can be used in drug development and synthesis. Plants are rich sources of ecologically developed secondary metabolites, which are potential remedies for different ailments<sup>1</sup>. The medicinal value of a plant lies in some of its chemical substances (phytochemicals) that produce a definite physiological action on the human body. The most important bioactive compounds of plants are alkaloids, flavonoids, tannins and phenolic compounds. These Bio-active chemicals may be concentrated in various parts of the plant, such as roots, stems, leaves, flower buds, flowers, fruits and seeds. Medicinal plants besides therapeutic agents are also a big source of information for a wide variety of chemical constituents which could be developed as drugs with precise selectivity<sup>2</sup>. *Pedaliium murex* is a member of the sesame family, Pedaliaceae. It is found in different parts of the world such as tropical Africa, Srilanka, India, Mexico and Pakistan. In India, it occurs mainly in the Western and Corommandal coasts as a weed of waste places and is generally called under the Hindi name "Gokhru or gokhar". The fruits are rich in flavonoids, Saponins, sterol and soluble proteins<sup>3</sup>. An infusion or extract prepared from the different parts of *P. murex* in cold water is used as demulcent, diuretic and also found to be used in the treatment of disorders of urinary systems such as gonorrhoea, dysuria, incontinence of urine and vice versa<sup>4,5</sup>. The plant is also used by the local people as analgesic and antipyretic activities<sup>6,7</sup>. Wounds are inescapable events of life, which arise due to physical or chemical injury or microbial infections. The healing of wounds often deviates from a normal course and under-healing, over-healing or failure of wounds to heal is common. Wound healing is a complex mechanism which holds numerous steps involving coagulation, inflammation, granulation tissue formation, matrix formation, connective tissue remodeling, collagenization and wound strength acquisition<sup>8</sup>. Research on drugs that increase wound healing is a developing area in modern biomedical sciences. Several drugs obtained from plant

sources are known to increase the healing of different types of wounds<sup>9</sup>.

## MATERIALS AND METHODS

### *Collection of plant material*

The fruits of *Pedaliium murex* were collected from in and around Bhavani (Tk), Erode (Dt), Tamilnadu, India. The plant was identified and authenticated at the Botanical Survey of India, Southern Regional Centre, Coimbatore, Tamilnadu, India and the specimen is maintained in the herbarium of Bharathidasan College of Arts and Science, Erode.

### *Extraction of fruits of Pedaliium murex*

The fruits of *Pedaliium murex* were dried in shade, powdered and passed through a 40-mesh sieve. The dried fruits of *Pedaliium murex* (300 g) were transferred into a Soxhlet apparatus containing 1200 ml of ethanol at 78.3° C for 72 hours. The extract was concentrated to dryness under vacuum desiccator.

### *Qualitative analysis of phytochemicals of ethanolic extracts of Pedaliium murex*

Alkaloids, Flavonoids, Tannins, Saponins, Phenols, Glycosides, Sterols and Terpenoids were found to be present in Ethanolic and aqueous extracts of *Pedaliium murex*.

### *Screening of wound healing activity of ethanolic extract of Pedaliium murex fruits*

#### *Experimental animals*

The experiments were conducted after obtaining approval from the Animal Ethical Committee, Nandha College of Pharmacy, Erode, Tamilnadu.

#### *Groupings*

Twenty-four male Wister rats (200–220 g) of approximately two months of age were used as experimental animals and were divided into four groups of six rats. The animals were caged individually after wounding for treatment till completion of wound healing. The animals were housed in standard environmental conditions of temperature (22 ± 3 °C), humidity (60 ± 5%), and a 12 h light/dark cycle. During the course of the experiment the rats were administered a standard pellet diet and water.

**Excision wound model**

Excisions of wound were made as described<sup>10</sup>. Animals were anesthetized with anesthetic ether and placed in operation table in its natural position. The dorsal area from the scapula to the ilium were then scrubbed and prepared for surgery. An excision wound was inflicted by cutting away approximately 1.5 cm

circular, full thickness of the predetermined area on the anterior-dorsal side of each rat. Using this excisional wounding method, the epidermal, dermal, hypodermal and panniculus, carnosus layers were removed completely. The grouping table shown in Table 1.

**Table 1**  
**Grouping Table**

S.No	Group	Intervention	Treatment
1	I	Normal	-
2	II	Reference	Povidone Iodine Ointment
3	III	Test-I	10% (W/W) of <i>Pedalium murex</i> extract
4	IV	Test-II	20% (W/W) of <i>Pedalium murex</i> extract

Test formulations were applied to respective groups twice a day for 7 days starting from the day of wounding. Wound healing property was evaluated by wound contraction percentage and closure time. The wound area was measured every second day by placing a transparent paper over the wound and tracing it out; area of this impression was calculated using graph sheet, and wound contraction. Wound closure time was recorded when the total wound healed.

**Ointment preparation**

For the animal model studies simple ointment of Ethanolic extract of *Pedalium murex* fruits was formulated in white soft paraffin base at a proportion of 10 % (w/w) and 20 % (w/w) using a ceramic mortar and pestle.

**Statistical analysis**

All values are reported as mean  $\pm$  S.E.M. The statistical differences among groups were assessed using one way ANOVA followed by Dunnett's test. A value of  $P < 0.05$  was considered significant.

**RESULTS AND DISCUSSION**

The result of the present study "Evaluation of Antioxidant activity and Wound healing potential of *Pedalium murex* in Wistar Albino rats" are discussed.

**Screening of phytochemicals**

*Pedalium murex* fruits extract revealed the presence of alkaloids, flavonoids, tannins, Saponins, phenols, glycosides, sterols and Terpenoids (Table 2).

**Table 2**  
**Preliminary phytochemicals screening of Ethanolic extract of *Pedalium murex***

Phytochemicals	Results
Alkaloids	+
Flavonoids	+
Tannins	+
Saponins	+
Phenols	+
Glycosides	+
Sterols	+
Terpenoids	+

+ Indicates present ; - Indicates Absent

**Wound healing activity**

A better healing pattern with complete wound closure was observed in rats treated within 7 days while it took about 15 days in control rats with different concentration of Ethanolic

extract (Table 3, Figure 1 and graph 1). There was a significant reduction in wound area from day two onwards in treated mice and also on later days the closure rate was much faster than when compared with control rat.

**Table 3**  
**Wound healing activity of *Pedaliium murex* in rats by Excision model**

Groups	Wound contraction (%)				Epithelialization period (day)
	1 day	3day	5 day	7 day	
Group I Control	10.92±0.15	21.8±0.6	43.23±0.57	55.3±0.14	19.76±0.26
Group II Povidone Iodine	17.73±0.53**	38.63±0.3**	67.6±0.62**	84.02±0.84**	13.48±0.24**
Group III <i>Pedaliium murex</i> (10%)	16.5±0.26**	36.24±0.5**	62.94±0.28**	75.20±0.76**	14.32±0.38**
Group IV <i>Pedaliium murex</i> (20%)	17.2±0.42**	38.24±0.5**	68.24±0.15**	83.24±0.5**	13.24±0.52**

#Values were mean ± SEM, n=6, \*P<0.05, \*\*P<0.01 vs. control(One way ANOVA followed by Dunnett's test).

The above graph shows the wound healing activity of *Pedaliium murex* extracts in rats by Excision model in different day intervals. The epithelialization of the experimental animal model in various periods.

**Figure 1**  
**Wound healing activity of *Pedaliium murex* in Albino Wistar rats**



**First day wound in rat**



**Third day wound reduction in rat**

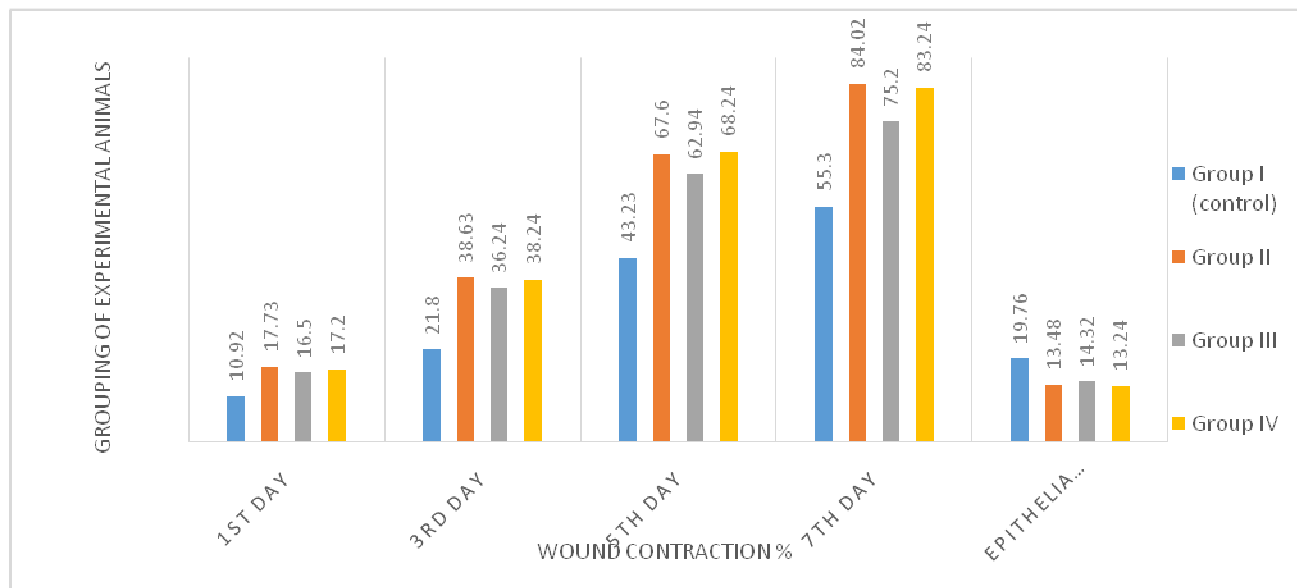


**Fifth day wound reduction in rat**



**Seventh day wound reduction in rat**

**Graph 1**  
**Wound healing activity of *Pedaliium murex* extracts in rats by Excision model**



In the healing of the excised wounds, the mechanism of wound contraction plays an important role. From the Table 3, it is clear that a 10% and 20% Ethanolic extract of *Pedaliium murex* as an ointment applied daily for a period of 7 days significantly reduced the area of open wounds as compared with those of control group. The actual healing seems to proceed from the 3<sup>rd</sup> day onwards from the day of wounding. The observation revealed a better healing pattern as percentage reduction in the wound area of the group III and group IV than that of the control group on 3<sup>rd</sup>, 5<sup>th</sup> and the 7<sup>th</sup> day respectively. The result obviously indicates the wound healing property of *Pedaliium murex* extract (Figure 1)

## CONCLUSION

*Pedaliium murex* is a valuable source of medicinally useful compounds that have been used traditionally for various ailments. Fruits extract of this plant showed good source of the bioactive compounds. In excision wound healing model, the prepared ointment of

*Pedaliium murex* showed significant increase in percentage of closure by enhanced the epithelization. The observation revealed that tissue regeneration was closely related to the treated group compared to the treated rats showed new blood vessels formation, extracellular matrix synthesis. Two doses of the plant extract 20% and 10% were administered. Among these doses, 20% is more effective than 10%. *Pedaliium murex* promoted the wound healing activity significantly in excision wound model. High rate of wound contraction, decrease in the period of epithelization were observed in Povidone iodine treated group compared to Ethanolic extract treated group. The results indicate that most plants used traditionally for treating these pathologies might be effective although organic solvents were used rather than the water decoctions or infusions used by farmers. Furthermore, lack of mutagenicity suggests that most of these plants are probably safe though other tests need to be conducted for further safety testing.

## REFERENCES

1. Nagendra KK, Rangaiah GS, Varaprasad B and Sirisha C, Bactericidal activities of different medicinal plants extracts against ocular pathogen viz., *Corynebacterium macginleyi*. Drug Invention Today, 29(1): 5-7, (2010).
2. Vijayalakshmi R and Ravindhran R, Asian journal of Plant Sciences and Research, 2(5): 581-587, (2012).

3. Mukherjee PK, Quality Control of Herbal drugs. Edition 1, Business Horizons, New Delhi, 113-117, (2002).
4. Enomoto S, Okada Y, Güvenc A, Erdurak CS, Coşkun M and Okuyama T Inhibitory effect of traditional Turkish folk medicines on aldose reductase (AR) and hematological activity, and on AR inhibitory activity of quercetin-3-O-methyl ether isolated from *Cistus laurifolius* L. Biol Pharm Bull; 27: 1140-1143, (2004).
5. Mathew S and Abraham TE. Studies on the antioxidant activities of cinnamon (*Cinnamomum verum*) bark extracts, through various in vitro models. Food Chem; 94: 520-528, (2006).
6. Shelke TT, Kothai R, Adkar PP, Bhaskar VH, Juvale KC, Kamble BB, *et al*., Nephroprotective activity of ethanolic extract of dried fruits of *Pedaliium murex* Linn., J Cell Tissue Res. 9: 1687-1690, (2009).
7. Shukla YN, Khanuja SPS, Chemical, pharmacological and botanical studies on *Pedaliium murex*., J Med Aromat Plant Sci., 26: 64-69, (2004).
8. Reddy JS, Rao PR, Reddy MS, Wound healing effects of *Heliotropium indicum*, *Plumbago zeylanica* and *Acalypha indica* in rats, Journal of Ethnopharmacol, Feb; 79(2):249-51, (2002).
9. Biswas TK and Mukherjee B, Plant medicines of Indian origin for wound healing activity: A review. The International Journal of Lower Extremity Wounds, 2, 25, (2003).
10. Morton JJP and Malone MH, Evaluation of vulnerary activity by an open wound procedure in rats, Arch. Int. Pharm, 196: 117-126, (1972).