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Research Article

FORMULATION AND EVALUATION OF HERBAL
OINTMENT CONTAINING CARICA PAPAYA LEAF
EXTRACT FOR WOUND HEALING IN ALBINO WISTAR
RATSUmesh mitte*, Akhila, Tarun Sarode, Ambareesha, Charanraj and Tirupathi
Department of Pharmacology, Aryan College of Pharmacy, Kalaburagi, Karnataka, India**Abstract:**

Background: Wound healing is a coordinated biological process involving hemostasis, inflammation, proliferation and tissue remodeling. *Carica papaya* Linn. leaves have been traditionally used in wound management and contain several reported bioactive constituents. This study investigated a topical herbal ointment containing ethanolic *Carica papaya* leaf extract.

Methods: Leaves collected from Gulbarga were authenticated, shade-dried, powdered and extracted with ethanol by Soxhlet extraction for 48 h. Preliminary phytochemical screening was performed. The extract was incorporated into an ointment base and evaluated for physicochemical characteristics. Wound-healing activity was assessed in an excision wound model in albino Wistar rats using control, standard povidone-iodine, 5% extract and 10% extract treatment groups.

Results: The extract showed positive tests for alkaloids, flavonoids, saponins, glycosides and terpenoids, while tannins and phenolic compounds were reported negative. The ointment was yellow, had characteristic odour and smooth consistency, with pH 5.4, Spreadability 26.5 and Extrudability 0.4g. At day 16, reported wound contraction was 53% in control, 93% with standard, 60% with 5% extract and 86% with 10% extract.

Epithelialization periods were 15.6, 12.6, 14.5 and 13.8 days, respectively.

Conclusion: The ethanolic *Carica papaya* leaf extract ointment demonstrated successful wound-healing activity and acceptable preliminary physicochemical properties in the reported experimental model. Further work should include complete statistical analysis, histopathology, dose optimization and safety evaluation.

Keywords: *Carica papaya* leaf, herbal ointment, wound healing, excision wound.

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1. INTRODUCTION:

The skin forms an important protective barrier and injury disrupts its structural and functional integrity. Wound repair is a complex process involving hemostasis, inflammation, proliferation and remodeling. Successful healing requires coordinated activity of inflammatory cells, fibroblasts, keratinocytes, endothelial cells, extracellular matrix components and growth factors.



Medicinal plants have long been investigated as sources of bioactive compounds for topical wound management. *Carica papaya* Linn. (family Caricaceae) is a medicinal plant traditionally used for several therapeutic purposes. Its leaves have been reported to contain alkaloids, flavonoids, saponins, tannins, phenolic constituents and other bioactive compounds. Previous literature cited in the dissertation describes antioxidant, antimicrobial, anti-inflammatory and wound-healing-related activities of papaya preparations.

The present work was undertaken to formulate a herbal ointment containing ethanolic *Carica papaya* leaf extract and to evaluate its preliminary physicochemical characteristics and wound-healing activity in an albino Wistar rat excision wound model.



2. AIM AND OBJECTIVES

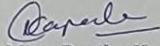
Aim: To formulate and evaluate herbal ointment containing *Carica papaya* leaf extract for wound healing in albino Wistar rats.

- To extract *Carica papaya* leaves by Soxhlet extraction.
- To perform preliminary phytochemical screening.
- To formulate a topical ointment containing *Carica papaya* leaf extract.
- To evaluate organoleptic and physicochemical properties.
- To assess wound-healing activity using an excision wound model.

3. MATERIALS AND METHODS

3.1 Plant collection and authentication

Carica papaya leaves were collected from Gulbarga, Karnataka, washed, shade-dried and powdered. The specimen was authenticated by Miss Rasika S. Kapale, Head, Department of Botany, Smt. V. G. Degree College for Women, Gulbarga, Karnataka, India.

	H. K. E. Society's SMT. VEERAMMA GANGASIRI COLLEGE FOR WOMEN NAAC Accredited 'A' Grade - website: www.vgcollege.in KALABURAGI - 585 102 DEPARTMENT OF BOTANY								
Ref. No.: HKES/VGC/BOT/AC/26/08	Date: 10/06/2020								
AUTHENTICATION CERTIFICATE This is to certify that UMESH MITTE of Aryan college of Pharmacy Kalaburagi has submitted specimen <i>Carica papaya</i>, family belongs to <i>Caricaceae</i>. Hence, in view of this, I do here by inform you that plant part submitted by you is found very good matches in its characters, after proper examination with the help of Karnataka flora and Gulbarga district flora. I do here by recommend as such plant is Authentic and be used for further research project.									
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Sl.no.</th> <th style="width: 40%;">Name of the Plant</th> <th style="width: 20%;">Family</th> <th style="width: 30%;">Voucher no.</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">01</td> <td style="text-align: center;"><i>Carica papaya</i></td> <td style="text-align: center;"><i>Caricaceae</i></td> <td style="text-align: center;">SVGWC008</td> </tr> </tbody> </table>		Sl.no.	Name of the Plant	Family	Voucher no.	01	<i>Carica papaya</i>	<i>Caricaceae</i>	SVGWC008
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  Miss. Rasika Kapale Head Department of Botany Smt. V.G. Degree College for Women's KALABURAGI									

Authentication Certificate



Collection and drying of Papaya leaves



Dried powder of Papaya leaves

3.2 Preparation of ethanolic extract

The powdered leaves were passed through sieve no. 40. The dissertation reports that 200 g of powder was extracted in a Soxhlet apparatus using ethanol for 48 h. The filtrate was concentrated under reduced pressure using a rotary evaporator and the dried extract was stored at 4 °C.

Extraction Procedure :





Soxhlet Apparatus

Extract product kept for evaporation



Carica Papaya leaf extracted product

3.3 Preliminary phytochemical screening

Phytochemical group	Result
Alkaloids	Positive
Flavonoids	Positive
Tannins	Negative
Saponins	Positive
Phenolic compounds	Negative
Glycosides	Positive
Terpenoids	Positive



3.4 Formulation of herbal ointment

The ointment was prepared by the fusion method. Hard paraffin was melted on a water bath and the remaining base ingredients were incorporated with stirring. The papaya extract was then incorporated by levigation to obtain a homogeneous preparation.

Ingredient	Quantity/100 g	Reported role
Wool fat	5 g	Emollient, moisturizer
Cetostearyl alcohol	5 g	Stabilizer
Hard paraffin	5 g	Thickening agent, emollient
Yellow soft paraffin	75 g	Moisturizer/base
Plant extract	10 g	Wound healing, anti-inflammatory, antimicrobial



Figure 5.1.5.1 Recuirements

3.5 Physicochemical evaluation

The formulation was evaluated for colour, odour, consistency, pH, spreadability, extrudability, loss on drying, solubility, washability and non-irritancy. Spreadability was calculated using $S = M \times L / T$.

Parameter	Observation
Colour	Yellow
Odour	Characteristic
Consistency	Smooth
pH	5.4
Spreadability	26.5 s
Extrudability	0.4 g
Loss on drying	30 (unit not specified)
Solubility	Soluble in boiling water; miscible with alcohol, ether and chloroform
Washability	Good
Non-irritancy	Non-irritant

3.6 Experimental animals and wound model

Albino Wistar rats weighing 100–150 g were maintained for 7 days before experimentation with standard pellet diet and water ad libitum. The dissertation states that the Institutional Animal Ethics Committee permitted the study. A full-thickness excision wound of approximately 300 mm² was created on a predetermined shaved area. Wound area was assessed at specified intervals. Percentage wound contraction was calculated as $[(\text{initial wound area} - \text{final wound area}) / \text{initial wound area}] \times 100$.

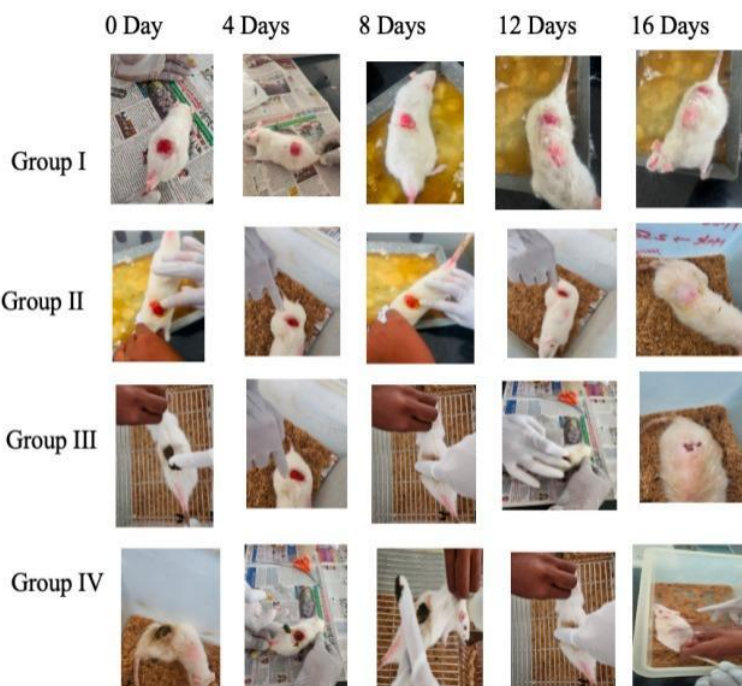
Selection of animals and grouping



Anaesthesia



Wound creation and treatment



4. RESULTS:

4.1 Phytochemical screening

Positive reactions were reported for alkaloids, flavonoids, saponins, glycosides and terpenoids; tannins and phenolic compounds were reported negative.

4.2 Physicochemical evaluation

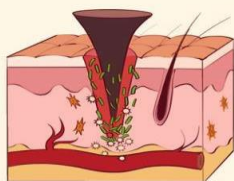
The prepared ointment was yellow with characteristic odour and smooth consistency. The reported pH was 5.4, spreadability 26.5 s and extrudability 0.4 g. It was reported as washable and non-irritant.

4.3 Excision wound model

Group	Day 0	Day 4	Day 8	Day 12	Day 16	Epithelialization
Control	3 cm	2.9 cm (3.3%)	2.6 cm (13.3%)	2.0 cm (30%)	1.4 cm (53%)	15.6 days
Standard	3 cm	2.6 cm (13.3%)	1.9 cm (36.6%)	1.1 cm (63%)	0.2 cm (93%)	12.6 days
5% extract	3 cm	2.8 cm (6.6%)	2.5 cm (16.6%)	1.9 cm (36%)	1.2 cm (60%)	14.5 days
10% extract	3 cm	2.7 cm (10%)	2.1 cm (30%)	1.7 cm (60.3%)	0.4 cm (86%)	13.8 days

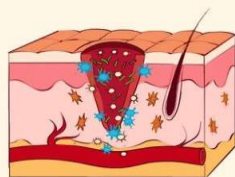
The reported wound measurements show progressive reduction in wound size. At day 16, wound contraction was 53% in control, 93% in the standard group, 60% in the 5% extract group and 86% in the 10% extract group. Epithelialization periods were 15.6, 12.6, 14.5 and 13.8 days, respectively.

Stages of Wound Healing



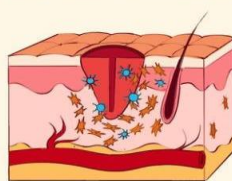
Homeostasis

The body stops the bleeding of the wound.



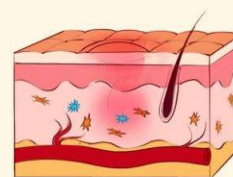
Inflammation

This is when inflammatory white blood cells move to and clean the wound.



Proliferation

The body makes new skin tissue and repairs broken blood vessels.



Remodeling

The wound fully closes, and the cells used for repair are no longer necessary.

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5. DISCUSSION:

Topical ethanolic *C. papaya* leaf extract was associated with greater reported wound contraction than the untreated control in the excision model. The

10% extract group showed greater wound contraction than the 5% group at day 16 (86% versus 60%) and a shorter reported epithelialization period (13.8 versus 14.5 days). The standard group showed

93% wound contraction and an epithelialization period of 12.6 days.

The activity may be related to the phytochemical constituents detected in the extract, particularly alkaloids, flavonoids, saponins, glycosides and terpenoids. The dissertation discusses possible roles of plant constituents in antioxidant activity, collagen formation, epithelialization and tissue repair. These mechanisms remain hypotheses in the present study because biochemical and histopathological confirmation was not reported.

The formulation demonstrated acceptable preliminary physical characteristics. Statistical significance should not be claimed from the supplied data because individual-animal observations, sample sizes, measures of variability and statistical test results were not reported.

6. CONCLUSION:

An ethanolic extract of *Carica papaya* leaves was incorporated into a topical ointment and evaluated for physicochemical properties and wound-healing activity in an albino Wistar rat excision model. The formulation was reported to be smooth, washable and non-irritant, with pH 5.4. The 10% extract group showed greater reported wound contraction than the 5% group. Further experimental studies are needed to confirm efficacy, mechanism, safety and dose optimization.

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