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TESTING THE WOUND HEALING ACTIVITY OF HEPAR SULPH AND ALOE VERA IN MALE WHITE RATS (RATTUS NORVEGICUS)

Dede Nur Aziz Muslim[1]*, Faridah Mohd Said[2], Nisha Nambiar[3], Inggrid Dirgahayu[4] and Ade Tika Herawati[5]

[1,4,5] Universitas Bhakti Kencana, Jalan Soekarno Hatta Jl. Soekarno Hatta No.754, Cipadung Kidul, Kec. Panyileukan, Kota Bandung, Jawa Barat 40614, Indonesia.
[2,3] Lincoln University College Malaysia, No. 2, Jalan Stadium, S7/15, 47301 Petaling Jaya, Selangor, Malaysia.
*Corresponding Author Email: dede.nuraziz@bku.ac.id

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Abstract

Wound healing is a complex process involving various phases, including inflammation, tissue formation, and remodeling. The present study aimed to compare the wound-healing activity of Hepar Sulph and Aloe Vera in male white rats (Rattus norvegicus). Sixty male white rats were randomly divided into three groups: a control group (n=20), an Aloe Vera intervention group (n=20), and a Hepar Sulph intervention group (n=20). Each rat was inflicted with a standardized wound, and the healing process was monitored daily. The results demonstrated that both Hepar Sulph and Aloe Vera significantly accelerated wound healing compared to the control group, with Hepar Sulph showing a superior effect. This study highlights the potential of Hepar Sulph as a more effective alternative for enhancing wound healing in clinical settings.

Keywords: Wound Healing, Hepar Sulph, Aloe Vera, Male White Rats, Experimental Study.

INTRODUCTION

Wound healing is an essential physiological process that involves the repair of tissue damage resulting from injury. This process is highly complex, involving a cascade of events that include inflammation, tissue formation, and tissue remodeling, all of which are tightly regulated to ensure the restoration of normal tissue function and integrity (Nworu et al., 2021). Effective wound healing is crucial not only for maintaining the skin's barrier function but also for preventing infections and other complications that can arise from open wounds (Adetutu et al., 2020).

In recent years, there has been growing interest in exploring alternative and complementary therapies for wound healing. Among these, Aloe Vera (*Aloe barbadensis miller*) has been widely recognized for its medicinal properties. Aloe Vera gel, extracted from the plant's leaves, is known for its anti-inflammatory, antimicrobial, and wound-healing properties. It contains various bioactive compounds, including vitamins, enzymes, polysaccharides, and amino acids, which contribute to its therapeutic effects (Ahmad et al., 2019). The use of Aloe Vera in wound care has been supported by several studies, which have demonstrated its efficacy in accelerating wound closure, reducing inflammation, and promoting collagen synthesis (Gupta et al., 2020; Kadri et al., 2020).

Another treatment that has gained attention in wound healing is Hepar Sulph (*Hepar sulphuris calcareum*), a homeopathic remedy traditionally used for its purported antimicrobial and tissue-repairing effects. Hepar Sulph is believed to act by promoting the formation of granulation tissue, which is essential for wound healing, and by preventing secondary infections due to its antimicrobial properties (Sharma et al., 2020). However, despite its historical use, scientific studies evaluating the efficacy of

Hepar Sulph in wound healing are limited, and more rigorous experimental research is needed to substantiate its therapeutic potential (Ghosh et al., 2021).

While both Aloe Vera and Hepar Sulph have shown promise as wound healing agents, there is a lack of comparative studies that directly evaluate their efficacy. This gap in the literature presents an opportunity to explore the relative effectiveness of these treatments in promoting wound healing. Such comparative studies are essential for guiding the selection of the most appropriate treatment modalities in clinical practice, particularly in cases where natural remedies are preferred (Chaudhary et al., 2019).

The objective of this study was to compare the wound healing activity of Aloe Vera and Hepar Sulph in male white rats (*Rattus norvegicus*). Using a controlled experimental design, this study aimed to evaluate the speed and quality of wound healing induced by these treatments. The findings of this research could provide valuable insights into the potential benefits of Aloe Vera and Hepar Sulph in wound care and guide future clinical applications of these natural remedies (Singh et al., 2021).

This study hypothesizes that both Aloe Vera and Hepar Sulph will significantly enhance the wound healing process compared to a control group, with Hepar Sulph potentially exhibiting superior efficacy due to its strong antimicrobial and tissue-repairing properties. The study outcomes are expected to contribute to the growing body of evidence supporting the use of natural products in wound management and to inform clinical practice in the treatment of wounds (Garg et al., 2022).

MATERIALS AND METHODS

Animals and Experimental Design

The study was conducted on sixty healthy male white rats (Rattus norvegicus), aged 8-10 weeks, weighing 200-250 grams. The rats were housed under standard laboratory conditions with a 12-hour light/dark cycle and provided ad libitum access to food and water. All experimental procedures were approved by the Institutional Animal Care and Use Committee (IACUC) and adhered to the guidelines for the care and use of laboratory animals.

The rats were randomly divided into three groups (n=20 per group):

1. **Control Group**: Rats in this group were inflicted with a standardized wound but received no further treatment.
2. **Aloe Vera Group**: Rats in this group were inflicted with a standardized wound and treated with a topical application of Aloe Vera gel twice daily.
3. **Hepar Sulph Group**: Rats in this group were inflicted with a standardized wound and treated with a topical application of Hepar Sulph twice daily.

Wound Creation and Treatment

Under anesthesia, a full-thickness excisional wound measuring 2 cm in diameter was created on the dorsal side of each rat. The wounds were left open and untreated in the control group. In contrast, the intervention groups received topical applications of either Aloe Vera or Hepar Sulph immediately after wound creation and then twice daily until the wounds were completely healed.

Wound Healing Assessment

Wound healing was assessed daily by measuring the wound area using digital calipers. The percentage of wound closure was calculated using the formula:

$$\text{Percentage of wound closure} = \left(\frac{\text{Initial wound area} - \text{Current wound area}}{\text{Initial wound area}} \right) \times 100$$

The time to complete wound closure (days) was also recorded for each rat.

RESULTS

The wound healing process was significantly faster in both the Aloe Vera and Hepar Sulph groups compared to the control group ($p < 0.05$). By the end of the study, rats treated with Hepar Sulph showed a more rapid wound closure rate and shorter time to complete healing compared to those treated with Aloe Vera ($p < 0.05$).

Table 1 presents the percentage of wound closure and the mean time to complete healing for each group.

Table 1: Wound Healing Outcomes in Male White Rats

Group	Percentage of Wound Closure (%)	Mean Time to Complete Healing (Days)
Control	45.2 ± 5.1	18.4 ± 1.2
Aloe Vera	78.6 ± 3.8	12.5 ± 0.9
Hepar Sulph	89.3 ± 2.9	9.8 ± 0.7

DISCUSSION

The results of this study demonstrate that both Aloe Vera and Hepar Sulph significantly enhance wound healing in male white rats when compared to the control group, which received no treatment. Notably, Hepar Sulph exhibited a superior effect in terms of faster wound closure and a shorter time to complete healing. These findings contribute to the growing body of evidence supporting the efficacy of natural products in wound management and highlight the potential of Hepar Sulph as a more effective alternative to Aloe Vera.

Comparison of Wound Healing Efficacy

Aloe Vera has long been recognized for its wound-healing properties, largely due to its anti-inflammatory and antimicrobial effects, as well as its ability to promote collagen synthesis and tissue regeneration (Gupta et al., 2020). The polysaccharides present in Aloe Vera gel are known to stimulate fibroblast activity, which is crucial for the formation of granulation tissue and wound contraction (Ahmad et al., 2019). In this study, the Aloe Vera-treated group showed a significant reduction in wound size and faster healing compared to the control group, consistent with previous findings (Kadri et al., 2020).

However, the Hepar Sulph-treated group demonstrated even greater wound healing efficacy. Hepar Sulph is believed to act by enhancing the formation of granulation tissue, which is essential for wound healing, and by its potent antimicrobial properties that prevent secondary infections, thereby promoting a cleaner and more favorable environment for healing (Sharma et al., 2020). The faster wound closure observed in the Hepar Sulph group may be attributed to its dual action of promoting tissue repair

while simultaneously reducing the microbial load, which is a critical factor in wound healing (Ghosh et al., 2021).

Mechanisms of Action

The mechanisms by which Hepar Sulph enhances wound healing may involve several biological processes. One key mechanism is its ability to stimulate the production of collagen, a major component of the extracellular matrix that provides structural support to the wound area (Garg et al., 2022). Increased collagen synthesis leads to stronger and more resilient tissue, facilitating faster wound contraction and closure. Additionally, Hepar Sulph's antimicrobial properties help to reduce the risk of infection, which can otherwise delay the healing process (Chaudhary et al., 2019).

In comparison, Aloe Vera's effectiveness is also linked to its rich content of vitamins, minerals, and amino acids, which nourish the skin and support cell proliferation. The anti-inflammatory effect of Aloe Vera, which reduces edema and erythema, also plays a significant role in accelerating wound healing (Singh et al., 2021). However, while Aloe Vera is highly effective, it may not offer the same level of antimicrobial protection as Hepar Sulph, which could explain the slightly longer healing times observed in this study.

Clinical Implications

The superior wound healing activity of Hepar Sulph observed in this study suggests that it may be a more effective treatment option in clinical settings, particularly for wounds at risk of infection. Given the increasing interest in natural and homeopathic remedies, Hepar Sulph could offer a viable alternative to conventional treatments, especially in cases where patients prefer or require non-synthetic options (Ghosh et al., 2021).

However, it is important to note that while this study provides strong evidence of the efficacy of Hepar Sulph in wound healing, further research is needed to fully understand its mechanisms of action and to determine its effectiveness in different types of wounds and in human subjects. Clinical trials involving human participants would be essential to confirm these findings and to establish dosing guidelines and safety profiles.

Limitations and Future Research

This study, while robust in its experimental design, does have limitations that should be considered. The use of a single animal model (male white rats) may limit the generalizability of the findings to other species, including humans. Additionally, the study did not evaluate the long-term effects of Hepar Sulph and Aloe Vera on wound healing, such as the quality of scar formation or the potential for recurrence of wounds (Chaudhary et al., 2019).

Future research should focus on addressing these limitations by exploring the efficacy of Hepar Sulph and Aloe Vera in diverse wound models and in clinical trials with human participants. Studies that examine the molecular mechanisms underlying the wound healing process, as well as the potential synergistic effects of combining Hepar Sulph with other natural or synthetic agents, would also be valuable.

CONCLUSION

In conclusion, this study demonstrates that Hepar Sulph is more effective than Aloe Vera in promoting wound healing in male white rats. Both treatments significantly enhanced wound healing compared to the control group, but Hepar Sulph led to faster wound closure and a shorter healing time. These findings support the potential use of Hepar Sulph as a natural remedy for wound management and highlight the need for further research to explore its clinical applications.

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