

# SKIN INFECTIONS: ESSENTIAL OILS AS POTENTIAL ANTIMICROBIALS

Essential oils are one of the most important and popular natural remedies used for the treatment of different ailments, including skin infections. Commercially available essential oils are a popular option for therapy because of the benefits associated with their use, easy availability, action against antimicrobial resistance, and the popularity of use in dermatology.<sup>1</sup>

Several studies have been conducted to evaluate the action of essential oils on skin pathogens, such as *Staphylococcus aureus*. However, a number of other species of pathogens are yet to be studied extensively.<sup>1</sup>



## Essential Oils versus Over-The-Counter Medications

Topical skin infections resulting from dermatological skin pathogens are treated using topical treatment. However, the overuse of medications, incorrect prescription of antimicrobials, and evolution of microbes pose a threat to complete and correct treatment of skin infections.<sup>1</sup>

In addition, the overuse of medications leads to emergence of antibiotic resistance in pathogens. One such example is the emergence of the methicillin-resistant *S. aureus* (MRSA) strain. Therefore, treatment becomes challenging and unsuccessful as the strains stop responding to all the conventional antibiotics available for treatment.<sup>1</sup>

One of the safest and effective ways to overcome resistant pathogenic strains is to use natural products for the treatment of wounds and skin infections. Several essential oils have been identified for dermatological use and most of them are recommended for the treatment of skin infections.<sup>1</sup>

Essential oils can be used for the treatment of skin infections caused by bacteria, viruses, and fungi. In addition, they can also be used effectively for the treatment of inflammatory skin conditions, such as psoriasis, dermatitis, lupus, and eczema and in general skin issues, such as wrinkles, scabs, and scars.<sup>1</sup>

## Skin Infection – Mechanism

The human skin has a natural microflora of its own. The microorganisms present on the human skin protect against the invasion of pathogenic bacterial growth by producing metabolic products that inhibit their growth. Some of the microorganisms naturally present on the skin include *Candida*, streptococci, staphylococci, and *Corynebacterium*.<sup>1</sup>

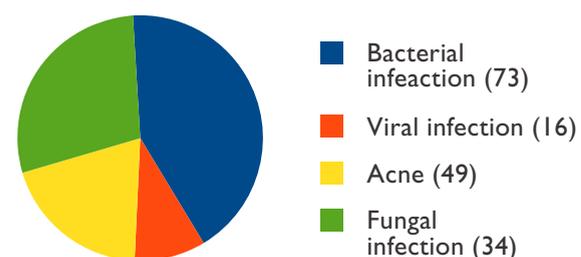
When the skin is injured or traumatized due to burns, natural thinning, scratches, wounds, skin defects, or ulcers, this defense system is compromised. As a result, pathogenic bacteria invade the outermost layer of the skin and result in infection. Environmental exposure at high-risk places, such as hospitals, may also increase the risk of skin infections.<sup>1</sup>

Skin infections are the most commonly encountered infections globally. Some common skin infections include impetigo, boils, ringworm, cellulitis, carbuncles, and foot odor (*Brevibacterium spp.*).<sup>1</sup>

## Role of Essential Oils in Treatment of Skin Infections

So far, 1,500 combinations of 90 essential oils have been identified for dermatological use. In total, 88 essential oils have been found to be effective against skin infections.

Figure 1: Essential oils used in specific infections



Different uses of these oils in specific infections are shown in Figure 1.<sup>1</sup>

Dermatophytes, yeast (*Candida albicans*), and Gram-positive bacteria are the most sensitive to essential oil inhibition. The essential oil extracted from *Cymbopogon martini* is effective and highly active against both Gram-positive and Gram-negative bacteria.<sup>2</sup>

The efficiency of essential oils also differs based on their concentration. For example, evening primrose oil affects Gram-negative bacteria more at its lower concentration. When the concentration of the oil is increased, a profound impact on Gram-positive bacteria is observed.<sup>2</sup>

### Best Essential Oils for Skin Infection: Use and Properties

Essential oils are volatile compounds derived from different plants. They have insecticidal, fungicidal, and antimicrobial properties and can potentially be used to control pathogens in plants and human pathogenic disease.<sup>2</sup>

Essential oils can be effectively used as antimicrobial agents. They have been proven more economical and environmentally safe.<sup>2</sup>

Some essential oils and their pharmacological properties and use are listed in Table 1.<sup>1</sup>

Table 1: Ten common essential oils used for skin infections

Essential oils	Properties	Use
Lavender 	Antiviral Antibacterial	Acne, psoriasis, skin rashes, bruises, scrapes, blisters, rosacea sores, carbuncles, burns, bacterial infections, and insect bites and stings
Tea tree 	Antiviral	Antifungal Antibacterial Ulcers; bacterial infections; rashes; carbuncles; blemishes; boils; burns; acne; abrasions; viral infections, such as shingles, warts, and chicken pox; wounds; and fungal infections
Roman chamomile 	Antiseptic	Redness and inflammation of acne-prone skin, diaper rashes, eczema and wounds, rosacea, psoriasis, dermatitis, burns boils, blisters, and sunburn
Lemongrass 	Antifungal Antibacterial	Open or blocked pores and treatment of fungal infections such as athlete's foot, bacterial infections, acne, hyperhidrosis, and cellulite
Eucalyptus 	Antibacterial Antifungal Antiseptic	Antimicrobial Burns, cuts, sores, ulcers, abscesses, wounds, bacterial and fungal infections, insect bites, shingles, chickenpox, and bacterial dermatitis
Oregano 	Antifungal	Antibacterial Wounds, bacterial skin infections, psoriasis, warts, eczema, and fungal infections

<p>Thyme</p> 	<p>Antibacterial Antifungal Antiseptic</p>	<p>Acne, sores, wounds, fungal infections, burns, blisters, sores, cellulitis, cuts, and dermatitis</p>
<p>Rose</p> 	<p>Anti-inflammatory Healing agent</p>	<p>Psoriasis, eczema, cuts, scars, pruritus, burns, and as a healing agent</p>
<p>Rosemary</p> 	<p>Antibacterial</p>	<p>Bacterial infections, acne, dermatitis, cellulite, eczema, and rosacea</p>
<p>Roman chamomile</p> 	<p>Antiseptic</p>	<p>Redness and inflammation of acne-prone skin, diaper rashes, eczema and wounds, rosacea, psoriasis, dermatitis, burns boils, blisters, and sunburn</p>
<p>Clove</p> 	<p>Antiseptic Antifungal</p>	<p>Acne, fungal infections, burns, cuts, athlete's foot, lupus, sores, wounds, and ulcers</p>

Other popular essential oils commonly used for the treatment of skin infections include sandalwood, ginger, basil, peppermint, palmarosa, jasmine, clove, and ylang-ylang.<sup>1</sup>

### Toxicity of Essential Oils

Medicinal plants are usually considered safe for use and application. However, this is not true. Certain essential oils may cause an allergic reaction in some patients, leading to skin irritation, dermatitis, and photosensitization.<sup>1</sup>

Therefore, it becomes necessary to determine the toxicity of essential oils in human skin cells and skin fibroblasts before recommending them for topical application. For example, *Mentha piperita* oil is one of the most commonly used oils for skin infections. However, it can cause dermal irritation.<sup>1</sup>

### References

1. Orchard A, van Vuuren S. Commercial essential oils as potential antimicrobials to treat skin diseases. *Evid Based Complement Alternat Med.* 2017;2017:451797.
2. Lodhia MH, Bhatt KR, Thaker VS. Antibacterial activity of essential oils from palmarosa, evening primrose, lavender and tuberose. *Indian J Pharm Sci.* 2009 Mar;71(2):134–6.