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The Effectiveness of Turmeric Powder (*Curcuma Longa*) on Wound Healing in White Rat (*Rattus Novergicus*)

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Abstract

Background and aim: Wounds are the loss or damage of some body tissues. The wound healing process which then occurs in damaged tissue can be divided into three phases, namely the inflammatory phase, the proliferation phase and the phase of remodeling, which is the re-modeling of the tissue. One of the nutritious medicinal plants used by the community is turmeric (*Curcuma longa*) is one of the medicinal plants that has benefits and uses quite a lot. The main compounds contained in turmeric rhizome are essential oils and curcuminoids. Curcuminoid has anti-inflammatory, antitumor promoter, antioxidant, antimicrobial and antiviral effects. This study aims to determine the effect of topical administration of turmeric (*Curcuma longa*) powder on wounds in white rats (*Rattus novergicus*).

Materials and methods: Research with the title Effectiveness Test of Giving Turmeric (*Curcuma longa*) Powder on Wound Healing in White Rats (*Rattus novergicus*) is a type of experimental research with clinical trial design to determine whether turmeric can heal wounds in white rats.

Results: From the results of the data analysis showed a significant comparison between turmeric (*Curcuma longa*) powder and 0.9% NaCl solution. But based on the assessment of the reduction in wound length using a graph there is a comparison between the two. Where wound healing in the group given turmeric (*Curcuma longa*) powder was slower than the group given 0.9% NaCl solution.

Conclusion: Giving turmeric (*Curcuma longa*) powder is effective in accelerating wound healing but slower when compared with 0.9% NaCl solution in incisions.

Keywords: *Curcuma Longa, NaCl 0.9% Solution, Rattus Novergicus, Wounds*

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Introduction

A wound is a condition that is often experienced by everyone, whether it is of mild, moderate or severe severity. The wound is the loss or destruction of some body tissue. This situation can be caused by trauma to sharp or blunt objects, changes in temperature, chemicals, explosions, electric shocks or animal bites. Wounds are damage or breakage of the integrity of the tissue caused by physical or mechanical means. Each wound causes inflammation, which is the body's reaction to injury. With so many wound incidents, knowledge about wound healing and management is indispensable in medical practice [1], [2].

The wound healing process which then occurs in the damaged tissue can be divided into three phases, namely the inflammatory phase, the proliferation phase and the remodeling phase, which is the re-creation of the tissue. Wound healing is a process of repair or reconstitution of a defect in an organ or tissue that is very complex and dynamic and is not limited to the location of the wound, but also affects the entire organ system in the body, both at the physical, cellular and molecular levels. . Trauma or other causes that cause injury will activate systemic processes that change the physiological state of the body, regardless of the location of the wound and cause metabolic and cellular processes that influence each other [1]. The wound healing process follows a pattern that can be divided based on cellular population and biochemical activity into: the inflammatory phase, the proliferation phase, and the remodeling phase. All types of wounds need to go through all three phases in order to restore tissue integrity. From this perspective, the response to injury is a very complex physiological process in the human body. The importance of optimal wound management has encouraged the rapid development of knowledge about wounds, healing, and wound management [1], [3], [4].

Wound healing is needed to regain intact body tissue. Several factors play a role in accelerating healing, namely internal factors and external factors. External factors that can accelerate wound healing and namely by wound irrigation using physiological solutions (0.9% NaCl) and the use of synthetic and natural drugs. In modern times, much has been learned about the wound healing process and some of the factors that get in the way of it. The herbal medicine that is often used by the community to heal wounds is turmeric (*Curcuma longa*) [3]. Traditional medicine is a treatment medium using natural ingredients from plants as raw materials [6]. Turmeric (*Curcuma longa*) is a medicinal plant that has quite a lot of benefits and uses such as in healing wounds, gastric pain (ulcers) and herbal medicine on cancer. The main compounds contained in turmeric are essential oils and curcuminoids. Essential oils contain sesquiterpenes alcohol, turmerone, and zingiberen, while curcuminoids contain curcumin compounds and their derivatives which include desmetoxy-curcumin and bidesmetoxy-curcumin. Curcumin has anti-inflammatory, anti-tumor, antioxidant, antimicrobial, and antiviral effects. In addition, the curcumin in turmeric also plays a role in increasing the body's immune system.

Material and Methods

The study with the title "Testing the Effectiveness of Giving Turmeric Powder on Wound Healing in Rats" is an experimental type of research with a clinical trial design to determine whether turmeric can heal cuts in mice. In this study, the test animals used were male rats (*Rattus norvegicus*) 3-4 months old and weighing 200 to 250 grams. Selection of 3-4 months of age because the age range represents adult age in mice. The selection of male sex was carried out to avoid hormonal influences that generally occur in female mice. The rats that were included in this study were rats of good general health with the characteristics of glowing eyes, hair that did not stand up, and active behavior. Mice showing signs of illness were excluded [2], [3].

Results

Incision wounds were performed on the backs of white rats with the same size for each mouse in the 3 groups. The size of the incision wound is 3 cm long. The assessment of wound healing was carried out by measuring the length of the wound using an elastic gauge so that it could follow the body shape of a white mouse. Measurement of length uses a butterfly brand metline gauge in centimeters (cm). On day-1, it was clear that the comparison of wound healing in each group was clear. From day-1 to day-6, it was seen that the group that was given a positive control as comparison had a faster rate of healing compared to turmeric powder and a negative control (without treatment). On day-6 the average wound length of the group that was given positive control was 8.00 ± 0.14 while the group of mice given turmeric powder had an average of 12.4 ± 0.18 and the negative control group had an average of 21.8 ± 0.16 .

The results of the one way ANOVA test showed that the group that was given treatment using positive control, turmeric powder and negative control had different changes in the length of the wound that was different every day. But in the group given positive control compared to the untreated or negative control group there was a difference in changes in the length of the wound every day where the p value was <0.05 , so it can be concluded that positive control is proven to accelerate wound healing when compared to negative controls. Meanwhile, for turmeric powder compared to the negative control group, there were differences in wound length on the 2nd, 4th, and 6th day where the p value was <0.05 . Then when compared between the positive control group and those given turmeric powder there was also a difference in the length of the wound on the 4th, 5th, and 6th day with the test results showing a p value <0.05 on that day. Differences in wounds from day to day in each group. The negative control group had a significant change in wound length on day 1 to day 5 as compared to day zero. This is evidenced by the p value <0.05 .

In the group that was given a positive control, there was a change where there was significant wound closure on the first, second, and fourth days which was marked with a p value <0.05 . While the group that was given turmeric powder experienced significant changes in wound length on the first, second, fourth, and fifth days which had a p value <0.05 . When we compare the changes in wound length of each group, the group that was given positive control had a higher shortening of wound length than the turmeric powder group and the negative control group. With an average shortening of the wound length of 2.2 mm (NaCl 0.9%), 1.76 mm (turmeric powder, and 0.18 (negative control) were compared from day zero to day 6. This indicates that the control positive was more effective in the wound healing process followed by turmeric powder and negative control.

Discussion

Wounds given to white rats will undergo a healing process marked by shortening the length of the wound from the first day to the last day. The wound healing process is divided into phases, namely the inflammatory phase, the proliferation phase and finally the remodeling phase. The inflammatory phase occurs on day 0-5 then the proliferation phase occurs on day 3 to day 14 while the maturation or remodeling phase lasts from day 7 to 1 year. Positive control has an effective wound healing [5]. Therefore positive control is often used in the wound care process. Due to positive control, the composition of the liquid is in accordance with the composition of the body fluids. Apart from positive control, this study also proved that turmeric powder also has the ability to treat acute inflammation. The content of turmeric powder (curcuminoid) shows an anti-inflammatory effect by inhibiting the synthesis and release of inflammatory mediators such as prostaglandins, histamine and serotonin. Thus accelerating the wound healing process [6].

It is suspected that the compounds that play a role in producing anti-inflammatory effects are curcuminoids (curcumin). In addition to the anti-inflammatory effects, the content of turmeric powder (curcuminoids) also has other effects, namely antioxidants, anti-microbial, anti-fungal, and cancer cell inhibitors. So that these benefits can protect wounds and speed up the wound healing process. From the results of the average length of the wound, the length of the wound from day to day 1 shows that the three groups given the treatment experienced a wound healing process marked by a reduction in the length of the wound from each group. In the group given turmeric powder, the average wound closure was better than the negative control group. Then in this study the positive control also had a better average wound closure than the negative control.

However, if the group given turmeric powder was compared to the positive control group, the results of this study showed that the positive control was more effective in the wound healing process compared to turmeric powder because in the group given positive control the level of wound length shortening was much faster than turmeric powder. This is not in accordance with the research conducted at the University of Surakarta with the title "Testing the Effectiveness of Turmeric Extract in Accelerating the Wound Healing Process in Male Rats". Where in this study shows that there is a relationship between turmeric powder extract and wound healing in rats. The difference between the results of the previous study and the results of this study may be due to the inequality of the turmeric preparations given. Where in this study only turmeric powder is used which is often used in everyday life, thereby increasing the possibility of confounding factors (less hygienic) that cause the results between this study and previous studies to differ [9].

Conclusion

Based on the results of my research on the effectiveness of giving turmeric powder on the healing of cuts in rats, it is concluded that: Turmeric powder has a significant effect on the healing of cuts in rats. Based on the data and statistical tests obtained, turmeric powder can affect the average wound length shortening in rats reaching 17.6 mm, where on the 1st, 2nd, 4th, and 5th days have $p < 0.05$. In this study, the positive control (NaCl 0.9%) used also had a significant effect on wound healing in mice. Based on the data and statistical tests obtained, the positive control showed an average wound shortening which reached 2.2 mm, where on the 1st, 2nd, 4th day had a p value < 0.05 . For negative control (without treatment) in this study. Based on the data and statistical tests carried out, it was found that the average wound shortening was only 0.18 mm where on days 1 to 5 had a p value < 0.05 . The comparison between turmeric powder, positive control, and negative control in this study showed that each group had a different effect where the positive control used showed more effectiveness in the wound shortening process than turmeric powder and negative control [11]. However, between the turmeric powder and the negative control showed that the effectiveness of turmeric powder had more influence on the shortening rate of wounds in mice.

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Conflict of interests

The authors state that there are no conflicts of interests regarding the publication of this paper.

Reference

- [1]. Jong WD, Sjamsuhidajat R. Buku ajar ilmu bedah. Edisi ke-2, Jakarta: Penerbit Buku Kedokteran–EGC. 2004.
- [2]. Tambayong J. Patofisiologi untuk keperawatan. EGC.
- [3]. Barbul A, Efron D. Wound Healing in Schwartz principle of surgery 9th ed. McGrawHill. New York. 2010:210-9.
- [4]. Galiano RD, Tepper OM, Pelo CR, Bhatt KA, Callaghan M, Bastidas N, Bunting S, Steinmetz HG, Gurtner GC. Topical vascular endothelial growth factor accelerates diabetic wound healing through increased angiogenesis and by mobilizing and recruiting bone marrow-derived cells. *The American journal of pathology*. 2004 Jun 1;164(6):1935-47.
- [5]. Adam JS, Alexander BD. Current management of acute cutaneous wound. *N Engl J Med*. 2008 Sep 4;359:1037-46.
- [6]. Cruse PJ, McPhedran NT. Wound healing and management. In: Sabiston DC (ed) *Essentials of surgery*. 1995.
- [7]. Ide P. Health Secret of Turmeric (Kunyit). *Elex Media Komputindo*; 2013 Feb 13.
- [8]. Kartika RW. Perawatan luka kronis dengan modern dressing. *Cermin Dunia Kedokteran*. 2015 Jul 1;42(7):546-50.
- [9]. Harper D, Young A, McNaught CE. The physiology of wound healing. *Surgery (Oxford)*. 2014 Sep 1;32(9):445-50.
- [10]. Tariq A, Shahzad A, Ijaz M, Akbar Z. Effectiveness of tetrachlorodecaoxide compounds in the healing of mandibular fracture. *Journal of Advanced Veterinary Research*. 2014 Jul 1;4(3):152-3.
- [11]. Orsted HL, Keast DK, Janet Kuhnke BS, Armstrong P, Attrell E, Beaumier M, Landis S, Mahoney JL. Prevention and Management of Open Surgical Wounds. *Wound Care Canada*. 2010;8(1):6.
- [12]. Ziemba R. First aid in cases of wounds, fractures, as well as thermal and chemical burns. *Mil Pharm Med*. 2012 Apr:15-24.