

## Article

# The Effectiveness Of Giving Calendula Oil On Wound Healing In White Rats (*Rattus Norvegicus*)

Heny Noor Wijayanti<sup>1</sup>, Yana Luthfiyati<sup>2</sup>

<sup>1</sup>Midwifery Departement, Respati University Yogyakarta, Yogyakarta Indonesia

<sup>2</sup>Midwifery Departement, Respati University Yogyakarta, Yogyakarta Indonesia

## SUBMISSION TRACK

Received: 1 November 2021

Final Revision: 2 December 2021

Available Online: 27 December 2021

## KEYWORDS

Calendula Oil, Wound Healing, White Rats

## CORRESPONDENCE

Phone: 081511582083

E-mail : [henywijayanti@respati.ac.id](mailto:henywijayanti@respati.ac.id)

## ABSTRACT

**Research Background :** In the process of childbirth, there is often a tear in the birth canal, especially in the perineum, which is known as a ruptured perineum. Some herbal ingredients that are thought to be healing wounds are nyamplung seed oil/tamanu oil (*Calophyllum inophyllum* L.), red ginger oil (*Zingiber officinale* var *rubrum*) and marigold flower oil/calendula oil (*Calendula officinalis*). Calendula ointment has the benefit of healing episiotomy wounds faster than the use of povidone iodine.

**Research Objective:** To determine the effectiveness of giving calendula oil herbal ingredients to wound healing in female white rats.

**Research Methods:** Laboratory experimental research using a completely randomized design using the Post Test Only Control Group Design pattern. The population in this study were female white rats (*Rattus norvegicus*). The sample selection was used by simple random sampling. Univariate analysis of wound healing was performed to obtain the mean  $\pm$  SD and bivariate analysis using one-way ANOVA using computer software.

**The results of the study:** The results of statistical tests showed that the One way Anova test obtained p value = 0.000 with a value of  $\alpha = 0.05$  ( $p < \alpha$ ) where the administration of Calendula Oil on white rat wounds was more effective than without treatment.

**Conclusion:** Based on the results of the study, it can be concluded that giving calendula oil to female white rats is effective in healing wounds.

## I. INTRODUCTION

In the process of childbirth, there is often a tear in the birth canal, especially in the perineum, which is known as a ruptured perineum. Perineal rupture like a wound in general if not treated properly will result in various disorders (Mochtar, 2012).

Perineal tears are one of the medical problems that require special skin care therapy. Some herbal ingredients that are thought to be healing wounds are nyamplung seed oil/tamanu oil (*Calophyllum inophyllum* L.), red ginger oil (*Zingiber officinale* var *rubrum*) and marigold flower oil/calendula oil (*Calendula officinalis*). Calendula ointment has the benefit of healing episiotomy wounds faster than the use of povidone iodine (Eghdampour, 2013).

*Calendula officinalis* has many pharmacological properties, such as being used for the treatment of skin disorders, pain and also as a bactericidal, antiseptic and anti-inflammatory. Pot marigold flower (*Calendula officinalis*) is a flower that grows in the Mediterranean area with a height of 61 cm, leaf length reaching 15 cm, and flowers 10 cm in diameter. This unique orange and yellow flower produces calendula oil which is useful in the cosmetic industry and is believed to have wound healing properties. The flavonoids and saponins in calendula prevent the release of harmful enzymes and histamine that cause sensitivity and inflammation and heal redness and pain, inhibiting the expansion of plasma in tissues by reducing capillary permeability. The anti-inflammatory effect is due to the triterpenoid content by reducing the immigration of white blood cells to the inflamed area. In an animal study, calendula stimulated granulation and increased glycoprotein and collagen (Nuraini, 2017).

There is some evidence of the effectiveness of using *Calendula officinalis* extract for the management of skin wounds. The data presented in this review support further studies on the use of ointments containing *Calendula officinalis* extract during wound healing. *Calendula officinalis* can prevent wound complications because it contains secondary metabolites, which can support wound healing. The butanol fraction of *Calendula officinalis* has significant genetic and environmental independent properties, but the increasing prevalence of myopia over the last century in certain societies has radical scavenging and antioxidant activity (Sihotang, 2021).

*Calendula officinalis* flowers are believed to be useful in reducing inflammation, wound healing, and as an antiseptic, used to treat various skin diseases, from skin ulcers to eczema. Internally *Calendula officinalis* has been used for heartburn and inflammation. Flavonoids, which are found in high amounts in *Calendula officinalis*, are responsible for its anti-inflammatory activity; triterpene saponins may also be important. *Calendula officinalis* is also known to contain carotenoids that have other functions (Shafeie, 2015).

The use of essential oils for wound healing as an alternative/complementary therapy has been scientifically proven on several herbal ingredients, but for calendula oil there has not been much research. Therefore, more research is needed in the laboratory before being tested directly on human skin. The test will be carried out on female white rats (*Rattus norvegicus*). The purpose of this study was to determine the effectiveness of giving calendula oil herbal ingredients to wound healing in female white rats.

## II. METHODS

**Design** This research is a laboratory experimental study that uses a completely randomized design using the Post Test Only Control Group Design pattern. The population in this study was a female white rat (*Rattus norvegicus*) obtained from the Center for Food and Nutrition Studies UGM

Yogyakarta. The sample selection was used by simple random sampling. Univariate analysis of wound healing was performed to obtain the mean  $\pm$  SD and bivariate analysis using one-way ANOVA using computer software. Hypothesis testing using a significance value of  $p$  value  $<0.05$ .

### III. RESULT

#### Homogeneity Test

**Table 1. White Rat Body Weight Before Treatment**

Treatment group	N	White rat body weight (gram) $\bar{X} \pm SD$	P value
Kontrol	4	173,75 $\pm$ 3,86	0,150
Calendula Oil	4	173,00 $\pm$ 4,24	

Based on the results of the homogeneity test of the average body weight of rats before treatment between groups, there was no difference in body weight of rats between groups with  $p$  value  $\alpha=0,150$  ( $p < \alpha$ ). This shows that the weight data of rats in the control group and calendula oil is homogeneous so that the experimental research requirements are met and the research can be continued.

**Table 2. Length of Wound Before Treatment**

Treatment group	N	wound length (cm) $\bar{X} \pm SD$	P value
Kontrol	4	1 $\pm$ 0,00	0,00
Calendula Oil	4	1 $\pm$ 0,00	

Based on the results of the homogeneity test, the average length of the wound before treatment in all groups had a wound length of 1 cm.

**Table 3. Day to 4 Wound diameter**

Treatment group	N	Wound length (cm) $\bar{X} \pm SD$	P value homogeneity test	P value Anova test
Kontrol	4	0,94 $\pm$ 0,038	0,252	0,04
Calendula Oil	4	0,90 $\pm$ 0,012		

Based on the table above, the results of the homogeneity test  $p$  value 0.252 and the one way ANOVA test obtained a  $p$  value  $\alpha=0,04$  ( $p < \alpha$ ), then the ANOVA test results can be used. This indicates that there are differences in the average wound healing in each group of rats.

**Table 4. Day to 8 Wound diameter**

Treatment group	N	Wound length (cm) $\bar{X} \pm SD$	P value homogeneity test	P value Anova test
Kontrol	4	0,82 $\pm$ 0,056	0,056	0,00
Calendula Oil	4	0,70 $\pm$ 0,012		

The table above shows homogeneous data so that the results of statistical tests using the One way Anova test can be used, where the  $p$  value = 0.000 with a value of  $\alpha=0,05$  ( $p < \alpha$ ) shows that there is a difference in wound diameter on day 8 between treatment group.

**Table 5. Percentage of Wound Healing**

Treatment group	N	Percentage of wound healing (cm) $\bar{X} \pm SD$	P value homogeneity test	P value Anova test
Kontrol	4	5,50 $\pm$ 3,87		
Calendula Oil	4	29,5 $\pm$ 1,29	0,326	0,00

The results of statistical tests using the One way Anova test obtained p value = 0.000 with a value of  $\alpha=0,05$  ( $p<\alpha$ ) this shows that there is a difference in the percentage of wound healing between treatment groups. In the table above, it can also be seen that the percentage of wound healing was 29.5% in the group given Calendula Oil. So giving Calendula Oil to white rat wounds was more effective than without treatment.

#### IV. DISCUSSION

The table for wound healing on day 4 shows that the average wound diameter on day 4 has not shown a significant difference in each group. this is reasonable because on day 4 the wound is in the early inflammatory and proliferative phase, namely the wound healing phase characterized by collagen synthesis. Collagen synthesis begins within 24 hours of injury and peaks on day 5 to day 7, then decreases slowly (Sjamsuhidajat, 2015).

Day 8 in the wound healing process is the maturation phase. According to (Sjamsuhidajat, 2015), said that the maturation phase is a maturation process consisting of re-absorption of excess tissue, there will be a shrinkage of the wound area according to the force of gravity and finally the re-formation of the newly formed tissue.

In the percentage of wound healing, Calendula oil was found to be more effective than not treated. The initial phase in wound healing is the inflammatory phase (Sjamsuhidajat, 2015). In this inflammatory phase, the wound is inflamed to prevent infection in the wound. The antiseptic properties of ginger oil play a role in this phase. Recently, wounds in mice treated with a flattened gel phase emulsion (LPG) prepared from: Calendula officinalis oil completely regenerated the epithelium within 14 days, in contrast to the formulation or control group (Nicolaus, 2017).

The results of a study by Shafeie (2015), found that application of Calendula officinalis flower gel had a negligible positive effect in the early stages of wound healing on experimentally induced cutaneous wound healing in mice. However, the 7% gel resulted in better tissue alignment, collagen differentiation and fibril maturation, whereas the 10% and 5% gel showed better results in the control and placebo groups, so the 7% gel was more effective, especially for the first fourteen days due to the wound has less covering and the gel has less toxic effect.

Another study that is research contributing to a better understanding of the wound healing properties of Calendula officinalis observed in life. In our cell-based model, we provide evidence that lipophilic (HE) and hydrophilic (EE) extracts prepared from Calendula officinalis might impact the inflammatory phase and the new tissue formation phase, and here the granulation tissue formation. However, the effectiveness of the compound is still a matter of research. Triterpenes in lipophilic extracts likely play a minor role, but carotenoids or their degradation products may be more relevant, which needs to be proven in future studies (Nicolaus, 2017).

Similar research results also suggest that Calendula promotes wound healing and may be effective in shortening the duration of wound healing. The use of calendula ointment greatly increases the

speed of caesarean section wound healing so that it can be used to accelerate caesarean section wound healing (Jahdi, 2018).

## V. CONCLUSION

Based on the results of the study, it can be concluded that giving calendula oil to female white rats is effective in healing wounds. Overall Calendula extract was associated with a statistically significant increase in wound healing in the skin according to the measured results.

## REFERENCES

- Eghdampour F, Jahdie F, Kheyrkhah M, Taghizadeh M, Naghizadeh S, Hagani H. Eghdampour F, et al. J Caring Sci. 2013 The Impact of Aloe vera and Calendula on Perineal Healing after Episiotomy in Primiparous Women: A Randomized Clinical Trial. 2013 Nov 30;2(4):279-86. doi: 10.5681/jcs.2013.033. eCollection 2013 Dec. J Caring Sci. 2013. PMID: 25276736 Free PMC article.
- Jahdi F, Khabbaz AH, Kashian M, Taghizadeh M, Haghani H. Jahdi F, et al. J Family Med Prim Care. 2018. The impact of calendula ointment on cesarean wound healing: A randomized controlled clinical trial. 2018 Sep-Oct;7(5):893-897. doi: 10.4103/jfmprc.jfmprc\_121\_17. J Family Med Prim Care. 2018. PMID: 30598929 Free PMC article.
- Mochtar, R. 2012. Sinopsis obstetri. Jakarta : EGC.
- Nicolaus, C., Junghanns, S., Hartmann, A., Murillo, R., Ganzera, M., & Merfort, I. (2017). In vitro studies to evaluate the wound healing properties of Calendula officinalis extracts. Journal of Ethnopharmacology, 196(November 2016), 94–103. <https://doi.org/10.1016/j.jep.2016.12.006>
- Nuraini, I. 2017. Pemanfaatan Herbal dalam Penyembuhan Luka Perineum dan Luka Sectio Cesarea - Jurnal Keperawatan, 2017 - jurnal.stikeswilliambooth.ac.id
- Shafeie, N., Naini, A. T., & Jahromi, H. K. (2015). Comparison of different concentrations of calendula officinalis gel on cutaneous wound healing. Biomedical and Pharmacology Journal, 8(2), 979–992. <https://doi.org/10.13005/bpj/850>
- Sihotang, H. (2021). Penggunaan Calendula Officinalis sebagai Terapi Penyembuhan Luka di Kulit. *Jurnal Penelitian Perawat Profesional*, 3(3), 461-470. <https://doi.org/10.37287/jppp.v3i3.527>
- Sjamsuhidajat, R and Dejong, W. 2005. Buku Ajar: Ilmu Bedah. Jakarta: EGC.

## BIOGRAPHY

**First Author** Heny Noor Wijayanti, S.SiT, M.Kes is a lecturer in the Midwifery Study Program, Diploma Three, Faculty of Health Sciences, Universitas Respati Yogyakarta. The author is a lecturer in community midwifery care, maternal neonatal emergency midwifery care and stunting prevention services in midwifery. Educational History The author is a graduate of DIV midwife educator stikes ngudi waluyo in 2011 and Master's Degree in Health Promotion Education from Sebelas Maret University in 2014. The author is also a researcher and a servant in complementary fields in maternal and neonatal care.

**Second Author** Yana Luthfiyati, S.SiT, M.Kes is a lecturer in the Midwifery Study Program, Diploma Three, Faculty of Health Sciences, Universitas Respati Yogyakarta. The author is a lecturer in community midwifery care, postnatal midwifery care. The author is also a researcher and devotee in complementary fields in maternal and neonatal.