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The Recovery from Grade II Burns in Test Mice (Mus Musculus Linn) After Using Iodine Leaf Latex Gel (Jatropha Multifida Linn)

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ABSTRACT

Burn injuries are emergencies that pose a severe threat and require immediate action to save lives. The saponins, tannins, alkaloids, and flavonoids in iodine leaf latex gel (Jatropha multifida Linn) are known to speed up the healing process for burn wounds. The research aimed to investigate the effect of iodin leaf latex gel on the recovery of grade II burn wounds in male mice (Mus musculus Linn). The research employed a true-experimental laboratory method with-a-post-test-only control design group at the Kusuma Husada University Laboratory in Surakarta. A total of 24 test mice were manipulated and divided into three groups: the positive control group, the negative control group, and the iodine leaf latex gel group. Burn wounds utilized a 1,5 cm superheated mental surface applied to the backs of the mice for 5-10 seconds to induce burn injuries. The observed parameters included the burn wound area, the percentage of burn wound healing, and the duration of burn wound healing. Data analysis operated One-Way ANOVA. The research revealed that iodine leaf latex gel had a restorative time of 8 days and healing percentage of 30,75%. It was better than the other control groups. The statistical analysis indicated significance (<0,05) in the burn wound recovery percentage. In conclusion, a 6% concentration of iodine leaf latex gel had a more favorable effect on burn wound healing than other control groups.

Keywords: *Burn injury, Iodine, Mice*

1. INTRODUCTION

Consumes are a crisis issue that can happen anyplace and whenever. Burns are frequently a life-threatening condition that necessitates immediate intervention. Consumes are harm and loss of body tissue that happens because of intensity like fire, hot fluids, synthetic substances, power and radiation, [2]. Consumes are a kind of injury that harms or changes the body's frameworks because of erosion between the outer layer of the skin and a hot item, either straightforwardly or in a roundabout way. The length of tissue contact with an intensity source impacts the degree and profundity of harm to body tissue and decides the term of the recuperating component. The more extended the contacting time, the more extensive and more profound the tissue harm that happens, [1]. Age, percentage of body surface area burned, and inhalation injury are the three factors that contribute to premature burn death [12].

The prevalence of burns according to the WHO media center of burns (2017) is estimated at 180,000 every year. Most of them are in low and middle income countries, [6]. In Indonesia, as per Riskesdas 2018, it is still moderately high, to be specific around 40%. The region of Papua has the highest prevalence, at 2.1%, while the region of North Sulawesi has the lowest, at 0.5 percent. [1].

The prevalence of burns in Central Java according to Riskesdas 2018 is 1% with the classification aged 1-4 years at 1.4%, aged 5-14 years at 0.45%, aged 15-24 years at 1.53%, aged 45 years. Age 54 years is 0.65%, age 55-64 years is 1.95%, age 65-74 years is 1.17%, age >75 years is 1.04% (Fajriyani, 2022) occurs in a number of men 0.6% and women 0.8%, [11].

Based on the data above, burns are a very acute and frequently experienced health problem. If not treated immediately, it can cause complications such as infection and electrolyte imbalance and even death [14] so that it requires the role of trained and skilled health workers in the burn wound healing process.

Currently, many people carry out treatment using natural plants. From various studies, there are many nutritious plants that can be used for treatment. Medicines from natural ingredients still need to be researched and

developed using more advanced technology to support the existence and role of medicinal plants as a basic human need, [4].

The iodine tree (Jatropha multifida Linn) is one of the treatment plants. This plant has many names on the island of Java like Chinese distance, tintir distance (Hermawan *et al.*, 2016) in the Sunda region (jarak gurita), in Ternate (Balacia batai), in West Java (Kaliki), in Sumatra (Dulang/Gloah), and in Madura (Kaleke), [17].

People in tropical and subtropical countries use the iodine plant as a medicine because it has many uses for curing diseases, one of which is related to the skin. These uses include seed oil, sap, leaves, bark, and roots, [16].

The sap of the iodine plant is utilized to treat wounds by applying the sap of the stems or passes on to the injury which has been demonstrated to accelerate wound recuperating in light of the fact that it contains synthetic mixtures like saponins, flavonoids, tannins and alkaloids. This compound has helpful properties when used to treat wounds, [20].

Based on previous research, it was stated that extra iodine leaf gel preparations using a concentration of 3% were effective in healing second degree burns, and could speed up the healing process of burn wounds, [18]. Organization of the 3% planning on days 7 and 14 showed a diminishing in provocative cells, perceptibly it had the option to show an expansion in angiogenesis, fibroblast and re-epithelialization scores. On the 21st day, organization of the 3% gel planning had the option to contain the injuries on the mice and there was fur covering the injury region, [5].

Based on the data above, researchers are interested in developing the use of the leaf sap of the iodine plant (Jatropha multifida Linn) into a gel dosage form that is intervened in laboratory test animals of mice (Mus musculus Linn) to determine whether there are side effects. side effects of iodine administration in healing burns. second degree in mice (Mus musculus Linn) test animals.

2. METHOD

1. Research Types and Designs
   This research is True Experimental Laboratories research with a quantitative approach using the Post Test Only Control Group design/method. Where respondents were divided into 3 intervention groups, where respondents were divided into 3 intervention groups, namely group 1 intervention with iodine leaf latex gel treatment, The control group was used as a comparison to determine the effect of iodine leaf latex gel (Jatropha multifida Linn) on the healing process of second-degree burns in test mice (Mus musculus Linn). Group 2 was a positive control using 0.9% NaCl, and Group 3 was a negative control with no treatment. This examination has breezed through the moral leeway assessment at Dr. RSUD Moewardi Hospital with number 818/V/HREC/2023.
2. Time and Place of Research
   Between May and July of 2023, the study was carried out in the integrated laboratory at Kusuma Husada University in Surakarta.
3. Population and Sample
   a. Test Animals
      In this study, mice were used as test animals with a population of 27 test animals. Sampling was determined using the Federer replica formula to obtain a sample of 24 test animals. With the criteria of being healthy, without defects, male, weighing 18-22 grams, and aged 6-8 weeks.
   b. Material Examples
      Material sampling was carried out in the morning at 05.00-08.30 WIB, in Karanganyar village, Tamansari District, Boyolali Regency. The research samples were determined at the Herbarium Building of the Tawangmanggu Center for Medicinal Plant Research and Development (B2P2TO) stated based on letter number KM.04.02/XI.6/1437/2023 which shows that the examples utilized were without a doubt iodine plants (Jatropha multifida Linn).
4. Tools and materials
   a. Tool
      Notebooks, pencils, markers, calipers, scales, mortar and stamps, measuring cups, tubes, magnetic stirrers, chemical spatulas, chemical spoons, dropper pipettes, hair scissors, scissors, knives, matches, iron plates, buses, handscoons, cotton buds, rat drums, and places to eat and drink were the tools used in this research.
   b. Material
      The materials used in this research were 6% iodine leaf sap, 2% carbopol, 0.2% propyl paraben, 0.18% methylparaben, 8% glycerin, 0.5% triethanolamine (TEA), 83.12% aqua distillate and NaCl 0.9%. In this study, the iodine leaf sap formula with a concentration of 6% was chosen. This is based on research [18] and [5] showing that a concentration of 3% shows optimal burn wound healing results, so this research was carried out. with a dose 2 times larger.
5. Work procedures
   Mice were acclimatized for 3 days, then divided into 3 small groups. Before being injured, the mice were given sedation utilizing Liposin on the back where the fur had been cut clean. The injury is made utilizing a metal material with a breadth of 1.5 cm which has been warmed involving fire for 5-10 seconds by applying strain until a consume happens. Every day in the morning, between 8:00 and 9:00 WIB, the test mice in each group

received treatment in accordance with the procedures for that group. Additionally, an intervention was performed to determine the wound area and the percentage of wound healing.

3. RESULTS AND DISCUSSION

The goal of this study is to see how a 6% concentration of iodine leaf latex gel (Jatropha multifida Linn) affects the healing of second-degree burns in mice (Mus musculus Linn). The parameters that were observed were the area of the wound, burn wounds, the length of time it took for the wound to heal, and the percentage of wounds that healed from II-degree burns.

3.1 Evaluation of Laboratory Tests of Gel Form Preparations

a. Homogeneity and Organoleptic Tests

The examination results showed that the dose structure was semi-strong, brown in variety with an unmistakable smell of iodine leaf plastic with a delicate surface. All arrangements showed no coarse grains when seen outwardly. This expresses that the readiness is dispersed uniformly and has a homogeneous organization.

b. Test pH

The pH test is connected with the security and solace of the arrangement when utilized, so the pH of the gel readiness should be equivalent to the pH of human skin, specifically 4.5 to 6.5, [19]. In the event that the pH is acidic it will cause skin disturbance, assuming the pH is exceptionally soluble it will cause textured and irritated skin (Pratimasari *et al.*, 2015). In light of the consequences of pH testing of the iodine leaf plastic gel readiness, a pH of 5 was gotten which is named typical for human skin.

c. Viscosity Test

The determination of a substance's concentration value is the goal of the viscosity test. The higher the consistency number, the higher the thickness level, a decent thickness esteem is 500-10.00 Cpas [15]. In the thickness trial of the iodine leaf plastic gel planning, the outcomes were 3,400 Cpas.

d. Spreadability Test

A good spreadability value is between 5 and 7 centimeters, which is used to measure how quickly gel preparations spread when applied to the skin because it affects drug absorption and active substance release. [7]. In this test, the experimental outcomes got without a heap were 3 cm, utilizing a heap of 50 grams and 100 grams the outcomes were 4 cm. This indicates that the gel preparation's spreadability test does not meet the requirements due to the preparation's viscosity's influence.

e. Adhesion test

The adhesion test is used to see the strength of a formulation in adhering to the skin. The longer the duration of the adhesion of the formulation, the better it is, so that the strength of the active substance in the preparation has a wider effect [15] not less than 4 seconds (Pratimasari *et al.*, 2015). The experimental outcomes showed that the bond of the iodine leaf gum gel met the attachment test prerequisites.

f. Hedonic Test

The hedonic test is a questionnaire-based pleasure test administered to 20 volunteers. In view of the epicurean test, it was found that the iodine leaf plastic gel was enjoyed by respondents with regards to variety, fragrance, surface and generally.

3.2 Length of Time and Healing Rate of Burn Wounds

When a burn wound is 1.5 cm in size on the first day, the healing area shrinks the fastest. On day 8 it showed recuperating with an area of 0 cm, a few guinea pigs in the mediation bunch had not shown mending with an area of 1.1 cm, 0.9 cm and 0.8 cm until on day 10 they had totally recuperated and arrived at mending of 0 cm and in the positive benchmark group on day 10 there were 3 guinea pigs that had not yet recuperated, still with twisted areas of 0.5cm, 1cm and 0.7cm, while in the negative benchmark group there were 3 guinea pigs. The wounds of the test animals that had not yet healed were still 0.8 cm and 0.8 cm. 0.9cm.

Iodine leaf latex gel was found to be the most effective treatment for second-degree burns. The active compounds in the iodine plant that play a role in the wound healing mechanism are saponins, tannins, alkaloids, and flavonoids. As a result, the activity of administering iodine leaf sap in the form of a gel with a concentration of 6% results in the mechanism for healing burns. which is antimicrobial, antifungal, antiviral, anticoagulant, anti-inflammatory, and antioxidant [16].

Saponin has the effect of relieving pain and forming new cells, [20] where the collagen that makes up the fibers renews tissue and accelerates the proliferation phase, [9].

Tannins play a role in capturing free radicals that cause damage and have anti-inflammatory effects, reducing inflammation in addition to repairing and suppressing pain (swelling, heat, painful) and also as an asteringent which can speed up the next phase in wound repair without damaging living cells, [9].

Alkaloids are antibacterial by stimulating the elements that form bacterial cells, preventing the cell wall (bacteria attached to the wound from being broken down directly by the alkaloid) so that layers of the cell wall do not form which cause bacterial cell death, [9].

Flavonoids function to improve blood circulation throughout the body and prevent blockage of blood vessels, have anti-inflammatory properties and are useful as antioxidants and help reduce pain if bleeding occurs. Apart from that, it is useful as an anti-inflammatory and prevents stiffness and pain due to burns, [8]

3.3 Burn Wound Healing Percentage

The observed percentage of healing of burn wounds is a measurement of the initial wound area until the wound dries up on day 10, where high results indicate effective burn healing with the burn wound getting smaller from day to day. The results of measuring the percentage of healing of burn wounds showed that the iodine leaf latex gel intervention group on day 8 had achieved 100% healing and in the 3 test animals the percentages were still at 26.67%, 46.67% and 40.00%. Meanwhile, in the positive and negative control groups, only 1 test animal achieved 100% recovery on the 8th day.

On the tenth day, all guinea pigs had accomplished a mending level of 100 percent, In the 0.9% NaCl bunch there were as yet 3 guinea pigs with wound recuperating rates of 66.67%, 33.33% and 53.33% and in the gathering without treatment there were likewise 3 guinea pigs that had not yet arrived at the recuperating rate, which was as yet 46 .67% and 40.00%. Which were acquired by iodine leaf plastic gel the typical level of recuperation was the best specifically 30.85% contrasted with the benchmark group of other guinea pigs, in particular the positive benchmark group 20.91% and the negative benchmark group 11.48%.

Mice	Average percentage (%) of burn wound healing		
	Intervention Group Iodine leaf latex gel	Positive control group NaCl 0,9%	Negative control group Without treatment
1	24,27	0,00	0,00
2	20,20	32,66	0,00
3	37,40	0,00	15,26
4	34,13	25,80	22,53
5	35,53	19,46	16,06
6	31,33	21,60	14,73
7	34,93	33,60	23,26
8	29,20	34,73	0,00
Total average	30,85	20,91	11,48

3.4 One-Way Anova Statistical Program Test for Social Sciences (SPSS).

In light of the SPSS test results, it shows that the information is ordinarily conveyed and homogeneous (Sig. >0.05), the test is gone on with One-Way Anova to decide the distinctions between medicines, the outcomes show that there are massive contrasts, in particular (Sig. 0.05), so a Post Hoc Turkey test was used to confirm these differences. It revealed that the data results were divided into two subgroups: group 1, which included the group without treatment and 0.9% NaCl, and group 2, which included iodine leaf latex gel and 0.9% NaCl. In view of the experimental outcomes, it tends to be seen that iodine leaf plastic gel is demonstrated to have the best enemy of consume impact contrasted with different medicines.

4. CONCLUSION

The area of consumes treated with iodine leaf plastic gel diminished the quickest contrasted with other benchmark groups. The healing period for burns using iodine leaf latex gel starts on the 8th day and everything heals on the 10th day. Iodine leaf plastic gel affects the recuperating system of severe singeing on the skin of mice tried with a mending level of 30.75%.

It is necessary to carry out a physical stability test on the iodine leaf latex gel preparation. In order to achieve more optimal burn wound healing percentage results, additional research on the preparation of iodine leaf latex gel with varying concentrations is required. Further research needs to be carried out over a longer period of time to find out how long it takes for burn wounds to heal optimally.

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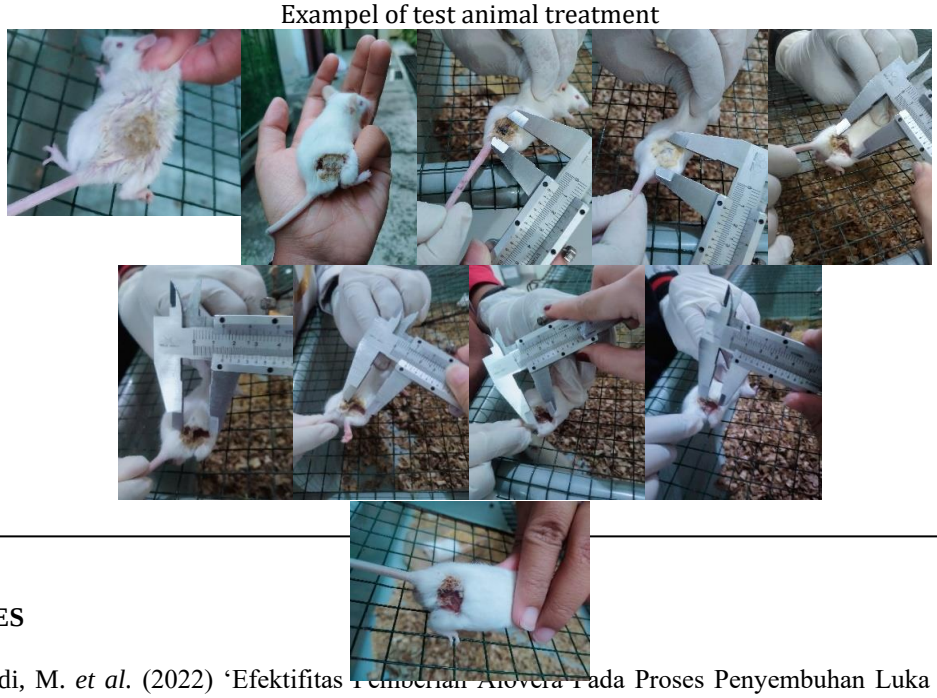
5. APPEDIX (if applicable)

Exampel of test animal treatment



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