

# The Effectiveness of Aloe Vera and Onion Extract for Healing Cuts in White Rats

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**Abstract**—Aloe vera also consists of several glycoproteins, which prevent pain inflation and accelerate repair. Likewise, aloe vera consists of polysaccharides, which stimulate wound healing and skin growth. Several previous researchers have proven that Aloe vera has anti-inflammatory, antipyretic, antifungal, antioxidant, antiseptic, antimicrobial, and antiviral properties. Flavonoid compounds contained in shallots are one of the compounds that play a role in the wound healing process because they are useful as anti-inflammatory and anti-microbial, based on previous research that the use of gels containing onion extract has been shown to accelerate wound healing. To determine the effectiveness of aloe vera and onion extract for wound healing in white rats. This research was conducted experimentally, the experimental animals were divided into 3 groups, each group consisted of 7 white rats, each group was given treatment using (Aloe vera and onion extract and NaCl liquid). Rats were injured with a dermal punch tool with a wound size of 0.4 cm. Extracts of aloe vera and shallots were applied to the rat's wounds thinly every 2 days and each treatment was observed from the first day until the wound healed. Each quantitative data was analyzed using the SPSS program (analysis of variance, Wilcoxon). The results showed that there were no significant differences in the 3 groups ( $P>0.05$ ), there were no differences in the results of the study between the treatment group (aloe vera and shallots) and the control group (NaCl) which indicated that the two treatments equally fast in wound healing. The conclusion of this study is that the use of turmeric extract and salt water can accelerate the process of wound healing.

**Keywords**— Aloe Vera, Shallots, Wound Healing, Aloe Vera Extract And Onion Extract, Rats.

## I. INTRODUCTION

A wound is a break in tissue continuity due to tissue substance that is damaged or lost due to injury or surgery. Wound is a degradation of the integrity of epithelial tissue. Disruption of the integrity of the skin, mucosal surface or organ tissue can cause the formation of wounds. Wounds can occur as part of a disease process or have an accidental or intentional etiology. Intentional injury intended as therapy, for example in a surgical procedure or venipuncture. However, accidental injuries occur accidentally. Wounds can be caused by blunt and sharp trauma. Blunt trauma is an involuntary injury resulting from being hit by a blunt object. Blunt trauma can cause bruises (contusions), abrasions and lacerations (vulnus laceratum). Sharp trauma is an involuntary injury resulting from contact with a sharp object. Sharp trauma can result in the formation of incised wounds or cuts (vulnus scissum), stab wounds (vulnus punctum) and stab wounds (vulnus caesum)<sup>(1)</sup>.

Ministry of Health of the Republic of Indonesia states the prevalence of injuries in Indonesia is 9.2%. Central Sulawesi ranks highest for the incidence of injuries, namely 13.8% and the lowest prevalence of 5.6% occurs in Jambi. Meanwhile in West Kalimantan it was 9.0%. Therefore this incident cannot be underestimated and must be dealt with quickly because if this is allowed to happen it will increase the number of incidents<sup>(2)</sup>. The use of traditional medicine in Indonesia saves a lot of natural natural resources potential as a source of food and medicines. Material which is easy to obtain and low cost makes traditional medicine often used. Traditional medicine is considered safer if it is used in accordance with the dosage provisions, the time of use, and the provisions for how to use it so that abuse does not occur. Shallot (*Allium cepa* L.) is one of the popular horticultural crops in the culinary world, as a cooking spice (flavor), vegetables (pickles and salads) and processed fried onion products<sup>(3)</sup>. Wounds can be classified as different types, namely from minor, moderate to severe, from minor to major injuries, from superficial wounds to deep wounds, from non-infectious wounds to infections, from burns, bruises, knife wounds, crush injuries, wounds needle sticks, to gunshot wounds, from acute to chronic wounds. Acute wounds such as minor abrasions, knife wounds, minor scalds, broken skin, and early-stage wounds after surgery occur suddenly and require a quicker time to heal, which is two to three weeks. Chronic wounds such as ulcerative wounds, diabetic foot ulcers, venous ulcers of the lower extremities, arterial ulcers of the lower extremities, chronic radiation injuries and deep burns or scalds are wounds with a longer healing process, i.e. four to six weeks<sup>(1)</sup>. Based on the healing process, it can be categorized into three, namely, Primary healing (healing by primary intention) The edges of the wound can be reunited, the surface is clean, no tissue is lost. Usually occurs after an incision. Wound healing takes place from internal to external. Secondary healing (healing by secondary intention) Some tissue is lost, the healing process takes place starting from the formation of granulation tissue in the wound bed and its surroundings. Delayed primary healing (tertiary healing) Wound healing is slow, often accompanied by infection, manual wound closure is required<sup>(4)</sup>. Aloe vera is a plant that is familiar to Indonesian people. In several countries, aloe vera is often used as a first aid measure for injured body parts (cuts and burns). Aloe vera contains many active substances which are very useful in accelerating wound healing because they contain, among others, glucomannan,

lignin, vitamin A, vitamin C, enzymes and amino acids which are very important for cell regeneration. Aloe vera stimulates the growth factor of the epidermis, increases the function of fibroblasts, and the formation of new blood vessels so that it can accelerate healing and wound closure<sup>(5)</sup>. One of the medicinal plants that have medicinal properties is aloe vera. Aloe vera has been used as a medicinal ingredient for thousands of years to treat burns, hair loss, skin infections, sinus inflammation, and pain in the gastrointestinal tract. Several previous researchers have proven that Aloe vera is efficacious as an anti-inflammatory, anti-pyretic, anti-fungal, anti-oxidant, anti-septic, anti-microbial, and anti-viral<sup>(6)</sup>. The aloe vera plant consists of hydroxyl anthracene derivatives including aloin A and B2 with a total of 25-40% of chromone compounds and their derivatives such as aloe A, B2, and C resins. Other important compounds in aloe vera plants include several sugars such as glucose, mannose, and cellulose and various enzymes such as oxidase, amylase, and catalase as well as vitamins consisting of B1, B2, B6, C, E, and folic acid, and minerals such as calcium, sodium, magnesium, zinc, copper, and chromium. Aloe vera mucus also consists of several glycoproteins, which prevent pain inflation and speed repair. Likewise, aloe vera contains polysaccharides, which stimulate wound healing and skin growth<sup>(7)</sup>. The mucus from the aloe vera plant can be used for the treatment of internal and external wounds. Aloe vera mucus includes several compounds such as vitamin E and vitamin C and several amino acids, which can play an important role in accelerating wound healing to such an extent that experiments have shown that vitamin C can play a role in increasing collagen production and preventing the synthesis of DNA strands, as well as vitamin E as a strong antioxidant in wound healing. Aloe vera mucus has an enzymatic system of antioxidants such as glutathione peroxidase and superoxide dismutase, which accelerate wound healing by neutralizing the effects of free radicals generated at the wound site and by its anti-inflammatory property<sup>(7)</sup>. Shallots are plants that have tubers, skin and reddish-purple flesh. Shallots can live in the highlands. The active compounds that shallots have are Allisin and Alliin, Flavonoids, Alylpropyl disulfide, Phytosterols, Flavonols, Pectin, Saponins, Tripropanal sulfoxide, and acetogenin compounds. Flavonoid compounds which are anti-inflammatory and antimicrobial are very useful for helping the healing process of inflammation due to bruises, burns, or inflammation of the internal organs<sup>(3)</sup>. The active compounds contained in shallots play a role in neutralizing and helping to remove harmful toxic substances. Flavonoid compounds contained in shallots are one of the compounds that play a role in the wound healing process because they are useful as anti-inflammatory and anti-microbial, based on previous research that the use of a gel containing shallot extract has been shown to accelerate healing in burns<sup>(8)</sup>. Giving shallot extract cream can cure burns in white rats (*Rattus norvegicus*). The most effective healing of burns with a concentration of 55%. Based on this research on burns using shallot extract cream (*Aliium Cepa L.*), further research is needed with different concentrations and microscopic view of the wound healing process<sup>(3)</sup>.

## II. OBJECTIVE

This study aims to determine that extracts of aloe vera and shallots are effective for healing cuts in white rats.

## III. METHODOLOGY

### *Study Design*

This type of research is a pure experiment (true experiment research) with a post test only control group research design. Using white rats that were randomly selected and divided into 3 groups, namely the aloe vera extract group and the shallot extract group as the treatment group and the NaCl group as the control group. Each quantitative data was analyzed using the SPSS program (analysis of variance, Wilcoxon).

### *Population and Sample*

The population in this study were white rats that were injured on the back. There were 7 samples in this study for each sample with a total of 21 white rats.

### *Instrument*

The instruments in this study consisted of tools used to make extracts, and tools used to make wounds in rats. The materials used in this study were mice, feed, drinks for rats, alcohol, aloe vera extract and shallot extract and NaCl.

### *Intervention*

This research will be carried out in November 2021 - May 2022 in the laboratory of the Pontianak Muhammadiyah College of Nursing. The implementation in this study began with preparing white rats, which were randomly divided into 3 groups and each group consisted of 7 rats. The detailed treatment of the researchers is as follows: White rats were divided into 3 groups, mice were placed in cages and given food and drink, the rat's back was injured with a knife 2 cm long, the incision is smeared with aloe vera extract and shallots, the treatment was given for 2 weeks.

### *Data Collection*

The data collection procedure is divided into the preparation stage, the implementation stage and the observation stage. This research has passed the Pontianak Muhammadiyah STIK ethical test with number: 244/II.I.AU/KET.ETIK/VII/2022. Data analysis in this study consisted of univariate analysis and bivariate analysis. This study used the Wilcoxon test and the Mann Whitney test.

## IV. RESULTS

### *1. Wicoxon Test Results for Healing Cuts in the Treatment Group (Aloe Vera Extract)*

Based on Table 1 the results of the distribution of the incision test in the aloe vera extract group, with a sample of 7 mice, it showed a p-value of 0.014 <0.05, meaning that there was an average difference before and after administration. of aloe vera extract. With an average value of the total length of the wound before treatment in the intervention group 0.4 and 0.17 after treatment

TABLE 1. Results of Wound Healing in the Treatment Group (Aloe Vera Extract) (n=7)

	N	Average ± s.d.	Median (min-mak)	p
Before	7	0,4 ± 0	0,4 ( 0,4-0,4 )	0,014
After	7	0,17 ± 0,048	0,2 ( 0,1-0,2 )	

2. *Wicoxon Test Results for Healing of Cuts in the Treatment Group (Shallot Extract)*

Based on the results of the distribution of the cut wound test in the aloe vera extract group, with a sample of 7 rats showing a p-value of 0.015 <0.05, meaning that there was an average difference before and after administration of shallot extract. With an average value of the total length of the wound before treatment in the intervention group 0.4 and 0.14 after treatment

TABLE 2. Results of Wound Healing in the Treatment Group (Shallot Extract) (n=7)

	N	Average ± s.d.	Median (min-mak)	p
Before	7	0,4 ± 0	0,4 ( 0,4-0,4 )	0,015
After	7	0,14 ± 0,05	0,1 ( 0,1-0,2 )	

3. *Results of the Wicoxon Test on Healing of Cuts in the Control Group (Sodium Chloride)*

Based on the results of the distribution of the incision test in the aloe vera extract group, with a sample of 7 mice, it showed a p-value of 0.015 <0.05, meaning that there was an average difference before and after administration. from NaCl. With an average value of the total length of the wound before treatment in the intervention group 0.4 and 0.14 after treatment

TABLE 3. Results of the Wicoxon Test on Healing of Cuts in the Control Group (Sodium Chloride) (n=7)

	n	Average ± s.d.	Median (min-mak)	P
Before	7	0,4 ± 0	0,4 ( 0,4-0,4 )	0,015
After	7	0,14 ± 0,05	0,1 ( 0,1-0,2 )	

4. *Comparison Results of the Mann Whitney Test on Healing of Cuts in the Aloe Vera Treatment Group and the NaCl Control Group*

Based on the results of the distribution of the incision test in the aloe vera extract group to the control group (NaCl), that is, with a sample of 7 mice, it shows that the p value is 0.298 <0.05, meaning that there is no average difference between the intervention group and the control group. The average value of the intervention group with the total length of the wound after treatment in the intervention group was 0.17 and the average value of the control group with the total length of the wound after treatment was 0.14.

TABLE 4. Comparison Results of the Mann Whitney Test on Healing of Cuts in the Aloe Vera Treatment Group and the NaCl Control Group (n=7)

	n	Average ± s.d.	Median (min-mak)	p	z
The mean difference in the aloe vera group	7	0,17 ± 0,04	0,2 ( 0,1-0,2 )	0,298	-
The average difference in the control group sodium chloride (NaCl)	7	0,14 ± 0,05	0,1 ( 0,1-0,2 )		

5. *Comparison Results of the Mann Whitney Test on Healing*

*of Cuts in the Onion Treatment Group and the NaCl Control Group*

Based on the results of the distribution of the incision test in the shallot extract group to the control group (NaCl), that is, with a sample of 7 rats, it shows that the p value of 1,000 <0.05 means that there is no average difference between the intervention group and the control group. The average value of the intervention group with the total length of the wound after treatment in the intervention group was 0.14 and the average value of the control group with the total length of the wound after treatment was 0.14.

TABLE 5. Comparison Results of the Mann Whitney Test on Healing of Cuts in the Onion Treatment Group and the NaCl Control Group (n=7)

	n	Average ± s.d.	Median (min-mak)	p	z
The average difference of shallot groups	7	0,14 ± 0,53	0,1 ( 0,1-0,2 )	1.000	0
The mean difference in the sodium chloride control group	7	0,14 ± 0,53	0,1 ( 0,1-0,2 )		

6. *Comparison Results of the Mann Whitney Test on Healing of Cuts in the Aloe Vera and Shallot Treatment Group*

Based on the results of the distribution of the incision test in the shallot extract group to the control group (NaCl), that is, with a sample of 7 rats, it shows that the p-value is -1.041 <0.05, meaning that there is no average difference between the intervention group and the control group. The average value of the intervention group with the total length of the wound after treatment in the aloe vera group was 0.17 and the average value of the control group with the total length of the wound after the onion was 0.14.

TABLE 6. Comparison Results of the Mann Whitney Test on Healing of Cuts in the Aloe Vera and Shallot Treatment Group (n=7)

	N	Average ± s.d.	Median (min-mak)	P	Z
The average difference in aloe vera groups	7	0,17 ± 0,04	0,2 ( 01-0,2 )	0,298	-
The average difference of shallot groups	7	0,14 ± 0,05	0,1 ( 01-0,2 )		

7. *The results of measurements of the average change in wound length*

It can be seen that the time span (days) needed by the two groups of white rats to completely close the wound. In the table it can be seen that all rats in the treatment group and control group experienced complete wound closure on the 10th (tenth) day. Based on the table above, it can be seen that from day one to day 10 (ten) the wound length of the two groups did not show a significant difference in the wound healing process.



TABLE 7. The results of measurements of the average change in wound length

Days	Group 1	Group 2	Group 3
0	0,4	0,4	0,4
2	0,4	0,4	0,4
4	0,27	0,27	0,3
6	0,2	0,22	0,21
8	0,17	0,14	0,11
10	0	0	0

Information

Group 1 : Wounds with Aloe Vera Extract

Group 2 : Cutting with Shallot Extract

Group 3 : Cut wounds with NaCl solution

## V. DISCUSSION

### 1. Aloe Vera Extract Group

The results of this study stated that the wound healing at the beginning and at the end using aloe vera extract was very significant. Because the aloe vera plant consists of hydroxyl anthracene derivatives, including aloin A and B2 with a total of 25-40% chromone compounds and their derivatives such as aloe vera resin A, B2, and C. Other important compounds in the aloe vera plant include several sugars. such as glucose, mannose, and cellulose as well as various enzymes such as oxidase, amylase, and catalase as well as vitamins consisting of B1, B2, B6, C, E, and folic acid, as well as minerals such as calcium, sodium, magnesium, zinc, copper, and chromium. Aloe vera mucus also consists of several glycoproteins, which prevent painful swelling and promote repair. Likewise, aloe vera contains polysaccharides that stimulate wound healing and skin growth<sup>(7)</sup>. So that aloe vera extract is effective for healing cuts in rats, this can be related to the results of research that this treatment has a significant effect. This is also supported by other research<sup>(9)(10)</sup>.

### 2. Shallot Extract Group

The results of this study stated that the healing of cuts at the beginning and at the end using shallot extract was significant because shallots are plants that have bulbs, the skin and flesh are reddish purple. Shallots can live in the highlands. The active compounds that shallots have are Allisin and Alliin, Flavonoids, Alylpropyl disulfide, Phytosterols, Flavonols, Pectin, Saponins, Tripropanal sulfoxide, and acetogenin compounds. Flavonoid compounds which are anti-inflammatory and anti-microbial are very useful for helping the healing process of inflammation due to bruises, burns, or inflammation of the internal organs<sup>(3)</sup>. The active compounds contained in shallots play a role in neutralizing and helping to remove harmful toxic substances. Flavonoid compounds contained in shallots are one of the compounds that play a role in the wound healing process because they are useful as anti-inflammatory and anti-microbial, based on previous studies that use Gel containing shallot extract has been shown to accelerate healing in burns<sup>(8)</sup>.

So that shallot extract is effective for healing cuts in mice, this can be related to the results of research that this treatment has a significant effect. This is also supported by other research<sup>(3)(8)</sup>. who explained that giving shallot extract to wounds in white rats can accelerate healing. This study observed until the wound healed, the average cut wound in

mice treated with aloe vera and shallot extracts was observed every 2 days until the wound healed. The researcher previously described the process of wound healing in experimental animals by observing the wound healing process until it healed. With the results of this study means there is an influence on the treatment.

### 3. Sodium chloride control group

The results of this study stated that wound healing at the beginning and at the end using NaCl solution was significant. This is because NaCl as a control is also effective in healing acute wounds. The ingredients and benefits that exist in NaCl liquid can accelerate the wound healing process. So that NaCl liquid is effective in healing cuts in mice, this can be related to the results of research that this treatment has a significant effect.

### 4. Group Comparison of Aloe Vera Extract and Onion Extract with Sodium Chloride Control Group

The results of this study stated that the comparison of initial and final wound healing using aloe vera and shallot extracts with the control (NaCl) was not significant. Even though the results were not significant, it does not mean that aloe vera and shallot extracts are not effective for wound healing, because clinically the use of aloe vera and shallot extracts is effective for healing cuts because they are the same or equivalent to NaCl liquid which has been shown to be effective for wound healing, with the results shallots and NaCl have the same average value which indicates an increase in wound healing.

NaCl as a control is also effective in healing acute wounds. Sodium chloride solution is an effective physiological fluid for wound care by maintaining moisture, keeping the granulation dry so that the wound remains in a balanced state, namely not dry and not wet<sup>(11)</sup>. Meanwhile, aloe vera extract has mucilage which consists of several glycoproteins, which prevent pain inflation and accelerate repair. Likewise, aloe vera contains polysaccharides, which stimulate wound healing and skin growth<sup>(7)</sup>. So that extracts of aloe vera and shallots with NaCl have almost the same function in the wound healing process, this can be related to the results of the study that the two treatments did not have a significant effect.

This study is not in line with previous studies where there was a significant effect of aloe vera on the wound healing process compared to the control group<sup>(5)</sup>. This is also not in line with other studies which explain that there is a significant effect of aloe vera in the wound healing process compared to the control group<sup>(3)</sup>.

In general, the wound healing process is divided into 3 main phases: the inflammatory phase, the proliferative phase and the maturation or remodeling phase. Inflammatory phase This phase occurs after 24-48 hours and in certain circumstances and can increase for 2 weeks. The proliferative phase in this phase occurs the proliferation of several cells during the recovery process, including the remnants of injured tissue that attempt to restore normal tissue. The remodeling phase is the final process of the wound healing process. In this phase, collagen synthesis occurs which has started in the

proliferative phase. Healing or epithelialization occurs without fibroplasia and granulation tissue formation, but in certain circumstances such as incision wounds, revitalization can occur in less than 48 hours, while deeper wounds are larger, so the healing process takes a long time<sup>(12)</sup>.

This study observed until the wound healed, the average cut wound in rats treated with aloe vera and shallot extract with NaCl control was observed every 2 (two) days until the wound healed. The researcher previously described the process of wound healing in experimental animals by observing the healing process of cuts until they healed. The results of this study mean that there is an influence on the 2 (two) treatments.

## VI. CONCLUSION

Based on the results of research and discussion, it can be concluded that:

1. The results of research on the wound healing process using aloe vera extract in healing cuts at the beginning and at the end are significant. Because the aloe vera plant consists of hydroxyl anthracene derivatives including aloin A and B2 with a total of 25-40% of chromone compounds and their derivatives such as aloe resin A, B2, and C. Other important compounds in aloe vera plants include several sugars such as glucose, mannose, and cellulose and various enzymes such as oxidase, amylase, and catalase and also vitamins consisting of B1, B2, B6, C, E, and folic acid, and minerals such as calcium, sodium, magnesium, zinc, copper, and chromium. Aloe vera mucus also consists of several glycoproteins, which prevent pain inflation and speed repair. Likewise, aloe vera consists of polysaccharides, which stimulate wound healing and skin growth.
2. The results of this study stated that the healing of cuts at the beginning and at the end using shallot extract was significant because shallots are plants that have tubers, the skin and flesh are reddish purple. Shallots can live in the highlands. The active compounds that shallots have are Allisin and Alliin, Flavonoids, Alylpropyl disulfide, Phytosterols, Flavonols, Pectin, Saponins, Tripropanal sulfoxide, and acetogenin compounds. Flavonoid compounds which are anti-inflammatory and anti-microbial are very useful for helping the healing process of inflammation due to bruises, burns, or inflammation of the internal organs.
3. The results of research on the process of wound healing using turmeric extract and salt water with control of NaCl fluid for wound healing at the beginning and at the end is not significant. This is because NaCl as a control is also

effective in healing acute wounds. According to Thomas (2012) 0.9% NaCl fluid is an effective physiological fluid for wound care by maintaining moisture, keeping the granulation dry so that the wound remains in a balanced state, namely neither dry nor wet.

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