

Research Article

Evaluation of wound healing effect of *Jasminum grandiflorum* in albino rats by histopathological studies

Ravishankar M¹, Shreenivas P. Revankar^{2*}, Jagadeesh K²

¹Professor and Head, Department of Pharmacology, Adichunchanagiri Institute of Medical Sciences, BG Nagar, Bellur, Karnataka, India, ²Department of Pharmacology, Shimoga Institute of Medical Sciences, Shimoga-577201, Karnataka, India

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*Correspondence:

Dr. Shreenivas P. Revankar,

E-mail: sprevankar@yahoo.com

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ABSTRACT

Background: Wound healing is an important process in regeneration of the lost tissue, it involves various steps. Varieties of substances are known to interact in the healing process, some of the plant products are found to be beneficial. Jasmine leaves are mentioned to have healing effect in ancient literature. Hence the study was carried out to evaluate the wound healing effect by assessing the histopathological parameters.

Methods: The study was done in the albino rats which were divided into various groups. The histopathological parameters were studied at regular intervals.

Results: It was found that jasmine paste improved the wound healing process at all the stages.

Conclusion: *Jasminum grandiflorum* has wound healing effect in albino rats.

Keywords: Wound healing, *Jasminum grandiflorum*, Excision model, Wound contraction, Histopathological

INTRODUCTION

Injury is the severe or chronic damage of the tissue that results in damage of both parenchyma and stromal framework of the tissue. Healing is the repair by deposition of collagen and other extracellular matrix causing the formation of scar. In pathological context it refers to the replacement of destroyed tissue by a living tissue. Inflammation, wound contraction, repair and regeneration are the different stages of wound healing.¹ The healing process involves inflammation, angiogenesis, migration and proliferation of fibroblasts, scar formation and connective tissue remodeling.

Inflammation is a complex reaction in tissues that consists mainly of responses of blood vessels and leukocytes.² Inflammation may be acute or chronic, it is terminated when the offending element is terminated. Acute inflammation is of short duration and chronic of longer duration. The four cardinal signs of inflammation are rubor (redness), tumor

(swelling), color (heat) and dolor (pain). The fifth clinical sign loss of function (function laesa).^{1,3}

The inflammatory phase provides initial tensile strength to wound. Wound contraction usually starts 2 to 3 days after wound and is complete by 14 days. The wound is reduced to approximately 80% of the original size.⁴ Contraction results in faster healing, if contraction is prevented, healing is slowed and results in large ugly scar.⁵ Repair is an orderly process in which wound is eventually replaced by scar.⁶ Regeneration is replacement of tissues and cells with that of identical function and morphology.

Various factors which effect wound healing process are classified into local, systemic and specific factors. The local factors are type, size and location of wound; vascular supply, infection, movement, radiation, UV light etc. Systemic factors include circulatory status, infection, metabolic status, malnutrition and effect of hormones.⁸ Cytokines or growth factors EGF (epidermal growth

factor), TGF, VEGF, IGF and FGF are some of the specific factors which influence the wound healing process.⁹

The different animals used for studying wound healing process are Rabbits, rats and mice, albino rats are the most commonly used among them.¹⁰ The process of wound healing is monitored by using different parameters like physical, mechanical, histopathology and biochemical. Histopathological study involves the microscopic features like inflammatory cells, collagen, fibroblasts and epithelisation. Biochemical attribute includes the mucopolysaccharides and collagen content. *Jasminum grandiflorum* is called by different names, jasmine in English, cameli in Hindi and mallige in Kannada. The plant is widely distributed in Asia, Africa and Australia. In India grows all over in forests and also cultivated. Almost all parts of the plant is known to have medicinal value.¹¹ There are variety of herbal preparation for wound healing in the folklore medicine like erythrina indica, lantana camara, procumbens, circumm longa Linn etc. one among them is crushed leaves of *Jasminum grandiflorum*, crushed leaves of the plant are advocated in number of ayurvedic literatures. Hence present study was undertaken to establish the traditional claim, and to study the wound healing effect of *Jasminum grandiflorum* leaves in albino mice.¹²

METHODS

The study was carried out in the department of pharmacology J J Medical College, Davangere. Healthy adult albino rats of either sex weighing 100 to 150 gms of more than 2 months age which were inbreed in the central animal house were housed at suitable temperature, ventilation and nutrition. The animals were divided into four groups of six animals each. The fresh leaves of *Jasminum grandiflorum* were collected from the botanical garden of ashwini ayurvedic medical college after confirmation from botanist. The leaves were washed, cleaned and wiped dry. Then it was ground fine in a grinder by adding water and a paste was prepared. The paste was used for application on the wounds.¹³ The wound models chosen for the study were excision and Resutured incision wound models. The three attributes namely physical, mechanical and histological features were observed and studied. The animals were depilated on the dorsal surface before wounding .they were caged individually with free access to water and food then the animals were starved for 12 hrs with only free access to water prior to wounding. Wounding was performed under light ether anesthesia. Drug application was started from day of wounding. Paste was applied on the whole surface of the wound twice daily at 10 AM and 4 PM .the duration of treatment varied as per wound model. All control animals received equal volume of normal saline.

Excision wound model

The purpose of this model was to study the histological attributes. Wounding of the rat was done as mentioned by hunt and co-workers.¹⁴ The full thickness of impression

area was excised to obtain a wound area of 31.4 mm². Homeostasis was obtained by blotting the wound with cotton swab soaked in normal saline. The wound on the right side was to assess the test compound and wound on the left was taken as the control.

Here the wound biopsy was taken under light ether anesthesia. The ulcer along the base and 0.5 cm of the adjacent normal tissue was excised. The biopsy was taken and fixed in 10.5% formalin and subjected to histological examination.

Various cellular elements and collagenisation were quantified microscopically by giving scores to inflammatory cells, granulation tissue and epithelisation.

RESULTS

Table 1: Time taken for complete epithelisation.

Method: Excision wound	Number of animals used: 12 animals
Animals: Albino rats	Route of drug administration: Local application
Weight: 100 – 150 G	Initial wound size: 31.4 mm ² .

Groups	Drugs	No. of Wounds	Period of Epithelisation (Days) Mean ± S. E.
1.	Control	12	17.25 ±0.13
2.	<i>Jasminum grandiflorum</i>	12	13.42 ±0.19
	t- value* Significance		16.47 P < 0.001 Highly Significant

*Students't- test

Note: Early and complete epithelisation is seen in wounds treated with *Jasminum grandiflorum* when compared to the control.

Results of Excision Wound Model

Table 2: Histopathological findings of day wound biopsy– I (after 24 hours).

Observation	Control	<i>Jasminum Grandiflorum</i>
Wound filled with fibrin clot and exudates	+	++++
Inflammatory cells	+	++++
Ground substance	+	+

+ → Occasionally present

++++ → Maximally present

Influx of inflammatory cells into the wound was observed with *Jasminum grandiflorum* to a greater degree as compared to the control.

Table 3: Histopathological finding of day –7 biopsy.

Observation	Control	<i>Jasminum Grandiflorum</i>
1. Inflammatory cells	+++	+
2. Fibroblasts	++	++++
3. Collagen	+	++++
4. Blood Vessels	+	++
5. Epithelisation	+	++++

+ → Occasionally present
 ++ → Moderately present
 +++ → Present to a large extent
 ++++ → Maximally present

Signification reduction of inflammatory cells was observed with *Jasminum grandiflorum*. However, the inflammatory cells persisted to a greater degree with the control. Collagenisation was maximum with *Jasminum grandiflorum* treated wound when compared to the control. Blood vessels were seen to a higher extent with *Jasminum grandiflorum* when compared to the control. Epithelisation was early and complete with *Jasminum grandiflorum* and only minimal with control.

Table 4: Histopathological finding of day – 14 biopsy.

Observation	Control	<i>Jasminum Grandiflorum</i>
1. iinflammatory cells	+	+
2. Collagenisation	++	++++
3. Epithelisation	++++	++++

+ → Occasionally present
 ++ → Moderately present
 ++++ → Maximally present

Collagenisation was much better with *Jasminum grandiflorum* when compared to the control. Epithelisation was complete and of almost same degree with both.

DISCUSSION

Wound healing is a complex phenomenon involving a number of processes, a proper healing of the wound is essential for restoration of the anatomical continuity and the functional state. There are many folklore medicines and indigenous drugs which are claimed to promote wound healing among them leaves of *Jasminum grandiflorum* one. This study was done to find the

effectiveness of the paste prepared from *Jasminum grandiflorum* leaves, in promoting the wound healing using different standard parameters. As can be established from the results the test drug has shown to accelerate the wound healing process. So also other parts of the plant extract may also have the wound healing property and the need to be studied specifically.

In the above histopathological assessment was done to evaluate the wound healing process. Excision model 2 was used to study the histopathological features of the wound on different days. In the model it was found *Jasminum grandiflorum* significantly improved the healing process. Collagenisation and epithelisation process was also improved. The other wound healing models can be tried upon as an improvement over the study. In the above study only one parameter was studied namely histopathological but biochemical parameter was not carried out, so this can also be carried out to substantiate the results for accuracy. There is enough scope to evaluate for the wound healing process in the burn wounds.

CONCLUSION

The leaves of *Jasminum grandiflorum* have been advocated for variety of wounds in the body in a number of ayurvedic literatures. Hence a study was undertaken to estimate its wound healing efficacy. *Jasminum grandiflorum* leaves promoted wound healing by improving the early inflammatory process, by enhancing wound contraction through increased fibroblast proliferation, and by promoting an early epithelisation and increased collagen formation when compared with control in albino rats. Further studies would be required to substantiate the wound healing effect of *Jasminum grandiflorum*.

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