



# EFFECTIVENESS TEST OF SECOND DEGREE BURN WOUND HEALING FROM ETHANOL EXTRACT OINTMENT OF ZANTHOXYLUM ACANTHOPODIUM DC. IN WISTAR RATS

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## ABSTRACT

*Terpenoid content in Zanthoxylum acanthopodium DC. Fruit has antioxidant and antimicrobial activities that are repellent and insect killer. Antioxidant and immunostimulant activities of Zanthoxylum acanthopodium DC. Fruit can increase the number of lymphocyte cells. This study aims to analyze the effectiveness of second-degree burn healing ointment of Zanthoxylum acanthopodium DC—fruit on Wistar rats. This research is an experimental pre-test control group design conducted in March 2023. The research samples were Zanthoxylum acanthopodium DC plants, and the experimental animal samples were 20 male white rats of the Wistar strain (Rattus norvegicus) divided into four treatment groups, each consisting of five rats. Statistical analysis was a One-Way ANOVA test followed by a post-hoc test. Before A, a descriptive analysis of wound contraction and epithelialization period was performed before further testing. If the data in this study is not normally distributed, then data transformation will be carried out so that the data is usually spread. The results of the burn wound healing effect possessed by Zanthoxylum acaOintmentum DC. both 20% and 30% ointment and nebacetin ointment as standard showed significant references. The wound contraction rate of 30% ointment was better than nebacetin ointment as the standard. In conclusion, both Zanthoxylum acanthopodium DC. Both 20% and 30% ointments and nebacetin ointment, as the bar, did not show significant differences in epithelial period parameters.*

**KEYWORDS:** *Zanthoxylum acanthopodium DC, Burns, Wound Healing*

## BACKGROUND

The Ministry of Health's 2013 Basic Health Research data noted that burns rank sixth cause of unintentional injury after falls, motorcycles, sharp/blunt objects, other land transportation, and falls with a prevalence rate of 0.7 percent of the Indonesian population. It also emphasized that children ages 1-4 are the most vulnerable age group to burns with a prevalence rate of up to 1.5 percent (1). Combustion is an injury (injury) as a result of direct contact or exposure to sources of heat (thermal), electricity, chemicals, or radiation (2). Wound healing that must be treated and healed immediately, several healing phases such as the inflammatory phase, proliferative phase, and maturation phase. The inflammatory phase is characterized by hemostasis, chemotaxis, and increased permeability of blood vessels that limit further damage, close wounds, remove cellular debris and bacteria and encourage cellular migration (3). Zanthoxylum acanthopodium DC. fruit extract is reported to have active physiological activity as a potential antioxidant and antimicrobial so the components that play a role in these unique properties need to be identified (4).

Some studies prove that the terpenoid content of Zanthoxylum acanthopodium DC. has antioxidant and antimicrobial activities that are repellent and insect killer (5). Antioxidant and immunostimulant activities of Zanthoxylum acanthopodium DC. fruit can increase the number of lymphocyte cells. They can reduce free radicals, but until now, there is still not much information related to the biological activity of Zanthoxylum acanthopodium DC. nano herbs, especially in increasing antioxidant and immunostimulant activities associated with preventing or accelerating the healing of burns on the skin. This study aims to analyze the effectiveness of second-degree burn wound healing ointment Zanthoxylum acanthopodium DC. in Wistar rats.

## RESEARCH METHODS

This research is an experimental pre-test control group design. March 2023. The research sample was the Zanthoxylum acanthopodium DC plant, and the animal samples were 20 male Wistar rats (Rattus norvegicus) divided into four treatment groups, each comprising five rats. Independent variables include the administration of several topical formulations (base ointment, nebacetin® ointment, Zanthoxylum acanthopodium DC ointment. 20% and Zanthoxylum acanthopodium DC. 30% ointment), and the independent variables which include wound contraction and epithelialization period (7); (8). The statistics analysis used in the study was Anova's One-Way test, followed by a post-hoc test. Before another test is done descriptive analysis of wound contraction and epithelial period. If the data in this study is distributed abnormally, then there will be a transformation of the data so that the data is distributed normally.



## RESULTS AND DISCUSSIONS

**Table 1. Wound Contraction Analysis Results (%) Data on Burn Healing Parameters.**

Observation Time	Wound Contraction (%)				Nilai
	Control	Standard	Saleb	Saleb	
			Zanthoxylum acanthopodium DC. 20%	Zanthoxylum acanthopodium DC. 30%	
Day 3	4.78 (8.33)	0.01 (8.70)	14.54 (25.91)	10.62 (15.91)	0.002**
Day 6	9.43 ± 5.21	18.24 ± 10.54	32.16 ± 7.88	45.67 ± 7.58	0.002*
Day 9	7.51 ± 7.92	35.12 ± 8.05	45.45 ± 6.55	52.42 ± 8.92	0.002*
Day 12	9.51 (29.17)	53.56 (20.71)	64.64 (21.75)	56.67 (8.96)	0.005**
Day 14	23.2 (37.50)	86.71 (42.46)	76.27 (13.64)	89.29 (3.64)	0.002**

In addition to wound contraction, another parameter that is also evaluated in assessing burn healing is the epithelial period, the results of different tests from the epithelialization period of each treatment group can be seen in the table below.

**Table 2. Results of Epithelial Period Comparison in Each Treatment Group**

Treatment Group	Period Epitelialisasi*	Value P
Control	22 (2) <sup>a</sup>	0.014
Standard	17 (2) <sup>b</sup>	
Ointment Zanthoxylum DC. 20%	20 (2) <sup>b</sup>	
Ointment Zanthoxylum DC. 30%	20 (2) <sup>b</sup>	

\* Data is presented in Median (Range). Different lowercase letters in the same column shows a significant difference in the value of P < 0.05

From the table data above it can be seen that there are significant differences in the epithelial period of the standard group, 20% and 30% in the control group. However, in the Zanthoxylum acanthopodium DC. ointment group and the standard group there was no difference in epithelial period. This is evident from the value P < 0.05 (Value P = 0.014). Based on the results of the above study, it can be seen that there are significant differences in the wound contraction parameters and epithelialization periods of each treatment group. The healing activity of the burn owned by the Zanthoxylum acanthopodium DC. fruit is related to the antioxidant, anti-inflammatory, and antimicrobial activity of this Zanthoxylum acanthopodium DC. fruit, because through the antioxidant and antimicrobial activity owned by this fruit it will create a good environment (Microenvironment) for wound healing.

Zanthoxylum acanthopodium DC. is a Rutaceae family that is widely found in North Sumatra, and the fruit is widely used as a traditional cooking spice by the Batak tribe (9). Some studies prove that the content of Zanthoxylum acanthopodium DC. terpenoids has antioxidant and antimicrobial activity, also has immunostimulating effects (9). Most plants that contain bioactive compounds such as glycosides, alkaloids, terpenoids, and flavonoids have antioxidant and antidiabetic activity (10). Burns can usually be prevented, and different treatments are applied based on the severity of the burn. Sometimes, ointments, creams, biological and nonbiological dressings, and antibiotics are recommended levels 2, 3, and 4 burns, while misuse of these drugs increases the risk of antibiotic resistance and fungal infections, even slowing wound healing and increasing the depth of burns (11). Alternative treatments for burns other than with pharmacology are honey, aloe vera, oatmeal, eggs, mud, leaves, or cow dung, which have been used for the treatment of burns (12); (13). The skin is part of the integument system and is considered the largest organ of the human body. There are three main layers of skin: epidermis, dermis, and hypodermis (subcutaneous fat). Skin appendages such as sweat glands, hair follicles, and sebaceous glands are in-depth reviewed elsewhere (14). This is supported by the results of research conducted by Winarti *et al.* (2018) who reported that ethyl acetate extract from Zanthoxylum acanthopodium DC. fruit has high antioxidant activity with ic50 value of 66.91 BPJ, antioxidant activity in ethyl acetate extract is due to the presence of compound 2-methoxy-4-vinylfenol (6).

## CONCLUSION

The conclusions that can be drawn from this study are as follows, the healing effects of burns possessed by Zanthoxylum acanthopodium DC. ointments are both 20% and 30% and nebacetin ointment as standard shows significant differences. Where the wound contraction rate of your ointment is 30% better than nebacetin ointment as standard. But in both Zanthoxylum acanthopodium DC. ointments, both 20% and 30% and nebacetin ointment as standard showed no significant difference in the parameters of the epithelial period.



## BIBLIOGRAPHY

1. Dinas Kesehatan Republik Indonesia. *Riset Kesehatan Dasar. Diabetes Mellit.* 2013;87–90.
2. Tutik Rahayuningsih. *PENATALAKSANAAN LUKA BAKAR (COMBUSTIO). PROFESI.* 2012;08(September):32.
3. Suryadi IA. *Wound Healing Process and Wound Care. e-Jurnal Med Udayana.* 2013;2(2):254–72.
4. Sitanggang FMC, Duniaji AS, Pratiwi IDPK. *Daya Hambat Ekstrak Buah Zanthoxylum acanthopodium DC. (Zanthoxylum acanthopodium DC) dalam Etil Asetat terhadap Pertumbuhan Escherichia coli. J Ilmu dan Teknol Pangan.* 2019;8(3):257–66.
5. Mery Suknawati, Sumarto CW. *The Effect of Zanthoxylum acanthopodium DC. Fruit (Zanthoxylum acanthopodium DC.) on uality of Smoked Catfisg (Pangasius hypophthalmus) Stored at Room temperature. Berk Perikan Terubuk.* 2013;41(1):5–6.
6. Winarti W, Simanjuntak P, Syahidin MF. *Identifikasi Senyawa Kimia Aktif Antioksidan Dari Ekstrak Etil Asetat Buah Zanthoxylum acanthopodium DC. (Zanthoxylum acanthopodium DC). In: Talenta Conference Series: Tropical Medicine (TM). Medan: Talenta Publisher; 2018. p. 162–6.*
7. Izzati UZ. *EFEKTIVITAS PENYEMBUHAN LUKA BAKAR SALEP EKSTRAK ETANOL DAUN SENGGANI ( Melastoma malabathricum L.) PADA TIKUS ( Rattus norvegicus ) NASKAH PUBLIKASI Oleh : ULFA ZARA IZZATI PROGRAM STUDI FARMASI. Naskah Publ.* 2015;6.
8. Hariani. *Pengaruh Pemberian Etanol 96% Tumbuhan Paku Nephrolephis falcata (Cav.). C.Chr Terhadap Penyembuhan Luka Bakar Derajat Dua Pada Tikus Putih (Rattus norvegicus) Jantan Galur Sprague Dawley. Skripsi Fak Kedokt Dan Ilmu Kesehatan Prodi Farm.* 2016;8:372–9.
9. Asbur Y, Khairunnisyah K. *Pemanfatan Zanthoxylum acanthopodium DC. (Zanthoxylum acanthopodium DC) sebagai tanaman penghasil minyak atsiri. Kultivasi.* 2018;17(1):537–43.
10. Ergina, Nuryanti S, Purtsari ID. *Uji Kualitatif Senyawa Metabolit Sekunder Pada Daun Palado (Agave angustifolia) Yang Diekstraksi Dengan Pelarut Air Dan Etanol Qualitative Test of Secondary Metabolites Compounds in Palado Leaves (Agave). J Akad Kim.* 2014;3(3):165–72.
11. Agussalim Bukhar. *Departemen Gizi Klinik Fakultas Kedokteran Universitas Hasanuddin Makassar Email : 2018;1:80–90.*
12. Budiyanto MAK. *Efek ekstrak lidah buaya (.*
13. Hakim AM. *Efektifitas Aloe vera terhadap Luka Bakar. J Ilm Kedokt Wijaya Kusuma.* 2020;9(2):245.
14. Kalangi SJR. *Histofisiologi Kulit. J Biomedik.* 2014;5(3):12–20.
15. Sefanny, Nicki L. *Tentang Efektifitas Berkumur Ekstrak Zanthoxylum acanthopodium DC. 4% (Zanthoxylum Acantopodium) Terhadap Penurunan Jumlah Bakteri Pada Siswa Sekolah SMA N 1 Medan. Fak Kedokt Gigi Univ Sumatera Utara.* 2020;