

The Effect of Binahong (*Anredera cordifolia*) 13% Leave Extract Gel on the Acceleration of Wound Healing Post Toot Extraction

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ABSTRACT

Tooth extraction is the act of removing a tooth from the socket in the alveolar bone. The wound healing process is divided into 4 continuous phases, namely hemostasis, inflammation, proliferation, and remodeling or maturation phases. Binahong leaf extract gel contains flavonoids, alkaloids, oleanolic acid, ascorbic acid, saponins and proteins used as antimicrobials. This study aims to determine that the binahong leaf extract gel has an effect on accelerating wound healing after tooth extraction. Binahong leaf extract gel was effective for accelerating wound healing after tooth extraction on the 10th day post test compared to the administration of povidone iodine, this was evidenced by the average inflammation control group of 0.81 seen from wound closure of 0.56 and the average intervention group seen from inflammation was 0.25 with p-value of 0.011 seen from wound closure of 0.13 with p-value of 0.010. As conclusion, giving binahong leaf extract gel 13% for 10 days has an effect on faster wound healing after tooth extraction compared to povidone iodine.

Keywords: post-tooth extraction wounds; binahong leaf extract gel

INTRODUCTION

Dental and oral health is an integral part of general health. A person who experiences dental and oral health problems will have an effect on general health. ⁽¹⁾ According to the 2018 National Basic Health Research results in the field of dental and oral health, the prevalence of dental and oral health problems is 57.6%. A total of 21 provinces have a prevalence above the national prevalence. The prevalence of people who have dental and oral problems is 23.4%. In Indonesia, the DMF-T index is 4.8 with the M-T (Missing Teeth) index is 3.9, meaning that from the average damage of 5 teeth per person, an average of 4 teeth are extracted per person. The percentage of MTI (Missing Teeth Index) in Indonesia is 79.6%, while the percentage of using fixed and removable dentures is only 4.5%. ⁽²⁾ Dental and oral health is a health problem that requires immediate treatment because it affects the body's condition. ⁽³⁾

Based on research at the Dental Polyclinic of the Kaluku Bodoa Health Center, Makassar City in 2020, the 35-44 year age group had the highest frequency of tooth extraction, namely 22 cases (29.3%), followed by the 25-34 year age group with 16 cases. (21.3%), age group 45-54 years as many as 12 cases (16%), age group 55-64 years as many as 10 cases (13.3%), age group 15-24 years as many as 8 cases (10.7 %), age group >65 years as many as 5 cases (6.7%). Meanwhile, the lowest frequency of tooth extraction was in the 10-14 year age group, as many as 2 cases (2.7%). ⁽⁴⁾

Tooth extraction is a process of removing teeth from their sockets caused by various factors, including severe cavities, broken teeth due to impact and toothache due to infection at the root, where the tooth can no longer be treated. Tooth extraction can also be a surgical procedure that involves hard and soft tissues in the oral cavity. ⁽⁵⁾

Healing after tooth extraction can take place naturally. Generally, wounds after tooth extraction can heal naturally as a form of the body's response to damaged tissue, but it is not uncommon to experience obstacles that can slow down the healing process such as infection, bleeding and dry socket. To get the anatomical integrity of the injured part and regain normal function, the wound healing process takes place. ⁽⁶⁾

The wound healing process consists of 4 phases, namely: (1) hemostasis phase which aims to stop bleeding and restore blood flow to the wound area; (2) inflammatory phase to remove damaged tissue and prevent bacterial infection; (3) the proliferative phase, namely the phase of formation of new blood vessels; and (4) the remodeling

phase is the phase that occurs the longest. In wound healing, tissue requires oxygen and nutrients in order to proliferate properly, so a process that can form new blood vessels from pre-existing blood vessels is needed, namely angiogenesis. Angiogenesis occurs in the proliferative phase and is one of the natural processes that is indispensable in wound healing and maintaining blood flow to tissues after injury. Good wound management will determine the end result of a good wound healing process. ⁽⁷⁾

Wound care after tooth extraction can be done pharmacologically and non-pharmacologically. Giving 10% povidone iodine as a pharmacological treatment contains chemicals so that if used continuously it can have a negative impact on body health, therefore it is necessary to treat wounds after tooth extraction using herbal ingredients that are safe for the human body which can accelerate wound healing after extraction. tooth.

With public awareness about the negative impact of chemical-based drugs, they began to return to treatment by using traditional medicines that are efficacious as drugs to treat various diseases that are not harmful to the body. One of the plants that has many benefits in treating disease is binahong leaf (*Anredera cordifolia*). Research on the antibacterial activity of Binahong leaves and their secondary metabolite content has been carried out, that the simplicia of binahong leaves contains alkaloids, polyphenols and saponins. ⁽⁸⁾

Plants that are efficacious as drugs contain important substances that play a very important role in determining the work activity of these medicinal plants, one of which is flavonoids which are generally found in plants as glycosides. Flavonoids are natural phenolic compounds that have potential as antioxidants. One of the interesting plants to study with active antioxidant content is binahong. Empirically, various benefits of binahong leaves (*Anredera cordifolia*) have been recognized, among others, to treat several diseases such as cuts, burns, cancer, and heart disorders. The chemical content of binahong leaf extract includes flavonoids, alkaloids, oleanolic acid, protein, ascorbic acid and saponins that can affect wound healing after tooth extraction and inhibit the growth of *Streptococcus* sp bacteria in the socket after tooth extraction. ⁽⁹⁾

Based on the results of the study, the binahong plant plays a role in the anti-inflammatory mechanism. Saponins found in binahong leaves are able to prevent infection in wounds and activate growth factors. Alkaloids in binahong leaves are anti-bacterial so that they can indirectly affect the wound healing process. Ascorbic acid is able to increase the body's resistance to infection, play a role in mucosal maintenance, accelerate healing and as an antioxidant. The study also explained that the optimal concentration of binahong plant extract without causing irritation was 5%. ⁽¹⁰⁾

Based on previous research, binahong leaf extract was used as a post-extraction treatment with experimental animals as research subjects, with a concentration of 5%. So it is necessary to do research on humans with a concentration of 13%.

The purpose of this study was to prove that the administration of 13% binahong leaf extract gel (*Anredera cordifolia*) could have an effect on accelerating wound healing after tooth extraction, compared to 10% povidone iodine.

METHODS

The design of this research was post test only with control group. In this design, the research object was divided into two, namely the control group and the treatment group. The selection of these two groups was done randomly. The study was designed to compare the effectiveness of wound healing after tooth extraction in the group given binahong leaves with a concentration of 13% (treatment group / A) and the group given 10% povidone iodine (control group / B).

The population of this study were patients who had their teeth extracted at the Lembanna Health Center, Kajang Health Center and Tanete Health Center, Bulukumba Regency, Indonesia. The respondent's criteria include: having a wound after tooth extraction, not having an allergy to drugs, having received antibiotic therapy, being willing to fill out informed consent, and not having a disease that can interfere with wound healing such as diabetes mellitus. The sample size was 32 patients determined using the Lemeshow formula, which was further divided into the treatment group and the control group, each of which was 16 patients.

In the pre- and post-treatment phases for both groups, wound inflammation and wound closure were measured. The instrument used in this measurement is an observation sheet in the form of a checklist, which includes signs of redness around the wound area, edema around the wound area, inflammation and closing of the wound after tooth extraction.

After the data were collected, descriptive analysis was then performed to describe inflammation and wound closure, in the form of mean, mode, and standard deviation. ⁽¹¹⁾ Furthermore, a comparative test was conducted to compare the inflammation and wound closure between the treatment group and the control group. Friedman test was used to compare wound healing on the third, seventh and tenth days. Meanwhile, the Mann-Whitney test was used to compare wound healing between the treatment group and the control group.

This research has applied the ethical principles of health research which include informed consent, confidentiality, anonymity, justice and beneficency.

RESULTS

Confounding Variables Test

Table 1. The results of testing the confounding variables in the treatment group and control group

Variable	Treatment group	Control group	p-value*
Age			
< 35	9	8	0.723
≥ 35	7	8	
Oral hygiene			
Brush teeth 2 times a day	12	11	0.694
Brush teeth <2 times a day	4	5	
Smoking status			
Smoking	3	4	0.669
Not smoking	13	12	

*Chi Square

Table 1 shows that the p-value for all confounding variables is > 0.05. Thus it can be said that all confounding variables were homogeneous or there was no difference in age, oral hygiene and smoking habits between the control group and the treatment group.

Normality Test

The data normality test was conducted to determine whether the data for each variable was normally distributed or not. The results of the data normality test are used to determine the statistical test used. If the data is normally distributed, then parametric statistics can be selected, whereas if the data is not normally distributed, then non-parametric statistics must be used. In this study, the sample size was <50, so the normality test used was Shapiro Wilk.

Table 2. Normality test of wound inflammation data after tooth extraction in the control group and the treatment group

Wound inflammation after tooth extraction	Control group		Treatment group	
	Mean+SD	p*	Mean+SD	p*
Post test day-3	3.75 ± 0.931	0.032	2.88 ± 0.619	0.001
Post test day-7	2.25 ± 0.683	0.001	1.38 ± 0.719	0.001
Post test day-10	0.81 ± 0.655	0.002	0.25 ± 0.447	0.000

Shapiro Wilk

Table 2 shows that the wound inflammation data after tooth extraction in the control group and the treatment group were not normally distributed, so the comparison test had to use non-parametric statistics.

Table 3. Normality test of wound closure after tooth extraction in the control group and the treatment group

Wound closure after tooth extraction	Control group		Treatment group	
	Mean+SD	p*	Mean+SD	p*
Post test day-3	1.75 ± 0.447	0.000	1.31 ± 0.479	0.000
Post test day-7	1.19 ± 0.544	0.000	0.63 ± 0.500	0.000
Post test day-10	0.56 ± 0.512	0.000	0.13 ± 0.342	0.000

Shapiro Wilk

Table 3 shows that the wound closure data after tooth extraction in the control group and the treatment group were not normally distributed, so the comparison test had to use non-parametric statistics.

Differences in Wound Inflammation after Tooth Extraction between Control Group and Treatment Group

Table 4. The results of the difference in wound inflammation after tooth extraction between the control group and the treatment group

Time	Control group Mean±SD	Δ Mean	Treatment group Mean±SD	Δ Mean	p-value*
Post test day-3	3.75 + 0.931	1.5	2.88 + 0.619	1.5	0.006
Post test day-7	2.25 + 0.683	1.13	1.38 + 0.719	1.44	0.002
Post test day-10	0.81 + 0.655		0.25 + 0.447		0.011

Mann-Whitney*

Table 4 describes wound inflammation after tooth extraction using binahong leaf extract gel and povidone iodine on post test day 3, post test day 7 and post test day 10. Differences in wound inflammation after tooth extraction were analyzed using the Mann-Whitney test. On day 3, day 7 and day 10, there was a difference in the value of wound inflammation with $p < 0.05$, which were 0.006, 0.002 and 0.011, respectively.

Differences in Wound Closure after Tooth Extraction between Control Group and Treatment Group

Table 5. The results of the difference in wound closure after tooth extraction between the control group and the treatment group

Time	Control group Mean±SD	Δ Mean	Treatment group Mean±SD	Δ Mean	p-value*
Post test day-3	1.75 + 0.447	0.56	1.31 + 0.479	0.68	0.015
Post test day-7	1.19 + 0.544	0.63	0.63 + 0.500	0.50	0.007
Post test day-10	0.56 + 0.512		0.13 + 0.342		0.010

Mann-Whitney*

Table 5 describes wound closure after tooth extraction using binahong leaf extract gel and povidone iodine on post test day 3, post test day 7 and post test day 10. Differences in wound closure after tooth extraction were analyzed using the Mann-Whitney test. On day 3, day 7 and day 10, there was a difference in the value of wound inflammation with $p < 0.05$, which were 0.015, 0.007 and 0.010, respectively.

DISCUSSION

This study was conducted on respondents who generally have their permanent teeth extracted. Most of the mandibular posterior teeth were extracted without complications. In this study, respondents did not experience complications and complications because most of the respondents were adults, thus giving a positive and cooperative response in research activities. In this age group, respondents were more cooperative and did not interfere or affect the relationship between the treatment given and the wound healing process.

In general, respondents have good oral hygiene, which can help reduce sources of infection and create a sense of comfort. ⁽¹²⁾

The proportion of respondents with smoking habits is relatively small, so that the smoking behavior variable does not interfere with the relationship between treatment and wound healing. The local effects of smoking on dental and oral health include: causing inflammation of the gums, periodontal disease, root caries, loss of alveolar bone, tooth loss, and is associated with the appearance of typical lesions on the soft tissues of the oral cavity, as well as vasoconstriction of blood vessels, so that it can reduce the activity of PMNs, reduces blood flow and gingival crevicular fluid, which results in decreased supply of oxygen and nutrients to the tissues, which in turn can inhibit wound healing. ^(13,14)

Based on the results of the study, on day 3, it was seen that the group given the binahong leaf extract gel still experienced wound inflammation after tooth extraction, namely redness around the wound, swelling and presence of pus; In addition, the wound is smaller but has not closed. Meanwhile the group that was given povidone iodine also still experienced inflammation with worse wound conditions, namely redness around the wound, swelling, presence of pus and pain; other than that the wound has not closed.

On the 7th day, the inflammation in the group given the binahong leaf extract gel decreased, namely there was still redness and swelling; while the wound has shrunk but has not closed. Meanwhile, in the group that was given

povidone iodine, the new epithelial tissue formed matured and a new layer of corneum appeared, with wound shrinking and closure.

On the 10th day, the inflammation of the group given the binahong leaf extract gel had disappeared; and the wound has shrunk and closed. Meanwhile, the group given povidone iodine also no longer experienced inflammation; while the wound has also shrunk and closed.

Although the progress of wound healing in both groups progressed well, scores of inflammation and wound closure were better in the group given the binahong extract gel. In addition to its anti-inflammatory effect, binahong leaf gel can also increase various growth factors involved in wound healing, increase fibroblast proliferation and migration and have antibacterial effects.⁽¹⁵⁾ Fibroblasts and vascular endothelial cells will begin to proliferate and within three to five days granulation tissue will form as a sign of healing. Fibroblast proliferation at the wound healing stage indicates a gradual healing process. From a study conducted on 20 *Cavia cobaya* guinea pigs by giving binahong leaf gel, the results showed that there was an increase in the number of fibroblast cells in the group given 5% binahong leaf gel treatment. Oleanolic acid which functions as an anti-inflammatory, antibacterial and antioxidant has been shown to stimulate fibroblast cells and fibronectin cells.⁽¹⁶⁾

CONCLUSION

Based on the results of the study, it was concluded that the binahong leaf extract gel was very effective for healing wounds after tooth extraction

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