

The Effect of Giving Formulation of Red Fruit Oil Gel Emulsion (*Pandanus Conoideus Lamk.*) on Healing Speed of Burns Degree IIA in White Male Rats Wistar Strain (*Rattus Norvegicus L.*)

Anggun Anjaswara¹, Fidia Rizkiah Inayatilah², Siti Maimunah², Rahmi Annisa²

¹Undergraduate Student of Departement of Pharmacy, Faculty of Medical and Health Sciences, Maulana Malik Ibrahim State Islamic University, Malang Indonesia.

²Department of Pharmacy, Faculty of Medical and Health Sciences, Maulana Malik Ibrahim State Islamic University, Malang Indonesia.

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ABSTRACT

Aims: The aims this study was to obtain an gel emulsion of red fruit oil in accordance with chemical physics characteristics and to know the effect oil gel emulsion preparation of red fruit on healing burn degree IIA on male wistar rats. **Methods:** The design of this research used *true experimental laboratory post test only control group design* that with 5 groups of treatment, with use 20 male wistar rats were given burns degree IIA and given treatment according to the group each divided into positive group (bioplasenton[®]), negative group (normal saline 0.9%), treatment group (gel emulsion of red fruit) concentration 3%, 5%, and 10%). The wound healing data measured on days 7, 14, and 21 and then analyzed it using *one way Anova* statistical test, then continued using LSD advanced test. **Results:** The research results showed that oil gel emulsion of red fruit had chemical physics characteristic in accordance with gel emulsion preparation specification including organoleptic test, pH test, physical homogeneity test, spreading test, and stability test. The result of oil gel emulsion of red fruit concentration of 3%, 5% and 10% influenced the healing of burn on the statistical test of the gel emulsion treatment group did not different significantly with positive group ($p < 0,005$), so the oil gel emulsion preparation of fruit red that equal with group positive in the healing of burns. **Conclusion:** Based on the results of the study and discussion, it can be concluded that the preparation of red fruit oil emulsion gel with concentrations of 3%, 5%, 10% has chemical physics characteristics in accordance with a good gel emulsion preparation and administration of emulsion of red fruit oil concentrations of 3%, 5%, 10% for 21 days had an effect on the speed of healing male white rat wistar strain.

Keyword : Red Fruit (*Pandanus Conoideus Lamk.*), Emulsion Gel, Emulsion, Topical, Healing of Burns.

INTRODUCTION

The skin can be damaged. Damage to tissue caused by burns not only can occur on the skin surface but can also in the lower tissue of the skin. The burned tissue will be damaged, so that body fluids can pass through the capillaries of blood vessels in the tissues that are swollen from burns. This degree of IIA burn takes two to three weeks in its healing.) IIA burning injuries in the healing process, there are four healing phases, including hemostasis, inflammation, proliferation and remodeling⁴. The process of wound healing takes place biologically but its healing is influenced by external factors that can accelerate the healing time that can be with oral or topical medication. However, topical medications are considered more effective because of its direct application to burns. Many people are re-using natural materials that in its practice get used to life by avoiding synthetic chemicals and prefer the natural ingredients. There are many treatments with natural ingredients that can be selected as a solution to overcome the diseases one of which is the use of herbs¹. Red fruit is a plant of local wisdom that is where the red fruit is a plant that can only thrive in papua. Red

fruit is a plant that has many benefits because of its content. Red fruit contains: antioxidants (carotenoids, tocopherol), saturated fatty acids such as, lauric acid, palmitate, stearate, and unsaturated fatty acids such as palmitoleic acid, oleic, linoleic, omega-3 and others, fiber and calcium⁷. There has been a lot of research on these red fruit plants, but as far as the author's knowledge there is no research that makes the emulsion gel preparation of red fruit oil as a healing of burns by using wistar rats as experimental animals. In this study, gel emulsion was made because it has better penetration to penetrate the skin so that more active substances are retained in the wound so that the activity is better, easy to use, able to keep the skin moist, not irritate the skin and have a more attractive appearance. This research is based on previous research by Wicaksono (2015) which is the effect of giving red fruit oil to the number of fibroblast cells on male rats wistar strain with degree IIA burn for 7 days. Therefore, do research on the development of red gel oil gel Emulsion formulation on the speed of healing burns in mice. To know the effect of the preparation of Red Fruit Oil gel emulsion to wound healing speed is done by observing the area of burn. It is expected

Table 1: Formulation Design Gel Emulsion of Red Fruit Oil.

Ingredients	Function	Formula % (b/v)		
		F1	F2	F3
Red Fruit Oil	Active ingredients	3	5	10
HPMC	Basic Gel	5	5	5
Span 80	Surfactan	15	15	15
Propylene glycol	Enhancer	10	10	10
Metyl paraben	Preservative	0,3	0,3	0,3
Propyl paraben	Preservative	0,1	0,1	0,1
Aquadest ad		100	100	100

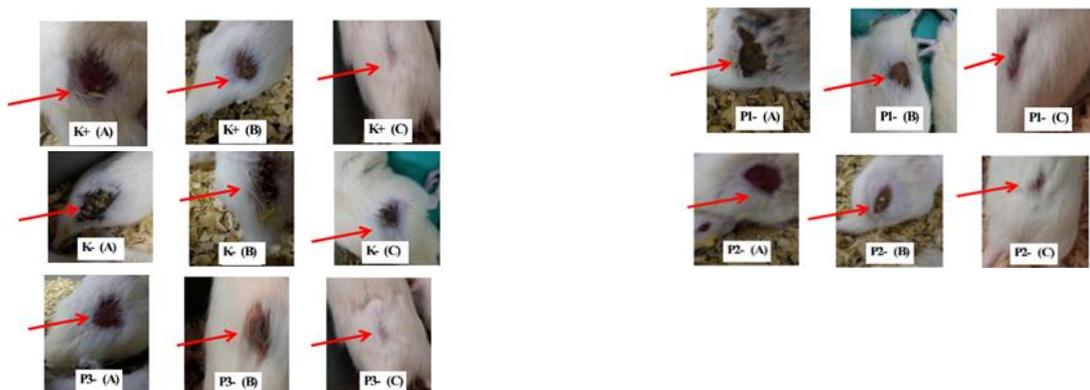


Figure 1: Drawing the healing process of widespread burns of degree IIA in wistar white rats in each group on days 7, 14 and 21. (A) Wide Length Degrees IIA 7th day; (B) Wide Length Degrees IIA 14th day; (C) Wide Area Degree IIA 21st day; (K-): Negative Control; (K+) Positive Control; P1, P2, P3: Treatment group 3%, 5%, and 10%.

that the results of this study will provide a new alternative treatment of gel emulsion preparations using red fruit oil as a healer burns in the future.

MATERIAL AND METHOD

Materials

The materials used in this study were: Aquades, red fruit oil, Span 80 (sigma aldrich), methyl paraben (Hallstar), HPMC (sigma aldrich,), propyl paraben (Sigma aldrich), Propylene glycol (alginate), Normal saline 0.9% (Bioextra), Water tap / water flow, ketamine, Xylazin, Bioplacenton®.

Sample Preparation

The sample used in this research is red fruit juice obtained from CV. Papua Cendrawasih Industries in Wamena Papua.

Formulation Design

The formulation of emulsion gel red fruit was prepared in three formulation, each with different concentrations of red fruit oil. (without red fruit oil) F1 3%, F2 5%, and F3 10%. Each formulation is made up of 3 replicates on each preparation. The preparation is made as much as 20 grams.

Gel Emulsion of Red Fruit Oil

Emulsion gel preparation made 3 formula that is F1, F2 and F3 which added active substance that is red fruit oil 3%, 5% and 10%. For the preparation of a gel emulsion preparation HPMC was first developed in hot water. The oil phase (red fruit oil, span 80, and propyl paraben) and water phase (propylenglycol and methyl paraben) are prepared separately by mixing each component at 60°C. The oil phase is added to the water phase and then stirred for 15 minutes. The emulsion formed is then mixed with

HPMC which has expanded for 20 minutes to form an emulsifier.

Evaluation Gel Emulsion of Red Fruit Oil

Organoleptic Test

Organoleptic examination includes color and odor observations. The preparation must show the same character of the same color and smell after accelerated storage⁵.

Interpretation on organoleptic test of red gel oil emulsion preparation is the typical red fruit oil and red color.

pH test

The pH of the preparation is tested using pH meter by calibrating the tool first using a neutral pH, then washed with aquades, then dried with tissue paper. Then the electrode is dipped, until the instrument shows a constant pH. The number designated by pH meter is the pH of the dosage. The preparation of 1 g is dissolved with sufficient aquadest and then tested by pH meter.

Interpretation of pH measurement results indicates that all the formulas have 4.5 to 6.5 so the emulgel is safe to use because it will not cause irritation².

Physical Homogeneity Test

On this examination is seen whether the homogeneous dosage texture. The way is as follows²: (1) A number of preparations to be observed are applied to a clean and dry object glass to form a thin layer, then covered with glass cover (2) the preparation is homogeneous if on observation using a microscope, cream has a texture that looks flat and not clot.

Induction Burns

The day before the burning, the mice were shaved on the back. Then at the time of being injured, the rat was

Table 2: Result Organoleptic Test Gel Emulsion of Red Fruit Oil.

Formula	Characteristics	Changes observed on the day		
		1	7	14
F1	Texture	L	L	L
	Color	O	O	O
	Smell	KhMBM	KhMBM	KhMBM
F2	Texture	L	L	L
	Color	MT	MT	MT
	Smell	KhMBM	KhMBM	KhMBM
F3	Texture	L	L	L
	Color	MG	MG	MG
	Smell	KhMBM	KhMBM	KhMBM

Information:

- F1 : Gel emulsion with red fruit oil 3%
- F2 : gel emulsion with red fruit oil 5%
- F3 : gel emulsion with red fruit oil 10%
- KhMBM : Typical red fruit
- L : Soft
- MT : Bright red
- MG : Dark red
- O : Orange

anesthetized first. Anesthesia is general anesthesia using ketamine and xylazin. Rats are then placed on top of the surgical base for injury.

In the area of the shaved back skin and the surrounding is cleaned with a 70% alcohol solution. After that made a circular burn with a diameter of 2.4 cm, with the skin is traced at a temperature of $\pm 96^{\circ}\text{C}$ for ± 1 minute. Rats are grouped into 5 groups, there are (figure 1).

Gel Emulsion of Red Fruit Oil Against Healing Speed of Wistar Wire Mouse Injury

Treatment of burns was done to all groups during the study. using gloves and open bandages then the treatment process to clean the wound with normal saline 0.9%, given 0.5 cc normal saline on the wound area (treatment performed 1x / day at 09.00 - 10.00), covered the wound with sterile gauze and plaster. The positive control group (K +) is a positive group with closed wound care using Bioplacenton. The negative control group (K-) is a negative control group with closed wound care using a gel emulsion base. The treatment group 1 (P1) was a treatment group with closed wound care using 3% red fruit oil gel emulsion. The second treatment group (P2) was a treatment group with closed wound care using 5% red oil gel concentration emulsion. Treatment group 3 (P3) was treatment group with closed wound care using 10% red oil gel concentration emulsion. The experiment lasted for 21. On day 7, day 14, and day 21 were measured the diameter of the burn wound.

RESULTS AND DISCUSSION

Organoleptic Test

Based on Table 2 of organoleptic test results of emulsion gel preparation with various concentrations of red fruit oil, All gel emulsion formulations on organoleptic test of day 1, 14th, and 21st day have a soft texture. In a gel emulsion preparation with 3% red orange oil the color is orange, on a 5% red gel oil gel emulsion the color is bright red and, on the gel emulsion gel 10% red color is dark red. The color difference that occurs is caused by the difference in

the concentration of red fruit oil added to the gel emulsion preparation. The most concentrated gel emulsion preparation is 10% red gel oil because the highest red fruit concentration is added to this F3 preparation. For the smell of gel emulsion with various concentrations of red fruit oil has a distinctive odor of red fruit oil and does not change from day 1, day 7, and day 14 still have a distinctive odor of red fruit oil.

pH test

Based on table 3 the results of the pH-test show that all the gel emulsion of red fruit formulations show in the pH range of 5.3 - 5.9. Thus, the formulated emusel meets the physiological pH range of human skin.

Physical Homogeneity Test

On this examination is seen whether the homogeneous dosage texture. The way is as follows: (1) A number of preparations to be observed are applied to a clean and dry object glass to form a thin layer, (2) then covered with another object glass, (3) the preparation is homogeneous if the preparation shows the arrangement homogeneous and no visible coarse grain (Voight, 1994).

Based on Table 4, all gel emulsion preparations with various concentrations of red fruit oil 3%, 5%, and 10% after homogeneity test from day 1, day 7, and day 14 were absent changes in the homogeneous dosage form and no particles separated, so in this study the preparation was homogeneous.

Gel Emulsion Red Fruit on Healing Speed of Burns Degree II A Wistar Range of Wistar Rats

After obtaining emulsion of red fruit oil gel in accordance with the chemical characteristics of gel chemical emulsion characteristic, the research activity was done to see the effect of red fruit oil preparation on the wound healing area of white rat as measured on day to -7, 14, and 21. The following can be seen in Figure 2.

From the above figures it can be stated that each treatment group with 4 replicates of the same treatment group each has an average of different healing wounds, whereas in general the initial area on which the initial burn wound

Table 3: pH Test Emulsion Gel Containing various concentrations of Red Fruit Oil (*Pandanus conoideus* Lamk.).

Formula	pH day									Average ± SD
	1			7			14			
pH	R1	R2	R3	R1	R2	R3	R1	R2	R3	
F1	6.00	5.90	6.00	5.80	5.90	6.00	5.80	5.90	5.90	5.90 ± 0.08
F2	5.80	5.70	5.80	5.70	5.60	5.80	5.70	5.80	5.70	5.70 ± 0.07
F3	5.40	5.30	5.40	5.40	5.40	5.40	5.30	5.30	5.40	5.30 ± 0.05

Table 4: Result Homogeneous Observation.

Formula	Days		
	1	7	14
F1	Homogeneous	Homogeneous	Homogeneous
F2	Homogeneous	Homogeneous	Homogeneous
F3	Homogeneous	Homogeneous	Homogeneous

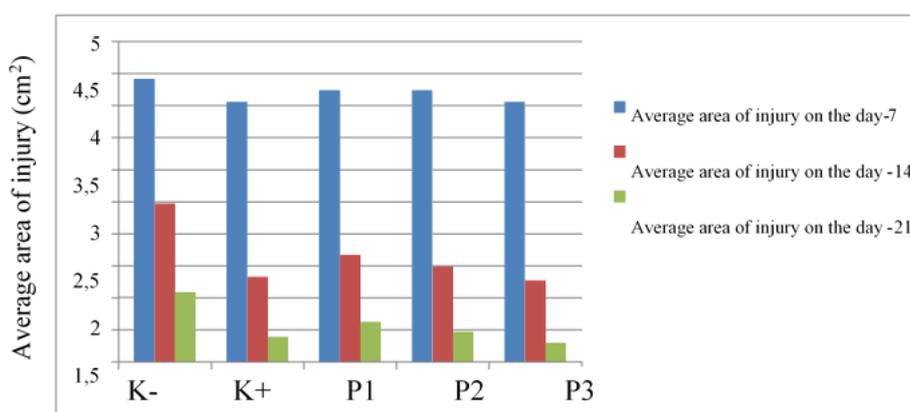


Figure 2: Extent of burn wound healing due to various concentrations of red fruit oil emulsion gel on day 7, 14, and 21.

healing begins to be tested is the area of the day after the rat given the treatment of burns because after 24 hours the burn area has stabilized.

To determine the difference in the size of the widespread narrowing of the wound on the 7th, 14th and 21st days of the red oil gel emulsion shown in the figure (attached to Figure 3.2).

Negative control treatment did not significantly narrow the burn width when compared with the average widespread healing of other types of treatment burns. This is because burns left without treatment or treatment did not experience significant narrowing for 21 days. Wound healing is influenced by two factors: internal and external factors. In the negative control of burn healing is not optimal because only internal factors that occur but no external factors. The intended absence of extrinsic factors is a factor that can accelerate wound healing such as nutrients and compounds that can accelerate wound healing.

In the positive control treatment of the wound is the provision of bioplacenta containing placenta extract and Neomycin Sulfate. Placenta extract works to trigger the formation of new tissue and accelerate the healing of burns, chest wounds, and skin defects. This substance can work by increasing the growth factor beta (TGF-beta) in the early phase of wound healing and increased vascular endothelial growth factor in the final phase. Neomycin Sulfate is an aminoglycoside class antibiotic. The mechanism of aminoglycoside action is to bind 30S

bacterial ribosomal subunits, causing misreading of t-RNA, which may inhibit bacterial growth and proliferation¹⁰. So on the positive control of widespread healing of burns occurred significantly on day -14 visible area of burns decreased and on the 21st day the area of burn almost completely cured.

Generally, 3%, 5%, and 10% control treatments were good in the progress of wounded malignant male wistar strain. The best concentration on the research is on the control 10%, the more the content of red fruit oil at 10% concentration then narrowing the widespread burns faster and significant.

In the wound healing process there is an inflammatory phase. The initial reaction to wound healing, vascular and cellular response is a manifestation of the inflammatory response. Acute inflammatory responses usually last for 24-48 hours and complete within 2 weeks. Inflammation is a protective response aimed at eliminating the initial cause of cell injury and disposing of necrotic cells and tissues caused by damage to origin. The connective tissue cells include sentinel to invade, for example mast cells, macrophages, and lymphocytes and fibroblasts that synthesize the extracellular matrix and can proliferate to fill the wound¹⁰.

Anova test results obtained results P = 0.000 thus p < 0.05 then there are significant differences in effect on the healing/narrowing of burns area in mice. Because the Anova results suggest that the gel emulsion preparation of red fruit oil has an effect on the healing / narrowing of burn

wound in male white rats, it is necessary to proceed with the comparison to see the difference of mean value of healing / narrowing of burn area between treatment groups using Least test Significan Difference (LSD).

The LSD test results showed significant differences in healing / narrowing of burns between several groups. In the 7th day statistic test there was no significant difference in each group because the wound area was largely the same size. This happens because for IIA degree burns the initial phase of healing is in the 7th day that fibroblasts appear first and increase significantly¹⁰. So that on the 7th day invisible there has been no significant change or narrowing of burns area. In the 14th and 21st day statistical tests it showed that the negative control group was compared with the positive controls as well as the de-treated group.

CONCLUSION

Based on the results of the study and discussion, it can be concluded that the preparation of red fruit oil emulsion gel with concentrations of 3%, 5%, 10% has chemical physics characteristics in accordance with a good gel emulsion preparation and administration of emulsion of red fruit oil concentrations of 3%, 5%, 10% for 21 days had an effect on the speed of healing male white rat wistar strain.

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