

Olive Oil Shows Promise for Wound Healing of Ulcers

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PRACTICE POINTS


- Interventions that effectively reduce excessive and prolonged inflammation can help promote timely wound healing. Consider integrating anti-inflammatory treatments into wound care protocols to enhance healing outcomes.
- Utilization of olive oil in wound therapy, particularly for conditions such as diabetic foot ulcers, pressure ulcers, perineal ulcers, and chronic ulcers, has shown promise for promoting healing.
- Regularly review and incorporate findings from recent studies on the use of olive oil and other novel interventions in wound therapy to ensure the application of the most current and effective treatment strategies.

In proper skin healing, inflammation will stop once the harmful microbes are removed. However, an excess and prolongation of inflammation can result in delayed healing. Thus, interventions that can limit the amount of inflammation can help promote wound healing. The use of olive oil in wound therapy has been of great interest. Herein, we will review studies that investigated the use of olive oil on diabetic foot ulcers, pressure ulcers, perineal ulcers, and chronic ulcers.

Turkestan, later spreading to Anatolia, Syria, Palestine, and Israel. Mechanical extraction of the oil from the olive fruit involves pressure processing, centrifugation, and adhesion filtering.¹ Refining of olive oil is done via alkali refining or physical refining, with physical refining being useful in removing oxidation by-products and pro-oxidant metals. Olive oil is composed mainly of triacylglycerols, which are glycerol esters attached to various fatty acids, with the most common fatty acid being the monounsaturated oleic acid. Additional fatty acids include palmitic acid, linoleic acid, stearic acid, and palmitoleic acid.² Olive oil contains phenolic compounds, the main ones being oleuropein, hydroxytyrosol, and tyrosol. These phenolic compounds are proposed to be strong antioxidants and radical scavengers.³

Mediterranean countries are responsible for approximately 97% of the world's olive cultivation.⁴ Olive oil historically was used as lamp fuel, lubricant, body ointment, and later as a source of edible oil.¹ Recently, its potential uses in medicine have called for further exploration into other uses for olive oil.

The skin is the largest organ of the body and serves as a protective barrier against pathogens and harmful substances. Skin damage results in 3 main phases to aid in wound healing: inflammation, proliferation, and maturation. In proper skin healing, inflammation will stop once the harmful microbes are removed. However, an excess and prolongation of inflammation can result in delayed healing. Thus, interventions that can limit the amount of inflammation can help promote wound healing. Olive oil contains several anti-inflammatory

 Olive oil is obtained by mechanical extraction from the fruit of the *Olea europaea* tree, which is believed to have originated from ancient Iran and

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molecules (compounds or chemicals), including phenolic compounds and omega-3 fatty acids.⁵ Studies also have shown that olive oil can promote re-epithelialization in tissues.⁶ Thus, use of olive oil in wound therapy has been of great interest.

This article will review studies that have investigated the use of olive oil for wound healing of diabetic foot ulcers, pressure ulcers, perineal ulcers, and chronic ulcers. To conduct a comprehensive scoping review of the literature on the effects of olive oil in wound healing, we utilized the resources of the Galter Health Sciences Library & Learning Center (Chicago, Illinois). Our search strategy was structured to encompass a range of relevant databases accessible through the library, including PubMed, Embase, and Web of Science. We formulated our search terms to be broad yet specific to our topic, combining keywords such as *olive oil*, *wound healing*, *skin repair*, and *dermal therapy*. The inclusion criteria were set to filter studies conducted from January 2000 to December 2019, focusing on clinical trials, observational studies, and review articles. We limited our search to articles published in English, which yielded a preliminary set of articles that were then screened based on their titles and abstracts. Full-text versions of potentially relevant studies were retrieved and assessed for eligibility. We included studies that specifically evaluated the effects of olive oil in wound healing, excluding those that did not directly relate to our research question or had insufficient data. The data extraction from these studies was conducted using a standardized form, capturing study design, population, intervention details, outcomes, and key findings. The synthesis of these data provided a comprehensive overview of the current evidence on the topic, aiding in the identification of gaps in knowledge and directions for future research.

Diabetic Foot Ulcers

Foot ulcers are common in patients with diabetes mellitus and are associated with notable morbidity and mortality. Foot ulcers can clinically manifest in various forms but are classically described as lesions with a deep sinus in the feet. Patients with diabetic foot ulcers are at risk for infection, and severe forms of the ulcers require amputation.^{7,8} Routine care of foot ulcers involves irrigation of the ulcer and surrounding area with normal saline solution daily, followed by a dressing with sterile gauze. Studies investigating the effect of olive oil on foot ulcers suggest that olive oil use for care and healing of foot ulcers is an area of interest.

A double-blind, randomized clinical trial investigated the effects of topical olive oil on diabetic foot ulcers.⁹ A total of 34 patients with foot ulcers of Wagner grades 1 (superficial ulcers that involved the skin but not underlying tissue) or 2 (deeper ulcers penetrating to the ligaments and muscles but not the bone) that had remained open and did not improve for more than 3 months were recruited. The patients were randomly assigned to receive topical olive oil and routine care (intervention group)

or to receive routine care (control group). Patients who received olive oil had oil poured on their ulcers with gauze wrapped around the ulcer that was soaked with olive oil. The clinical characteristics of the diabetic ulcer (eg, site, grade, size, status of healing) were assessed. The study revealed that after 4 weeks, olive oil significantly decreased ulcer area ($P=.01$) and ulcer depth ($P=.02$) compared with the control. Furthermore, there was a significant difference ($P=.003$) in complete ulcer healing between the olive oil and control groups: 73.3% (11/15) of patients in the olive oil group had complete ulcer healing, whereas 13.3% (2/15) of patients in the control group had complete ulcer healing.⁹ The positive effect of olive oil on the healing of diabetic foot ulcers encourages further investigation as a possible therapy for foot ulcers.

Another randomized controlled trial of 45 patients with diabetic foot ulcers of Wagner grades 1 or 2 investigated the effect of olive oil.¹⁰ Patients were randomly assigned to 1 of 3 groups for 1 month: the olive oil group, the honey group, or the control group. Patients in the olive oil group had their wounds dressed using gauze with olive oil daily, the patients in the honey group had their wounds dressed using gauze with honey daily, and the control group had routine care consisting of irrigation with saline solution and dressing with a sterile gauze. This study calculated a wound healing score based on a predefined checklist for diabetic foot ulcers through 4 variables: wound grading, color, surrounding tissue status, and drainage. Each variable had a maximum score of 100, contributing to a total possible score of 400, which indicated complete healing. A score of 50 signified deterioration. Wound healing was categorized as follows: (1) complete healing is indicated by a total score of 400; (2) partial healing was indicated by an increase of at least 30 points from the initial score; (3) lack of healing occurred when there was no change or less than a 30-point increase from the initial score; and (4) aggravation was noted when the score decreased by at least 10 points from the initial assessment. The study revealed that olive oil and honey treatments resulted in an increase in mean score, which indicated better wound healing. Patients in the olive oil group had a mean score of 253.0 before the intervention and 330.5 after the intervention ($P<.0001$); patients in the honey group had a mean score of 267.5 before the intervention and 371.5 after the intervention ($P<.0001$).¹⁰

There also have been case reports on combined olive oil and honey in diabetic foot ulcer management. Haghghian et al¹¹ presented a case of a diabetic foot wound that healed completely within 2 weeks after the combined use of olive oil and honey wax. Zahmatkesh and Rashidi¹² observed the healing of a diabetic foot wound over a month with daily dressings of a mixture of heated honey and olive oil, resulting in granulation tissue formation within 5 days. Microvascular changes, such as capillary basement membrane thickening, pericyte degeneration, and impairment of vasodilation and constriction,

may contribute to inflammation in blood vessels, which can delay the healing of diabetic foot ulcers.⁷ Because olive oil and honey contain compounds that have antioxidative, antimicrobial, and anti-inflammatory properties, both may play a role in notably reducing inflammation and promoting the healing of foot ulcers.¹³

Pressure Ulcers

A pressure ulcer is a superficial skin injury that is caused by a prolonged period of pressure on the skin, in which the skin becomes red but there is no rupture. Prolonged periods of immobility resulting in a reduction or pause of blood supply are common causes of pressure ulcers.¹⁴ Studies have suggested that topical olive oil may be effective in prevention of pressure ulcers and should be incorporated as part of standard-of-care measures.

In a randomized, single-blind trial, 72 patients with the first stage of bed sore—which is a pressure ulcer—in the sacral, shoulder, heel, or other areas were randomly assigned to either the intervention or control group.¹⁴ Patients in the intervention group had 15 mL of olive oil rubbed on the wound for 20 minutes daily and then washed with tepid water. The Pressure Ulcer Scale for Healing tool was utilized to assess the healing status of the pressure ulcer. This tool considers wound surface size, exudate rate, and tissue type to provide a score of 0 to 17 (0=healed ulcer; 17=progression of ulcer). The mean score (SD) was lower in the olive oil group at days 4 and 7 compared with the control group (day 4: 7.50 [2.823] vs 9.50 [1.732]; day 7: 5.44 [3.806] vs 8.83 [2.864])($P<.001$). Furthermore, between days 1 and 7, there was significant improvement in the olive oil group (mean difference, 3.56; $P<.001$) but no significant change in the control group (mean difference, 0.75; $P=.052$).¹⁴ The results indicate that patients in the olive oil group had a better ulcer healing status compared with patients in the control group.

In a noninferiority, randomized, double-blind clinical trial, olive oil was compared to a recommended skin care measure of hyperoxygenated fatty acids (HOFA) for the prevention of pressure ulcers.¹⁵ The study consisted of 571 residents from several nursing homes who were at risk for pressure ulcers. Either olive oil or HOFA was applied to areas at risk for pressure ulcers, with 2 sprays of 0.2 mL per spray to each area every 12 hours. The participants were followed up for 30 days or until a pressure ulcer developed. Researchers performed skin assessments; the Braden Scale was used to assess the risk for pressure ulcers. The incidence difference of pressure ulcers in the olive oil group and HOFA group did not exceed in the noninferiority margin of 7%. Furthermore, Kaplan-Meier survival curves for the time until pressure ulcer onset showed a nonsignificant difference between the 2 groups.¹⁵ These findings suggest that olive oil is as effective as HOFA for the prevention of pressure ulcers. Although the mechanism of olive oil on prevention of pressure ulcers has not yet been determined, it has been suggested that anti-inflammatory compounds in olive oil,

such as polyphenol and oleocanthal compounds, play an anti-inflammatory role.

Perineal Ulcers

Episiotomy is a surgical incision that is made to open the vagina during birth to aid in delivery of the baby. In contrast to spontaneous vaginal tears, an episiotomy allows for easier repair and healing of the laceration.¹⁶ Studies were conducted to investigate the effect of olive oil on women with lacerations after an episiotomy.

A total of 90 primigravid women who had undergone episiotomy were recruited and randomly assigned to 1 of 2 interventions: cold compression with gel packs for 20 minutes within 12 hours after delivery for up to 10 days, if necessary, or topical olive oil twice daily within 12 hours after delivery for up to 10 days.¹⁷ Although there was no significant difference in the structural features of the wound, there was a significant difference in the redness severity. After 10 days, the mean REEDA (redness, edema, ecchymosis, discharge, and apposition) score (SD), which assesses tissue healing, was 0.47 (0.96) in patients who received cold compression with gel packs and 0.20 (0.50) in patients who received topical olive oil ($P=.04$).¹⁷ This study suggests that there is the potential for olive oil to be used for wound healing after episiotomy.

A double-blind trial consisted of 60 women who had mediolateral episiotomy or perineal tear grades 1 and 2 who were randomly assigned to 1 of 2 groups for 10 days: olive oil sitz bath or distilled water sitz bath (control group). The results showed a significant difference in pain severity after 5 and 10 days ($P<.05$), wound redness after 5 days ($P<.0001$), and redness ($P<.000$) and edema ($P<.05$) 10 days after delivery.¹⁸ This study encourages further investigation of the benefits of olive oil for care after an episiotomy.

Chronic Ulcers

Chronic ulcers are other persistent wounds that do not respond to standard treatments and pose a notable health burden. Their development is influenced by factors such as oxidative stress, microbial infections, and the body's immune response. A case series was conducted to investigate the wound healing effects of olive oil on chronic ulcers.¹⁹ Fourteen patients who were diagnosed with 1 or more chronic skin ulcers that had not healed with conventional treatment, such as cleansing, debridement, or infection control, were recruited. The mean (SD) of the patients' Bates-Jensen Wound Assessment Tool score was 39.05 (4.23), indicating that these ulcers had been challenging to treat. In addition, the wounds in this study were found to be infected with bacteria. An ointment consisting of *Ceratothoa oestroides* olive oil extract was applied to the wounds after they were cleansed. The results showed that Bates-Jensen Wound Assessment Tool scores decreased by 14.7% to 67.5% (mean, 36%; median, 38%) after 3 months of treatment. Furthermore, 5 patients had a completely healed wound, indicating that *C oestroides* olive oil

extract can regenerate chronic ulcers that do not respond to antibacterial agents.¹⁹ These results encourage further investigation of the role of *C oestroides* olive oil extract on healing properties and microbial control.

Final Thoughts

This review illuminated several key aspects of research on the role of olive oil in wound healing. Although the studies included in this review offer valuable insights, it is essential to acknowledge the variability in the quality of data presented. Several studies demonstrated robust methodology with clear definitions of outcomes and controlled conditions, providing high-quality evidence. However, other studies exhibited limitations, including small sample sizes and potential biases, which may affect the generalizability of the findings. Despite these limitations, the collective evidence suggests potential for olive oil in wound healing, warranting further investigation. Future research should aim for more standardized methodologies and larger, more diverse patient cohorts to validate these findings and explore the mechanisms underlying the therapeutic effects of olive oil.

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