

## Activity Of Salam Leaf (*Syzygiumpolyanthum*) Gel As A Burns Healer In White Rats (*Rattusnorvegicus* Strain Wistar)

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### Abstract

Burns are unique because they involve much dead tissue (eschar), which remain in place for an extended period. Salam leaves can be used for wound treatment by attaching them to the wound place. One of the ingredients of Salam leaves is an anti-bacterial which can kill and inhibit the growth of bacteria and antioxidants. This study aimed to determine the activity of Salam leaf extract gel as a healing grade 2 burns in white rats.

Posttest Only Control Group Design used experimental white mice (*Rattusnorvegicus* strain Wistar). The sampling technique was simple random sampling, consisting of 4 groups, namely 3 treatment groups giving salam leaf extract gel each 15%, 30 and 40 %, 1 negative control group with standard saline solution 0.9%. Microscopic observation of the thickness of the granulation tissue in the Hematoxylin-Eosin preparation was carried out. Data were analyzed using descriptive analysis, data normality test with Shapiro Wilk, Kruskal Wallis comparison test.

Average grade 2 burns healing using salam leaf extract gel (*Syzygiumpolyanthum*) in experimental animals with 15% gel was 3.3 days, 30% gel was 7.8 days, and 45% gel was 13 days, while with NaCl 0.9% is 12.7 days. The Kruskal-Wallis test results show the Asymp value. Sig <0.05 indicates a difference between the administration of salam leaf extract and the duration of healing burns. Histological examination in the bay leaf extract gel group's of 15% and 30% concentrations showed the thickest granulation tissue thickness compared to other treatment groups.

Giving salam leaf extract gel is effective in the healing process of grade 2 burns. Further research is needed regarding the treatment of burns grade 2 B or grade 3 and other various dosage forms and additional research on the standardization of active ingredients that can be used as complementary or an alternative in the treatment of grade 2 burns for multiple groups of people.

### Abstract

Burns are unique in that they involve large amounts of dead tissue (eschars) that remain in place for long periods. Bay leaves can be used for wound treatment by attaching them to the wound. One of the contents of bay leaves is an anti-bacterial that can kill and inhibit the growth of bacteria and antioxidants. This study aimed to determine the activity of the extract gel bay leaf as a healer for grade 2 burns in white rats.

**Method:** True experimental research design with Posttest Only Control Group Design using experimental white rats (*Rattusnorvegicus* strain Wistar), the sampling technique is simple random sampling, consisting of 4 groups, namely 3 the

treatment group was given 15%, 30 and 40% of bay leaf extract gel, respectively, 1 negative control group with 0.9% typical saline solution. Microscopic observations of granulation tissue thickness in Hematoxylin-Eosin preparations were carried out. Data were analyzed using descriptive analysis, data normality test with Shapiro Wilk, comparative test Kruskal Wallis Test.

**Results:** Average healing of grade 2 burns using gel bay leaf extract (*Syzygiumpolyanthum*) in experimental animals with 15% gel was 3.3 days, 30% gel was 7.8 days, and 45% gel was 13 days while with 0.9% NaCl liquids 12.7 days. The results of the Kruskal-Wallis test showed the Asymp value. Sig <0.05 indicates a difference in the administration of bay leaf extract with the duration of burn wound healing. Histological examination of the 15% and 30% concentration of the bay leaf extract gel group showed that granulation tissue thickness was the thickest compared to other treatment groups.

**Conclusion:** Giving bay leaf extract gel is effective in the healing process of grade 2 burns. Further research is needed regarding the treatment of burns grade 2 B or grade 3 and/or with various other dosage forms and further research on the standardization of active ingredients that can be used as complementary or alternative medicine in treating burns. handling cases of grade 2 burns for various groups of people in Indonesia

**Keywords:** Bay leaf extract gel, Grade 2 burns, healing

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## INTRODUCTION

Burns are surgical wounds that are not infected, and there is no inflammation and contamination from the digestive, respiratory, genital or urinary tracts (Morison, 2003). Burns are unique in that they involve large amounts of dead tissue (eschars) that remain in place for extended periods (Smeltzer SC, 2002). Burns that most often occur at home and are the most common are second-degree burns (Nurdiana et al., 2008).

Wound healing is a complex process through several phases, namely: coagulation, inflammation, proliferation, and remodelling phases. (Suriadi, 2004). The role of nurses in wound care, such as the selection of dressings to the choice of wound cleaning solutions, is crucial to accelerate the wound healing process. New tissue growth will occur in the proliferative phase, which consists of new capillaries and fibroblast cells that fill the cavity (Widyatama. 2010).

Today many studies are looking for alternative materials for health. Various kinds of plants around us that are often used by the community are bay plants, usually used as kitchen spices or flavouring spices because they have a distinctive aroma that can add to the delicacy of dishes. Compounds such as niacin, fibre, tannin, vitamin C are contained in bay leaves (Soeharto, 2004; Moeloek, 2006). Based on research by Liliwirianis et al. (2011), bay leaves also contain steroids, phenolic compounds, saponins, flavonoids, and alkaloids. Bay leaves are often used to treat gastritis, diarrhoea, high blood pressure, lowering total cholesterol levels, anti-inflammatory, and anti-bacterial (Kemenkes RI, 2011).

Based on the description above, the focus of this study is the use of bay leaf extract gel to heal burns. Researchers are very interested in knowing about the effect of giving bay leaves

(*Syzygiumpolyanthum*) on healing burns in white rats (*Rattusnorvegicus* strain Wistar). According to Susilowati in Handayani (2005), Wistar rats can be used to represent mammals, including humans, and have been used effectively as experimental animals to study the biology and pathology of organ tissues.

## METHOD

### Salam Leaf Extract

The mature leaves were taken in the centre of the stalk and dried in an oven at 60°C. Furthermore, the dried simplicia is made in powder form. A total of 1000 grams of powder was weighed carefully and extracted by maceration method with 70% ethanol (1:5) for 3 × 24 hours with solution changes every 24 hours. The extract was then concentrated using a rotary evaporator until concentrated.

### Making Salam Leaf Extract Gel

**Table 1.** Gel formulation

Ingredients	15% formula	30% formula	Formula 45%
bay leaf extract	15 grams	30 grams	45 grams
Vaseline flavum	63.75 grams	52.50 grams	48.75 grams
Adepslanæ	21.25 grams	17.50 grams	16.25 grams
Total Gel Weight	100 grams	100 grams	100 grams

Each thick extract was weighed and put into a mortar and then mixed with a gel base consisting of vaselineflavum and adepslanæ, stirred using a stamper for 5 minutes. After homogeneous, they are put into the extract container.

### Mouse sample selection

The planned sample was 24 rats divided into 4 groups, namely three treatment groups and one negative control group. Calculation of the number of samples is as follows:

$$(t - 1)(r-1) = 1$$

#### Information:

t= number of groups (4 groups)

r = number of replications in each treatment group

$$(4-1)(r-1) = 15$$

$$3(r-1) \geq 15$$

$$3r-3 \geq 15$$

$$3r \geq 18$$

$$r \geq 6$$

Based on the formula above, it can be explained that the total number of research samples is 6 x 4 groups = 24 rat samples. The interventions given to each group are:

- a. The three treatment groups were given 15%, 30% and 45% bay leaf extract gel.
- b. The negative control was given normal saline 0.9%.

The sample used in this study was *Rattus norvegicus* strain Wistar rats with healthy criteria, aged between one to two months, with the same sex and type of rat and the same average weight.

### Manufacturing and Treatment of Second Degree Burns

Mice were anaesthetized using inhalation of diethyl ether, the area of the skin to be burned was disinfected. The gauze is attached to a 2 x 2 cm block (styrofoam) and immersed in water at 98 oC for 3 minutes. Then the block is attached to the experimental animal for 30 seconds. The wound is compressed with distilled water for 1 minute to prevent the burn from spreading or worsening. Burns that form are classified as second-degree burns characterized by a pink and white base of the wound, and it is located higher above the normal skin surface. The wound was then treated according to the group, smeared with bay leaf extract gel at concentrations of 15%, 30% and 45% and normal saline 0.9%, then covered with sterile gauze. The treatment of the wound was carried out every day. On the 15th day,

### Data analysis

The observed wound imaging was the thickness of granulation tissue using an Olympus microscope and then converted with the OlyVIA program (viewer for histology examination) and AutoCAD 2009 with a magnification of 40x. Measurements were carried out in three different areas, namely on the left side of the wound bed, in the middle of the wound bed, on the right side of the wound bed, then

a nine-line count line was drawn, then the average value of all the counting lines was taken. The study results were analyzed using the IBM® SPSS® Statistics 24 program with the normality test of the data using the test Shapiro Wilk, homogeneity test using test of homogeneity of variance, one-way ANOVA, and post hoc Tukey HSD test.

## RESULTS AND DISCUSSION

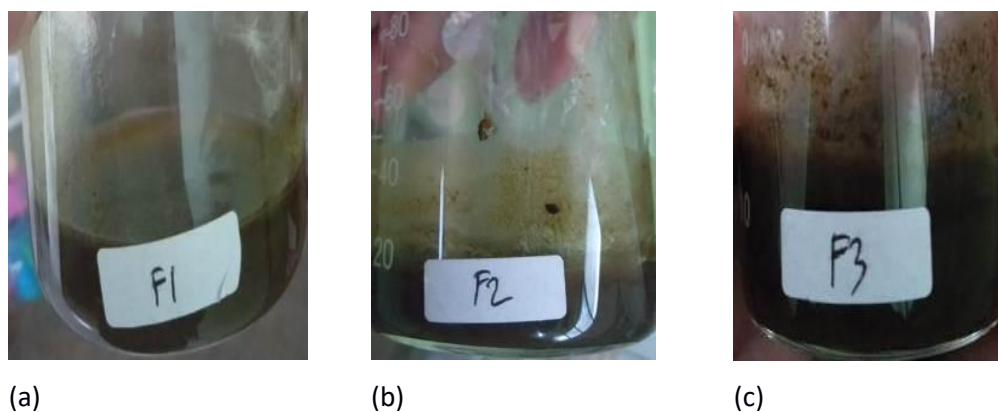
### Salam Leaf Extract

The extraction process aims to find the active compounds contained in bay leaves. The active compounds are derived from secondary metabolites produced by a plant. The results of bay leaf extract have blackish brown colour, distinctive odour, bitter taste, and semi-solid form. The yield obtained was 3.5% or 3.5 parts extracted from 100 elements of the bay leaf sample. Extracts from natural ingredients are generally dark in colour because they are concentrates of secondary metabolites in plants. The bitter taste of the extract is due to the influence of the tannin group, which gives the leaves a bitter taste. The distinctive smell of bay leaf extract is obtained because of the essential oil content found in bay leaves.



**Figure 1.** bay leaf extract

The extract was then formulated in the form of a gel dosage form. The extract cannot be directly used for treatment because it is still a concentrate of the active compound. The extract is also less stable in the open air, so it must be made in the dosage form. Gel preparations contain a lot of water, so they are very suitable to be applied to wounds. The extract is formulated in 3 formulas to see the optimum dose for the wound condition. The three-bay leaf extract gels were light brown to dark brown, depending on the extract that had a dark colour effect on the preparation. The higher the concentration of extract contained in the gel, the darker the colour will be.



**Figure 2.**Formula (a) Concentration of 15%; (b) 30% concentration; (c) Concentration of 45%

### Second Degree Burn Treatment

When the wound is given, hot gauze penetrates the epidermis and part of the dermis, which causes the wound to show an inflammatory reaction, namely rubor and tumour. In this study, wound healing was based on a reduction in the diameter of the burn wound, no erythema, no oedema, dry wound, no pus, granulation, odourless, fused wound edges.

**Table 2.**The results of the assessment of the duration of the wound healing

Group	$\bar{x}$ Healing time (days)
NaCl 0.9%	12.7
Salam leaf extract gel 15%	3.3
30% bay leaf extract gel	7.8
Bay leaf extract gel 45%	13.0

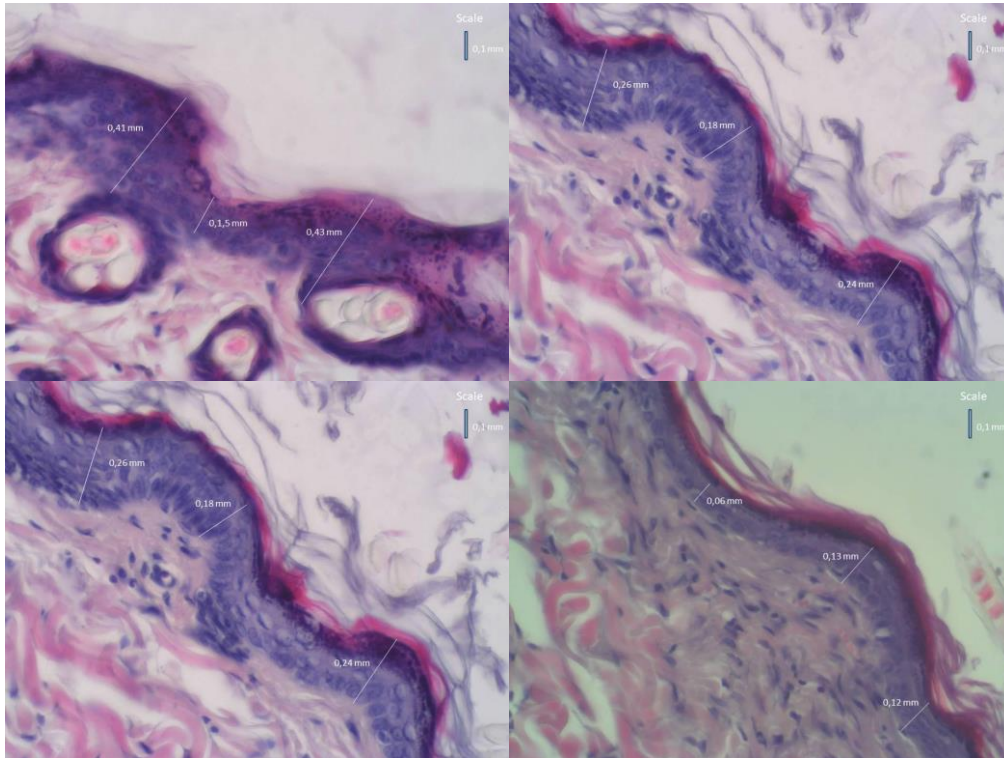
Based on the results table above, 15 % bay leaf extract gel is the best in accelerating the healing process of 2nd-degree burns. In the normality test, the data using Shapiro Wilk showed significant values for the treatment of 15%, 45% bay leaf gel and 0.9% NaCl $<0.05$ , so the data were not normally distributed. Thus, the test performed was the Kruskal-Wallis statistical test.

The results of the Kruskal-Wallis test show the average ranking for burn healing time for NaCl 0.9% is 17.67, 15% bay leaf gel is 3.5, 30% bay leaf gel is 9.5, and 45% bay leaf gel is 6.3. The test results show the Chi-Square value of 20.231 with Asymp. Sig 0.000. Therefore the value of Asymp. Sig  $< 0.05$ , then there is an effect of giving bay leaf extract on the healing time of second-degree burns.

### Granulation Tissue Thickness

The granulation tissue thickness was analyzed on day 15 because the proliferative phase of second-degree burns peaked on day 15 (Widyastuti, 2010). In the process of healing burns, the formation of granulation tissue is characterized by the formation of blood vessels or revascularization, which

helps supply glucose and amino acids to fibroblasts to maximize collagen formation (Rowan et al., 2015). One of the processes of good wound healing is characterized by the quality of granulation tissue formation. The thicker the granulation tissue formed, the shorter the wound healing process (Paglinawan et al., 2008). The thickness of the granulation tissue in each treatment group is shown in the figure below:



**Figure 3. Thickness of Granulation Tissue in (a) Gel 15%; (b) Gel 30%; (c) Gel 45%; (d) 0.9% NaCl**

Based on the results of laboratory examinations of rat skin tissue that has been stained with HE (Hematoxylin Eosin), 15% bay leaf extract gel has the most enormous average thickness of 0.33 mm. Meanwhile, the 30% bay leaf extract gel was 0.22 mm, the 45% leaf extract gel was 0.11 mm and the negative control group (NaCl 0.9%) had the thinnest granulation tissue thickness of 0.10 mm.

EnhancementThe thickness of granulation tissue formed in the gel treatment group of bay leaf extract was thought to be due to the content of active compounds derived from bay leaf extract. The results of bay leaf extraction contain several active compounds such as saponins, tannins, flavonoids, phenols, and essential oils. Flavonoids in bay leaves have an anti-inflammatory function because they can reduce the production of pro-inflammatory molecules, namely NO and PGE-2 (Supriyanti, 2009). Tannins also function as adstringens used in cosmetics to lighten the skin (Yuliarti, 2010). Leaf polyphenol content regards acts as an antiseptic and antioxidant. While the leaf saponins regards functions as a wound cleanser and trigger collagen formation, which plays a role in the wound

healing process (proliferative phase) (Wardani, 2009). These ingredients can help the wound healing process with different cellular mechanisms, anti-inflammatory, antimicrobial, and antioxidant. Meanwhile, the administration of 0.9% NaCl solution did not affect the speed of wound healing, so it can be said that the control group experienced routine wound healing.

## CONCLUSION

The conclusion obtained in this study was that the administration of 15% bay leaf extract gel was the most effective in the healing process of grade 2 burns, which was for 3.3 days with the thickest granulation tissue thickness compared to the other groups.

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