

Article

Bioactivity of Torch Ginger Umbut Extract (*Etilingera elatior*) Against Heal Wounds of Mice (*Mus musculus*)

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Abstract. Torch ginger has a wide range of good antimicrobial, antioxidant, anticancer, larvicidal and repellent activities. Active compounds in Torch ginger that affect pharmacological activities are phenols, polyphenols, flavonoids, and terpenoids. Based on these ingredients Torch ginger can be used to heal wounds. This study aims to observe the effect of Torch ginger Umbut extract on wound healing in mice. This study hopes to add information about the effect of Torch ginger umbut extract on the healing of cuts in mice so that it can be another alternative for wound healing and can be a reference for other researchers. This study used a completely randomized design with 5 treatments and 3 replications. Tests carried out on adult male mice. The results showed that the optimal wound healing in P2 is treatment with 10% Torch ginger umbut extract which requires a range of wound healing 7-8 days. Based on these results, Torch ginger umbut extract can heal wounds.

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1. Introduction

Nowadays the use of medicinal plants has increased both traditionally and modernly. According to the World Health Organization (WHO), more than 80% of the world's population in developing countries uses medicinal plants for health efforts[1]. Many studies have been carried out using medicinal plants to cure diseases. As in Wulandari and Sumarmin (2018)[2] states that sambiloto extract (*Andrographis paniculata*) can reduce uric acid levels in mice. The other hands Fitri

et al (2017)[3] conclude that mangosteen peel extract could decreased uric acid level too. In addition, the use of medicinal plants is also carried out by using red betel leaves where the red betel leaf extract (*Piper croatum*) can reduce blood glucose levels in mice [4].

Torch ginger is native to Indonesia as evidenced by ethnobotany studies on the island of Borneo, where 70% of the species have other local names on the island. Torch ginger is included in the zingiberaceae family, this plant is known by various names including "kencong" or "kincung" in North Sumatra, "kecombrang" in Java, "honje" in Sunda, "bongkot" in Bali, "sambuung" in West Sumatra and "Kantan flower" in Malaysia. Western people call this plant a torch ginger or torch lily because of its torch-like flower shape and stunning red color. Some people also call it the Philippine waxflower or porcelain rose in reference to the beauty of its flowers [5].



Figure 1. Torch ginger (*Etlingera elatior*)

Torch ginger has a wide range of bioactivity as a good antimicrobial, antioxidant, anticancer, larvacide and repellent. Active compounds that generally affect pharmacological activity are phenols, polyphenols, flavonoids, and terpenoids. This pharmacological activity occurs with several mechanisms of action in overcoming disease [6]. Some areas in Indonesia, Torch ginger is generally used to increase breast milk, deodorant and is also used as a wound medicine [7]. Based on several studies, it is known that the Torch ginger plant (*Etlingera elatior*) can heal wounds. In Handayany's (2015) [8] study, the ethanol extract gel formula of Torch ginger flower was effective in healing cuts in rabbits and showed optimum wound healing effects. In Sagala's research (2016) [9] shows that Torch ginger flower extract has an effect in accelerating the healing of incisions.

Injury is a break in the continuity or anatomical connection of the tissue as a result of forced rudaism. According to Ermawan (2019) [10] wounds have several effects on the body, including loss of all or part of organ function, sympathetic stress response, bleeding and blood clots, bacterial contamination and cell death. In response to this damage, the body will try to repair damaged tissue through a wound healing mechanism [11]. Wounds will cause problems if they are not handled properly, causing the wound to be more chronic and become infected.

In general, the main treatment for giving wounds is generally in the form of debriment, irrigation, and also administration of antibiotics or antiseptics [12]. The antiseptic that is commonly used is povidone iodine, but the use of povidone iodine has side effects that must be considered such as irritation, sunburn, and skin discoloration due to the dye contained in povidone iodine [13].

Based on the above, a research was conducted with the title Effect of Torch ginger umbut extract (*Etilingera elatior*) on the healing of cuts in mice (*Mus musculus*). This study aims to determine how the effect of Torch ginger umbut extract (*Etilingera elatior*) on the healing of cuts in mice (*Mus musculus*.) as well as to determine the optimal concentration required for wound healing by the extract of Torch ginger Umbut. This research hopes to add information about the effect of Torch ginger tuber extract (*Etilingera elatior*) on the healing of cuts in mice (*Mus musculus*) so that it can be another alternative for wound healing and can be a reference material for other researchers.

2. Experimental Section

This experiment done as diagram below:

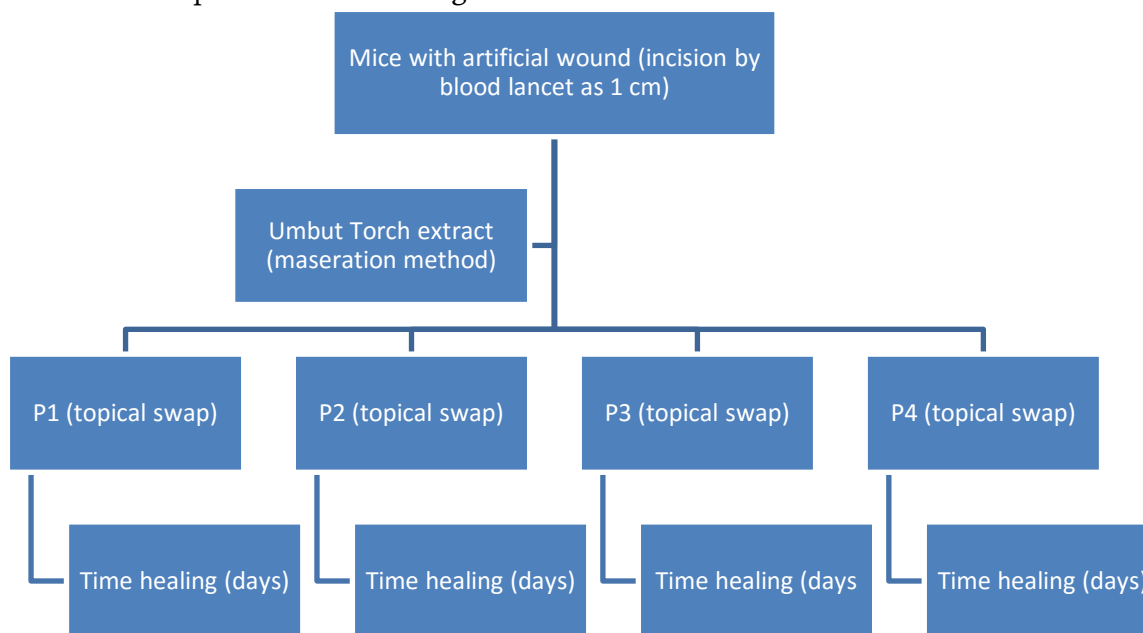


Figure 2. Scheme of experimental section

2.1. Tools and materials

The tools used in this study were mouse cages, rotary evaporator, razors, scalpels, erlenmeyers, measuring cups, spatulas, plastic wrap, cameras. The materials used in this study *Mus musculus* were 15 male, pellet feed, distilled water, rice husks, gauze, plaster, umbut extract of *Etilingera elatior*, methanol, and povidone iodine 10%.

2.2. Preparation of Test Material

Umbut *Etilingera elatior* used as research material obtained from Kerinci regency, Jambi. Umbut that has been taken is washed and then dried by being dried in the sun. Next, the dried shredded is weighed as much as 250 g, then placed in a glass bottle and macerated with methanol as much as 2.5 L or until the umbut is submerged.

The maceration container is closed and kept in a sun-protected place for 7 days while occasionally stirring. Then filtered, pulp and filtrate are separated. The filtrate was then concentrated by evaporation using a rotary evaporator until a thick extract of *Etlingera elatior* was obtained. Extracts obtained were diluted using 0.9% physiological NaCl according to the desired concentration.

2.2. Testing on Animals

The previously acclimated mice were anesthetized using chloroform, then the hair on the back to be injured was shaved. Subsequently injured with a scalpel with a length of 2 cm and a depth of 2 mm. The incision wound in group P0 is smeared with povidone iodine. In group P1 the wound was smeared with Torch ginger umbut extract with a concentration of 5%. In group P2 the wound was smeared with Torch ginger umbut extract with a concentration of 10%. In group P3 the wound was smeared with Torch ginger umbut extract with a concentration of 15%. And in group P4 the wound was smeared with Torch ginger extract with a concentration of 20%. The treatment is given once every 24 hours, then the wound is covered with gauze. Observations were made every day by measuring the length of the wound until the wound healed

3. Results and Discussion

Table 1. Time range of wound healing

Type Treatment	Time Range
P0	6-7 days
P1	8-9 days
P2	7-8 days
P3	6-7 days
P4	6-7 days

Based on further tests with DMRT, there were no significant differences between P0, P2, P3, and P4. It can be concluded that the effectiveness of Torch ginger umbut extract in wound healing is the same as the effectiveness of wound healing by povidone iodine 10%. (table 2)

Table 2. Further tests with DMRT

Type treatment	N	Subset for alpha = 0.05	
		1	2
P0	3	7.0000	
P4	3	7.0000	
P3	3	7.0000	
P2	3	7.3333	
P1	3		8.6667
Sig.		.321	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3.000.

The process of wound healing by Torch ginger umbut is influenced by the bioactivity of secondary metabolites found in Torch ginger umbut. The content of secondary metabolites such as Alkaloids, flavonoids, tannins, and saponins can act as anti-inflammatory and inhibit infection in wounds. So that the wound healing process can run optimally. The content of antioxidants found in Torch ginger umbut can also function as an immunomodulator so that it can increase the immune response.

The content of flavonoids is responsible through the mechanism of inhibiting free radical activity, and increasing the speed of epithelialization, ascorbic acid content supports the formation of collagen, which immediately after the wound, exposure to collagen fibrils to the blood will cause platelet aggregation and activation and release of chemotaxis factors which start the wound healing process [11].

Flavonoid compounds contain phenol compounds which have the ability to inhibit the formation of pathogenic fungal conidia, denature proteins and damage cell membranes so that it can be said that flavonoid compounds can act as antibacterial agents. According to Yenti (2011) [14], flavonoids can inhibit bacterial growth by damaging the permeability of bacterial cell walls, microsomes and lysosomes as a result of interactions between flavonoids with bacterial DNA and also being able to release energy transduction to the bacterial cytoplasmic membrane and inhibit bacterial motility. Besides the flavonoid content contained in Torch ginger umbut can function as an analgesic so as to reduce pain.

Tannins function as an astringent that can cause shrinking of the skin pores, harden the skin, stop exudates and bleeding mild, so that it can cover the wound and prevent bleeding that usually arises in the wound [15]. Tannins also function as antioxidants. The tannin content can function as an antiseptic that can prevent damage caused by bacterial and fungal infections. Saponins work by stimulating the formation of new cells, or called Growth Factor. Causing the multiplication and growth of blood vessel endothelial cells, vascular smooth muscle cells and fibroblasts, causing cellular growth which ultimately repair damaged blood vessel walls [16-34].

4. Conclusion

Based on the research that has been done, it can be concluded Torch ginger umbut extract (*Etilingera elatior*) can heal wounds in mice (*Mus musculus*) and extract concentration of 10% is sufficiently optimum in healing wound in mice (*Mus musculus*)

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