Burn Wound Healing Activity of Ethanolic Extract of Acalypha indica in Ointment Formulated against Rabbits (Ocyctagus caniculus)

Khairani Fitri1*, Tetty Noverita Khairani1, Fajar Apollo Sinaga2, Amenia Gracia1
Talunohi

1Faculty of Pharmacy and Health, Institut Kesehatan Helvetia, Medan- Indonesia
2Faculty of Sport Science, Universitas Negeri Medan, Medan - Indonesia

ABSTRACT

Objectives: The purpose of this study was to determine burn wound healing activity of Acalypha indica L. in ointment formulated.

Design: This study uses an experimental laboratory design. This study used rabbits as test animals induced by burns with hot iron plates on the back. Extract ointment applied to the wound then observed the development of healing.

Interventions: The extract was formulated in ointments with concentrations of 3, 5 and 7%. positive control used was ointment containing sesame oil and negative control used is an ointment base.

Main outcome measure: The results showed a concentration of 3% had a slow and low effect, at a concentration of 5% it had a moderate healing phase, and a concentration of 7% had a good healing phase.

Conclusion: The ointments containing Acalypha indica leaf extracts have good activity in healing burns in rabbits.

Keywords: Acalypha indica L., ethanolic extract, ointment, wound healing.

ARTICLE INFO: Received 02 April 2020; Review Completed 22 May 2020; Accepted 28 May 2020; Available online 15 June 2020

Cite this article as:
Fitri K, Khairani TN, Sinaga FA, Talunohi AG, Burn Wound Healing Activity of Ethanolic Extract of Acalypha indica in Ointment Formulated Against Rabbits (Ocyctagus caniculus); Asian Journal of Pharmaceutical Research and Development. 2020; 8(3):18-20 DOI: http://dx.doi.org/10.22270/ajprd.v8i3.740

*Address for Correspondence:
Khairani Fitri, Faculty of Pharmacy and Health, Institut Kesehatan Helvetia, Kapten Sunarmsono Street 107, Medan, Sumatera Utara, Indonesia

INTRODUCTION

The Acalypha indica L. plant is a plant that has benefits in traditional medicine. The leaves can treat nosebleeds, coughs, dysentery, diarrhea, vomiting of blood, bleeding, and external wounds.1,2,3 This is corroborated by the phytochemical test of earring plants which shows the presence of flavonoid, triterpenoid, steroid, and saponin compounds.4,5

The use of Acalypha as a traditional medicinal plant has been carried out. Acalypha boiled water can treat toothaches and ear infections, the pulp can be used to treat burns and rheumatism. Acalypha plant extract can also play a role as a natural contraceptive, analgesic and anti-inflammatory, the effects of neurotherapy and neuroprotectants, reduce blood glucose, reduce uric acid. Some studies report that the extract of Acalypha can inhibit the growth of some pathogenic bacteria.1,2,6

Based on the flavonoid compounds owned by the leaves of Acalypha indica as an anti-inflammatory, it needs to be developed into a pharmaceutical preparation to increase its use.1,4,5 One of the ointment preparations was chosen because it is the most suitable pharmaceutical preparation for medicinal purposes for the skin because of the longer contact between the drug and the skin.7 In this study, the ethanol extract of Acalypha indica was formulated into an ointment and tested its activity in healing burns in rabbits.

MATERIALS AND METHODS

Plant and Chemical Materials

The Acalypha indica used in this study was obtained from Medan, North Sumatra, Indonesia. The part of the plant used is leaf. Acalypha indica have been determined by the Herbarium Medanense (MEDA), Universitas Sumatera Utara, Indonesian and it is known that the species is Acalypha indica L.
Tools used include rabbit cages, shavers, iron plates 2.5 x 2.5 cm with a thickness of 1 mm for burns, rotary evaporators, maceration vessels, blenders, wood stirrers, mortars and stamper, water baths, digital scales, beaker glass, measuring cups, glassware, and universal pH sticks.

The material used in this study was a thick extract from the leaves Acalypha indica, 70% ethanol, cholesterol, stearyalkohol, cerae albi and vaselin album.

Plant Extraction

The Acalypha indica extract by maceration method which is a number of sample soaked in 96% ethanol solvent for 3 days while stirring occasionally. Maserate and residue are separated and filtered, then the pulp is washed using the same solvent until a total of 10 times the weight of the simplicia is obtained. Maserates are collected and allowed to stand for 24 hours without stirring, then separate the clear solution with the precipitate. Clear solution was thickened using a rotary evaporator until a thick extract was obtained. 8,9,10

Ointment Formulation

The burn ointment formula from the ethanol extract of Acalypha indica leaves can be seen in table 1 below.

| No. | Formula | Concentration |
|-----|---------|---------------|
| 1   | Negative control | Homogen       |
| 2   | F. 3%  | Homogen       |
| 3   | F. 5%  | Homogen       |
| 4   | F. 7%  | Homogen       |

Table 1: Homogeneity Formula Salve Test Results

Formula Evaluation Results

The results of the formula test in the form of homogeneity, adhesion, pH and skin irritation can be seen in tables 1-4.

Table 2 Ointment Adhesion Test Results

| No. | Formula | Result (second) |
|-----|---------|----------------|
| 1   | Negative Control | 31,08          |
| 2   | F. 3%  | 20,78          |
| 3   | F. 5%  | 15,59          |
| 4   | F. 7%  | 20,05          |

Table 3 pH measurement results

| No. | Formula | pH      |
|-----|---------|---------|
| 1   | Negative Control | 5,64    |
| 2   | F. 3%  | 5,46    |
| 3   | F. 5%  | 5,17    |
| 4   | F. 7%  | 5,04    |

Table 4 Irritation Test Results

| No. | The Symptoms | Negative Control | F.3% | F.5% | F.7% |
|-----|--------------|------------------|------|------|------|
| 1   | Reddish      | ----             | ---- | ---- | ---- |
| 2   | Swollen      | ----             | ---- | ---- | ---- |
| 3   | Itchy        | ----             | ---- | ---- | ---- |

Animals that have been injured using a hot plate smeared with ointment according to the test group that has been divided, this is done twice a day for 14 consecutive days and observed the development of wound healing.

RESULT AND DISCUSSION

Formulation Evaluation Results

The results of the formula test in the form of homogeneity, adhesion, pH and skin irritation can be seen in tables 1-4.

Table 1: Homogeneity Formula Salve Test Results

| No. | Formula | Homogen |
|-----|---------|---------|
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| 1   | Reddish      | ----             | ---- | ---- | ---- |
| 2   | Swollen      | ----             | ---- | ---- | ---- |
| 3   | Itchy        | ----             | ---- | ---- | ---- |

Based on the results obtained from the formulation test, each formula has good characteristics, meets the requirements, and is safe to apply on the skin because it does not cause irritation. The average pH of the ointment has a range of 4.5 - 6.5. A pH value that is too low can cause irritation, while a pH that is too high can cause scaly skin. Based on the Indonesian National Standard the pH range of topical preparations is 4.5 - 8.12 This shows that the pH value of ointment preparations is still in the range that is allowed to be used topically. Increasing the pH of each ointment preparation is influenced by the addition of active substances.

Test Results on Animals

The results of the testing of the ethanol extract of the leaves of the Acalypha indica leaf can be seen in Figure 1.
The burns observed in this study were minor burns that did not appear to have blisters or did not damage skin tissue. First-degree burns that are damage to the outer skin only that occurs edema in the dermis, skin appendices (integument, skin adnexa) such as hair follicles, sweat glands and acute sebaceous glands. In skin damage in the case of first-degree burns, the healing process can occur spontaneously, generally requiring a period of 1-14 days.\textsuperscript{13,14}

From this study it was found that the earring leaves of ethanol extract ointment is one of the therapies that has a better effectiveness against the healing of burns in rabbits. This is because some of the compounds contained in the ethanol extract of earring leaves have the ability to accelerate tissue regeneration, repitelization, stimulate fibroblasts and the formation of collagen in burns affected skin and have antimicrobial effects that will suppress microorganisms that can slow wound healing.\textsuperscript{11,13,14}

**CONCLUSION**

Ethanol extract of *Acalypha indica* which is formulated in the form of ointment to treat burns effectively heals burns in rabbits within 14 days.

**CONFLICT OF INTEREST**

All author have no to declare.

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