

Testing The Effectiveness Of Burns Healing Of Gel Preparations Jatropagar (*Jatropha Curcas* L) Leaf Extract On Male White Rats (*Rattus Norvegicus*)

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ABSTRACT

Indonesia has a variety of traditional medicinal plants for treating burns. One of them is *Jatropha* leaves which contain active substances such as saponins, tannins, alkaloids and flavonoids which have antibacterial, antioxidant, anticancer and anti-inflammatory properties. The aim of this research was to determine the effectiveness of *Jatropha* leaf preparations with extract concentrations of 10%, 15%, 20% on healing burns. This research stage includes plant determination, simplicia making, extract making, phytochemical screening testing, physical quality testing of gel preparations and animal testing. The research was experimental by comparing the effectiveness of healing burns in grouped mice and *Jatropha* leaf extract gel preparations and the most effective formula for healing burn wounds was *Jatropha* leaf extract gel preparations at concentrations of 10%, 15%, 20%. Statistical test results showed that there was a difference in the duration of healing of burn wounds in male white rats between *Jatropha curcas* (*Jatropha curcas* L) leaf gel preparations with concentrations of 10%, 15%, 20%, bioplaceton gel and gel base.

Keywords: L burns, *Jatropha Curcas* Leaves (*Jatropha Curcas* L)

INTRODUCTION

Wounds are a disruption of the continuity of normal anatomy and metabolic function of body structures, including organs, tissues and cells (Restrepo Klinge 2019). Several factors cause injuries, for example due to bites, accidents, sharp objects, bullets and metal objects. The effects that arise when injured are loss of all or function of an organ, bleeding and blood clotting, bacterial contamination and cell death. This situation is caused by microbes, mechanical, chemical or temperature trauma that affects tissue which results in skin destruction. The occurrence of injuries that cause tissue damage (Muthia Milsari., 2019). Wound healing is the body's attempt to restore its structural integrity and normal function after tissue disruption (Johnston and MT 2017). This process is divided into inflammation, debridement, repair and maturation phases (Fossum 2013). Many factors influence wound healing, namely age, nutrition, tissue necrosis, drug administration and infection. These factors influence the length of wound healing. (DE et al . 2015).

Indonesia is a country known for its abundant biological riches, where there are many plants that can be used as medicine, because they believe that medicines derived from natural ingredients rarely cause detrimental effects with a relatively small risk of side effects. One of the medicinal plants used by Indonesian people is *jatropha* leaves (*Jatropha Curcas*. L). According to (Bawotong et al 2020), *jatropha* leaves contain many secondary metabolite compounds which are active compounds. such as saponins, flavonoids and polyphenols, the leaves also contain tannins. Other research was also carried out by (Sharma et al . 2017), the results showed that *Jatropha* leaves contain alkaloids, saponins, tannins, terpenoids, steroids,

glycosides, phenolic compounds and flavonoids through ethanol extract. *Jatropha* leaves are efficacious as a medicine for worms, flatulence and wounds. Therefore, wound healing is very important to prevent the risk of infection which can make wounds worse and difficult to heal (Bawotong et al. 2020).

Based on research (Yulianto, 2018), *Jatropha* leaves contain tannins, saponins and flavonoids which are antibacterial, antioxidant, anticancer and anti-inflammatory. Flavonoids also play an important role in protecting wounds from bacterial growth in the inflammatory phase and can help speed up wound healing (Desiyana et al., 2016). The mechanism of Flavonoids can inhibit enzymes involved in inflammation, one of which is Cyclooxygenase (COX), resulting in a reduction in the number of inflammatory cells so that the process becomes shorter. Saponin also has the ability to act as a cleaner and antiseptic which functions to kill or prevent the growth of microorganisms. Apart from that, saponins can also stimulate collagen growth during the healing process. Tannin functions as an astringent which can cause skin pores, harden the skin, stop exudates and cold bleeding, so that wounds close more quickly and come off more quickly (Revi 2011). Tannins also have antibacterial properties through damage to cell walls, cell membranes, leakage of cell membranes, inactivation of enzymes and inactivation of the function of the genetic material of bacterial cells (Desiyana, 2016). The anti-inflammatory activity of *Jatropha* leaf extract means it is necessary to develop a pharmaceutical preparation to increase its use. One pharmaceutical preparation that can make it easier to use topically is a gel preparation. Making gel preparations is one of the preparations that is often used to treat burns, namely gel preparations. Gel preparations have the advantage of being cool, moisturizing, easy to use, easy to penetrate the skin, gel preparations also have a high water content. This preparation is preferred because when used it is transparent, elastic, has good drug release, has an attractive appearance, and does not leave a layer of oil on the skin, thereby reducing the risk of skin inflammation (Erfan, 2020). A good gel preparation can be obtained by formulating several types of gelling agents. In this research, the gelling agent used is HPMC, because HPMC has the advantages of producing a clear gel, easily soluble in water, providing good viscosity to the preparation, the mixture is clear, and the binding force of the active substance is strong. Based on the description above, the researchers want to examine whether the extract from castor bean leaves can be an active ingredient in gel preparations for healing burns in male white rats (*rattus norvegicus*).

METHODS

This research is experimental research because it compares healing effectiveness tests from research results with different gel preparation formulas. This research began with making a gel pr

eparation formula, then the preparation was carried out. The finished gel preparations were evaluated for organoleptic tests, homogeneity, pH, viscosity, spreadability and adhesiveness. Next, data analysis was carried out. From the results obtained from testing the physical properties of the gel preparation formula. Then conclusions are drawn regarding the data on the results of making gel preparation products with the effectiveness of healing burns from *Jatropha* leaves. Then proceed with computerized one way anova variation analysis using the SPSS application.

The instruments of this research are all the tools and materials used in observing the healing effectiveness test of *Jatropha* leaf extract gel preparations in healing burns in male white rats. As for the tools and materials used in conducting this research as follows:

Table 1. *Jatropha* leaf extract formula

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Material name	F1	F2	F3
Castor leafextract Fence	10%	15%	20%
HPMC	7%	7%	7%
Propylene glycol	15%	15%	15%
Methylparbene	0.075%	0.075%	0.075%
Aquadest	150%	150%	150%

Table 2. Formula 20 gram

Material name	F1	F2	F3
Extract Fence distance	2g	3g	4g
HPMC	1.4g	1.4g	1.4g
Propylene glycol	3g	3g	3g
Methylparbene	0.015g	0.015g	0.015g
Aquadest	ad 30	ad 30	ad 30

RESULTS AND DISCUSSION

Table .3 Organoleptic Test Results

Organoleptic Test	Formula 1	Formula II	Formula III
Form	Semisolid	Semisolid	Semisolid
Smell	The distinctive aroma of Jatropha leaves	The distinctive aroma of Jatropha leaves	The distinctive aroma of Jatropha leaves
Color	Green	Green	Green
Results			

The results of organoleptic testing showed that the dosage form of Jatropha leaf extract gel from the three formulas met the requirements, namely having a semi-solid gel form in general. Formulas, II and III have the same color, namely.

Table 4 Results of Homogeneity observations green.

Formulas	Observation
F1 10%	Homogeneous
F 11 15 %	Homogeneous
F111 20%	Homogeneous

Homogeneity examination was carried out by smearing the preparation on a transparent glass preparation, showing that the gel preparation of *Jatropha curcas* (*Jatropha curcas* L) FI 10%, FII 15% and FIII 20% leaf extract had good homogeneity, because there were no coarse grains. If there are no coarse grains then the test preparation is declared homogeneous (Nikam, 2017).

Table. 5 Adhesion test

Replication	Adhesion test results (seconds)		
	Formula 1	Formula II	Formula III
1	1.02	2.00	2.00
2	1,23.04	1.58	1.23
3	1.36.01	2.02	1.37
Rate - rate	1,2	1.8	1.5

Adhesion testing aims to determine the ability of the gel to stick to the skin. A good gel has high adhesion. As the HPMC concentration increases, the adhesion will increase in each formula. The higher the concentration of the gelling agent used, the greater the consistency of the gel and the adhesion power (Nurlaela et al., 2012). The results of the adhesion test show that the *Jatropha* leaf extract gel preparation with 3 formulas meets the gel adhesion value, namely more than one. second. Where formula 1 has an adhesion of 1.2 seconds, formula II has an adhesion of 1.8 seconds, and formula III has an adhesion of 1.5 seconds.

Table 6 Observation Results Diameter spread

Replication	Spreadability Test Results (cm)		
	Formula I	Formula II	Formula III
1	2,8	2,8	2,8
2	3,1	3,1	3,1
3	3,3	3,3	3,2
Rate –rate	3,3	3.0	3.0

The spreadability test of the preparation is carried out to determine the amount required for the gel to spread the gel preparation applied to the skin. The spreadability of a semisolid dosage form that is good for topical use ranges from 3cm-5cm in diameter. The results of the spreadability test showed that the three gel preparation formulas met the standards. When this formula produced optimal spreadability values, Formula I had a diameter of 3.3 cm. Formula II had 3.0 cm and Formula III had 3.0 cm. all three formulas have perfect results. The dispersion power test is very important to carry out because it is related to the effectiveness of the

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preparation being made, where the greater the dispersion power, the more active substances in a preparation will be distributed evenly. A good dispersion power test meets the requirements, namely 3-5 cm (Saiful, 2016).

Table 7 Viscosity test results

Replication	Observation(cP)		
	Formula I	Formula II	Formula III
1	9972	9972	4826
2	9975	9905	4806
3	9919	9902	4854
Rate - rate	9945	9926	4828

100 ml glass beaker , then the spindle is selected according to the formula, then the speed is adjusted by selecting the spindle according to the formula, then the speed is adjusted to 30rpm and inserted into the preparation until it shows the viscosity value of the preparation. The viscosity value (cP) shown on the Brookfield viscometer is the viscosity value of the preparation (Septiani et al., 2012).

Table 8 Results of pH examination of gel preparations

Replication	Results of the pH observation examination of the gel preparation			
	Formula I	Formula II	Formula III	Control + Bioplacenton
1	7.59	7.74	7.41	5.81
2	7	7	7	5.81
3	6	6	6	5.86
Rate - rate	6.86	6.91	6.80	5.82

A pH test is carried out to see the acidity level of the gel preparation to ensure that the gel preparation does not cause irritation to the skin. The pH of the gel preparation was measured with a pH meter. The pH of the preparation that meets the skin pH criteria is 4.5-7. The results obtained in the third study of the *Jatropha* leaf extract gel preparation formula had an average pH. FI produced a pH value of 6.86, FII produced 6.91 and F III produced 6.80. A good gel pH is 4.5-7 (Hariningsih, 2019).

Results of Reducing the Diameter of Second Degree Burns in Experimental Animals

Table.9 Average Decrease in Burn Wound Diameter

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Day To-	Control Positive (cm±SD)	Control Negative (cm±SD)	Concentration 10% (cm ± SD)	Concentration 15% (cm ± SD)	Concentration 20% (cm ± SD)
1	1.6±2.22	1.6±2.22	1.6±2.22	1.6±2.22	1.6±2.22
6	2.57 ± 0.094	2.37 ± 0.449	2.03 ± 0.047	2.17 ± 0.235	2.4 ± 0.124
9	2.2 ± 0.282	1.9 ± 0.094	1.7 ± 0.141	1.9 ± 0.216	2.4 ± 0.124
12	1.3±0.094	1.3±0.094	1.2±0.047	1.2±0.094	1.2±0.047
14	1.2±0.081	1.2±0.047	-	-	-

Based on the results of the reduction in burn wound diameter, on the first day it showed that all treatment groups received burn wound treatment with an average of

2.22 % . On the sixth day, a decrease in burn wound diameter was obtained at concentrations of 20 %, 10 % and 15%. On the ninth day, a decrease in burn wound diameter was obtained at concentrations of 10%, 15% and 20%. On the twelfth day , a decrease in diameter was obtained at concentrations of 10%, 15% and 20%. On the fourteenth day, a decrease in diameter was obtained in the negative and positive.

A. Organoleptic Test

Organoleptic testing, the dosage form of *Jatropha* leaf extract gel from the three formulas met the requirements, namely having a semi-solid gel form in general controls. The aim of reducing the diameter of healing is to determine which treatment preparation is more effective in healing shallow second degree burns that form on the skin of male white rats (*Rattus norvegicus*). The results of reducing the diameter of healing burn wounds were obtained from the concentration of *Jatropha* leaf extract, where the diameter of healing burn wounds decreased on the 14th day.

B. Homogeneity Test Results

Homogeneity checking is carried out by smearing the preparation on a transparent glass preparation. If there are no coarse grains then the test preparation is declared homogeneous. Based on the results of the one way ANOVA analysis, it shows a sig = .000, p value <0.05, these results prove that each formulation of *jatropha* leaf extract has a significant (significant) difference, so it can be concluded that each concentration of *jatropha* leaf extract formulation Gel preparation fences have different effectiveness.

C. Adhesion test results

Adhesion testing aims to determine the ability of the gel to stick to the skin. A good gel has high adhesion. As the HPMC concentration increases, the adhesion will increase in each formula. The higher the concentration of gelling agent used, the greater the consistency of the gel and the greater the adhesive power.

Based on the results of the one way ANOVA analysis, it shows a sig = .000, p value <0.05, these results prove that each formulation of *jatropha* leaf extract has a significant (significant) difference, so it can be concluded that each concentration of *jatropha* leaf extract formulation Gel preparation fences have different effectiveness.

D. Spreadability Test Results

The spreadability test is very important to carry out because it is related to the effectiveness of the preparation being made, where the greater the spreadability, the more active substances in a preparation will be spread evenly. A good spreadability test meets the requirements, namely 3-5 cm.

Based on the results of the one way ANOVA analysis, it shows a sig = .000, p value <0.05, these results prove that each formulation of *jatropha* leaf extract has a significant

(significant) difference, so it can be concluded that each concentration of jatropha leaf extract formulation Gel preparation fences have different effectiveness.

E. Viscosity Results

The viscosity test is carried out to determine the amount of viscosity of the preparation, where the viscosity value states the amount of resistance of a liquid to flow. The higher the viscosity value, the greater the resistance to flow. Gel viscosity was measured using a Brookfield Viscometer. Viscosity aims to determine the viscosity value to determine the viscosity value of a substance. The higher the viscosity value, the higher the viscosity level of the substance.

Based on the results of the one way ANOVA analysis, it shows a sig = .000, p value < 0.05, these results prove that each formulation of jatropha leaf extract has a significant (significant) difference, so it can be concluded that each concentration of jatropha leaf extract formulation Gel preparation fences have different effectiveness.

F. Results of pH testing of gel preparations testing is testing the degree of acidity of the gel from the formulated preparation. The pH test is carried out to see the acidity level of the gel preparation to ensure that the gel preparation does not cause irritation to the skin. The pH of the gel preparation was measured with a pH meter. The pH of the preparation that meets the skin pH criteria is 4.5-7. Based on the results of the one way ANOVA analysis, it shows a sig = .000, p value < 0.05, these results prove that each formulation of jatropha leaf extract has a significant (significant) difference, so it can be concluded that each concentration of jatropha leaf extract formulation Gel preparation fences have different effectiveness.

G. Results of Reducing the Diameter of Second Degree Burns in Experimental Animals The results of the observations showed the effectiveness of healing burns as indicated by the burns shrinking or healing. Healing of superficial partial thickness second degree burns can heal in approximately 12-14 days, because tissue damage in this degree of burn includes the epidermis and the top layer of the dermis. Based on the results of one way ANOVA showing a sig=.000 value, p value < 0.05, these results prove that each formula treatment has a significant (significant) difference, so it can be concluded that variations in the concentration of the extract formulated in gel preparations have a diameter different healing.

CONCLUSIONS

Based on the results of research testing the effectiveness of healing burns from jatropha leaf extract (*Jatropha curcas* L) on white rats (*Rattus norvegicus*) the following conclusions were obtained:

1. *Jatropha curcas* (*Jatropha curcas* L) leaf extract gel preparation is effective in healing burns of male white rats (*Rattus norvegicus*).
2. *Jatropha curcas* (*Jatropha curcas* L) leaf extract gel preparation is the most effective in healing burns in male white rats (*Rattus norvegicus*) it is at a concentration of 20%.

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