

Effect of *Ipomoea batatas* L. Leaves Extract on Percentage Healing of Traumatic Ulcer in Oral Mucosa (*Rattus norvegicus* Strain Wistar)

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ABSTRACT

Traumatic ulcer is a lesion common found in the oral cavity caused by trauma and can cause pain on eating, swallowing, and speaking. *Ipomoea batatas* L. leaf extract contains alkaloids, steroids, flavonoids, tannins, phenols, and saponins. The purpose of this study was to determine the effect of *Ipomoea batatas* L. leaves extract on wide and percentage healing of traumatic ulcer in oral mucosa. The true experimental laboratory with post test only control group design was confirmed in this research. Twelve male rats (*Rattus norvegicus*) 2-3 months weight between 200-250 grams is burnt on the lower labial mucosa during one seconds using burnisher to produce an ulcer. Width of ulcer was measured the day after thermal trauma and healing percentage of ulcer was measured the day after extract was applied. Extract was applicated twice a day in every morning and afternoon for 10 days. he result of oneway ANOVA analysis showed that *Ipomoea batatas* L. leaves extract has no significant effect on percentage healing of traumatic ulcer with value $p=0,285$ ($p \leq 0,05$). It was conclude that *Ipomoea batatas* L. leaves extract has no significant effect on percentage healing of traumatic ulcer in oral mucosa.

Keywords: Sweet potato leaves, Traumatic ulcer, Oral mucosa.

INTRODUCTION


Ulcers can be interpreted as the oral epitel lesion which cause the free nerve ending on lamina propria opened and cause pain to patients.¹ Traumatic ulcer can be caused by thermal trauma as consuming hot food and drink.²

Clinically, ulcers are varies, but generally appears as a single ulcer, pain, with the red surface or smooth and slight halo erythema.³ Traumatic ulcers often occur on the labial mucosa, buccal

mucosa, palatum, the tongue edge limit, etc.⁴ Traumatic ulcers can be healed without leaving scars in 6-10 days, spontaneously or after the causative factor is omitted.³

One of the alternatives treatment that has minimal side effects to overcome the traumatic ulcers is with the implementation of fitotherapy or therapy which using herbal plant.⁵ One of the herbal plants which are used to treat traumatic ulcers is the purple sweet potato leaves (*Ipomoea batatas* L.) Lamk).⁶ *Ipomoea batatas* L. leaves



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contain vitamin C and polyphenol which can catch free radicals to accelerate the ulcers healing.^{7,8} *Ipomoea batatas* L. leaves contain vitamin C, A, B₂, protein and iron so that can help the formation of new collagen fibers.^{9,10,11} *Ipomoea batatas* L. leaves has secondary metabolites namely flavonoid and tannin.¹² Flavonoid serves as the anti inflammatory by inhibiting the activity of Cyclooxygenase (COX) and Lipoxygenase enzymes so that can reduce inflammation and pain.^{13,14} Tannin is capable of forming a protective layer on the tissue which exposed to keep the wound from infection.¹⁵

This research aims to find out the effect of the *Ipomoea batatas* L. leaves extract on traumatic ulcers width and healing percentage on oral mucosa.

MATERIAL AND METHOD

This research is a laboratory experimental with *post test only control group* design. The samples which were used in this research were male Wistar rats (*Rattus norvegicus*) which were obtained from the Veterinary Faculty of Syiah Kuala University as much as 12 rats, divided into 3 groups consists of 4 rats of negative control group, 4 rats of positive control group and 4 rats of treatment group.

The tools which were used were *burnisher*, *stopwatch*, analytical balance, blender, measuring cup, *erlenmeyer*, *rotary evaporator*,

sieve, autoclave, prob UNC 15, tweezers, lamp and spiritus. The material which were used were mask, gloves, *Ipomoea batatas* L. leaves, 200-250 grams of male Wistar rats, *triamcinolone acetonide* 0,1%, chloroform, paper filter, aquadest, 2,5 ml *disposable micro applicators*, *syringe*, ethanol 96%, 0,1 ml *Ketamine hydrochloride*, 0,05 ml *Xylazine hydrochloride*, *aluminium foil* and alcohol 70%.

As much as 12 male Wistar rats (*Rattus norvegicus*) were kept for 1 weeks in a plastic cage sized 40 cm x 30 cm x 14 cm with rice husk covering the floor and the temperature was 24°C in the 12 hours dark-light cycle, and the water and food were available.^{16,17,18} Then, they were given an intramuscular injection anesthesia in the gluteus muscle with combination of 0,1 *Ketamine hydrochloride* and 0,05 ml (2gr/100 ml) *Xylazine hydrochloride* from each 100 gr of body weight with the aim that the animals did not feel the sensation of pain at the time of wound forming.¹⁹

Next, rats were given thermal trauma to create the traumatic ulcers by using *burnisher* which had been heated up on the heater fueled with spiritus for 60 seconds. The labial mucosa at the bottom of rats was clamped with tweezers, and then the hot *burnisher* attached on the labial mucosa at the bottom of rats for 1 second (depth reached one third of *burnisher*). The making of lesion was

Tabel 1: Traumatic Ulcers Healing Percentage

Day (%)	Aquadest Group	Triamcinolone acetonide 0,1% Group	Purple Sweet Potato leaves extract (<i>Ipomoea batatas</i> L.)
0	0,00	0,00	0,00
1	21,77	-8,96	15,16
2	30,90	-29,40	27,01
3	48,57	-28,49	29,90
4	78,06	48,14	51,88
5	65,48	29,59	73,19
6	88,78	60,97	84,85
7	86,71	79,12	91,21
8	95,75	79,12	94,87
9	97,11	95,59	98,22
10	100,00	100,00	100,00

characterized with white pale color, an area which was more sunken than the surrounding mucosa.¹⁶

In the treatment group, 0,13 ml of *Ipomoea batatas* L. leaves extract was given, positive control group was given *Triamcinolone acetonide* 0.1%, negative control group was given aquadest, which were applied topically to the whole ulcers' surface to exceed the ulcers' edge by using *disposable micro applicators* 2 times a day for 5 minutes in the morning and afternoon. Ulcers application and measurement were started from day 2 until day 11. After the research was complete, the trial animals Wistar rats were kept alive.

The measurement result of the control rats and treatment rats were analyzed statistically using SPSS program with 0,05 ($p < 0,05$) significant level and 95% ($\alpha = 0,05$) confidence level. The steps of hypothesis test are data normality test, variant homogeneity test and *One-way ANOVA* test.²⁰

Research results

Traumatic ulcers healing could be seen from the percentage increase of healing (Table 1)

Based on the normality test, the data was distributing normally ($p > 0,05$) on all groups. Homogeneity test showed that the data variance on all groups were the same. From the result, *oneway ANOVA* test could be used and showed that the purple sweet potato leaves extract did not affect the healing percentage of traumatic ulcers on oral mucosa with $p = 0,285$ ($p \leq 0,05$).

DISCUSSION

The cleanliness of the rat's mouth could not be controlled because it was supported by the dirty cage environment which could cause secondary infections. An infection can extend the healing of inflammatory process which has potential on lesion area enlargement.²¹ Tannin and fenol which are located in the *Ipomoea batatas* L. leaves extract may inhibit secondary infections caused by bacteria with denaturing the protein of bacterial cells, inhibiting the function of the cell membrane and the synthesis of nucleic acids.²² Flavonoid can also inhibit the growth

of bacteria by interfering the permeability of bacterial cell's wall which will cause the lysis on the cell.²³

The healing percentage of traumatic ulcers on *Ipomoea batatas* L. leaves extract group was faster compared with *Triamcinolone acetonide* 0,1% control and aquadest control group, due to saponin, flavonoid, and amino acids are in the extract. Saponin is able to inhibit erythema and edema, antimicrobials, affects collagen, also improving and strengthen the skin cells.²⁴ The role of flavonoid is as antiinflammatory, antioxidants and reducing the pain in case of bleeding or swelling.²⁵ Amino acids especially glutamine and arginine can decrease the mediator production of pro-inflammatory so that the healing will accelerate.^{26,27}

The healing of traumatic ulcers on the *Triamcinolone acetonide* 0.1% group was slower compared with aquadest group. *Triamcinolone acetonide* 0,1% is a glucocorticoid class which can reduce or prevent the issue responses against inflammatory responses by inhibiting macrophages and phospholipase A and by pressing IL-1 α on the inflammatory location.^{28,29} The inflammatory mediator inhibition can cause the healing process incomplete so that the traumatic ulcers healing becomes slower.³⁰

Triamcinolone acetonide 0,1% can eliminate pain by inhibiting the phospholipase A₂ enzyme which can cause arachidonate acid cannot be formed and the prostaglandin unformed. Prostaglandin plays a role in the inflammatory process, edema, local pain and redness.²⁹

Inflammatory pain is one of the forms which was useful for accelerating the issue damage repairment.³¹ This could make the aquadest group experiencing the healing of traumatic ulcers faster than *Triamcinolone acetonide* 0.1% due to aquadest could not eliminate pain.

CONCLUSION

Ipomoea batatas L. leaves extract did not affect the traumatic ulcers healing percentage on oral mucosa.

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