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TESTING THE EFFECTIVENESS OF BIDARA LEAF ETHANOL EXTRACT (*Ziziphus mauritiana* L.) IN GEL PREPARATIONS FOR BURN WOUNDS IN MALE RABBIT (*Oryctolapus cuniculus*)

Sulasmi Sulasmi[1*], Angga Nugraha Sanjaya[1], Sofia Elia Sari[1], Cucu Arum Dwi Cahya[2]
[1]Institut Kesehatan Deli Husada Deli Tua, Sumatera Utara, Indonesia
[2]Institut Kesehatan Medistra, Lubuk Pakam, Sumatera Utara, Indonesia
Coressponding authors: sulasmistore@gmail.com

Abstract

Bidara plants have many benefits in the treatment of sore skin, ulcers, and burns. Burns are a form of tissue damage or loss caused by contact with a heat source such as fire, hot water, electricity, radiation, or corrosive substances. This study aims to determine the effectiveness of the ethanol extract of bidara leaf in healing burns in male rabbits compared to bioplacenta. This study used an experimental method of maceration extraction using 96% ethanol. To test the effect of burns, 15 test animals were grouped into five groups, each of which used three test animals. The treatment group was a gel-based negative control group, a positive bioplacenta control group, and a treatment group with bidara leaf ethanol extract at concentrations of 5%, 10%, and 15%. The results of the research on the effectiveness of healing burns in the three formulations, namely a concentration of 15%, showed faster healing of wound diameter in male rabbits compared to concentrations of 5% and 10% but were not more effective when compared to bioplacenta ointment.

Abstrak

Tanaman bidara memiliki banyak manfaat dalam pengobatan sakit kulit, bisul dan luka bakar. Luka bakar adalah suatu bentuk kerusakan atau kehilangan jaringan yang disebabkan oleh kontak dengan sumber panas seperti api, air panas, listrik, radiasi atau zat korosif. Penelitian ini bertujuan untuk mengetahui efektivitas ekstrak etanol daun bidara dalam penyembuhan luka bakar pada kelinci jantan dibandingkan dengan bioplacenton. Penelitian ini menggunakan metode eksperimen dengan ekstraksi maserasi menggunakan etanol 96%. Untuk menguji pengaruh luka bakar menggunakan 15 hewan uji yang dikelompokkan menjadi lima kelompok, masing-masing kelompok menggunakan tiga hewan uji. Kelompok perlakuan adalah kelompok kontrol negatif berbasis gel, kelompok kontrol positif bioplacenton, dan kelompok perlakuan dengan ekstrak etanol daun bidara konsentrasi 5%, 10%, 15%. Hasil penelitian efektivitas penyembuhan luka bakar pada ketiga formulasi yaitu konsentrasi 15% lebih cepat penyembuhan diameter luka pada kelinci jantan dibandingkan konsentrasi 5% dan 10% tetapi tidak lebih efektif jika dibandingkan dengan salep bioplacenton.

Keywords: *Bidara leaf ethanol extract, burns, ointment and bioplacenton*

Kata kunci: *Ekstrak etanol daun bidara, luka bakar, salep dan bioplasenton.*

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INTRODUCTION

The bidara plant is a tiny, evergreen, fruit-bearing tree that is native to northern and tropical Africa as well as western Asia. It can be found in Israel in the valleys up to 500 meters above sea level. especially

in Indonesia, where the Sumbawa region is where this plant thrives in profusion (West Nusa Tenggara). The bidara plant's entire body can be used for medicinal purposes. Bidara plants are saponin-rich plants, as evidenced by the foam that is created when the leaves of a bidara plant are crushed. This foam has a strong scent.[1]. The content of secondary metabolites in Binara leaves are flavonoids, saponins, tannins[2]. The content of saponin secondary metabolites contained in plants really has an effect that can trigger the formation of collagen, which plays a very important role in the process of wound healing[3]. Flavonoids in plants act as antibacterial[4] and anti-inflammatory agents in wounds, as do tannins, which have an astringent function by shrinking skin pores[5].

Bidara leaf extract (*Ziziphus mauritiana* L.) has not yet been the subject of any scientific studies on how well it heals burns in rabbits used as test subjects. On the back of a rabbit that had been injured with a hot metal plate that had a 20 mm diameter, bidara leaf extract was made using the maceration method and tested for its impact on the healing of superficial second-degree burns. Gel preparations are used because they have a cooling impact on the skin due to their high water content[3].

METHODOLOGY

This research was conducted experimentally.

Apparatus

Laboratory glassware, a blender, a caliper, a razor blade, filter paper, a dropper pipette, a PH meter, an analytical balance, a mortar and stamper, an oven, a rotary evaporator, a 1 ml injection syringe (a Terumo), a metal plate 2.2 cm in diameter, a shaver, and a rabbit hutch were all used in this study.

Ingredient

The materials used in the study were bidara leaves (*Ziziphus Mauritiana* L.), 96% ethanol, carbopol 940, TEA, glycerin, propyleneglycol, metal paraben, paraben propellant, distilled water, 70% alcohol, bioplacenton, Mayer reagent, Molish reagent, Bochart reagent, Dragendroff reagent, chloroform, concentrated hydrochloric acid, acetic anhydrous acid, lead acetate, and rabbits as test animals.

Preparation of Bidara Leaf Ethanol Extract

As much as 1000 grams of bidara leaf simplicia were soaked in 96% ethanol with a ratio of 1 part simplicia dissolved in 10 parts of solvent for 5 days using 75 parts of 96% ethanol solvent. As much as 1000 grams of bidara leaf simplicia

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were soaked in 96% ethanol with a ratio of 1 part simplicia dissolved in 10 parts of solvent for 5 days using 75 parts of 96% ethanol solvent. Then it was filtered, re-macerated with 25 parts of 96% ethanol solvent for 2 days, then filtered, and concentrated with a rotary evaporator at 40°C [6,7]

Phytochemical Screening

Phytochemical screening tests can be seen in Table 1 below.

Bidara Leaf Extract Gel Formulation

Bidara leaf extract gel formula can be seen in Table 2 below.

Table 1. Phytochemical screening test

Secondary Metabolites	Procedure	Result
Alkaloids	The addition of 2N HCL and distilled water, heated, filtered, filtered 3 times each added reagent mayer, dragendroff and bouchardat.	Mayer : White precipitate Dragendroff : Brown precipitate Bouchardat : A brick red precipitate [8]
Saponins	Hot water was added, shaken and 2N HCL added	Stable foam is formed and 1 – 10 cm high[9]
Tannins	The addition of 10% $FeCl_3$ to the simplicia that had been macerated beforehand for 15 minutes	A blue color is formed in the filtrate [10]
Flavonoids	Add concentrated HCl and amyl alcohol	A red or yellow-orange color is formed on the amyl alcohol layer [11]
Steroid/Triterpenoid	The simplicia was macerated with N-Hexane	green color is formed

Table 2. Bidara leaf ethanol extract gel formula

Ingredients	F1	F2	F3	F4
Extract	5	10	15	-
Carbopol	4	4	4	4
TEA	4	4	4	4
Glycerin	20	20	20	20
Propylene glycol	10	10	10	10
Methyl paraben	0.4	0.4	0.4	0.4
Propyl paraben	0.4	0.4	0.4	0.4

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Evaluation of Bidara Extract Gel
Homogenity

Homogeneity testing is carried out using a glass object where the nanogel preparation is smeared on a piece of glass or other suitable transparent material and strives for transparency. [12].

pH

A pH meter was used to determine the preparation's pH. by calibrating the device using a buffer solution that has a neutral pH standard (pH 7.01) and an acidic pH standard (pH 4.01) until the tool displays the pH value. The electrodes were afterwards cleaned with distilled water and dried with paper towels. The gadget then displays a consistent pH value after the electrode has been submerged in the sample. The pH value of the preparation is represented by the number the pH meter displays[12].

Viscosity

A Brookfield DV-E viscometer was used to measure viscosity by placing the preparation within a 100 ml beaker glass and choosing the proper spindle number [13].

Making burns

Each rabbit was shaved on its back, then anesthetized with lidocaine HCL subcutaneously at a dose of 1 ml, then the metal was heated over a fire for 5 minutes then affixed to the rabbit's back for 5 seconds [14].

Burn tests were performed on five groups of rabbits, with one group consisting of three rabbits.

Group 1: Administration of gel base as a negative control
Group 2: Administration of burn ointment as a positive control
Group 3: 5% bidara leaf extract gel
Group 4: 10% bidara leaf extract gel
Group 5: Bidara leaf extract gel 15%

Observation of burn wound healing was carried out for 14 days, with the parameter being seen as a decrease in wound diameter from the diameter of the wound covered with drug therapy.

RESULTS AND DISCUSSION

Phytochemical screening results

The results of the phytochemical screening of bidara leaves can be seen in Table 3 below. Skrinning fitokimia adalah pengujian awal secara kualitatif untuk mengetahui kandungan metabolit sekunder yang terdapat pada tumbuhan. Metabolit sekunder yang terdapat pada tumbuhan adalah penentu aktivitas farmakologi dari suatu tanamana. Kandungan metabolit sekunder yang terdapat pada daun bidara diantaranya adalah alkaloid, flavonoid, tannin, saponin, glikosida, steroid/triterpenoid [15].

The presence of secondary metabolites in plants affects their ability to exert pharmacological effects. Alkaloids, saponins, tannins, flavonoids, steroids, and triterpenoids are all present in binara positive plants.

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In addition, saponins are crucial in increasing the production of fibronectin by fibroblasts and altering the gene expression of TGF- receptors. The presence of flavonoids can activate macrophages, which leads to macrophage proliferation and an increase in TGF- secretion. Tannin has astringent properties that induce the skin pores to constrict, stop mild bleeding, and produce fibroblast precursors [16].

Table 3. Phytochemical screening results

Secondary Metabolite	Result
Alkaloids	Positive
Saponins	Positive
Tannins	Positive
Flavonoids	Positive
Steroids/Triterpenoids	Positive

Table 4. Homogeneity of bidara extract gel preparations

Formula	Result
Gel Base	Homogeneous
Bidara extract gel 5%	Homogeneous
Bidara extract gel 10%	Homogeneous
Bidara extract gel 15%	Homogeneous

Evaluation of Bidara Extract Gel Preparations

Homogenity

Homogeneity test can be seen in Table 4 below. Homogeneity is done to ensure that there are no more coarse particles in the preparation at the time of its application [17].

pH

Secondary metabolite content in plants is a determinant of plant activity as a pharmacological effect. Binara-positive plants contain alkaloids, saponins, tannins, flavonoids, steroids, and triterpenoids. Flavonoids can activate macrophages, which causes macrophage proliferation, which increases TGF- secretion, and saponins play an important role in stimulating fibronectin by fibroblasts and changing TGF- receptor gene expression. Tannin acts as an astringent, shrinking skin pores and stopping light bleeding, while alkaloids form fibroblast precursors [18]. From the tests carried out it showed that all preparations met the requirements. The results of pH testing can be seen in table 5 below.

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Table 5. pH of bidara extract gel preparations

Formula	pH mean ± SD
Gel Base	6,14 ± 0,01
Bidara extract gel 5%	5,84 ± 0,00
Bidara extract gel 10%	5,77 ± 0,01
Bidara extract gel 15%	5,66 ± 0,01

Viscosity

The results of testing the bidara extract gel preparations can be seen in Table 6 below.

Table 6. Viscosity of bidara extract gel preparations

Formula	Viskositas mean ± SD
Gel Base	6,14 ± 0,01
Bidara extract gel 5%	5,84 ± 0,00
Bidara extract gel 10%	706 ± 8,6
Bidara extract gel 15%	804,3 ± 4,04

The good viscosity of semisolid preparations can be seen in their ability to be easily removed from their containers for easy application when used. The viscosity results are influenced by the formula used to create nanogel preparations as well as the materials used to increase the viscosity of the preparation[19].

Burn Effectiveness

The results of burn healing can be seen visually with the parameter of decreasing wound diameter.

The results of the average decrease in wound diameter can be seen in Table 7 below.

Table 7. wound reduction rate

Formula	Wound reduction ± SD
Gel Base	0.8 ± 0,21
Bioplasenton gel	2.4 ± 0.14
Bidara extract gel 5%	1.4 ± 0,00
Bidara extract gel 10%	1.6 ± 1.21
Bidara extract gel 15%	1.8 ± 4,04

The average percentage of wound recovery is the three formulations of bidara leaf ethanol extract gel with concentrations of 5%, 10%, and 15%, which is the effect of fast wound closure after formula administration, based on observations and data obtained. A gel preparation with a concentration of 15%, which obtained an average of 1.2 cm; a concentration of 10%, which obtained an average of 1.1 cm; a concentration of 5%, which obtained an average of 1 cm; while the negative control obtained an average of 0.88 cm, burn recovery can occur. If you give the gel, there is no extract because the wound that occurs can heal by itself, but it takes a very long time to give a gel containing extract [20].

In the bioplacenta gel, which is a positive control, recovery of burns with healing occurs at an average depth of 1.4 cm. This shows that in the recovery process using the three preparations, it can speed up normal wound recovery. The recovery results obtained showed that the positive control (bioplacenta gel) had a better effect than the ethanol extract of kedondong leaves with concentrations of 5%, 10%, and 15%, and the ethanol extract of bidara leaves with concentrations of 5%, 10%, and 15% gave a very good recovery effect. significantly different in gel preparations without extract (control basis); this is burn wounds in rabbits, and bidara leaf ethanol extract gel preparation with a concentration of 15% gives the best wound healing effect.The healing activity of burns treated with 5%, 10%, and 15% bidara leaf ethanol extract gel preparations is due to the presence of secondary metabolites, namely alkaloids, which have antibacterial properties[21]. Flavonoids can inhibit bacterial growth by damaging the bacterial walls, microsomes, and lysosomes. [22]. Tannins, which are found in plants, act as astringents. and can shrink pores on the skin, tighten skin, stop exudate, and lighten bleeding. Saponins contained in a plant can stimulate the formation of collagen and can help in the wound healing process [23].

Based on the results of the study, burn recovery had the best activity, namely bioplacenton as a comparison, as a test extract, namely bidara leaf extract gel with a concentration of 15%, 10% and 5%.

CONCLUSION

The ethanol extract of bidara leaves can be formulated into a gel preparation that can provide a healing effect on burns in rabbits and the most effective concentration is 15%.

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