

THE EFFECTIVENESS OF BINAHONG LEAVES AND GARLIC TUBERS EXTRACT GEL FOR PATIENTS WITH BURN INJURIES

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Article Info

Article history:

Received December 10th, 2022

Revised December 28th, 2022

Accepted January 4th, 2023

Keywords:

Binahong Leaves extract gel

Burn injuries

Garlic tubers Leaves extract gel

Wound area

IIA Degree

ABSTRACT

Background: Burns injuries is a damage of epithelial tissue that caused by heat substance, chemicals, and solar radiation. Binahong leaves and garlic tubers contain several active compounds which have effect as anti-inflammatory and anti-bacterial that can help on the healing process of IIA degree burns. **Purpose:** To know the effect of binahong leaves and garlic+ tubers extract gel on the decreasing of IIA degree burns area on white rat (*rattus norvegicus* strain wistar). **Methods:** The method describing the design or the design of the research, the research target (population, sample and data sources), techniques and data collection instruments and describes the techniques or data analysis procedures. **Results:** The result of MANOVA test shows that there is a difference in the size of the burns wound area on 14th day. Post hoc test shows a meaningful different result of 4th group on 14th day, 3rd group on 14th day, and 5th group on 14th day. Pearson test result shows the effect of all extract gel on the 14th day is 0,896 which is classified in significant category. **Conclusion:** Binahong leaves and garlic tubers extract gel have effects on IIA degree burns area *rattus norvegicus* strain wistar.

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1. INTRODUCTION

Burn is an injury to the skin or other tissues which caused by radiation or due to the heat, radioactivity, electricity, or chemicals. Burns are classified as first degree, second degree, and third degree depending on how deep the wounds are. Second degree burns cause damage to epidermis and dermis. There are 2 types of second degree burns, superficial partial-thickness burns (IIA) and deep partial-thickness (IIB).[1]

Silver sulfadiazine (SSD) is applied as standard topical gold therapy in the healing process of burns with anti-bacterial activity. SSD cream has several side effects such as neutropenia, erythema multiform, methemoglobinemia, leukopenia, and kidney toxicity [2]. Binahong extract gel contains compounds such as flavonoid, saponin, and tannin. Flavonoid inside Binahong leaves has anti-inflammatory effect, meanwhile saponin works as antiseptic which can stop or prevent mikroorganism growth in the wound to avoid the infection, boost

fibroblast cell, and stimulate the forming of collagen in the wound. [3] Similarly, there is allicin in garlic tubers. Allicin works as antimicrobial, antioxidant, and anti-inflammation.[4]

This study is conducted to know the effects of binahong and garlic tubers extract gel on IIA degree burns area on *Rattus norvegicus* strain wistar.

2. METHOD

This study is experimental study with post test only control group design. This study is conducted in Biomedic Laboratory on medical faculty of Muhammadiyah University of Malang. The 20 samples of *Rattus norvegicus* strain wistar are divided into 5 groups, 1 (SSD cream), 2 (basic gel), 3 (20% binahong extract gel), 4 (20% garlic extract gel), 5 (combination extract gel). Both extraction were conducted in Herbal Materia Medica Batu Laboratory with 96% ethanol. A metal (2 cm diameter) that has been heated in boiling water at 100°C for 3 minutes is affixed to the back of the rat for 10 seconds at a pressure corresponding to the weight of the metal against gravity. In order not to get licked by other rat, the wound which has been treated, is covered with hypafix after 30 minutes. The treatment was conducted for 14 days, then the wound area was measured on days 4, 7, and 14. The data of the IIA degree burns area in those days are measured using application named ImageJ. The data was analyzed using SPSS 25 with MANOVA test, Post-hoc Bonferroni and Pearson Correlation.

3. RESULTS AND DISCUSSION

The pattern of the wound that has been drawn in a transparency film paper, are scanned, calibrated, and measured virtually using ImageJ. The results of this measurements showed that every treatments gave different effects on the wound area of IIA degree burns, which can be seen on the Figure 1.

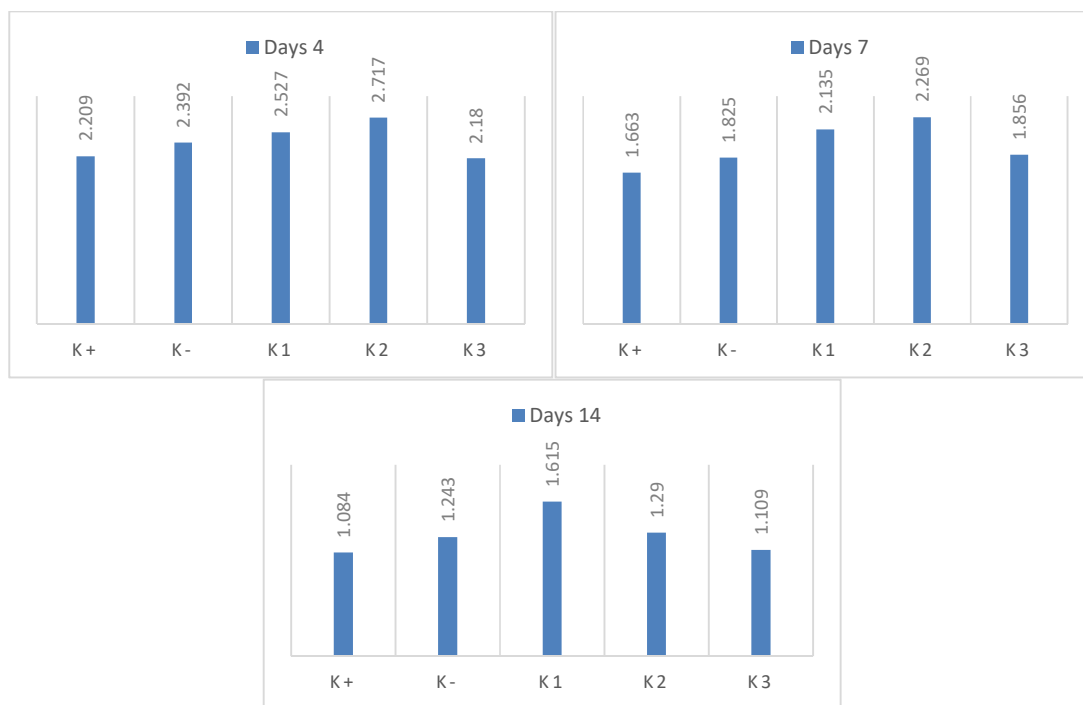


Figure 1. IIA Degree Burns Area Diagrams

Measurement on 14th day showed the final result of IIA degree burns healing, the average data of the last day of observation gave a result which proved that the combination extract gel (K3) is consistently the best among all extract gels, however the result of combination gel is still less effective rather than positive control group with silver sulfadiazine (burnazin plus cream) as a treatment that has 1,084 cm² average value as the final

result. The normality test and homogeneity Levene's test showed $p > 0,05$ which indicates the data is normally distributed and homogen.

Tabel 1. Oneway Anova Test

Variable	Sig.
Wound area 4 th day	0,239
Wound area 7 th day	0,10
Wound area 14 th day	0,003

The result of one way, wound area of IIA degree burns on days 4 and 7 have value of sig. $> 0,05$, therefore there is no significant different effect. There is a significant different effect on the IIA degree burns area on 14th day due to $p < 0,05$.

Measurement of day 14 showed that the average area of second degree burns treated with red dragon fruit peel extract gel concentrations of 10%, 15%, and 20% were smaller than the average area of second degree burns treated with gel and silver base. sulfadiazine (burnazine plus cream). Based on the average area of second degree burns on day 14, it can be concluded that red dragon fruit peel extract gel affects the area of second degree burns and the end of the proliferation phase of burn healing.

Table 2 MANOVA Test Results

Variable	Sig.
Wound area on day 4	0,134
Wound area on day 7	0,322
Wound area on day 14	0,001

Based on Table 2, the area of IIA degree burns in each treatment, both day 4 and day 7, did not have a significant difference in effect, because the sig. value is > 0.05 . The extent of second-degree burns on day 14 had a significant difference in effect, because the sig. value is < 0.05 for each treatment.

Based on Table 4, it can be concluded that extract gel have significant effect on the size of IIA degree burns area on days 4 and 14 The amount effect of all extract gel on the 14th day is 0,896 which is classified as negative correlation . Negative correlation showed that the higher the dose of extract gel, the smaller the IIA degree burns area.

Table 2. Post Hoc Bonferoni on 7th day

Comparison of The Group	Average Differences	Sig.	Conclusion	
K	K (-)	0,16	1,000	Insignificant
(+)	Binahong Extract Gel	0,47	0.121	Insignificant
	Garlic Extract Gel	0,60	0.013	Significant
	Combination Extract Gel	0,19	1,000	Insignificant

From Table 2 Posthoc Bonferoni test result above, IIA degree burns healing was significantly different on 7th day for garlic extract gel group compared to control (+) group. On 14th day, the result study showed the degree burns area was significantly decrease for binahong extract gel group compared to control (+) group.

Table 3. Post Hoc Bonferoni on 14th day

K (+)	K (-)	0,16	1,000	Insigificant
	Binahong Extract Gel	0,53	0,003	Insigificant
	Garlic Extract Gel	0,26	0,68	Significant
	Combination Extract Gel	0,32	1,000	Insigificant

Table 4. Result of Pearson Correlation Test

Correlation between variable		r	Sig.	Conclusion
Variable 1	Variable 2			
Extract gel	Wound area days 4	- 0,069	0,778	Insigificant
	Wound area days 7	- 0,336	0,159	Insigificant
	Wound area days 14	- 0,032	0,896	Significant

3.1 The application of Silver sulfadiazine

Silver sulfadiazine is a medicine used to treat burns. [3] According to Isrofah (2015), silver sulfadiazine has better microscopic result, however it has macroscopic which is not as good as extract gel therapy. It caused by the toxicity silver component that can affect fibroblasts and keratinosis. [5]

This study showed that the control (+) group has the most significant average value of IIA degree burns area decreasing, despite the gap was not too far and it was a normal result according to Silver sulfadiazine is standard gold therapy that used to treat burns that has been clinically tested. [6]

3.2 Comparison Between Control + and Garlic Extract Gel Treatment Group

From the result of Posthoc Benferoni on 7th day of the observation, we get 2269 cm² for garlic extract gel group. This result is significant compared to control + which used Silver sulfadiazine and get 1163 cm². Allicin in garlic is the key factor in the fibroblast activation; this leads to approximation of skin edges in shorter period, more regularly collagen deposition, and increasing of tensile strength of the healing tissue and wound healing in shorter period. [4]

However, the component of garlic extract gel is still less effective compared to control (+) that used SSD as a treatment. Burnazin plus cream also contains hyaluronic acid which can stimulate tissue regeneration, cell migration, and angiogenesis, therefore in this study, the average of IIA degree burns area that used Burnazin cream plus is smaller compared to the group that used basic gel. [5]

3.3 Comparison between control (+) and binahong extract gel group

The use of 20% concentrate binahong extract gel as a treatment in this study showed significant result compared to control (+) group on 14th day. Control (+) that used SSD gave smaller result in decreasing of average wound area compared to binahong extract gel.

According to Isrofah (2015) in study of comparison between binahong leaves extract and silver sulfadiazine standard gold therapy, it needs 40% concentrate of binahong to make it more effective than silver sulfadiazine therapy. That extract gel can show significant result of average value wound area decreasing because the 40% cream contains 11 more active compounds which claimed can help in burns healing. [5].

3.4 Comparison between combination extract gel and binahong extract gel group

Combination gel contains combined compounds from binahong leaves and garlic tubers. The combination of anti inflammation and anti bacterial from each binahong leaves and garlic tubers can give significant result compared to uncombined gel.

4. CONCLUSION

According to the observation on 14th day, the most effective extract gel for IIA degree burns healing on white rat *Rattus norvegicus* strain wistar is the combination gel of binahong leaves and garlic tubers extract. The amount effect of all extract gel on 14th day is 0,896 which is classified as significant category that indicates the higher the dose of the extract, the higher possibility IIA degree burns area that healed..

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