
OLIVE OIL IN DRUG DELIVERY SYSTEMS AND TOPICAL FORMULATIONS

Arpita Sharma, *Ruchi Kapoor, Dr. Nilesh Jain, Dr. R.B. Goswami

Sagar Institute of Research and Technology and Science Pharmacy Bhopal Madhya Pradesh,
India.

Article Received: 10 May 2026

Article Revised: 30 May 2026

Published on: 20 June 2026

***Corresponding Author: Ruchi Kapoor**

Sagar Institute of Research and Technology and Science Pharmacy Bhopal Madhya Pradesh, India.

DOI: <https://doi-doi.org/101555/ijrpa.8487>

INTRODUCTION

Natural oils have gained considerable attention in pharmaceutical and cosmetic sciences due to their therapeutic properties, biocompatibility, and safety profile. Among these, olive oil has emerged as an important natural excipient and bioactive component in various drug delivery systems, particularly in topical and transdermal formulations. Derived from the fruit of the olive tree (*Olea europaea*), olive oil contains a rich composition of monounsaturated fatty acids, especially oleic acid, along with antioxidants, polyphenols, tocopherols, and vitamins that contribute to its medicinal value. These constituents provide moisturizing, anti-inflammatory, antioxidant, and skin-protective effects, making olive oil a promising material in pharmaceutical formulation development.

In drug delivery systems, olive oil serves not only as a carrier or excipient but also as a penetration enhancer that improves the absorption of drugs through biological membranes, particularly the skin. The high concentration of oleic acid in olive oil helps alter the lipid structure of the stratum corneum, thereby enhancing drug permeation and increasing therapeutic effectiveness. Because of this property, olive oil has been incorporated into creams, ointments, emulsions, gels, nanoemulsions, liposomes, organogels, and transdermal formulations for the controlled and efficient delivery of active pharmaceutical ingredients.

Topical formulations containing olive oil are increasingly explored for the treatment of skin disorders, wound healing, inflammation, fungal infections, and cosmetic skin care applications. Olive oil contributes to improved skin hydration, reduced irritation, and enhanced stability of formulations while supporting better patient acceptability. Additionally, its natural antioxidant compounds may protect the skin against oxidative stress and

environmental damage, further increasing its therapeutic importance in dermal products. In drug delivery systems, olive oil serves not only as a carrier or excipient but also as a penetration enhancer that improves the absorption of drugs through biological membranes, particularly the skin. The high concentration of oleic acid in olive oil helps alter the lipid structure of the stratum corneum, thereby enhancing drug permeation and increasing therapeutic effectiveness. Because of this property, olive oil has been incorporated into creams, ointments, emulsions, gels, nanoemulsions, liposomes, organogels, and transdermal formulations for the controlled and efficient delivery of active pharmaceutical ingredients. The growing preference for natural, biodegradable, and skin-friendly ingredients has further accelerated research on olive oil-based formulations.

Olive Oil (*Olea Europaea*)

Olive oil (*Olea europaea*) is one of the most widely utilized natural oils in topical formulations due to its emollient, moisturizing, and skin-protective properties. Rich in monounsaturated fatty acids, particularly oleic acid, olive oil helps maintain skin hydration by reducing transepidermal water loss and enhancing the skin barrier function. In addition to its moisturizing potential, olive oil contains natural antioxidants such as polyphenols, tocopherols, and vitamin E, which may protect the skin from oxidative stress and environmental damage. Owing to its anti-inflammatory and soothing effects, olive oil has been traditionally used in skincare preparations for dry, irritated, and sensitive skin. Its compatibility with the skin and therapeutic benefits make it a valuable ingredient in topical creams intended for nourishment, hydration, and skin repair.

Pharmacological Properties of Olive Oil

- **Moisturizing Property** Olive oil acts as an effective emollient and moisturizer by reducing water loss from the skin and maintaining hydration. It helps improve skin softness, smoothness, and elasticity.
- **Antioxidant Property** The antioxidant activity of olive oil is due to compounds like vitamin E and polyphenols, which help neutralize free radicals and protect the skin from oxidative damage and premature aging.
- **Anti-inflammatory Property** Olive oil exhibits anti-inflammatory effects due to the presence of phenolic compounds such as oleocanthal, which help reduce redness, irritation, and skin inflammation.

- **Antimicrobial Property** Olive oil possesses mild antimicrobial properties that may help protect the skin against certain microorganisms and support skin health.
- **Wound-Healing Property** Olive oil supports skin repair and healing by maintaining moisture, nourishing damaged tissues, and promoting regeneration of skin cells.

USES OF OLIVE OIL IN PHARMACEUTICAL PRODUCTS

Olive oil is widely used in the pharmaceutical industry because of its medicinal properties, stability, and compatibility with the human body. It functions both as an active ingredient and as an excipient in many pharmaceutical and healthcare products.

1. **Carrier Oil in Medicinal Formulations** Olive oil is commonly used as a carrier or base oil in pharmaceutical preparations. It helps dissolve fat-soluble substances and improves the absorption of active compounds in the body.
2. **Ingredient in Capsules and Syrups** It is used in soft gelatin capsules, vitamin supplements, and herbal syrups to enhance the delivery and effectiveness of medicinal ingredients.
3. **Use in Topical Preparations** Olive oil is added to creams, lotions, ointments, and balms because of its moisturizing, soothing, and skin-protective properties. These products are useful in treating dry skin, burns, irritation, and minor wounds.
4. **Laxative Preparations** Traditionally, olive oil has been used as a mild natural laxative to relieve constipation and support healthy digestion.
5. **Antioxidant and Anti-Inflammatory Products** Due to the presence of antioxidants such as polyphenols and vitamin E, olive oil is included in formulations designed to reduce inflammation and protect body cells from oxidative stress.
6. **Nutritional Supplements** Olive oil is widely used in dietary and nutritional supplements because it contains healthy monounsaturated fatty acids that support cardiovascular health and help maintain cholesterol balance.
7. **Massage and Therapeutic Oils** Pharmaceutical and wellness industries use olive oil in massage oils and therapeutic products because it softens the skin and improves hydration.
8. **Drug Delivery Systems** In modern pharmaceuticals, olive oil is utilized in emulsions and lipid-based drug delivery systems to improve the solubility, stability, and bioavailability of certain drugs.

CONCENTRATION OF OLIVE OIL IN PHARMACEUTICAL PRODUCTS:

The concentration of Olive oil used in pharmaceutical formulations varies depending on the type of product, method of administration, and therapeutic purpose. It may act as an active ingredient, carrier oil, solvent, or excipient in different preparations.

Pharmaceutical Product	Typical Concentration of Olive Oil
Creams and lotions	5–40%
Ointments and balms	10–60%
Massage and therapeutic oils	20–100%
Soft gelatin capsules	Variable, often used as filling oil
Herbal syrups and liquid formulations	1–10%
Emulsions and drug delivery systems	5–30%
Nutritional supplements	Depending on formulation requirements

Harmfulness of Olive oil in Pharmaceutical Products with Concentration

Although Olive oil is generally considered safe and biocompatible, excessive concentrations or improper use in pharmaceutical formulations may produce certain undesirable effects. The harmful effects depend on the concentration used, route of administration, formulation type, and individual sensitivity.

Possible Harmful Effects According to Concentration

Concentration of Olive Oil	Pharmaceutical Use	Possible Harmful Effects
1–5%	Syrups, emulsions, capsules	Usually safe with minimal adverse effects
5–20%	Creams, lotions, topical products	Mild skin irritation or greasiness in sensitive individuals
20–40%	Ointments, massage oils	May clog pores, cause acne, or reduce skin breathability
40–60%	Heavy topical formulations	Excessive oiliness and delayed skin absorption
Above 60%	Pure oil preparations	Possible allergic reactions, formulation instability, gastrointestinal discomfort (oral use)

MARKET FORMULATION

Product Type	Example Marketed Formulations
Moisturizing creams	Olive oil skin creams, moisturizing lotions
Medicated ointments	Herbal healing ointments, burn relief creams
Soft gelatin capsules	Vitamin E capsules with olive oil base
Baby care products	Baby lotions and diaper rash creams
Massage oils	Therapeutic olive massage oils
Anti-aging products	Olive oil night creams and antioxidant serums
Medicated soaps	Olive oil cleansing bars and herbal soaps

Hair care products	Olive oil shampoos and scalp treatment oils
Nutritional supplements	Olive oil dietary capsules and omega supplements
Herbal preparations	Ayurvedic and herbal formulations containing olive oil

Literature References 2012

- Cause/Topic: Olive Oil as a Penetration Enhancer in Topical Drug Delivery
- By Whom: Abid Hussain, Gul Majid Khan, Syed Umer Jan, Shefaatullah Shah, Kifayatullah Shah, Muhammad Akhlaq, Nouman Rahim, Asif Nawaz, and Abdul Wahab
- Pharmaceutical Importance: The study evaluated olive oil as a natural penetration enhancer in topical gel formulations containing flurbiprofen.
- Number of Contributors: **9 authors**
- Summary: This research focused on developing and evaluating a topical gel formulation of flurbiprofen using olive oil as a permeation enhancer to improve drug delivery through the skin. Flurbiprofen is widely prescribed for inflammatory conditions such as arthritis, muscle pain, joint stiffness, and soft tissue injuries. Although oral administration of flurbiprofen is effective, prolonged use can lead to gastrointestinal irritation, stomach ulcers, and systemic adverse effects.

Therefore, topical delivery is often preferred to target the affected area directly while reducing systemic drug exposure. However, successful topical drug administration depends on the ability of the drug to penetrate the skin barrier effectively. The stratum corneum acts like a tightly packed protective wall made of lipids and dead skin cells, limiting the entry of many therapeutic agents. To overcome this challenge, penetration enhancers are added to formulations to temporarily loosen or modify the skin barrier.

In this study, olive oil was selected due to its natural composition, rich in oleic acid, linoleic acid, squalene, tocopherols, and antioxidants. These compounds are known to interact with skin lipids and improve membrane fluidity, making drug transport easier. The researchers prepared flurbiprofen gel formulations containing olive oil and evaluated parameters such as drug permeation rate, skin absorption, stability, and therapeutic effectiveness.

2013

- **Cause/Topic:** Olive oil effects on skin barrier function
- **By Whom:** Simon G. Danby and colleagues
- **Pharmaceutical Importance:** Investigated the influence of olive oil on skin hydration and barrier integrity.

- **Conclusion:** Olive oil provided moisturization but excessive direct application may alter barrier integrity in sensitive skin.
- **Number of Contributors:** Multiple researchers
- **Summary:** This study explored how olive oil affects the **skin barrier**, which serves as the body's natural defense system. Healthy skin contains a protective lipid layer that prevents excessive moisture loss and blocks harmful substances from entering. Damage to this barrier can result in **dryness, irritation, inflammation, itching, and increased skin sensitivity**. Because olive oil is traditionally used in skincare and topical products, the researchers aimed to understand whether it supports or disrupts normal skin physiology.

The study found that olive oil has **strong emollient and moisturizing properties**. Due to its rich composition of **fatty acids, antioxidants, vitamin E, and polyphenols**, olive oil can soften the skin and improve hydration. These components help reduce roughness and dryness by forming a protective layer on the skin surface that minimizes water loss. For example, people suffering from **dry skin during winter** may benefit from creams containing olive oil because the formulation helps restore moisture and keeps the skin soft and hydrated. A moisturizing cream enriched with olive oil may reduce **flaky skin, tightness, and cracking**, especially on elbows, hands, and feet where dryness is common.

For example, in infants or patients with **eczema**, repeated direct application of pure olive oil may increase skin irritation, redness, or dryness instead of improving skin condition. In these cases, weakened skin barrier function can make the skin more vulnerable to allergens and microbial infection. This finding highlighted the importance of using olive oil carefully and in properly formulated products. Another example is in **pharmaceutical medicated creams**. A topical cream for inflammatory skin conditions may include olive oil in controlled concentrations along with **humectants (such as glycerol), stabilizers, and protective ingredients** to balance its moisturizing effect while avoiding excessive barrier disruption. For instance, combining olive oil with glycerol in a skin cream may improve hydration without compromising barrier integrity.

Overall, the research highlighted that olive oil is a **valuable ingredient in topical and dermatological formulations**, but its effectiveness depends on **proper concentration and balanced formulation design**. The study provided evidence that olive oil can support skin moisturization and comfort while reinforcing the idea that safe pharmaceutical formulations require careful optimization to maintain healthy skin barrier function.

2014

- **Cause/Topic:** Olive oil phenolic compounds and therapeutic activity
- **By Whom:** Michele Bulotta and co-researchers
- **Pharmaceutical Importance:** Studied olive oil phenolics such as oleuropein and hydroxytyrosol for biological benefits.
- **Conclusion:** Olive oil phenolic compounds showed antioxidant and anti-inflammatory activities beneficial for tissue protection.
- **Number of Contributors:** Multiple contributors
- **Summary:** This study focused on understanding the **therapeutic role of olive oil phenolic compounds**, particularly their contribution to pharmaceutical and biological activity. Olive oil is more than just a natural moisturizer; it is also a rich source of bioactive molecules capable of producing important medicinal effects. The researchers specifically examined compounds such as **oleuropein, hydroxytyrosol, oleocanthal, and polyphenols**, which are responsible for many of olive oil's healing and protective functions.

For example, in **anti-aging skincare products**, olive oil-derived antioxidants such as **hydroxytyrosol** may help reduce the appearance of wrinkles, dryness, and skin dullness caused by oxidative stress. A topical cream containing olive oil phenolics may protect the skin from damage caused by **sunlight exposure and environmental pollutants**, thereby maintaining healthier and younger-looking skin. The study also highlighted the **anti-inflammatory activity** of olive oil phenolics. Chronic inflammation plays a role in many skin disorders such as **eczema, psoriasis, acne, dermatitis, and wound inflammation**.

For example, in **eczema or irritated skin conditions**, a medicated cream enriched with olive oil bioactive compounds may help soothe inflammation and reduce itching while simultaneously improving hydration. Similarly, in **minor burns, cuts, or skin wounds**, olive oil-based formulations may support faster healing by reducing inflammation and protecting damaged tissues from oxidative injury. Another important therapeutic aspect discussed in the study was the **wound-healing potential** of olive oil phenolics. Since tissue repair requires proper hydration, reduced inflammation, and protection from microbial contamination, olive oil components may create favorable conditions for skin regeneration. For instance, formulations containing olive oil extracts could potentially be applied to **minor wounds, cracked skin, diabetic foot dryness, or post-surgical skin recovery** to support tissue repair.

Another practical example is in **topical anti-inflammatory gels and creams**. Pharmaceutical scientists may incorporate olive oil phenolics into formulations used for **joint pain, localized inflammation, or skin irritation**, where the combined antioxidant and anti-inflammatory effects may enhance therapeutic outcomes while improving skin compatibility. Overall, this research highlighted that olive oil phenolic compounds possess **significant pharmaceutical and therapeutic potential**, particularly due to their **antioxidant, anti-inflammatory, protective, and wound-healing properties**. The findings support the incorporation of olive oil bioactive compounds into **topical creams, medicinal ointments, dermatological products, anti-aging formulations, and skin-protective therapies**, making olive oil an important natural ingredient in modern pharmaceutical science.

2015

- **Cause/Topic:** Traditional uses, phytochemistry, and pharmacology of olive oil (*Olea europaea*)
- **By Whom:** Muhammad Ali Hashmi, Afsar Khan, Muhammad Hanif, Umar Farooq, and Shagufta Perveen
- **Pharmaceutical Importance:** Comprehensive review of olive oil phytochemicals and therapeutic uses.
- **Conclusion:** Olive oil possesses antioxidant, anti-inflammatory, wound-healing, and moisturizing properties suitable for pharmaceutical and cosmetic use.
- **Number of Contributors:** 5 authors
- **Summary:** This review provided a detailed overview of olive oil (*Olea europaea*) by exploring its **traditional medicinal importance, phytochemical constituents, and pharmacological effects**. Historically, olive oil has been widely used in traditional medicine in Mediterranean and Middle Eastern regions for maintaining skin health, healing wounds, reducing pain, and treating inflammatory conditions. Ancient medicinal systems often used olive oil as a **base for herbal ointments and medicinal preparations** because of its soothing and protective nature. One major finding of the review was the **strong antioxidant activity** of olive oil. Antioxidants help neutralize harmful **free radicals**, which are unstable molecules responsible for tissue damage, premature aging, inflammation, and cellular stress. By reducing oxidative stress, olive oil may protect skin cells and improve tissue health.

For example, in **anti-aging creams**, olive oil extracts may help reduce **fine lines, skin dullness, and dryness** caused by oxidative damage. A moisturizing cream containing olive oil and antioxidants could help maintain skin elasticity and protect against environmental stress such as **pollution, UV radiation, and dryness**. For example, in **eczema management**, topical formulations containing olive oil may soothe dry, inflamed skin and improve comfort by reducing itching and irritation. Similarly, in **minor burns or inflamed skin**, olive oil-based creams may help calm the affected area while keeping the skin moisturized.

The researchers further described the **moisturizing and emollient properties** of olive oil, which are especially valuable in dermatological formulations. Olive oil forms a protective layer on the skin surface that helps reduce **water loss**, thereby maintaining skin softness and hydration. For example, in **winter skincare products**, olive oil may be incorporated into creams and lotions to protect against excessive dryness and rough skin. Similarly, **baby skincare formulations** may contain controlled amounts of olive oil for gentle moisturization, although balanced formulations are preferred to avoid barrier disruption. The study also discussed the **antimicrobial activity** of olive oil compounds, which may help protect the skin from certain microorganisms. This property makes olive oil potentially useful in **herbal antiseptic creams and dermatological products** designed to maintain skin health and cleanliness. For example, olive oil may be incorporated into **anti-inflammatory gels, medicated creams, transdermal patches, herbal ointments, and cosmetic formulations** to improve both therapeutic effectiveness and skin compatibility. A topical pain-relief cream containing olive oil may not only enhance drug absorption but also provide additional moisturizing and soothing benefits to the patient.

2016

- **Cause/Topic:** Enhancement of antioxidant and skin moisturizing effects of olive oil through microemulsions
- **By Whom:** Wantida Chaiyana, Pimporn Leelapornpisid, Rungsinee Phongpradist, Kanokwan Kiattisin, and co-researchers
- **Pharmaceutical Importance:** Investigated olive oil microemulsions for improving antioxidant and moisturizing properties in topical systems.
- **Conclusion:** Olive oil incorporated into microemulsions demonstrated enhanced antioxidant activity and superior skin hydration compared to native olive oil.
- **Number of Contributors:** 4+ authors

- **Summary:** This study focused on improving the therapeutic performance of olive oil by incorporating it into a **microemulsion delivery system**. Although olive oil naturally contains beneficial compounds such as **oleic acid, polyphenols, tocopherols, antioxidants, and vitamins**, conventional application of pure olive oil may not always provide optimal absorption into the skin. Factors such as poor penetration, greasiness, instability, and uneven spreadability can reduce therapeutic effectiveness. To overcome these limitations, the researchers developed olive oil-based **microemulsions** and evaluated their ability to improve skin moisturization and antioxidant effects.

For example, in individuals with **dry or dehydrated skin**, a moisturizer formulated with olive oil microemulsion may provide deeper and longer-lasting hydration than ordinary creams. During winter seasons, when skin often becomes rough and flaky due to environmental dryness, microemulsion-based creams may help restore moisture more effectively and improve skin smoothness.

Another major finding of the study was the improvement in **antioxidant activity**. Olive oil naturally contains antioxidant compounds such as **polyphenols, hydroxytyrosol, oleuropein, and vitamin E**, which help neutralize harmful **free radicals** responsible for skin aging and tissue damage. By improving the delivery of these antioxidants into the skin, microemulsions enhanced olive oil's protective effect against oxidative stress. For example, in **anti-aging skincare formulations**, olive oil microemulsions may help reduce signs of aging such as **fine lines, dullness, dryness, and reduced elasticity** by protecting skin cells from oxidative damage caused by pollution and UV exposure. A face cream containing olive oil microemulsion could potentially improve skin texture while offering protective antioxidant benefits.

For example:

- In **anti-inflammatory creams**, olive oil microemulsions may help deliver active drugs deeper into inflamed tissues while simultaneously soothing and moisturizing the skin.
- In **wound-healing formulations**, improved delivery of antioxidants may support tissue regeneration and reduce oxidative damage around wounds.
- In **cosmetic moisturizers**, olive oil microemulsions may provide a non-greasy feel with better spreadability and improved patient preference.

2017

- **Cause/Topic:** Glycerol-containing emollients in topical skincare
- **By Whom:** George Sorin Tiplica, Andrzej Kaszuba, Laura Malinauskienė, Pille Konno, Franck Boralevi, Eric Garrigue, Markéta Saint-Aroman, and Alain Delarue
- **Pharmaceutical Importance:** Evaluated glycerol-based emollients for improving skin hydration and preventing flare-ups of atopic dermatitis.
- **Conclusion:** Glycerol-containing moisturizers effectively maintained skin hydration and reduced recurrence of skin irritation.
- **Number of Contributors:** 8 authors
- **Summary:** This study focused on understanding the effectiveness of **glycerol-containing emollients in topical skincare**, particularly for people suffering from **dry skin, eczema, and skin barrier dysfunction**. The skin barrier plays an important role in protecting the body against **water loss, allergens, microbes, and environmental irritants**. When this barrier becomes damaged, skin may become **dry, itchy, inflamed, rough, or sensitive**, increasing discomfort and susceptibility to irritation.

For example, in people suffering from **dry skin during cold weather**, glycerol-based creams may help prevent cracking, peeling, and tightness by locking moisture into the skin. A person with severely dry hands due to frequent washing may experience relief after applying a moisturizer containing glycerol because it restores hydration and prevents further barrier damage. Another important finding of the study was the role of glycerol in managing **atopic dermatitis (eczema)**, a chronic skin condition characterized by itching, redness, dryness, and inflammation. Since eczema is often associated with a weakened skin barrier, maintaining hydration becomes essential to reduce flare-ups.

For example, a patient with **eczema-prone skin** using a glycerol-containing emollient daily may experience **reduced itching, improved skin smoothness, and fewer episodes of irritation**. Children or adults suffering from recurrent dry patches on elbows, hands, knees, or face may particularly benefit from moisturizers rich in glycerol. The study also emphasized that glycerol works particularly well when combined with **emollient oils**, including **olive oil**, because these ingredients provide complementary actions. While glycerol acts as a **humectant** by drawing moisture into the skin, olive oil functions as an **emollient and occlusive agent**, helping seal moisture and soften the skin surface.

For example, an **olive oil-based moisturizing cream containing glycerol** may offer better hydration than olive oil alone. In this combination:

- **Glycerol** attracts water and keeps skin hydrated internally.
- **Olive oil** forms a protective layer that reduces moisture loss and improves softness.

Overall, this study highlighted glycerol as a **highly effective humectant and therapeutic skincare ingredient** capable of restoring hydration, improving barrier integrity, and reducing irritation. The findings support its pharmaceutical application in **moisturizers, emollient creams, eczema management products, and olive oil-based topical formulations**, where prolonged skin hydration and barrier protection are essential for better therapeutic outcomes.

2018

- **Cause/Topic:** Olive oil and natural oils in skin moisturization
- **By Whom:** Theodora K. Karagounis, Julia K. Gittler, Veronica Rotemberg, and Kimberly D. Morel
- **Pharmaceutical Importance:** Reviewed the dermatological use of olive oil, sunflower oil, and coconut oil in skin hydration.
- **Conclusion:** Olive oil possesses moisturizing properties, but formulation balance is important to maintain skin barrier integrity.
- **Number of Contributors:** 4 authors
- **Summary:** This review focused on understanding how **olive oil and other natural oils contribute to skin moisturization and skin barrier maintenance**. Healthy skin depends on an intact barrier system that prevents excessive moisture loss and protects against irritants, microorganisms, and environmental damage. When this barrier becomes weakened, the skin may become **dry, rough, inflamed, itchy, or sensitive**, increasing the risk of dermatological disorders.

The researchers compared different natural oils commonly used in skincare and analyzed their impact on **hydration, barrier integrity, and skin physiology**. Among these oils, **olive oil received particular attention due to its rich composition of fatty acids, antioxidants, and bioactive compounds** that contribute to skin nourishment and moisturization. One major finding of the study was that olive oil acts as an effective **emollient**, meaning it softens and smoothens the skin by forming a protective layer that helps reduce moisture loss. Olive oil contains **oleic acid**, which improves skin softness and helps maintain hydration.

For example, individuals suffering from **dry skin during winter** may benefit from moisturizers containing olive oil because these products help prevent **skin roughness**,

flaking, and tightness caused by low humidity and cold temperatures. A body lotion enriched with olive oil may keep the skin softer and more hydrated throughout the day. For example, after repeated exposure to **soap, detergents, or excessive handwashing**, the skin barrier may become damaged, leading to dryness and irritation. A hand cream containing olive oil may help restore moisture and improve comfort by replenishing the skin's protective layer.

For example:

- **Olive oil** may provide strong emollient and antioxidant effects.
- **Sunflower oil** may better support barrier repair in some sensitive skin conditions.

Overall, this review demonstrated that **olive oil is a valuable natural ingredient for skin moisturization**, offering benefits such as **hydration, skin softening, antioxidant protection, and barrier support**. However, the study emphasized that **proper formulation balance is essential**, and olive oil works best when incorporated into **well-designed pharmaceutical and cosmetic topical products** rather than used excessively in pure form. The findings strongly support the use of olive oil in **moisturizers, emollient creams, dermatological preparations, and topical skincare formulations** for improving skin health and patient comfort.

2019

- **Cause/Topic:** Olive oil in pharmacological and cosmetic traditions
- **By Whom:** Ilaria Gorini, Silvia Iorio, Rosagemma Ciliberti, Marta Licata, and Giuseppe Armocida
- **Pharmaceutical Importance:** Reviewed historical and pharmacological applications of olive oil in cosmetic and medicinal preparations.
- **Conclusion:** Olive oil remains a valuable therapeutic ingredient because of its antioxidant, anti-inflammatory, and moisturizing activities.
- **Number of Contributors:** 5 authors
- **Summary:** This study reviewed the **pharmacological and cosmetic traditions of olive oil**, examining both its historical medicinal use and modern therapeutic relevance. Olive oil has been regarded as one of the oldest natural remedies in human history and was commonly used in **ancient Greek, Roman, Egyptian, and Mediterranean medicine** for treating wounds, dry skin, inflammation, burns, and various skin disorders.

Another important aspect discussed in the study was olive oil's **anti-inflammatory and soothing properties**. Since inflammation is associated with conditions such as **eczema, dermatitis, skin irritation, psoriasis, and redness**, olive oil-based products may help reduce discomfort and improve skin healing. For example, individuals experiencing **mild skin irritation or inflamed dry skin** may benefit from creams containing olive oil because the formulation can help calm irritation while simultaneously improving hydration. Similarly, after prolonged sun exposure, olive oil-containing moisturizers may soothe dry or irritated skin.

For example, a **healing ointment containing olive oil** may be useful for managing **dry cracked heels, rough skin patches, or mild superficial wounds**, helping improve comfort and supporting natural skin regeneration. Another important finding was olive oil's significance in **cosmetic traditions and dermatology**. Olive oil has long been included in products intended to improve **skin softness, elasticity, hydration, and overall appearance**. Because it acts as an **emollient**, olive oil forms a protective layer that reduces moisture loss and improves skin smoothness.

For example:

- In **anti-inflammatory creams**, olive oil may improve penetration of active drugs into affected tissues.
- In **herbal medicinal ointments**, olive oil may act as a carrier for plant extracts while providing additional soothing and moisturizing effects.
- In **cosmetic creams**, olive oil may improve spreadability and patient acceptability due to its skin-conditioning properties.

Overall, this review demonstrated that olive oil has maintained an important place in both **traditional medicine and modern pharmaceutical science**. Its multifunctional properties, including **antioxidant, anti-inflammatory, moisturizing, protective, and wound-healing activities**, strongly support its continued use in **topical formulations, cosmetic products, dermatological preparations, and advanced skincare systems**.

2020

- **Cause/Topic:** Plant oils and lipid-based cosmeceuticals in skincare
- **By Whom:** Anas Ahmad and Haseeb Ahsan
- **Pharmaceutical Importance:** Evaluated plant oils as therapeutic agents in topical skincare formulations.

- **Conclusion:** Natural oils improve hydration, barrier function, and skin protection.
- **Number of Contributors:** 2 authors
- **Summary:** The review emphasized the increasing use of plant-derived oils in pharmaceutical and cosmetic products. Olive oil and similar natural oils were found to improve moisturization, protect against oxidative stress, and enhance the therapeutic effectiveness of topical formulations. These findings support the formulation of olive oil-based creams with improved skin compatibility.

Plant oils such as olive oil, coconut oil, argan oil, jojoba oil, almond oil, and sunflower oil are rich in essential fatty acids, vitamins (A, D, and E), and antioxidants. These components help reduce transepidermal water loss, protect against oxidative stress, and support skin regeneration. For example, jojoba oil closely resembles human sebum, making it highly effective in balancing oily and acne-prone skin without clogging pores. Similarly, argan oil is widely used for its high vitamin E content, which helps in anti-aging and improving skin elasticity.

Lipid-based cosmeceuticals extend beyond simple oils and include advanced delivery systems such as liposomes, nanoemulsions, solid lipid nanoparticles (SLNs), and lipid creams. These systems enhance the penetration of active ingredients into deeper layers of the skin while maintaining stability and controlled release. For instance, vitamin C incorporated into lipid nanoparticles shows improved stability and better skin absorption compared to conventional formulations.

The review also emphasizes the role of plant oils in treating specific skin conditions. Coconut oil demonstrates strong antimicrobial activity against skin pathogens, making it useful in conditions like dermatitis. Olive oil, rich in oleic acid, provides intense moisturization and is often used in formulations for dry and sensitive skin. Almond oil is frequently included in massage oils and baby skincare products due to its mild and soothing nature.

In modern cosmeceuticals, these plant-based lipids are increasingly combined with synthetic actives to create hybrid formulations that offer both therapeutic and cosmetic benefits. This synergy improves product performance in areas such as anti-aging, sun protection, wound healing, and skin barrier repair.

Overall, the authors conclude that plant oils and lipid-based delivery systems represent a promising, sustainable, and skin-friendly approach in the evolving field of cosmeceuticals, blending nature's chemistry with pharmaceutical innovation like two worlds learning to speak the same skincare language.

2021

- **Cause/Topic:** Olive-derived compounds in topical formulations
- **By Whom:** Andreia Nunes, Ana R. Pinho, Mariana Santos, and co-researchers
- **Pharmaceutical Importance:** Investigated olive oil extracts and bioactive compounds for cosmetic and pharmaceutical applications.
- **Conclusion:** Olive oil derivatives demonstrated moisturizing, antioxidant, and skin-protective effects.
- **Number of Contributors:** 8+ authors
- **Summary:** The study explored the application of olive-derived bioactive compounds in skin formulations. Findings suggested that antioxidants present in olive oil help prevent skin damage caused by oxidative stress while improving hydration and elasticity. This supports olive oil's use as a functional ingredient in topical creams.

Their work centers on bioactive molecules extracted from olive oil and olive leaves, particularly phenolic compounds such as hydroxytyrosol, tyrosol, and oleuropein, along with lipid components like squalene. These compounds exhibit strong antioxidant, anti-inflammatory, antimicrobial, and skin-protective properties, making them highly suitable for dermatological and cosmetic applications.

In topical formulations, olive oil acts not only as an emollient but also as a skin barrier enhancer. Its rich fatty acid profile helps restore lipid balance in dry or damaged skin. For example, creams enriched with virgin olive oil are commonly used in formulations for eczema-prone or sensitive skin due to their soothing and protective effects. Meanwhile, olive leaf extracts are increasingly incorporated into serums and gels aimed at reducing oxidative stress and delaying visible signs of aging.

A key highlight of their research is the role of phenolic compounds in combating oxidative skin damage caused by UV exposure and environmental pollutants. Hydroxytyrosol, for instance, demonstrates strong free-radical scavenging ability, making it valuable in anti-aging creams and sunscreen-support formulations. Oleuropein contributes to wound healing and reduces inflammation, which supports its inclusion in post-procedure skincare products and healing ointments.

The researchers also emphasize modern delivery systems such as nanoemulsions, liposomes, and lipid-based carriers to improve the stability and skin penetration of olive-derived actives. For example, hydroxytyrosol-loaded nanoemulsions show enhanced absorption compared to conventional creams, allowing deeper dermal action at lower concentrations.

Overall, olive-derived compounds are presented as a multifunctional toolkit for topical formulations—where olive oil provides nourishment, phenolics provide protection, and lipid systems ensure efficient delivery. Together, they transform a traditional Mediterranean ingredient into a sophisticated cosmetic bioactive system, bridging ancient skincare wisdom with modern pharmaceutical design

2022

- **Cause/Topic:** Nanoformulations of ibuprofen for topical drug delivery
- **By Whom:** Various pharmaceutical formulation researchers
- **Pharmaceutical Importance:** Studied nanoemulsion and lipid-based systems for topical ibuprofen delivery.
- **Conclusion:** Nanoformulations improved skin permeation and anti-inflammatory effectiveness of ibuprofen.
- **Number of Contributors:** Multiple authors
- **Summary:** This research demonstrated that ibuprofen-loaded nanoformulations enhanced drug penetration through the skin and improved therapeutic action at the site of inflammation. The use of oils and suitable excipients was shown to improve drug release, suggesting potential compatibility with olive oil-based topical systems.

Pharmaceutical formulation researchers have extensively explored nanoformulations of ibuprofen for topical drug delivery, aiming to transform a commonly used oral painkiller into a more targeted, skin-applied therapeutic system with improved efficiency and reduced systemic side effects.

Ibuprofen, a non-steroidal anti-inflammatory drug (NSAID), is widely used for pain, inflammation, and fever. However, oral administration can lead to gastrointestinal irritation and fluctuating drug levels in the bloodstream. To overcome these limitations, researchers have developed nano-based topical systems that allow ibuprofen to act directly at the site of inflammation, such as muscles, joints, or localized skin injuries.

Nanoformulations such as nanoemulsions, liposomes, solid lipid nanoparticles (SLNs), nanostructured lipid carriers (NLCs), niosomes, and polymeric nanoparticles have shown significant promise in enhancing ibuprofen delivery through the skin barrier. These systems improve drug solubility, increase skin permeation, and provide controlled or sustained release.

For example, ibuprofen-loaded nanoemulsions create ultra-small droplets that enhance drug diffusion through the stratum corneum, making them useful in topical gels for muscle pain relief. Liposomal ibuprofen systems encapsulate the drug within phospholipid bilayers, improving stability and allowing deeper skin penetration with reduced irritation. Similarly, SLN-based ibuprofen creams offer prolonged release, maintaining anti-inflammatory action over extended periods with fewer applications.

In practical applications, ibuprofen nanogels and transdermal nano-patches have been investigated for conditions like arthritis, sports injuries, and localized swelling. These systems aim to concentrate the drug at the site of pain while minimizing systemic absorption, effectively reducing the risk of gastric side effects commonly associated with oral NSAIDs.

Overall, nanoformulations of ibuprofen represent a modern pharmaceutical strategy where a familiar drug is re-engineered into a smarter delivery system. Instead of flooding the whole body, the drug becomes a precision tool, releasing its anti-inflammatory action exactly where the body needs relief, like a microscopic courier delivering medicine straight to the site of pain.

2023

- **Cause/Topic:** Herbal and natural oil-based topical cream formulations
- **By Whom:** Cosmetic and pharmaceutical formulation researchers
- **Pharmaceutical Importance:** Increased use of plant-based ingredients in topical creams.
- **Conclusion:** Herbal creams containing natural oils demonstrated improved skin hydration and patient preference.
- **Number of Contributors:** Multiple authors
- **Summary:** Studies published during this period highlighted growing consumer demand for herbal skincare products. Natural oils such as olive oil, coconut oil, and jojoba oil were increasingly incorporated into creams because of their moisturizing and soothing properties. These findings support the formulation of safer and more acceptable topical preparations.

Cosmetic and pharmaceutical formulation researchers have extensively investigated herbal and natural oil-based topical cream formulations as a growing segment of modern cosmeceuticals, combining traditional plant knowledge with advanced pharmaceutical delivery science.

For example, aloe vera is widely incorporated into moisturizing gels and creams due to its soothing and wound-healing properties, making it effective in treating sunburn and minor skin irritation. Neem extract is frequently used in anti-acne formulations because of its strong antibacterial and antifungal activity. Similarly, turmeric-based creams are popular for their anti-inflammatory and brightening effects on the skin.

Natural oils play a crucial role as emollients and carriers in these formulations. Coconut oil enhances skin hydration and exhibits antimicrobial activity, making it suitable for dry and infection-prone skin. Shea butter provides deep moisturization and is commonly used in body creams for eczema and very dry skin conditions. Jojoba oil, due to its similarity to human sebum, helps regulate oil balance in acne-prone skin without clogging pores.

Researchers also highlight the importance of formulation technology in improving the effectiveness of these herbal creams. Techniques such as emulsification, nanoemulsion systems, and liposomal encapsulation are used to enhance stability, improve skin penetration, and ensure controlled release of active compounds. For instance, turmeric extract incorporated into a nanoemulsion-based cream shows better absorption and reduced skin staining compared to conventional formulations.

These formulations are being increasingly applied in cosmetic and dermatological products targeting conditions such as acne, dermatitis, aging skin, pigmentation, and general skin dryness. The combination of herbal actives and natural oils creates synergistic effects, where oils improve delivery and hydration while herbal compounds provide targeted therapeutic action.

Overall, herbal and natural oil-based topical creams represent a sustainable and skin-friendly approach in modern formulation science, offering effective alternatives to synthetic-only products while maintaining compatibility with human skin biology.

2024

- **Cause/Topic:** Olive oil in dermatological moisturization and barrier function
- **By Whom:** Contemporary dermatology researchers and review authors
- **Pharmaceutical Importance:** Reassessed benefits and formulation considerations of olive oil in skincare.
- **Conclusion:** Olive oil is effective when properly formulated with supporting excipients rather than used alone.
- **Number of Contributors:** Multiple authors

- **Summary:** Recent reviews emphasized that olive oil provides hydration, antioxidant protection, and anti-inflammatory benefits when included in balanced topical formulations. Researchers suggested combining olive oil with humectants such as glycerol and stabilizing excipients to maximize therapeutic performance and reduce possible irritation risks.

Contemporary dermatology researchers and various review authors have extensively examined the role of olive oil in dermatological moisturization and skin barrier function, positioning it as a biologically active emollient rather than a simple cosmetic oil.

In dermatological moisturization, olive oil works primarily by forming an occlusive layer on the skin surface, reducing transepidermal water loss (TEWL). This helps maintain hydration, especially in dry or compromised skin conditions. For example, topical formulations containing refined olive oil or virgin olive oil are commonly used in emollient creams designed for xerosis (dry skin) and mild eczema.

However, researchers also provide a nuanced view, noting that olive oil's high oleic acid content can, in some cases, increase skin permeability. While this may enhance penetration of active ingredients, excessive or undiluted application may disrupt the skin barrier in sensitive individuals. This dual behavior has led to its careful use in optimized concentrations within dermatological formulations.

In barrier function repair, olive oil contributes by supporting the lipid matrix of the stratum corneum. The presence of antioxidants such as polyphenols helps reduce inflammation and oxidative damage caused by environmental stressors like UV radiation and pollution. For instance, olive oil-based ointments are often incorporated into post-procedure skincare routines to soothe irritation and promote recovery of the skin barrier.

Modern dermatological formulations often combine olive oil with other biocompatible lipids or encapsulation systems such as emulsions, creams, and lipid nanoparticles. This improves stability and ensures controlled delivery of its beneficial components while minimizing potential irritation. For example, olive oil-enriched nanoemulsion creams are being explored for enhanced hydration with improved skin tolerance.

Overall, the consensus among contemporary dermatology literature is that olive oil plays a multifunctional role in skin health—acting as a moisturizer, a barrier-supporting lipid source, and a mild anti-inflammatory agent when properly formulated. It is best understood as a biologically active skincare ingredient whose effects depend strongly on concentration, formulation type, and skin condition

2025

- **Cause/Topic:** Emerging trends in herbal topical delivery systems
- **By Whom:** Pharmaceutical and cosmeceutical researchers
- **Pharmaceutical Importance:** Focused on natural excipients, oils, and patient-friendly formulations.
- **Conclusion:** Olive oil-based creams continue to show promise in topical pharmaceutical and cosmetic applications.
- **Number of Contributors:** Multiple authors
- **Summary:** Current research trends indicate increasing interest in natural oil-based topical systems because of their biocompatibility, lower irritation potential, and multifunctional therapeutic benefits. Olive oil-based formulations combined with moisturizing agents such as glycerol and anti-inflammatory agents like ibuprofen are considered promising for future topical applications.

Pharmaceutical and cosmeceutical researchers have extensively explored emerging trends in herbal topical delivery systems, focusing on how traditional plant-based actives can be transformed into highly efficient, stable, and targeted dermatological therapies using modern formulation technologies.

Their work highlights a shift from conventional herbal creams and ointments toward advanced delivery platforms designed to overcome challenges such as poor solubility, low skin permeability, instability of phytoconstituents, and variable bioavailability. Herbal actives like curcumin, aloe compounds, flavonoids, neem extracts, and green tea polyphenols are increasingly being engineered into optimized carriers for better clinical and cosmetic performance.

One major emerging trend is the use of nano-based delivery systems, including nanoemulsions, solid lipid nanoparticles (SLNs), nanostructured lipid carriers (NLCs), liposomes, and phytosomes. These systems enhance penetration of herbal actives through the stratum corneum and allow controlled or sustained release. For example, curcumin-loaded nanoparticles show improved anti-inflammatory activity in acne and psoriasis models compared to conventional herbal creams.

Researchers also emphasize vesicular systems such as transfersomes and ethosomes, which are specially designed to deform and pass through narrow skin channels, enabling deeper delivery of herbal compounds without systemic exposure. For instance, green tea polyphenol

ethosomal gels have demonstrated improved antioxidant delivery in photoprotective skincare applications.

Overall, emerging herbal topical delivery systems represent a convergence of phytochemistry and pharmaceutical engineering. They aim to convert traditional herbal wisdom into precision dermatology tools, where plant actives are no longer limited by their natural drawbacks but are instead enhanced through smart delivery platforms that behave like microscopic guided skincare architects.