Analysis of traumatic ulcer healing time under the treatment of the Mauli banana (*Musa acuminata*) 25% stem extract gel

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ABSTRACT

Introduction: Traumatic ulcer is one of oral disorders that often occur. The prevalence is quite high, between 3-24% of population. Therapy of traumatic ulcer is symptomatic. People usually use Aloe vera extract gel. Previous research showed that the Aloe barbadensis milleer gel is equivalent with ethanol extract of 25% Mauli banana (*Musa acuminata*) stem in accelerating wound healing based on the number of macrophages and neovascular. The objective of the study is to find out the time difference of traumatic ulcer healing using 25% *Musa acuminata* stem extract gel compared to a gel containing Aloe vera extract. **Methods**: The research was post test design. Subjects were patients of Oral Medicine Installation in Gusti Hasan Aman Dental Hospital Banjarmasin with diagnosis of traumatic ulcer using completely random sampling method. Eight patients as samples were determined by the formula of Lemeshow. **Results**: there was no significant difference with p=0.724 (p>0.05) between healing time using Aloe vera gel and 25% Musa acuminata stem extract. **Conclusion**: At the concentration of 25% *Musa acuminata* stem extract gel concentration has the same healing time with Aloe vera gel, therefore can be recommended as a topical use for traumatic ulcer healing.

Keywords: *Musa acuminata* stem, healing time, traumatic ulcer

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INTRODUCTION

Traumatic ulcer is one of oral disorder that often occur, characterized by ulcerative lesions with loss of epithelial layer exceed the basal membrane.[1,2] The prevalence of traumatic ulcer quite high. Several research showed variation range 3-24% of population.[3] Oral ulcer will disrupt the process of mastication, resulting in nutrient intake disorders. Therapy in oral ulceration is symptomatic intended to reduce inflammation, pain, and accelerate lesion healing.[4,5]

The oral ulcer potentially degenerate into secondary infections, because there are many microorganisms inside the oral cavity. Microorganisms inside the oral cavity,so the treatment with topical medicine that contained antiseptic was needed to accleerate lesion healing. So far, people use Aloe vera extract gel to treat oral ulcers. Previous laboratorium test

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showed that Aloe vera extract gel was equivalent to ethanol extract of *Musa acuminata* 25% in accelerating wound healing in mice by observing the number of macrophages and neovascular.[6] Aloe vera extract gel is one of the topical antiseptic medicine used to cure oral ulceration in dentistry, but it is expensive and uneasy to find in some remote areas.

Clinically *Musa acuminata* stem extract capable to accelerate the healing of oral mucosal lesions in mice compared to Aloe vera extracts gel.[7] The ethanol extract of *Musa acuminata* 25% capable to accelerate the healing of oral mucosal incision lesions in mice by increasing the amount of neovascular on the 5 th day and declined on the 7th day.[6] Other research showed that the methanol extract of *Musa acuminata* stem extract was not toxic towards the BHK (Baby Hamster Kidney) fibroblast cells 21 at the concentration of 25%.[8] In oral administration, the methanol extract of 100% *Musa acuminata* stem extract between the dose of 125 mg/kg bw up to 1000 mg/kg bw, did not cause any toxic effects on the liver of mice.[9]

Information about the use of *Musa acuminata* stem still very limited. Until now, the studies about the use of *Musa acuminata* stem as a medicinal plant is still small. Various studies using *Musa acuminata* stem extract has been done both in vitro and in vivo.[6,7] Based on these descriptions, it is necessary to conducted clinical research to determine the traumatic ulcer healing time difference under the treatment with *Musa acuminata* stem extract gel compared to the treatment with Aloe vera extract gel.

METHODS

The research was post test only design. Subjects were patients of Oral Medicine Installation in Gusti Hasan Aman Dental Hospital Banjarmasin with diagnosis of traumatic ulcer using completely random sampling method. The inclusion criteria were aged 19-35 years old, not consuming antihistamines and corticosteroids for 1 week, and not suffering any systemic disease. Eight patients as samples were determined by the formula of Lemeshow.

Tools used in this study were cotton, cotton roll, sterile cotton, ruler, tweezers, and a dental mirror No. 4. The treatment group was given a 25% *Musa acuminata* stem extract gel for traumatic ulcer therapy, whilst the control group was given Aloe vera extract gel. The making of *Musa acuminata* stem extract gel was done by using ethanol with maceration method using a vacuum rotary evaporator under the temperature of 40-50ºC. This extract then made into gel preparations with concentration of 25%, applied topically on the ulcer traumatic and 3 times daily within a period of 6-8 hours each application until the traumatic ulcers healed.

RESULTS

Hypothesis test used was unpaired t test parametric. Based on the Shapiro-Wilk test ($p > 0.05$) and homogeneity of variance Levene's test ($p < 0.05$) obtained that data distribution was normal and data variance was not homogeneous.

In Table 1 shown traumatic ulcer healing time on group of *Musa acuminata* stem extract (MASE) application and group of Aloe vera (ALOE) application on daily basis. Traumatic ulcer healing criteria based on clinical manifestations that the lesions had recovered, had the same color with the surrounding tissue and no signs of inflammation.

Table 2 showed the average value of traumatic ulcer healing time in group of *Musa acuminata* stem extract (MASE) application was 6.88 days. The value longer than the group of Aloe vera (ALOE) application, which was 6.50 days.

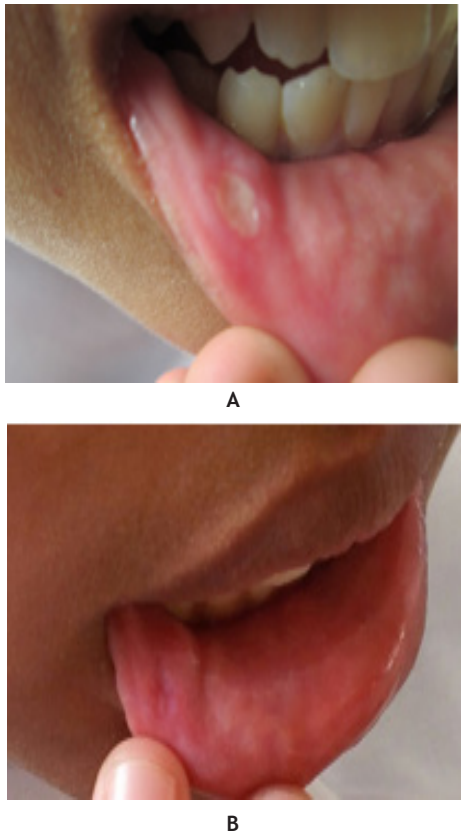
Tabel 1. Traumatic ulcer healing time

Patients	Time (Day)	Patients	Time (Day)
MASE 1	6	ALOE 1	5
MASE 2	9	ALOE 2	7
MASE 3	4	ALOE 3	4
MASE 4	9	ALOE 4	5
MASE 5	8	ALOE 5	10
MASE 6	7	ALOE 6	10
MASE 7	7	ALOE 7	6
MASE 8	5	ALOE 8	5

Tabel 2. Unpaired t test result of traumatic ulcer healing time

	Mean ± DS (day)	Mean difference (CI 95%)	P
MASE	6,88 ± 1,8	0,38 (1,9 - 2,6)	0,724
ALOE	6,50 ± 2,3		

Note: Unpaired t test, if $p<0.05$ = significant differences



A

B

Figure 1. Traumatic ulcer before (A) and after (B) medical treatment (Personal Doc.)

Figure 2. Lesions of traumatic ulcer (Personal doc.)

But based on significance value ($p>0.05$), the difference between the healing time of Aloe vera gel application and 25% of *Musa acuminata* stem extract was not quite significant. Traumatic ulcer healing showed in Figure 1 and Figure 2.

DISCUSSION

From the results obtained that traumatic ulcer healing time under the treatment of 25% *Musa acuminata* stem extract gel showed no significant differences with the treatment of Aloe vera gel. *Musa acuminata* stem extract contains bioactive ingredients especially tannins and saponin.[8] Condensed tannins having antioxidant effect that able to reduce the Reactive Oxygen Species (ROS), as proved in previous research that *Musa acuminata* stem extract can increase the activity of Super Oxide Dismutase (SOD) and catalase.[10] Terpenoids saponin has the effect of increasing the activity and amount of macrophages, thus *Musa acuminata* stem extract is a potential immunostimulator.[11]

Condensed tannins is the polymers of flavonoid compounds with carbon-carbon bond, which will increase the insulin receptor signaling. In a previous research showed that the insulin receptor can cause auto phosphorylation at TKD (Tyrosine Kinase Domain). The receptor of tyrosine kinase is a regulation key of cellular processes such as in proliferation and differentiation, survival and metabolism, migration, and cycle control.[12-14]

Musa acuminata stem extract also contains terpenoids saponin, such as bioactive compounds on the stem *Musa paradisiaca* (Ambon banana).[15] Terpenoids saponin increases the activity and amount of macrophages, which also occurs in *Centella asiatica* (gotu kola plant).[16]

Previous research showed that plants contain antioxidants are potential immuno-modulator. Immunomodulatory plants have the immunostimulator and immunosuppressants effects in accordance with the conditions that affected by the extract concentration.[17] *Musa acuminata* stem extract has antioxidant and immunostimulator nature that capable increasing the amount of macrophages and neovascular, so *Musa acuminata* stem extract classified as immunomodulatory plant. *Musa acuminata* stem extract capable to increase the amount of neovascular by angiogenesis process which is an instrumental part in the process of wound healing. This requires nutritional support to the cell metabolism, such as tannins and saponins. Approximately 60% of the granulation tissue consisting of blood vessels that need oxygen to blood vessels repairment and growth.[18]

The research results showed that the 25% of *Musa acuminata* stem extract gel application had no significant difference with Aloe vera extract gel application. This was because both the Aloe

vera extract gel and *Musa acuminata* stem extract gel contains the same compounds, which were tannins, saponins, and flavonoids, so these two substances had similar effects of accelerating wound healing time.

Previous research proved that the bioactive ingredients of *Musa acuminata* stem contains 67.59% tannins, 14.49% saponins, 0.34% alkaloids, 0.44% ascorbic acid, 0.25% flavonoids, and 0.006% lycopene. The main bioactive ingredients are tannins and saponins. Condensed tannins has the antioxidant effects that capable to reduce the Reactive Oxygen Species (ROS), as proved by previous research that *Musa acuminata* stem extract was capable to increase the activity of Super Oxide Dismutase (SOD) and catalase.[10] Terpenoids saponin has the effect of increasing the activity and amount of macrophages, thus *Musa acuminata* stem extract is a potential immunostimulator.[11]

CONCLUSION

At the concentration of 25% Musa acuminata stem extract gel concentration has the same healing time with Aloe vera gel, therefore can be recommended as a topical use for traumatic ulcer healing.

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