

Treatment of Grade II Burns With Cashew Leaf Gel (*Anacardium Occidentale L.*)

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ABSTRACT

*Burns are wounds touching the object's surface that produce heat (fire, chemicals, electricity, or radiation) or substances that burn in high acids and bases. Cashew leaves (*Anacardium occidentale L.*) are a plant that contains alkaloids, flavonoids, saponins, and tannins. It potentially becomes a burn wound treatment. The research aimed to determine the effect of administering cashew leaf gel (*Anacardium occidentale L.*) as an alternative medicine for recovering grade II burns. The type of research employed quantitative experimental with a Post Test Only Control Group Design research design. The object studied was cashew leaf gel (*Anacardium occidentale L.*) for restorative grade II burns on the back skin of male white mice. There were 27 mice divided into an intervention group by administering cashew fruit gel, positive control with branded ointment, and negative control without treatment. The Shapiro-Wilk normality test data analysis revealed that the data was normally distributed ($p>0.05$). The General Linear Model test obtained a significance value of 0.00 (sig. < 0.05). In the intervention group the wound healed on the 15th day, positive control with branded ointment 12th day, negative control without treatment 18th day. It indicated an effect of cashew leaf gel on burns. Post-hoc test presented that the three (3) treatment groups had significant differences in the sig results. < 0.005 . It inferred an effect of cashew leaf gel (*Anacardium occidentale L.*) on the restorative of grade II burns.*

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1. INTRODUCTION

The World Health Organization (WHO) (2019) reports that 90% of burns occur in low-income communities, who often lack the necessary infrastructure to anticipate and prevent burns. The WHO states that 265,000 deaths occur annually worldwide due to burns. Burn treatment must be performed correctly, accurately, and quickly. If not treated immediately, it can cause complications such as disruption of blood and oxygen

supply which causes hypovolemic shock and physical and psychological complications such as depression and anxiety (Brunner & Suddarth, 2016).

The most common type of burn is grade II. The American Burn Association defines grade II burns as burns that penetrate the dermis and are painful (Stevan, 2017). Grade II burns are characterized by blisters (Nugroho, et al., 2015). Burned skin experiences damage to the epidermis, dermis, and subcutaneous tissue. The depth of the burn can cause damage and disruption of skin tissue integrity, leading to severity and cell death. Burn treatment is still considered difficult and requires expensive treatment costs. Chemical drugs are usually used for first aid, but prolonged use can cause side effects (Fitria et al., 2014).

Natural wound treatment can use plant leaves containing chemical compounds that can function as healing medicines, one of which is cashew leaves (*Anacardium occidentale* L) (Fitri, 2022). Cashew leaves contain biologically active compounds including alkaloids, flavonoids, saponins, and tannins (Dwita, 2012). Flavonoids function to inhibit bleeding (Arya, 2017). Saponins can stimulate Vascular Endothelial Growth Factor (VEGF) to accelerate the inflammatory phase and wound healing (Young, 2015). Tannins can accelerate wound healing by scavenging free radicals and reactive oxygen species, accelerating wound closure, and increasing capillary angiogenesis and fibroblast cells (Kusumawardani, et al., 2015). Alkaloids function as effective antimicrobials to help the process of tissue rep epithelialization (Cahayani, 2018).

Research Silveira et al. (2015). showed that guava and cashew leaves, combined with water or alcohol, can be used as a remedy for healing skin wounds (Nehete, 2023). In this study, the researchers used a population of mice (*Mus musculus*) because they have anatomical and physiological structures similar to humans (Nugroho, 2018).

Mice are frequently used as test animals. The research rate using mice as a model is approximately 40%. Mice were chosen as research models because they have reproductive, respiratory, and circulatory systems similar to humans. The advantage of using mice as test animals is that they have a short reproductive cycle and produce numerous offspring. Male mice are more frequently used in research because they are active (Oktiansyah, 2015). Although cashew leaves are known to contain bioactive compounds with antimicrobial and wound healing potential, their effectiveness in grade II burn healing has not been experimentally evaluated, so research is needed to prove its truth.

Based on this problem description, cashew leaves have been shown to contain several antibacterial bioactive that can support burn healing. This study aimed to evaluate the effect of cashew leaf gel (*Anacardium occidentale* L.) on the healing of grade II burns in mice.

2. RESEARCH METHOD

This study employed a True Experimental study with a Post-Test Only Control Group Design. Male Swiss strain mice (*Mus musculus*) were used as test subjects, divided into three groups. The number of mice used in this study was calculated using the Federer formula, resulting in 27 mice for the study, divided into three groups ($n = 9$): a negative control group (without treatment), a positive control group (branded ointment), and a cashew leaf extract gel (*Anacardium occidentale* L.) intervention group. Data collection was conducted through observation to assess wound healing time and to assess wound size using a digital caliper. Before analyzing the data, normality was tested using Shapiro-Wilk. The results of the Shapiro-Wilk normality test showed a significance value of $p > 0.05$ for all groups, indicating that all data were normally distributed. Testing in each group using the multivariate general model test with Post-Hoc Bonferroni.

3. RESULT AND DISCUSSION

This study aimed to prove the effect of cashew leaf gel (*Anacardium occidentale* L.) on the extent of second-degree burns in male mice (*Mus musculus*). The wound healing parameter in this study was wound area measurement.

Table 1. Result and Post Hoc test

Group	The day of complete wound	Mean	Post-hoc	Difference	p-value
group 1 (intervention)	15th	62.56	group 2	.0840	0.000
			group 3	.7862*	
group 2 (branded ointment)	12th	59.78	group 1	-.0840	
			group 3	.7022*	
group 3 (without treatment)	18th	82.73	group 1	-.7862*	
			group 2	-.7022*	

Table 1 shows the differences in the time span (days) and the average wound area closure required by each group of mice to close the wound. The results of the study showed that all mice in group 1 (intervention group) experienced complete wound closure on the 15th day. Group 2 (branded ointment) using branded ointment can be seen from the results of the study that in contrast to group 1 (intervention group), the days needed for the burn wound to close completely in group 2 were faster than group 1, namely 12 days. Group 3 (negative control group), the time needed for the burn wound to close was on the 18th day.

In group 1 (intervention group), the healing time of burns required was 15 days. The healing results were seen to be 3 days slower than group 2 (positive control group), but 4 days faster than group 3 (negative control group). The content in cashew leaf gel (*Anacardium occidentale* L.) such as flavonoids works to stop bleeding by increasing the number of platelets in the blood, so that when bleeding occurs the platelets break down to produce the enzyme thrombokinase inhibits bleeding by increasing the number of platelets, so that when bleeding occurs the platelets will break down and produce the enzyme thrombokinase to form fibrin monomers assisted by Ca ions and vitamin K found in blood plasma (Arya, 2021). This opinion is supported by Fisher et al., (2013), saponins can clean or act as antiseptics to kill microorganisms that arise in wounds so that they do not become infected.

In group 2 (the positive control group), the application of the branded ointment resulted in faster burn wound healing compared to the other groups. The healing time required was 12 days. This phenomenon occurred due to the content of 10% placenta extract and 0.5% neomycin sulfate in the branded ointment. The placenta extract content in the branded ointment can accelerate the skin regeneration process so that wounds heal faster. The application of the branded ointment had an effect on burn wound healing as observed from the diameter of the wound and the condition of the wound which looked cleaner. The branded ointment used in the positive control group had an anti-inflammatory function similar to the role of saponins in cashew leaf extract gel (*Anacardium occidentale* L.).

Group 3 (the negative control group) without any treatment had the longest time for the burns to heal completely. The healing time required was 18 days. This was because the mice were not given any treatment that could help the burn healing process. Despite not being given treatment, the burn healing process in the negative control group continued, which was indicated by the emergence of clinical symptoms of a reduction in the size of the burns in the mice. This means that a healthy body has the natural ability to heal itself through the natural process of inflammation until maturation (Sjamsuhidajat, 2014).

The wound healing process in mice is also influenced by interfering factors. This includes poor preparation for second-degree burns. Shaving the fur improperly also affects the condition of the burn wound, as unclean fur can prevent the burn from directly touching the mouse's skin (Hasibuan, 2015).

Research on cashew leaves has shown a positive effect on burn wound healing. Therefore, nurses should not neglect burn care; the wound must be monitored and cleaned, either through branded ointment interventions or conventional methods.

Table 2. General liner model test

Effect	Value	Hypothesis	
		df	Sig
Pillai's Trace	.995	3.000	.000
Wilks' Lambda	.005	3.000	.000
Hotelling's	201.694	3.000	.000
Trace	201.694	3.000	.000
Roy's Largest		3.000	.000

The significance value analysis results obtained were 0.000 (sig. < 0.05). This indicates that there is an effect of administering cashew leaf gel (*Anacardium occidentale* L.) on the extent of burns in test mice (*Mus musculus*).

4. CONCLUSION

The results of the study showed that in the intervention Cashew (*Anacardium occidentale* L) with cashew fruit, wounds could heal within 15th days, in the positive control group using the branded ointment, the healing time was 12th days and wound healing in the control group showed that wound healing took 18th days. There was a significant difference in the average burn area between groups, with group 1 and group 3 showing a significant difference of 0.000 (sig. < 0.05). The results showed that the branded ointment was able to heal wounds 3 days faster than the cashew fruit intervention Cashew (*Anacardium occidentale* L). The researchers recommended that future researchers conduct research on the effectiveness of cashew fruit and leaves.

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