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# POTENTIAL OF THE MIRACLE LEAF GUM *Kalanchoe pinnata* (Lam.) Pers TO HEALING SPEED OF A BURNS IN *Rattus novergicus*

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## Abstract

The research has been conducted with the title Potential Test of The Miracle Leaf Gum *Kalanchoe pinnata* (Lam.) Press to Healing Speed of a Burns in *Rattus novergicus* . The miracle leaf gum contains active compounds such as the alkaloids, triterpenes, lipids, flavonoids, glycosides, bufadieniolides, phenols, and organic acids that can heal the burns. This research to find out the effectiveness of miracle leaf gum *Kalanchoe pinnata* as medicine for the burn. There are four treatments, namely negative control (non-treat), positive control (administration of gentamicin ointment), a mixture of ointment + gum of miracle, and pure gum of miracle leaf. The parameters observed in this research are the measurement of extensive burns and the percentage of the healing burn. The results showed that the gum of miracle leaf has an average percentage of 94.04% on the 15th day which shows the best results in accelerating the healing process of second-degree burn (II A) in Rattus novergicus.

**Keywords:** Miracle Leaf, Gum, Burns

## Introduction

The skin is a blanket that covers the surface of the body and its main function is as a protector from various kinds of disturbances and external stimuli (Siahaan and Chan, 2018). Skin whose main function is as an external defense is more susceptible to damage such as wounds (Ivanalee et al, 2018). Wound is a condition where there is a loss of epithelial integrity of the skin itself caused by changes in temperature, trauma from sharp or blunt objects, explosions, chemicals, animal bites and electric shocks (Ramadhian and Widiastini, 2018). According to (Oktaviani et al, 2019), the type of wound based on the cause can be divided into abrasions, cuts, lacerations, stab wounds, bite wounds and burns.

Burns are a form of tissue damage or loss caused by contact with heat sources such as fire, hot water, chemicals, electricity and radiation (Sari et al, 2018). According to (Arif, 2017) the longer the contact time, the wider and deeper the tissue damage that occurs. The severity of the burn dependes on the extent, dept and location of the wound. In addition, the patient's age and health also affect the prognosis. Not only that, the depth of the burn is determined by the high temperature and the duration of exposure to high temperatures. Burns will cause several negative effects including damage to

various organs such as the skin (Fitria et al., 2014). The bodyhas the ability to replace damaged tissue, improve its structure, strength and function in response to damaged tissue (Fitria et al., 2014).

One of the traditional plants that are known to have the potential to be developed as traditional medicine is cocor duck Kalanchoe pinnata (Sawitri et al, 2019). According to (Zahra et al, 2017), cocor duck leaves are generally used to treat ulcers, ulcers, breast swelling, bruises, broken bones, rheumatism, hemorrhoids, urination is not smooth, menstruation is not smooth, diarrhea, phlegm laxative, fever reducer, tonsil jaws, middle ear jaws, coughing up blood, bleeding wounds, burns and scalding. This plant is also known to have anticancer, antidiabetic, antifungal, antimicrobial, anti-inflammatory and analgesic properties so it is very suitable for treating burns (Sylvia et al, 2020).

Based on the explanation above, this research was conducted to determine the potential of the cocor duck plant as a burn cover.

## Materials and Methods

This research was conducted from February to March 2021 at Laboratory of Zoology FMIPA and Laboratory of Biopharmaceutical Faculty of Pharmacy Hasanuddin University, Makassar.The tools used in this study were scissors, test tube, stirring rod, iron plate, dropper pipette, analytical balance, stopwatch, sterile container, tracing paper and millimeter block (this tool will be used to calculate the percentage of burn healing). The materials used in this study were the sap of cocor duck (Kalanchoe pinnata), male rats (*Rattus novergicus*), cotton buds, feed and drink for rats, Gentamicin 0.1% ointment, 70% alcohol, ether, shaving cream.

### Rat Test Animal Setup

A total of 12 tails were randomized and then placed in sealed cages according to the treatment group. Each cage contains 3 mice. Then the rats were adapted for 7 days and on the 8th day the burn was made. Mice were given standard diet and drinking ad libitum.

### Cocor Duck Sap Extracting Technique

The collection of sap from the cocor duck plant (*Kalanchoe pinnata*) was carried out purposively. The material for this research is cocor duck sap obtained from the cocor duck plant from the area around the Hasanuddin University campus, Makassar. The sap is taken from the leaves, then the sap that comes out is accommodated into a test tube and stirred with a stirring rod until homogeneous.

### Technique of Making Duck Cocor Duck Sap Mixture and Ointment

The ingredients used for mixing the ointment are cocor duck sap and gentamicin ointment in a ratio of 2:1 with the amount of cocor duck sap of 0.133 g and the amount of gentamicin ointment as much as 0.067 g with each application of 0.2 g of ointment. Gentamicin ointment is mixed with cocor duck sap and then stirred until homogeneous. The ointment and sap of cocor duck that had been mixed were directly applied to the back of the burn on the rat.

### Burns Making

The initial stage is to determine the location of the burn, which is on the back of the rat, then the hair is shaved about 3-5 cm around the skin to be

burned and the skin is anesthetized using ether. Furthermore, disinfection was carried out with 70% alcohol on the skin of the rats. Then, a burn wound was made on the rat's back with a diameter of1.5 cm using an iron plate that had been heated for 30 seconds and affixed for 10 seconds to the rat's back until a second-degree burn was formed, which was marked by a reddish color and no bullae were formed. (water bubbles) on the skin of mice (Simanjuntak, 2008 in Balqis et al., 2014).

**Burn Treatment**

Rats that had been injured on their backs were each given treatment according to their group. Group 1 (K1) is not treated as a negative control, group 2 (K2) is giving gentamicin ointment 0.1% as a positive control, group 3 (K3) is giving cocor duck sap and gentamicin ointment (2:1), and group 4 (K4) is the provision of cocor duck sap ointment. Wound care was carried out for 15 days by applying once a day according to the control group, each with dose of 0.2 g.Then observations were made by measuring the surface area of the wound using tracing paper and millimeter blocks on the 0, 5, 10, and 15 days. After the results of the measurement of the burn surface area are obtained, then these results are used to determine the percentage of the extent of the burn wound healing rate

**Data analysis**

In this study, descriptive data analysis was carried out by describing the data scientifically in the form of graphs. The formula for calculating the percentage of burn healing is as follows (Handayani et al, 2016):

$$BH = \frac{L0 - Ln}{Ln} \times 100\%$$

Description
BH : Burn Healing (%):
L0 : Extent of burn on day 0
Ln : Extent of burn on day n

## Result and Discussion

### 1. Burn Area Measurement Results

In this study, 12 white *Rattus novergicus* rats were used with male sex and body weight of about 200-295 grams, aged about 2-3 months. To find out the value of the measurement of the burn area by drawing the area of the wound on the rat's back on the prepared tracing paper. After the condition of the wound was drawn on tracing paper, then the burn area was calculated on the rat using millimeter block paper. Then the calculation of the area of burns in rats is carried out using millimeter blocks which aims to make it easier for us to calculate the area of burns inrats. The following are the results of the measurement of the burn area shown in Table 1 and the graph of the measurement results of the burn area is shown in Figure 1.

**Table 1.** Results of Measurement of Burn Area

| Group | Day Burn Area (mm $^2$) ±STDEV - | | | |
|---|---|---|---|---|
| | **1** | **6** | **10** | **15** |
| Negative Control | 228.5± 41.2 | 197±28. 4 | 159±3 7.1 | 96.6±35.9 |
| Positive Control | 170±2 8.1 | 125.8±1 4.5 | 48.3±2 0.6 | 12.3±7.7 |
| Ointment+SapCoc or Duck | 201.5± 15.6 | 121±45. 4 | 71.6±2 3.7 | 18.1±20.1 |
| Cocor Duck sap | 158.6± 28.2 | 56.1±30 .4 | 38.6± 3.5 | 10.3±8.1 |

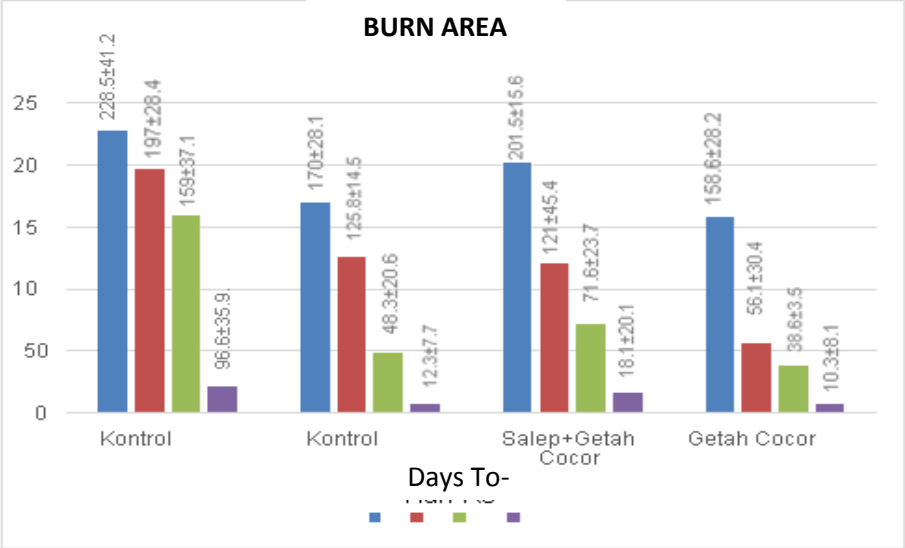


**Figure 1.** Graph of Burn Area

Based on the table above, the results of the measurement of the largest burn area on the first day are group 1 negative control and the smallest burn area is in group 4 pure cocor duck sap, on the sixth day the largest burn area is in group 1 negative control and the smallest burn area namely in group 4 pure cocor duck sap, on the tenth day the largest burn area was in group 1 negative control and the smallest burn area was in group 4 cocor duck sap, on the fifteenth day the largest burn area was in group 1 negative control and The smallest burn area was group 4 of cocor duck sap.

On the first day, the treatment for second-degree burns (shallow) was given. Shortly after the burn, there is a release of clotting factor mediators that can coagulate blood and play a role in initiating the inflammatory phase. The process that takes place in this phase results in the wound being slightly swollen and red (Sasongko, 2008). On the sixth day, the group of cocor duck sap, positive control, and ointment + cocor duck sap had formed a scab on the sixth daywhile the negative group had not formed a scab. No scab formation in the negative control treatment group was

due to the absence of treatment given so that the process of scab formation in the negative group treatment was slower to form compared to the three treated groups. On the tenth day the burns on the backs of the rats had started to shrink and no longer found the redness and the formation of a crust or scrab. The wound is first covered on the top by clotted blood which forms a crust or scab layer. This layer of crust or scab is to prevent oxidation of the wound so that microorganisms or bacteria around the wound cannot develop to infect the wound and the wound healing process will run well (Oktiarni et al, 2012). On the fifteenth day the crust or scab layer had peeled off in group 4 pure cocor duck latex, group 2 giving Gentamicin ointment, 18 and group 3 ointment + cocor duck sap. When the scab (scarb) is released, it can be indicated that there has been growth of new cells on the skin so that it can accelerate the release of the scab (scarb) and close the wound edges.

## 2. Burn Healing Percentage Results

The next step to determine the healing of burns in rats is to calculate the percentage of burn healing after treatment for 15 days which aims to determine which treatment group is the most effective in the process of healing burns. This can be shown in the results of the analysis of burn area measurement data related to the development of burn healing on the first day to the fifteenth day. The results of Observation of Burns on the first day with the 15th day can be seen in the following Figure 2.

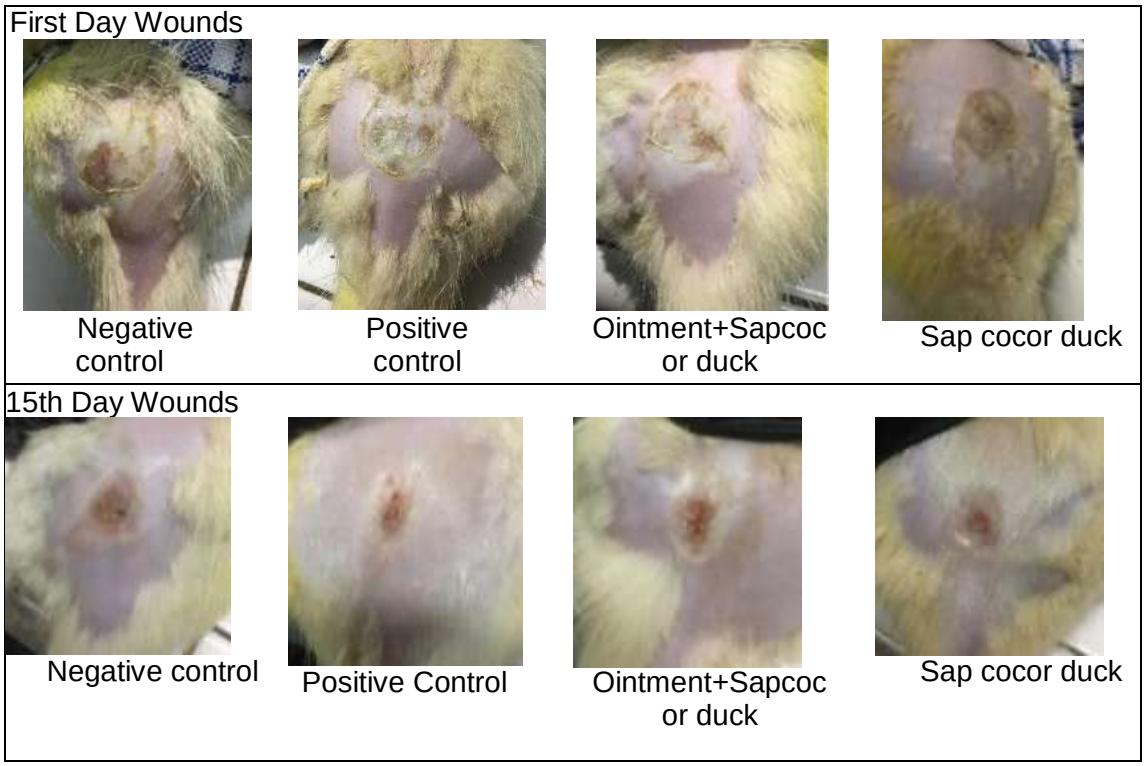


**Figure 2.** Observation of burns on 1 and 15 days

From the picture above, it can be seen that on the first day there were almost the same red spots in the four treatments. On the fifteenth day the burn had begun to heal and the wound had begun to shrink. In the picture above, it can be seen that the pure latex healed faster than the negative control, positive control, ointment + cocor duck sap.

The following data on the percentage of burn wound healing are shown in Table 2 and graph 2.

**Table 2.** Percentage of Healing Area of Burns

| Group | Percentage of Burn Area Healing Day-(%) ±STDEV | | | |
|---|---|---|---|---|
| | 1 | 6 | 10 | 15 |
| Negative Control | 0 | 13.36±3.5 | 30.86 ±4.1 | 90.09±5.3 |
| Positive control | 0 | 25.47±5.7 | 69.77±16.3 | 92.08±4.2 |
| Ointment+sapc ocor duck | 0 | 38.79±22.5 | 63.70±14.9 | 91.41±12.1 |
| Cocor duck Sap | 0 | 64.66±19.4 | 74.91±6.1 | 94.04±6.4 |

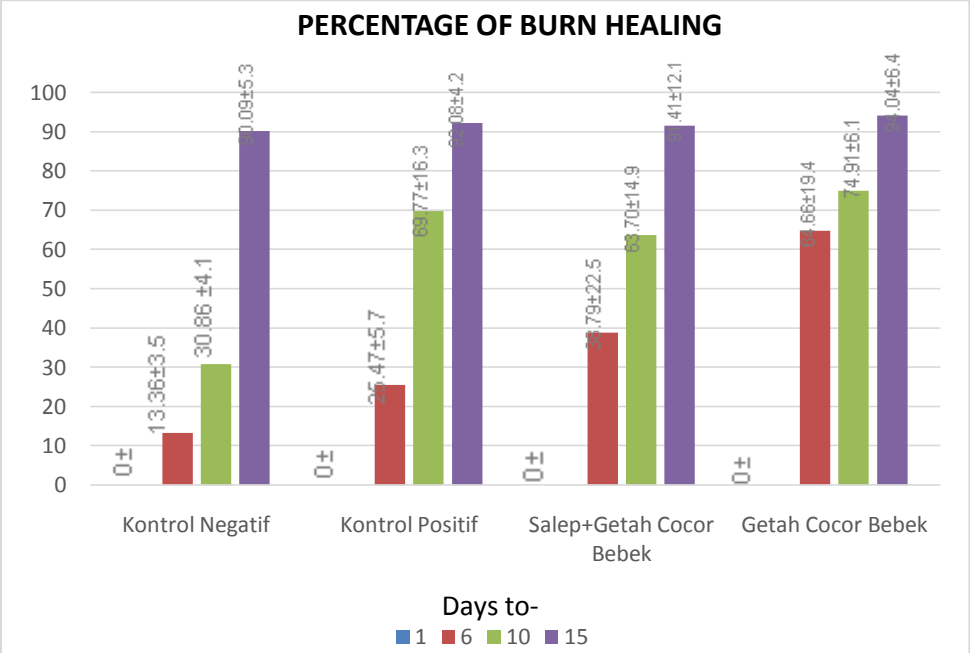


**Figure 3.** Graph of Burn Healing Percentage

The results of the percentage of burn healing on the first day based on the table above that the average results obtained were 0.0%, and on the sixth day the highest wound area was in group 4 pure cocor duck sap and the lowest percentage was in group 1 negative control. On the tenth day the highest percentage yield was in group 4 pure cocor duck latex and the lowest percentage was in group 1 negative control. On

the fifteenth day the highest percentage yield was group 4 pure cocor duck latex and the lowest percentage was group 1 negative control.

## Conclusion

Cocor duck sap contains active compounds, namely alkaloids, triterpenes, lipids, flavonoids, glycosides, bufadieniolides, phenols, and organic acids that can heal burns which have a percentage of 94.04% so that cocor duck sap is very good in healing burns.

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## References

Anggowarsito, J.L., 2014. Luka Bakar Sudut Pandang Dermatologi. Jurnal Widya Medika Surabaya. Vol 2(2).

Arif, M., 2017, Pengaruh Madu terhadap Luka Bakar, Medula, Vol. 7(5);71-74.

Damayanti, I.P., 2014, Faktor-faktor yang Berhubungan dengan Penyembuhan Luka Post Sectio Caesarea di RSUD

Fitria, M., Saputra, D., dan Revilla, G., 2014, Pengaruh Papain Getah Pepaya Terhadap Pembentukan Jaringan Granulasi pada Penyembuhan Luka Bakar TikusPercobaan, Jurnal Kesehatan Andalas, Vol. 3(1); 73-76.

Hermanto, F., dkk., 2014. Uji Aktivitas Anti Malaria Ekstrak Etanol Daun Cocor Bebek (Kalanchoe pinnata) pada Plasmodium falciparum 3D7. Jurnal Ilmiah Farmasi. Vol 2(2).

Ivanalee, A.S., Yudaniyanti, I.S., Yunita, M.N., Triakoso, N., Hamid, I.S., Saputro, A.L., 2018, Efektivitas Sugar Dressing (100% Gula) dalam Meningkatkan Kepadatan Kolagen pada Proses Penyembuhan Luka Bakar Buatan pada KulitTikusPutih (Rattus norvegicus) Jantan, Jurnal Medik Veteriner, Vol. 1(3);134-141.

Kurnianto, S., Kusnanto., dan Padoli., 2017, Penyembuhan Luka Bakar Pada Tikus Putih Dengan Menggunakan Ekstrak Daun Pegagan (Centella Asiatica) 25% Dan Ekstrak Daun Petai Cina (Leucaena Leucocephala) 30%, Jurnal Ilmiah Kesehatan., Vol 10 (2) ; 250-255.

Kusumawardhani, dkk., 2015 Pengaruh Sediaan Salep Ekstrak Daun Sirih (Piper betle Linn.) terhadap Jumlah Fibroblas Luka Bakar Derajat IIA pada Tikus Putih (Rattus norvegicus) Galur Wistar. Jurnal Kesehatan FKUB, Vol. 2(1) : 16-28.

Lallo, S., dkk. 2020, Aktivitas Anti Inflamasi dan Penyembuhan Luka dari Ekstrak Kulit Batang Murbei (Morus alba L.), Jurnal Farmasi Galenika, Vol. 6(1) : 26-36.

Maula, F.I., 2014, Uji Anti fertilitas Ekstrak N-Heksana Biji Jarak Pagar (Jatropacurcas L.) Pada Tikus Jantan (Rattus novergicus) Galur Sparaguedawley Secara In Vivo.

Mawarsari, T., 2015, Uji Aktivitas Penyembuhan Luka Bakar Ekstrak Etanol Umbi Talas Jepang (Colocasia esculenta L.) Pada Tikus Putih (Rattus novergicus) Jantan Galur Sparaguedawley.

Oktiarni, D., dkk. 2012, Pengujian Ekstrak Daun Jambu Biji (Psidium guajava Linn.) Terhadap Penyembuhan Luka Bakar Pada Mencit (Mus musculus), Jurnal Gradien, Vol. 8(1) : 752-755.

Plantamor. 2008. Plantamor Situs Dunia Tumbuhan, Informasi Spesies-Pala. http://www.plantamor.com/index.php?plant=883. Diakses 27 Agustus 2011.

Pulungan, R.H., 2017, Uji Potensi Produk Ruahan Salep GentamisinTerhadap Bakteri Staphylococcus epidermidis.

Purwaningsih, L.A., dan Rosa, E.M., 2015. Respon Adaptasi Fisiologis dan Psikologis Pasien Luka Bakar yang Diberikan Kombinasi Alternative Moisture Balance Dressing dan SeftTerapi di RSUP Dr. Sardjito Yogyakarta.