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REVIEW ARTICLE

Rosehip extract and wound healing: A review

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Abstract

Background: Each year, over 100 million patients are afflicted with new scars from medical procedures worldwide. Natural compounds have shown promise in the treatment of scars and skin disorders. Rosehip oil (RO), produced from the pressed fruit of the rosehip (*Rosa canina* L.) plant, is used in the pharmaceutical, cosmetic, and food industries. The use of this plant in the treatment of scars has yet to be reviewed.

Aims: This review aims to analyze the current findings on the use of RO in the treatment of postsurgical scars.

Methods: This literature search considered published journal articles (clinical trials or literature reviews). Studies were identified by searching electronic databases (PubMed and MEDLINE) and reference lists of respective articles. Additional articles were identified through Google Scholar. Only articles available in English were included in this review.

Results: There is a scarcity of high-quality studies assessing the therapeutic potential of RO. From the two human clinical trials using RO, there is some evidence to suggest its potential as an active ingredient in topical formulations for the treatment of wounds. Topical treatments containing RO extract may reduce the size and erythema of postsurgical scars through the polarization of macrophages and the inhibition of inflammatory cytokines.

Conclusions: Some evidence suggests that RO may improve postsurgical scars. At present, there is insufficient evidence to recommend the use of RO for the treatment of wounds. Further investigation is required to establish its therapeutic effects on human skin and its potential use as an ingredient in topical formulations.

KEYWORDS
natural remedies, *Rosa canina*, rosehip oil, scar reduction, wound healing

1 | INTRODUCTION

Every year, over 100 million patients are estimated to develop new scars,[1] leading to growing aesthetic concerns.[2] The anti-scarring drug market in the United States is valued at around $12 billion USD annually,[1] with the total annual spending on scar management and treatments estimated at over $20 billion annually.[3] Not only do scars have a financial burden on patients and healthcare organizations, but for many patients, scars can take a heavy psychological toll.[4,5] Bock et al.[4] found strong evidence of a severe decrease in quality of life in patients with hypertrophic and keloid scars. Patients report feelings of anxiety and self-consciousness with even minor facial

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scars,[5] highlighting the importance of effective therapies for scar management.

Scar formation is thought to arise due to an abnormal architecture of collagen resulting from the remodeling phase of wound healing.[5] Despite the high public interest in finding effective treatments for scars, the current treatment options have significant limitations,[1] which result from the complexity of wound healing and the multitude of factors that influence it, including age, race, gender, nutrition, and stress.[6]

Natural compounds have shown promise in the treatment of scars and skin disorders.[7] Rosehip oil (RO) is used in the pharmaceutical, cosmetic, and food industries. It is produced from the pressed fruit of the rosehip (*Rosa canina* L.) plant, and the primary constituents of the oil are linolenic acid, linoleic acid, and oleic acid.[7] Despite its widespread use in cosmetics, few scientific investigations have been conducted on RO's effect on human wound healing. Therefore, this review aims to evaluate the current body of knowledge regarding the effects of RO on wound healing and its potential mechanism of action in human skin.

2 | METHODS

2.1 | Search strategy

PubMed and MEDLINE databases were searched for articles published in print or electronically prior to December 2022. Additional records were identified through Google Scholar. The search strategy included the terms: Rosehip, Rosa canina, Rosehip oil, Wound, Healing, Scar, and Skin. The preferred reporting items for systematic reviews and meta-analyses[8] flow diagram of the search results is shown in Figure 1.

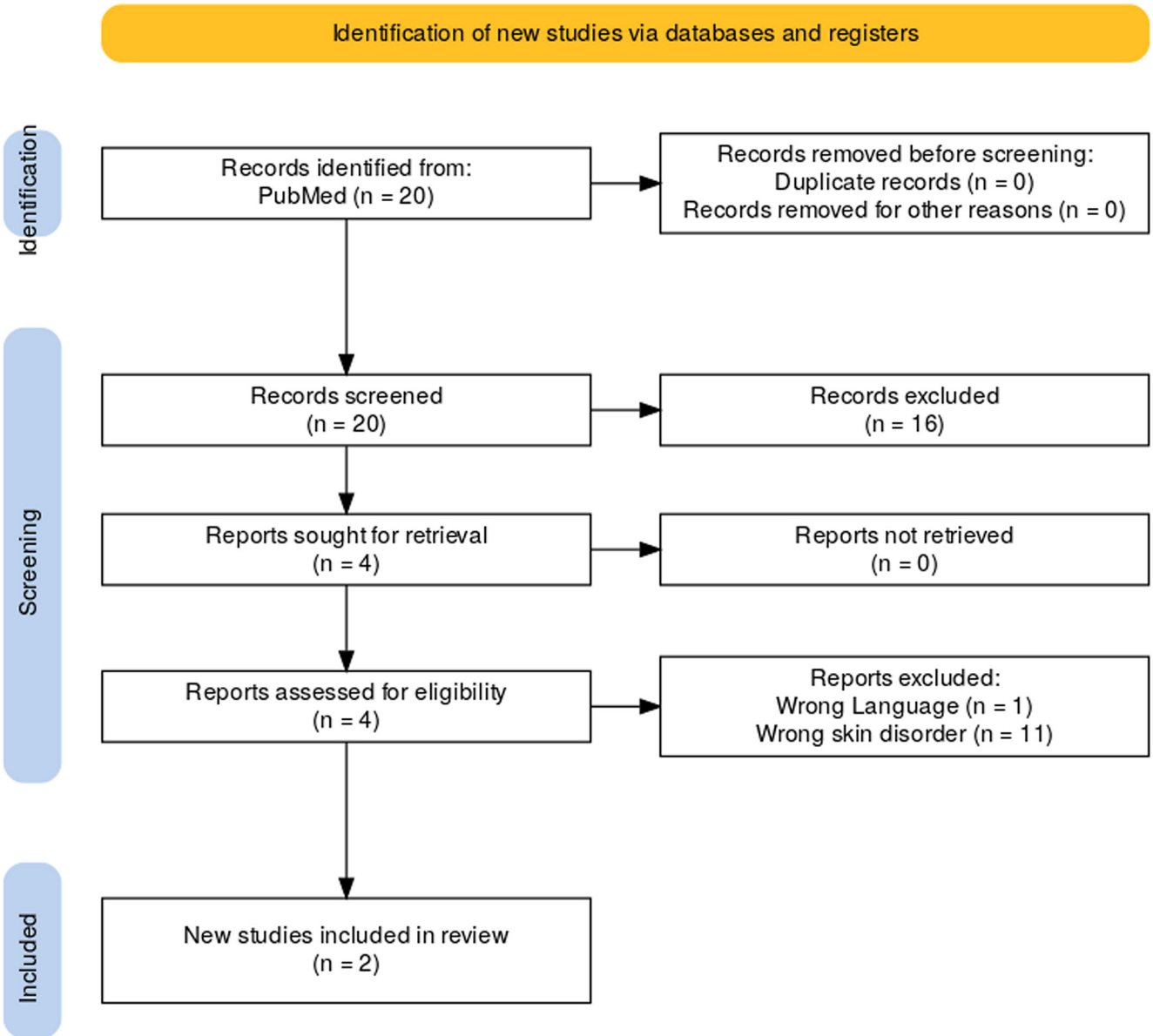

FIGURE 1 Preferred reporting items for systematic reviews and meta-analyses flow diagram of search results.

2.2 | Selection criteria

Studies were considered for inclusion if they examined RO's effect on postsurgical scars (1), focused on any sex and age (2), used a study design of randomized controlled trials, cohort studies, case–control studies, or cross-sectional studies, and employed reliable and valid methods to assess RO's effect on wound healing (3). Only full-text, peer-reviewed studies published in English were included (4).

Exclusion criteria were as follows: Studies not published in English (1), those not focusing on wound healing (2), and studies that do not provide original data, such as reviews, editorials, or opinion pieces (3). Studies were also excluded where full text was not available (4).

2.3 | Data analysis and extraction

Once articles meeting the inclusion criteria were identified, the lead author independently extracted information from each article. First, the titles and abstracts of each article were screened for relevance. Then, full articles were reviewed and data were extracted. The main data points extracted from each article were study design, study population, and primary findings. The screening tool, Rayyan.ai, was employed to organize and screen studies.

3 | RESULTS

Initial database searches identified 20 unique articles; 4 articles were selected for detailed review (Figure 1). Two articles were included in the final review (Table 1).

3.1 | Characteristics of included studies

The first trial[9] concentrated on the treatment of postsurgical scars. The study comprised 108 elderly participants who underwent surgical procedures to remove skin tumors over 3 months. The patients were divided into two groups: a treatment group that applied rosehip seed oil twice daily for 6 weeks and a control group that did not receive any additional treatment. The treatment period began following surgical suture removal, and patients were closely monitored for any side effects. The primary outcomes measured were erythema, dyschromia, atrophy, and hypertrophy through evaluation by the same dermatologist. Patient satisfaction was also evaluated. Outcomes were measured at 6 and 12 weeks.

Ala et al.'s study[10] consisted of 60 patients presenting to the emergency department with second-degree burns of 1%–10% in size, aged between 18 and 65 years, with a mean age of 33.7 years. The study employed a randomized controlled trial, with 30 patients in each group. One group was treated with Adibderm®, an herbal ointment containing rosehip extract, and the other with silver sulfadiazine, a standard treatment for burns. The rosehip-containing

TABLE 1 Study characteristics.

Article	Study design	Sample size	Mean age	Primary variables evaluated	Summary of findings
Valerón-Almazán, et al. 2015[8]	RCT	108	Not provided	Erythema, dyschromia, atrophy, and hypertrophy	The treatment group showed significantly lower rates of erythema, dyschromia, and atrophy compared to control. There was no significant difference in hypertrophy. RO was well tolerated with no adverse effects reported.
Ala et al. 2018[9]	RCT	60	33.7 (18-65)	Wound healing time, complication rates, and patient satisfaction	The rosehip group demonstrated significantly increased wound healing rates compared to the silver sulfadiazine control.

compound was applied onto the wound every 6 h until it was deemed "healthy" by the emergency medicine physician. Wound healing time, complications, and patient satisfaction were the primary outcomes measured in this study.

3.2 | Efficacy

In the study by Valerón-Almazán et al.[9] the treatment group had significantly lower rates of erythema after both 6 and 12 weeks (73% of treated patients did not present with erythema at 12 weeks vs. 50% of control patients). The rosehip group also showed lower rates of dyschromia, with differences observed at 6 and 12 weeks; only the differences at 12 weeks were significant (63% of treated patients without discoloration vs. 21% control). The atrophy measurement also showed differences between treatment and control at 6 and 12 weeks, with only the second measurement being significant (85% vs. 62% of patients without atrophy found at 12 weeks). Finally, hypertrophy analysis showed increased improvement in RO versus control; the differences were not significant. The rosehip seed oil was well tolerated, with no side effects reported, and none of the participants discontinued the treatment due to adverse effects.

In Ala et al.'s trial,[10] the RO group experienced significantly faster rates of wound healing compared to the control group (7.53 ± 2.28 days vs. 11.83 ± 2.32 days, $p < 0.001$). The herbal ointment was well tolerated by patients with a significantly greater patient satisfaction score (7.83 ± 1.02 vs. 7.23 ± 1.19, $p = 0.041$) compared to control. Satisfaction scores were recorded at the treatment period's end and rated out of 10.

4 | DISCUSSION

The physiological response to a wound in humans is a multifaceted process characterized by a cascade of events leading to the formation of a scar. This process is typically divided into three distinct phases: inflammation, proliferation, and remodeling.[11] Aberration of these processes leads to pathological scarring, such as hypertrophic and keloid scars.[12] These scars can lead to increased anxiety, decreased self-esteem, and an overall decrease in an individual's quality of life.[4] The studies included in this systematic review focused on exploring the potential of RO in treating wounds and reducing scar formation, both common issues in clinical practice.

RO (*Rosa canina* L.) is native to various regions worldwide and has been traditionally used for its purported health benefits.[13] Both analyzed trials suggest its beneficial impact on wound healing. The wound healing effects may be due to the compound's antioxidant and antimicrobial properties attributed to its chemical composition, including fatty acids, polyphenols, vitamins B, C, and E, and carotenoids.[6,14] However, the composition of RO can differ based on environmental factors influencing the plant's growth and the process through which the oil is extracted and processed.[7] RO products are typically manufactured through the process of cold pressing the oil from the seed or fruit. Another method used is ethanol extraction which has demonstrated efficacy in extracting higher rates of antioxidant compounds.[15] The concentration of RO in the medication varies depending on the proprietary formulation the rosehip extract used.[16] For example, the FDA found that the maximum use of *Rosa canina* fruit extract in eye-area skin products was 0.2%, whereas *Rosa canina* seed extract was used up to 1.5% in lipstick (this is the highest reported concentration). A manufacturer reported that their trademark mixture consists of *Rosa canina* fruit extract (maximum percentages: 0.45%–0.65%), butylene glycol (maximum percentages: 76.50%–93.50%), and water (maximum percentages: 5.85%–23.05%).

Valerón-Almazán et al.[9] found lower rates of erythema, dyschromia, and atrophy in postsurgical scars amongst the RO group compared to the control group. In Ala et al.'s trial,[10] the rosehip extract treatment showed significantly faster wound healing rates in second-degree burns compared to silver sulfadiazine, a standard burn treatment. These findings demonstrate the potential healing effect of RO. A significant benefit of RO in the studies reviewed was its safety profile. No adverse effects were reported in either of the two trials. The safety of RO, as indicated in these studies, and the fact that it is generally well tolerated make it a promising candidate for further research into optimal dosage and timing of treatment.

The underlying mechanism through which RO influences healing is theorized to involve the promotion of the transition from M1 to M2 macrophages.[6] The M1 phenotype is associated with promoting inflammation, whereas M2 macrophages aid in the regeneration of the extracellular matrix and resolution of inflammation.[17] Disruptions in this transition process can lead to non-healing or chronic wounds.[18] Lei et al.[6] observed that RO influenced an increase in the concentration of type III collagen in mice, promoting healthier tissue healing in a "basket weave" style, typical of unscarred skin, in contrast to the traditional parallel lines observed in scar formation. Hypertrophic and keloid scars, the most common forms of pathological scarring, are associated with high concentrations of TGFβ1 and TGFβ2 and a higher collagen I/III ratio.[19] An overexpression of TGFβ1 and TGFβ2 and a decreased expression of TGFβ3 are theorized to contribute to the formation of keloids.[19] In this context, the findings from the studies included in this review may be due to RO's antagonistic effect on TGFβ1,[6] promoting healthier tissue healing and decreasing scar size. Moreover, RO demonstrated anti-inflammatory and anti-scarring effects, as indicated by its inhibitory effects on inflammatory mediators such as IL-1R and IL-1.[6,20,21] Overall, Lei et al.'s animal trial demonstrated a notable decrease in scar size in the mice treated with RO compared to the control group.

Beyond wound healing, RO has been suggested to have other skin benefits. Leeyaphan et al.[20] reported a significant reduction in pruritus in intertrigo patients treated with a lotion containing RO, showing a similar level of patient satisfaction compared to corticosteroid treatment. While these findings indicate the potential versatility of RO in dermatological applications, more research is needed to validate these results.

This review's primary limitation lies in the heterogeneity of the selected randomized controlled trials. One trial focused on burn wounds, while the other reviewed postsurgical wounds. While both types of injuries involve the skin, the nature and severity of these wounds vary significantly, which could affect the results. Moreover, while both studies had control groups, neither employed double-blinding with a placebo. This could potentially introduce bias into the results, despite attempts to standardize procedures. The lack of double-blinding may decrease internal validity, affecting the results' reliability and potentially overestimating the treatment effect.

5 | CONCLUSION

In conclusion, RO appears to have a plausible potential mechanism of action for improving scars, appears to be safe, and has been shown to improve scars in two clinical trials. While the existing data provide some promising insights into the potential use of RO for the reduction of postoperative scars in human skin, more rigorously designed studies are needed further to explore the therapeutic use of RO in topical preparations.

Furthermore, it is critical to recognize that while RO may provide a host of benefits for various skin conditions, it does not operate in isolation. It forms part of a broader ecosystem of factors contributing to wound healing and scar reduction. These factors include the individual's age, health status, lifestyle factors such as smoking and diet, and the nature of the wound or scar itself. These elements need to be considered in future research on RO's potential therapeutic uses. At present, while promising, there are insufficient data to confirm its efficacy and optimal dosage. Therefore, we cannot recommend the use of RO for the treatment of wounds.

AUTHOR CONTRIBUTIONS

Design, identification of studies, literature analysis, writing, and editing and revision of the manuscript were performed my Malachy Belkhelladi. Conception, identification of studies, editing and revision of the manuscript were performed by Amina Bougrine.

CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest to disclose.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

ETHICS STATEMENT

This literature review was conducted in accordance with the ethical standards of academic research. The authors ensured that all cited studies were published in peer-reviewed journals and obtained through reputable databases.

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