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Comparison of the Effectiveness of Taro Leaf Stalk Extract (Colocasia Esculenta) with Gentamicin Sulfate Cream in the Wound Healing Process in White Rats

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ABSTRACT

This study aimed to compare the effectiveness of taro leaf stalk extract (*Colocasia esculenta)* with gentamicin sulphate *cream* in the wound healing process in white rats. This research is quantitative research with a purely experimental approach. The results of this study consisted of the results of a comparison of the area of early and late wounds in the research rat group, the results of a comparison of the initial wound area and the average wound for 14 days, the results of a pre-post comparison with the research rat group. The research results on the wound healing process using taro leaf stalk extract stated that the ratio of wound area at the beginning and end between taro petiole extract and control (NaCl) was insignificant. This is because 0.9% Nacl fluid is an adequate physiological fluid for wound care by maintaining moisture and keeping granulation dry so that the wound remains in a balanced state that is not dry or wet.

INTRODUCTION

The skin is the body's outermost organ that protects the organs below. As an organ located outermost and functions as a barrier to the body, the skin is easily injured (Samirana, Swastini, Subratha, & P Y & Ariadi, 2016) (Napsiah, 2018). Wounds on the skin are morphological damage to skin tissue or deeper tissues (Winarsih, Wientarsih, & Sutardi, 2012) (Napsiah, 2018). Injury is a condition that is often experienced by everyone, both with moderate severity, mild and severe. A wound is the loss or damage of a portion of body tissue. This state can be caused by sharp or blunt force trauma, temperature changes, chemical substances, explosions, electric shocks and animal bites (Sukarna & Amiruddin, 2022) (Napsiah, 2018).

Timed wounds are classified into two sections: acute wounds and chronic wounds (Masson-Meyers et al., 2020). Acute wounds have a rapid attack and heal according to the estimated time. Examples of acute injuries are surgical sutures, cuts, burns, stab wounds and crush injuries. At the same time, chronic wounds fail to heal at the estimated time, e.g. diabetic ulcers and venous ulcers (Febriani, 2022) (Napsiah, 2018). Wounds can be divided into two based on the fundamental cause: open and closed wounds. Open wounds are wounds where the skin or mucous membrane tissue is damaged, and soft tissue injuries are accompanied by damage/disconnection of skin tissue damaged by the skin and can be accompanied by tissue under the skin. While closed wounds are soft tissue injury wounds without damage/disconnection of skin tissue, which is damaged only tissue under the skin (Thakur & Mishra, 2016) (Nugraha, 2016).

Indonesia itself has a reasonably high wound prevalence rate. From risks as data in 2013, it was stated that the national wound prevalence rate was 8.2%. This figure has increased by 0.7% compared to the previous five years. In 2007, the prevalence of injuries nationally was 7.5%. The incidence of injuries is divided into several categories of causes of injury. The prevalence of injuries based on the cause categories are injuries due to falls (40.9%) and motorcycle accidents (40.6%), then the causes of injuries due to sharp/blunt objects (7.3%), other land transportation (7.1%) and falls (2.5%). (Kemenkes, Bock, Dalla Man, & Campioni, 2013)(Ansori, 2015).

The prevalence of surgical injuries is the most considerable prevalence of injuries worldwide, with 100 million cases per year, followed by trauma injuries with 50 million cases per year, chronic wounds with 10 million cases per year, burns with 3.5 million cases for minor burns and 6 million cases for major burns (Rizzo, Rowan, Driscoll, Chan, & Chung, 2017)(Nugraha, 2016).

Untreated open wounds can potentially develop infections such as gangrene and tetanus. If left untreated, the infection will cause paralysis, chronic infections, bone infections and even cause death. Therefore, proper treatment is needed to reduce the occurrence of infection in a wound. Infectious wounds are the most common disease in developing countries due to poor hygiene. The availability of drugs that can accelerate the wound healing process is still limited, even though the development of the drug industry has been significantly advanced, so it is necessary to have drugs that can accelerate the healing of open wounds so that the incidence of infection does not become a problem that is often found, especially in developing countries (Prasad, 2007) (Zahriana, 2017)(Zahriana, 2017).

Proper handling of open wounds is essential to prevent infection. Wound healing is a derivative of the body's mechanism from the start of the wound that occurs due to a pathological process to restore damaged tissue to normal. Wound healing can be done with medical and non-medical. Medical wound healing can be done by administering drugs as doctors recommend, while non-medical such as giving drugs by utilizing natural resources such as plants. Plants used as open-wound medicine include taro leaf stalks (Ansori, 2015).

Based on phytochemical content tests conducted by (Wijaya, 2014), taro leaf stalks contain flavonoids, alkaloids, tannins, saponins, steroids, and terpenoids. The five phytochemical ingredients in the taro leaf stalk extract can heal wounds. Flavonoids function as antibacterial by forming complex compounds against extracellular proteins that disrupt the integrity of bacterial cell membranes (Dwidjoseputro, 1994) (Wijaya, 2014)(Wijaya, 2014). Alkaloids also have antibacterial abilities. The mechanism disrupts the constituent components of peptidoglycan in bacterial cells, so the cell wall layer is not formed intact and causes cell death (Stephen K. Robinson, 1991) (Wijaya, 2014). Tannins function as astringents that can cause the shrinking of skin pores, stopping exudate and light bleeding (Fadel & Besan, 2021) (Wijaya, 2014). Saponins can be cleaners and antiseptics that kill germs or prevent the growth of microorganisms that usually arise in wounds so that wounds do not experience severe infections (Daniel N. Robinson, 1995) (Wijaya, 2014). Moreover, the last terpenoids are also known to play an essential role in improving the wound healing process because terpenoids are known to have antimicrobial effects, and potent antioxidants are thought to be responsible for wound contraction and increased speed of epithelialization (Kumar, Saroja, Kumar, & Kalaichelvan, 2012) (Wijaya, 2014).

The potential for effectiveness in using taro leaf stalk makes it interesting to research the Comparison of the Effectiveness of Taro Leaf Stalk Extract (Colocasia esculenta) with Gentamicin Sulfate Cream in the Wound Healing Process of White Rats (Purnama, Sriwidodo, & Ratnawulan, 2017).

Based on the background above, the formulation of the problem in this study is how to compare the effectiveness of taro leaf stalk extract (Colocasia esculenta) with gentamicin sulphate cream in the wound healing process in white rats. This study aims to see the effectiveness of Taro Leaf Stalk Extract (Colocasia Esculenta) compare with the gentamicin as the general wound cream. This study purpose to see effectiveness between taro leaf and gentamicin with control group that taro leaf is easy to get an also economic to help in wound healing process.

A. Taro Petioles

The Taro plant is a food plant in the form of perennial herbs included in the taro-talisman tribe (Araceae), from all parts of the taro plant are thought to function as an alternative wound medicine on the petioles of taro plants which are often used as new wound dressings or as an alternative to wound medicine (Dalimartha, 2006) (ADewangga, Meirani, Apriliany, Darojati, & Yudha, 2018). Research from (Wijaya, 2014) with the title Potential of Taro Leaf Stalk Ethanol Extract (Colocasia Esculenta [L]) as an Alternative Wound Medicine on Rabbit Skin (Oryctolagus Cuniculus), where in this study, a Phytochemical Content Analysis was carried out to test some of the ingredients contained in the pedestal petiole, as follows:

1. Alkaloid Test

   A total of 1 gr of taro leaf stalk extract was put into a test tube, 2 mL chloroform and 2.5 mL 10% ammonia, and ten drops of 2 M sulfuric acid were added to clarify the separation of the formation of 2 different phases. The formed phase's upper part is taken, and Mayer reagent is added. Alkaloids in the sample are characterized by forming a red precipitate.

2. Flavonoid Test

   A total of 1 gr of taro leaf stalk extract was put into a test tube, then added magnesium powder to taste and ten drops of concentrated hydrochloric acid. The presence of flavonoids is characterized by the formation of a reddish-black colour in the solution.

3. Tannin Test

   A total of 1 gr of Taro leaf stalk extract was added with hot water, then dripped using iron (III) chloride. The onset of blackish-green colour marked the presence of tannins in the sample.

4. Saponin Test

   A total of 1 gr of Taro leaf stalk extract is added with equates and then shaken vigorously for approximately 1 minute. Then let stand for 10 minutes and observe foam or foam formed. The presence of saponin compounds in the sample is characterized by forming stable foam for 10 minutes with a height of 3 cm.

5. Test Steroids and Terpenoids

   A total of 1 g of Taro leaf stalk extract is added to chloroform as much as 20 drops, after which it is shaken. Two drops are added to the filtrate for each anhydrous acetate and concentrated sulfuric acid. Steroids give it a blue or green colour, while terpenoids give it a red or purple colour. The results of phytochemical content tests show the content of flavonoids, alkaloids, tannins, saponins, steroids, and terpenoids in taro leaf stalk extract. The five phytochemical ingredients in the taro leaf stalk extract can heal wounds. Flavonoids function as antibacterial by forming complex compounds against extracellular proteins that disrupt the integrity of bacterial cell membranes (Dwidjoseputro, 1994) (Wijaya, 2014). In addition, according to (Anggraini, 2008) (Wijaya, 2014), Flavonoids have anti-inflammatory effects, which function as anti-inflammatory and can prevent stiffness and pain. According to (Herdiyati, Atmaja, Satari, & Kurnia, 2020) (Wijaya, 2014), Flavonoids also function as antioxidants to inhibit toxic substances and flavonoids that have antibacterial abilities.

   Alkaloids also have antibacterial abilities. The mechanism is thought to disrupt the constituent components of peptidoglycan in bacterial cells, so the cell wall layer is not formed intact and causes cell death (Daniel N. Robinson, 1995) (Wijaya, 2014). Tannins function as an astringent that can cause the shrinking of skin pores, stopping exudate and light bleeding (Anief, 1997) (Wijaya, 2014). Tannins also have antibacterial power by precipitating proteins because tannins are suspected of having the same effect as phenolic compounds (Ajizah, 2018) (Wijaya, 2014). The antibacterial effects of tannins include reactions with cell membranes, enzyme inactivation, and destruction or inactivation of genetic material function.

   Saponins can be cleaners and antiseptics that kill germs or prevent the growth of microorganisms that usually arise in wounds so that wounds do not experience severe infections (Daniel N. Robinson, 1995) (Wijaya, 2014). In addition, saponins are known to have an essential role in wound healing because of their ability as antiseptics.

   Terpenoids are also known to play an essential role in improving the wound healing process because terpenoids are known to have antimicrobial effects, and potent antioxidants are thought to be responsible for wound contraction and increased epithelial speed (Ajizah, 2018) (Yerimadesi, Ellizar, Hayati, & Hashanah, 2017).

B. Gentamicin Sulfat Cream

Gentamicin is an aminoglycoside class antibiotic. The antibiotic is effective against the bacteria Pseudomonas aeruginosa and Enterobacter sp. All aminoglycosides are bactericidal. Antimicrobials that are bactericidal means they can kill bacteria. (Bartal, Gonen, & Nisan, 2003) (Afifah, Yuliani, & St, 2017). This inhibitory mechanism in antibiotic protein synthesis binds to the 30S subunit of the bacterial ribosome or some bind to the 50S subunit of the ribosome and inhibits peptidyl-tRNA translocation from site A to site P and causes mRNA reading errors, then results in bacteria being unable to synthesize proteins vital for their growth (Pratiwi et al., 2008) (Afifah et al., 2017). The dose of gentamicin sulphate cream is 2 to 3 times a day after bathing is applied (Departemen Kesehatan Republik Indonesia, 1978).

This study aimed to compare the effectiveness of taro leaf stalk extract (Colocasia esculenta) with gentamicin sulphate cream in the wound healing process in white rats.

To determine the effectiveness of the wound healing process using taro leaf stalk extract. To determine the effectiveness of the wound healing process using gentamicin sulphate cream. To compare the effectiveness of taro leaf stalk extract (colocasia esculenta) with gentamicin sulphate cream in wound healing in white rats. The benefits of this research for nursing educators as a scientific reference for future research in wound nursing with healing methods using medicinal plants. For nursing students, as a motivation for students to think critically and come up with new ideas for healing wounds using medicinal plants.

METHOD

This research is quantitative research with a purely experimental approach. This research was conducted at the STIK Muhammadiyah Pontianak campus. This research will be carried out from September 2020-February 2021. The instrument in this study was divided into wound area measurements using a ruler. The calendar is used to calculate days in the wound healing process. Wound healing process assessment scale using Resvech Scale V1.0 Scale Of Result From Assessment And Progress Of Wound Healing:

Table 1. Resvech Scale

NO	Items	Measurement and Dates		
		0/	1/	2/
1.	Wound dimensions: (0) Area = 0 cm^2 (1) Area < 4 cm^2 (2) Area = 4 - < 16 cm^2 (3) Area = 16 - < 36 cm^2 (4) Area = 36 - < 64 cm^2 (5) Area = 64 - < 100 cm^2 (6) Area ≥ 100 cm^2			
2.	Depth/tissues involved (0) Intact skin healed (1) Dermis-epidermis involved (2) Subcutaneous tissue involved (3) Muscle involved (4) Bone and attached tissue involved			
3.	Edge: (0) Not distinguishable (1) Diffuse (2) Delimited (3) Damaged (4) Thickened (“aged", "everted”)			
4.	Perilesional maceration (0) No (1) Yes			

NO	Items	Measurement and Dates		
		0/	1/	2/
5.	Tunneling (0) No (1) Yes			
6.	Type of tissue in the wound bed (0) Closed/healed (1) Epithelial tissue (2) Granulation tissue (3) Necrotic tissue and sought in the bed (4) Necrotic (dry or moist black scab)			
7.	Exudates: (0) Dry (1) Moist (2) Wet (3) Saturated (4) Leaking exudate			

8.	Infection/inflammation: a. Increasing painful Yes :1 No : 0 b. Erythema around the wound Yes :1 No : 0 c. Edema around the wound Yes :1 No : 0 d. Rising temperature Yes :1 No : 0 e. Increasing exudates Yes :1 No : 0 f. Purulent exudate Yes :1 No : 0 g. Tissue is friable of bleeds easily. Yes :1 No : 0 h. Wound stationery, no progress Yes :1 No : 0 i. Tissue compatible with biofilm Yes :1 No : 0 j. Odour Yes :1 No : 0 k. Hypergranulation Yes :1 No : 0 l. Wound increasing larger Yes :1 No : 0 m. Satellite lesions Yes :1 No : 0 n. Pale tissue Yes :1 No : 0
9.	Frequency of pain (in the past ten days) (0) Never (1) When changing dressing (2) Often (3) All the time
	Total score (max=40, Min=0

The sample size in this study was 30 white rats divided into ten white rats that were not given treatment or Nacl alone, ten white rats treated with gentamicin sulphate cream, and ten white rats treated with ethanol extract of taro leaf stalks.

Data processing is carried out when data has been collected. Stages of data processing, according to Notoatmodjo (2010; (Azkiyati, 2012), are as follows:

1. Data editing/checking is done to see if all data has been filled in according to the instructions.
2. Coding/marking data, this process is done to facilitate data classification and avoid data mixing.
3. For data entry, researchers enter data into a computer program. All data is carefully entered down to the last respondent number.
4. Tabulated, researchers make tables following the purpose of research or desired by the researcher.
5. Cleaning ensures that all data entered into the data processing machine follows the truth.

Data analysis in this study used Independent T-Test. The Independent T-Test is a comparative or difference test to determine whether there is a meaningful mean or mean difference between 2 independent groups that scale interval/ratio data.

RESULTS AND DISCUSSION

The results of this study consisted of 1) Results of comparison of initial and late wound area in the research rat group, 2) Results of comparison of initial wound area and average wound for 14 days, and 3) Pre-post comparison of research rat groups.

1. Results of Comparison of Early and Late Wound Area in Research Mouse Group

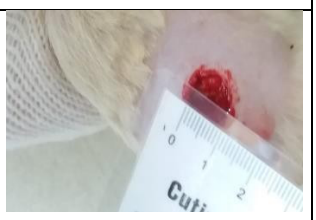
The results of this study can be seen in Table 4.1 as follows:

Table 2. Comparison of Early and Late Wound Areas in the study group

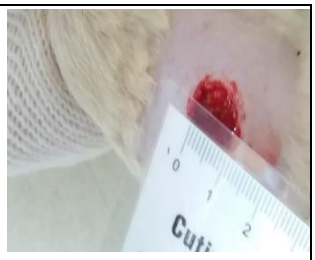
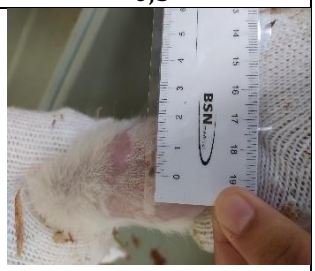
No	Comparison Group	P-Value
1	Taro leaf stalk extract group and control (NaCl)	0.349
2	Gentamicin and control group (NaCl)	0.831
3	Group of taro and gentamicin leaf stalk extracts	0.553

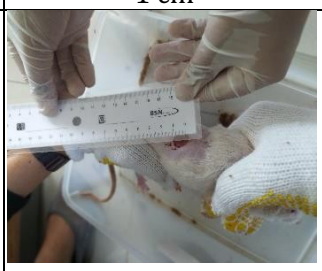
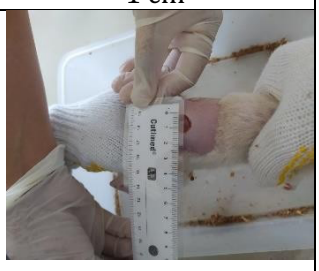
The study results in the comparison group, namely the taro leaf stalk extract group and control (NaCl) were insignificant with a P-Value of 0.349, and the results of the gentamicin and control (NaCl) group were insignificant with a P-Value of 0.831. The taro and gentamicin leaf stalk extract groups were insignificant, with a P-Value of 0.553.

Table 3. Results of extensive images of wounds

NO	NAME	Extract	NaCl
1.	Rat 1 (early)	 1 cm	 1 cm
	Rat 2 (early)	 1 cm	 1 cm
	Rat 1 (end)	 0,4	 0,5
	Rat 2 (end)	 0,5	 0,4

NO	NAME	Gemtamicin	NaCl

2.	Rat 1 (early)	 1 cm	 1 cm
	Rat 2 (early)	 1 cm	 1 cm
	Rat 1 (end)	 0,55	 0,5
	Rat 2 (end)	 0,4	 0,4

NO	NAME	Extract	Gentamicin
3.	Rat 1 (early)	 1 cm	 1 cm
	Rat 2 (early)	 1 cm	 1 cm

	Rat 1 (end)	 0,4	 0,55
	Rat 2 (end)	 0,5	 0,4

From table 4.2 above, it is explained that there was a change in the wound area of rats on the first day of the beginning and day 12, namely in rat 1, given that taro leaf stalk extract experienced a change of 0.6. In contrast, rat two, given taro leaf stalk extract, experienced a change in wound area by 0.5.

Rat 1, given gentamicin ointment, experienced a change in wound area by 0.45, while rat 2, given gentamicin ointment, experienced a change in wound area by 0.6. Rat 1, given only NaCl, experienced a change in wound area by 0.5, while Rat 2, given NaCl, experienced a change in wound area by 0.6.

2. Average results of wound area in the study group

The results of this study are seen in Table 4.1 as follows:

Table 4. Average results of wound area in the study group

No	Comparison Group	P-Value
1	Taro Leaf Stalk Extract Group and Control (NaCl)	0.676
2	Gentamicin and Control Group (NaCl)	0.362
3	Taro leaf stalk extract group and Gentamicin	0.665

Hasil rata-rata luas luka pada kelompok penelitian yaitu: 1) Kelompok ekstrak tangkai daun talas dan Control (NaCl) is insignificant with a P-Value of 0.676. 2) Gentamicin and Control (NaCl) group is insignificant with a P-Value of 0.362. 3) The group of taro leaf stalk extract and Gentamicin is insignificant with a P-Value of 0.665.

On the first day, the wound area of all treated rats was 1 cm. On the third day, or the first dressing, there was a change in the wound area in rat one given gentamicin ointment, which was 0.45. In other rats, there was no change.

On day five or change the second dressing, there was a change in rat 1, given taro leaf stalk extract, by 0.05. In rat 1, given gentamicin ointment, there was a change of 0.05, while in rat one, control, NaCl did not change. Rat 2, given taro leaf stalk extract, did not experience a change of still 1 cm. Rat two was given gentamicin ointment, experienced a change of 0.2, and rat two, control (NaCl), did not experience a change that remained 1 cm.

On day seven, or changing the third dressing, there was a change in all treatment and control mice. Rat 1 given taro leaf stalk extract had a change of 0.25, Rats 1 given gentamicin ointment had a change of 0.3, and Rat 1 control (NaCl) had a change of 0.1. While in rat 2, given taro leaf stalk extract, there was a change of 0.1. In rat 2, given gentamicin ointment, there was a change of 0.4. In rat two control (NaCl), there was a change of 0.15.

Day 9, or the fourth dressing change changes occurred in all treatment and control mice. Rat 1, given taro leaf stalk extract, had a change of 0.45, Rat 1, given gentamicin ointment, had a change of 0.4, and Control

rat 1 (NaCl) had a change of 0.3. While in rat 2, given taro leaf stalk extract, there was a change of 0.3. In rat 2, given gentamicin ointment, there was a change of 0.6. In control rat 2 (NaCl), there was a change of 0.3.

Hari ke 12 atau ganti balutan kelima terjadi perubahan pada semua tikus perlakuan dan control. Tikus 1 yang diberi ekstrak tangkai daun talas terjadi perubahan sebesar 0,6, Tikus 1 yang diberi salep gemtamicin terjadi perubahan sebesar 0,45, Tikus 1 kontrol (NaCl) terjadi perubahan sebesar0,5. Sedangkan pada tikus 2 yang diberi ekstrak tangkai daun talas terjadi perubahan sebesar 0,5, Tikus 2 yang diberi salep gemtamicin terjadi perubahan sebesar 0,6, Tikus 2 kontrol (NaCl) terjadi perubahan sebesar 0,6. Hari ke 14 atau ganti balutan keenam terjadi perubahan pada semua tikus perlakuan dan control. Tikus 1 yang diberi ekstrak tangkai daun talas terjadi perubahan sebesar 0,9, Tikus 1 yang diberi salep gemtamicin terjadi perubahan sebesar 0,6, Tikus 1 kontrol (NaCl) terjadi perubahan sebesar 0,65. Sedangkan pada tikus 2 yang diberi ekstrak tangkai daun talas terjadi perubahan sebesar 0,7, Tikus 2 yang diberi salep gemtamicin terjadi perubahan sebesar 0,8, Tikus 2 kontrol (NaCl) terjadi perubahan sebesar 0,7.

A. Results of Comparison of Early and Late Wound Area in Research Mouse Group

1. Taro Leaf Stalk Extract Group and Control (NaCl)

The results stated that the ratio of wound area at the beginning and end between taro leaf stalk extract and control (NaCl) was insignificant. This is because NaCl, as an effective control, is also effective in healing acute wounds. According to Thomas (2012), 0.9% Nacl fluid is an adequate physiological fluid for wound care by maintaining moisture and keeping granulation dry so that the wound remains in a balanced state that is not dry nor wet. At the same time, taro leaf ethanol extract contains phenolics, anthocyanins, tannins, saponins, terpenoids, anthraquinones, alkaloids, flavonoids, sterols, carbohydrates, vitamins A and C (Eddy, 2009; Kumawat et al., 2010; Goncalves et al., 2013). These ingredients have a role in the wound-healing process. They are antibacterial, including flavonoids and phenolics, which act as antibacterial in various pathogenic bacteria and play a role in the epithelialization process in stimulating skin tissue regeneration in wounds so that wounds can be quickly covered with new skin. The saponins contained are also bioactive components that play a role in collagen formation. While tannins play a role in blood coagulation and as an anti-inflammatory (Muralidhar et al., 2013; Karimi et al., 2011; Ashok et al., 2012). So NaCl and taro leaf stalk extract have almost the same function as the wound healing process; this can be attributed to the study's results that these two treatments do not have a significant effect.

This study is different from previous research conducted by Wijaya. B.A. et al., where taro leaf stalk extract significantly affected the wound healing process compared to betadine control. The study stated that the number of samples used was six rabbits divided into groups: three rabbits with betadine and three with taro leaf stalk extract. This study was carried out until the wound-healing process was complete, which is different from the research conducted by researchers starting from the study samples, the number of samples and observation time in the wound-healing process, and this study was only carried out for 14 days.

In general, wound healing occurs in 3 primary phases: inflammatory, proliferation, and maturation or remodelling. The inflammatory phase occurs immediately after the wound and peaks on the third day. The proliferative phase occurs on the fourth to the seventh day, characterized by fibroblasts whose number continues to increase during this phase. Fibroblasts are the main factor that dominates wound healing, as well as the skeleton or basic structure to produce collagen. The maturation phase is a phase of wound healing that lasts for a long time (3-6 months or even years) (Theoret, 2017).

This study observed when wound healing ended. On average, there was a decrease in wound area in rats treated with taro leaf stalk extract and NaCl, observed every two days or every change of wound dressing. On the first day, the wound area of all treated rats was 1 cm. There was no change in the wound area on the third day or the first dressing.

On d

ay 5, or changing the second dressing, there was a change in rat one given taro leaf stalk extract by 0.05. In rat one control, NaCl did not change. In rat two, given taro leaf stalk extract did not experience a change that remained 1 cm, and rat two control (NaCl) also did not experience a change that remained 1 cm.

On day 7, or changing the third dressing, there was a change in all treatment and control mice. Rat 1, given taro leaf stalk extract, had a change of 0.25, and control rat 1 (NaCl) had a change of 0.1. While in rat two, given taro leaf stalk extract, there was a change of 0.1, in control rat 2 (NaCl), there was a change of 0.15.

Day 9, or the fourth dressing change changes occurred in all treatment and control mice. Rat 1, given taro leaf stalk extract, had a change of 0.45, and control rat 1 (NaCl) had a change of 0.3. While in rat two, given taro leaf stalk extract, there was a change of 0.3, in control rat 2 (NaCl), there was a change of 0.3.

On day 12, or changing the fifth dressing, there was a change in all treatment and control mice. Rat 1, given taro leaf stalk extract, had a change of 0.6, and control rat 1 (NaCl) had a change of 0.5. While in rat two, given taro leaf stalk extract, there was a change of 0.5, in control rat 2 (NaCl), there was a change of 0.6.

On day 14, or change of the sixth dressing, all treatment and control mice were changed. Rat 1, given taro leaf stalk extract, had a change of 0.9, and control Rat 1 (NaCl) had a change of 0.65. While in rat two, given taro leaf stalk extract, there was a change of 0.7, in control rat 2 (NaCl), there was a change of 0.7. Based on the average measurement above, there is no significant difference between the average wound area in taro leaf stalk extract and NaCl.

Previous research explained related to the wound healing process in experimental animals by observing the wound healing process until complete healing, namely in taro leaf stalk extract, the wound healing time ranged from 9 days with a percentage value of 95.33%, while liquid betadine (positive control) had a percentage value of 60.00%. This study's results show a significant influence on these two treatments.

2. Gentamicin and Control Group (NaCl)

The results showed that the ratio of wound area at the beginning and end between the gentamicin and control (NaCl) groups was insignificant. This is because NaCl, as an effective control, is also effective in healing acute wounds. According to Thomas (2012), 0.9% Nacl fluid is an adequate physiological fluid for wound care by maintaining moisture and keeping granulation dry so that the wound remains in a balanced state that is not dry nor wet. At the same time, Gentamycin is an aminoglycoside class antibiotic that effectively inhibits germs that cause primary and secondary skin infections, such as Staphylococcus, which produces penicillinase, Pseudomonas aeruginosa and others. Gentamycin treats primary and secondary skin infections such as impetigo contagiosa, eczema, and furunculosis: Pyoderma, psoriasis and other kinds of dermatitis (Hidayat, 2015). So NaCl and Gentamycin have almost the same function in the wound-healing process. This can be attributed to the research results that these two treatments do not have a significant effect.

This study is different from previous research conducted by Anu. H.V. et al. (2019) conducted a comparative study between handle extract and gentamicin ointment which is also one of the control treatments using NaCl. From the results of this study, handle extract with gentamicin ointment has the same wound-healing effect and is better than NaCl. The study used a sample of 5 mice in each treatment. The study was conducted for 14 days. In general, wound healing takes place in 3 primary phases: the inflammatory, the proliferation, and the maturation or remodelling phases. The inflammatory phase occurs immediately after the wound and peaks on the third day. The proliferative phase occurs on the fourth to the seventh day, characterized by fibroblasts whose number continues to increase during this phase. Fibroblasts are the main factor that dominates wound healing as well as the skeleton or basic structure to produce collagen. The maturation phase is a phase of wound healing that lasts for a long time (3-6 months or even years) (Theoret, 2017).

This study observed when wound healing ended. On average, there was a decrease in wound area in rats treated with gentamicin and NaCl ointment, observed every two days or every change of wound dressing. On the first day, the wound area of all treated rats was 1 cm. On the third day, or the first dressing, there was a change in the wound area in rat one given gentamicin ointment, which was 0.45. In other rats, there was no change. On day five, or changing the second dressing, there was a change in rat one given gentamicin ointment. There was a change of 0.05, while in rat one control, NaCl did not change. In rat 2, given gentamicin ointment experienced a change of 0.2, and in rat 2, the control (NaCl) also did not experience a change that remained 1 cm.

On day 7, or changing the third dressing, there was a change in all treatment and control mice. Rat 1, given gentamicin ointment, had a change of 0.3, and control Rat 1 (NaCl) had a change of 0.1. While in rat 2, given gentamicin ointment, there was a change of 0.4, in control rat 2 (NaCl), there was a change of 0.15. Day 9, or the fourth dressing change changes occurred in all treatment and control mice. Rat 1, given gentamicin ointment, had a change of 0.4, and control rat 1 (NaCl) had a change of 0.3. While in rat 2, given gentamicin ointment, there was a change of 0.6, in control rat 2 (NaCl), there was a change of 0.3. On day 12, or changing the fifth dressing, there was a change in all treatment and control mice. Rat 1, given gentamicin ointment, had

a change of 0.45, and Control rat 1 (NaCl) had a change of 0.5. While in rat 2, given gentamicin ointment, there was a change of 0.6, in control rat 2 (NaCl), there was a change of 0.6.

On day 14, or change of the sixth dressing, all treatment and control mice were changed. Rat 1, given gentamicin ointment, had a change of 0.6, and control rat 1 (NaCl) had a change of 0.65. While in rat 2, given gentamicin ointment, there was a change of 0.8, in control rat 2 (NaCl), there was a change of 0.7.

3. Taro and Gentamicin Leaf Stalk Extract Groups

The results stated that the ratio of wound area at the beginning and end between taro leaf stalk extract and gentamicin was insignificant. This is because taro leaf ethanol extract contains phenolics, anthocyanins, tannins, saponins, terpenoids, anthraquinones, alkaloids, flavonoids, sterols, carbohydrates, vitamins A and C (Eddy, 2009; Kumawat et al., 2010; Goncalves et al., 2013). These ingredients have a role in the wound-healing process. They are antibacterial, including flavonoids and phenolics which act as antibacterial in various pathogenic bacteria and play a role in the epithelialization process in stimulating the process of skin tissue regeneration in wounds so that they can be quickly covered with new skin. The saponins contained are also bioactive components that play a role in the formation of collagen. While tannins play a role in blood coagulation and as an anti-inflammatory (Muralidhar et al, 2013; Karimi et al, 2011; Ashok et al, 2012).

While Gentamycin is an aminoglycoside class antibiotic that is effective for inhibiting germs that cause primary and secondary skin infections, such as Staphylococcus, which produces penicillinase, Pseudomonas aeruginosa and others, Gentamycin is used to treat primary and secondary skin infections such as impetigo contagiosa, eczema, and furunculosis: Pyoderma, psoriasis and other kinds of dermatitis (Hidayat, 2015).

This study comparing taro leaf stalk extract with gentamicin ointment has never been done before. So that the results of this study are taro leaf stalk extract and gentamicin have almost the same function in the wound healing process. This can be attributed to the study's results that these two treatments do not have a significant effect.

B. Average results of wound area in the study group

1. Taro leaf stalk extract group and Control (NaCl)

The average yield of wound area in taro leaf stalk extract and NaCl controversy was insignificant. This is seen in the wound healing process where the results of the wound area and wound image have the same process and follow the theory of Theoret (2017), which states that wound healing takes place in 3 primary phases, namely: inflammatory phase, proliferation phase and maturation or remodelling phase. In this study, the process of taro leaf stalk extract and NaCl on the first day both occurred in the inflammatory phase, while on the third day or at the time of changing the first dressing, there was still an inflammatory phase. On the next day, namely changing the 2nd, third, fourth, and fifth dressing, there was still a proliferation process, while on the 14th day or changing the sixth dressing, there was a maturase phase, namely the wound healing phase. This is the cause of not too significant average wound area in tangka leaf extract, taro and Nacl.

2. Gentamicin and Control Group (NaCl)

The average yield of wound area in gentamicin and NaCl controversy was insignificant. This is seen in the wound healing process where the results of the wound area and wound image have the same process and follow the theory of Theoret (2017), which states that wound healing takes place in 3 primary phases, namely: inflammatory phase, proliferation phase and maturation or remodelling phase. In this study, the first day of the gentamicin and control (NaCl) processes occurred in the inflammatory phase. In contrast, there was still an inflammatory phase on the third day or when changing the first dressing. The next day, namely changing the 2nd, third, fourth, and fifth dressing, there was still a proliferation process. In contrast, on the 14th day or changing the sixth dressing, there was a maturase phase, namely the wound healing phase. This is the cause of not too significant average wound area in gentamicin and control (NaCl).

3. Taro and Gentamicin Leaf Stalk Extract Group

The average yield of wound area in taro leaf stalk extract and gentamicin was not significant. This is seen in the wound healing process where the results of the wound area and wound image have the same process and follow the theory of Theoret (2017), which states that wound healing takes place in 3 primary phases, namely: inflammatory phase, proliferation phase and maturation or remodelling phase. In this study, the process of taro leaf stalk extract and gentamicin occurred in the inflammatory phase on the first day. In contrast, there was still an inflammatory phase on the third day or when changing the first dressing. The next day, namely changing the 2nd, third, fourth, and fifth dressing, there was still a proliferation

process. In contrast, on the 14th day or changing the sixth dressing, there was a maturase phase, namely the wound healing phase. This is the cause of not too significant average wound area in taro leaf stalk extract and gentamicin.

CONCLUSION

In this study, it can be concluded that the results of research on the wound healing process using taro leaf stalk extract stated that the ratio of wound area at the beginning and end between taro leaf stalk extract and control (NaCl) is not significant, this is because 0.9% Nacl fluid is an adequate physiological fluid for wound care by maintaining moisture, keeping granulation dry so that the wound remains in a balanced state that is not dry nor dry wet. At the same time, taro leaf ethanol extract contains phenolics, anthocyanins, tannins, saponins, terpenoids, anthraquinone, alkaloids, flavonoids, sterols, carbohydrates, vitamins A and C. So NaCl and taro leaf stalk extract have almost the same function in the wound healing process, this can be attributed to the research results that these two treatments do not have a significant effect.

The results of research on the wound healing process using gentamicin sulphate cream stated that the ratio of wound area at the beginning and end between the gentamicin and control (NaCl) groups was not significant. This is because 0.9% Nacl fluid is an adequate physiological fluid for wound care by maintaining moisture and keeping granulation dry so that the wound remains in a balanced state that is not dry nor wet. At the same time, Gentamycin is an aminoglycoside class antibiotic that is effective for inhibiting germs that cause primary and secondary skin infections such as Staphylococcus which produces penicillinase, Pseudomonas aeruginosa and others. So NaCl and Gentamycin have almost the same function in the wound-healing process. This can be attributed to the research results that these two treatments do not have a significant effect.

The research results comparing the effectiveness of taro leaf stalk extract (colocasia esculenta) with gentamicin sulphate cream in wound healing in white rats stated that the ratio of wound area at the beginning and end between taro leaf stalk extract and Gentamycin was insignificant. This is because taro leaf ethanol extract contains phenolics, anthocyanins, tannins, saponins, terpenoids, anthraquinones, alkaloids, flavonoids, sterols, carbohydrates, vitamins A and C. At the same time, Gentamycin is an aminoglycoside antibiotic that effectively inhibits germs that cause primary and secondary skin infections, such as Staphylococcus, which produces penicillinase.

Advice for nursing educators with this research, nursing educators can make this research a scientific reference for future research in the field of wound nursing with healing methods using medicinal plants. Nursing students, with this research nursing students, can make this research as a reference and motivation for students to think critically and come up with new ideas in the process of healing wounds using medicinal plants.

The community with this research can take the essence of this study as input and information to the broader community about alternative wound healing using taro leaf stalks.

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