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Mini Review

A Review of Lavender Antimicrobial Ointment: Nature's Defence for Healthy Skin

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Abstract

Lavender (*Lavandula angustifolia*) essential oil has long been recognized for its antimicrobial properties, which make it a promising candidate for topical formulations. This study investigates the formulation of a lavender-based antimicrobial ointment, evaluating its effectiveness against common pathogenic microorganisms, including Staphylococcus aureus, Escherichia coli, and Candida albicans. The lavender essential oil, known for its broad-spectrum antimicrobial activity, was incorporated into an ointment base composed of natural emulsifiers and moisturizers. The antimicrobial activity of the ointment was assessed using standard agar diffusion methods and minimum inhibitory concentration (MIC) tests. Results indicated that the lavender-based ointment exhibited significant antimicrobial activity against both bacterial and fungal strains, with notable inhibition zones observed in all tested microorganisms. The ointment also showed minimal skin irritation in preliminary dermatological assessments, suggesting its suitability for use in topical treatments. These findings support the potential of lavender essential oil as a natural alternative for the formulation of antimicrobial ointments, providing a safe and effective remedy for managing skin infections and other dermatological conditions. Further clinical studies are recommended to confirm its efficacy and safety for long-term use.

Keywords: Anti-microbial; Dermatological; Potential

Introduction

Restoring the health of the skin and homeostasis following an injury requires a complicated and variable biological process called wound healing, which involves a series of tissue interactions. The two primary functions of this mechanism are tissue healing and infection prevention. Numerous soluble mediators (such as growth factors and cytokines), cell types (such as immunological, endothelial, inflammatory, blood, and epithelial), and interactions with the matrix that surrounds cells are all involved in healing. The haemostasis phase, the phase of inflammatory responses, the epithelial differentiation and mitotic period, and the tissue reshaping phase are the four primaries chronologically and geographically overlapping stages that are well recognized. Reactive oxygen species, more commonly known as ROS, are created in wounds that heal correctly and serve as cellular messengers to promote angiogenesis, cytokine activity (including growth factor production from platelets (PDGF) signal transduction), and cell motility, among other important wound healing activities. Impaired wound healing can be caused by a number of variables, including oxygenation, age, gender, infection, and nutrition. Actually, damaged tissues have an impact on the healing process by producing more reactive oxygen products and lowering different types of free radical scavengers, both enzymatic and non-enzymatic Nevertheless, the excess ROS outweighs the positive impact and results in further tissue damage. Since ancient times, people have used natural medicines and medicinal herbs to heal a variety of skin conditions, including burns and wounds, providing a healthier option to such manufactured goods. Numerous scientific studies have really validated the use of medicinal plants for wound healing (6–13), and they provide several benefits, including being inexpensive, accessible, efficient, simple to maintain, and safe due to the infrequent and mild side effects—most notably local hypersensitivity. Numerous processes

by which the plants employed in traditional medicine aid in tissue regrowth and wound repair still require evaluation and confirmation by modern research.

Microbes

Bacteria, archaea, and single-celled eukaryotes—cells with a nucleus, such as amoeba or paramecium—are examples of microbes, which are creatures that are too tiny to be seen without a microscope.

Anti-Microbial

Antimicrobials are compounds that either destroy or inhibit the development of bacteria, viruses, fungus, and protozoa. They can be applied to humans, animals, and plants to cure and prevent infectious illnesses.

Types of microbes

Bacteria, archaea, protozoa, fungus, algae, lichens, slime moulds, viruses, and prions are among the several kinds of microorganisms. Despite the exception of viruses, which can only exist briefly outside of their host cells, the majority of these creatures may live in the air or soil without a host.

Bacteria

Minuscule, potentially advantageous, prokaryotic beings.

Archaea

Prokaryotic species that can survive in harsh environments have pseudopeptidoglycan cell walls.

Protozoa

Single cell eukaryotes.

Fungi

Single-celled or heterogeneous creatures consisting of yeasts and molds.

Viruses

Microbes with a protein coat and DNA or RNA that are not alive.

Lavender

The Lamiceae family includes lavender aromatic oil (LEO), a widely used and widely accessible commercial EO with antibacterial qualities. Its chemical constituents are thought to be the cause of Toxicity.

Lavender has antibacterial properties

- **Antibacterial:** Lavender oil works well against a variety of germs, including antibiotic-resistant ones like MRSA and VRE.
- **Antifungal:** Infections involving Candida can be treated with lavender oil.
- **Antiplaque:** In the dental profession, lavender can be administered as a kind of antiplaque medicine.

Ingredients

Figure 1: Lavender.

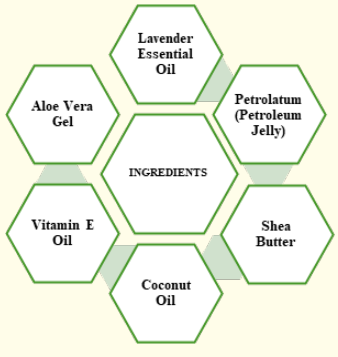

Figure a

Lavender essential oil

LEO works well against a variety of bacteria, including antibiotic-resistant ones like vancomycin-resistant Enterococcus (VRE) and methicillin-resistant *Staphylococcus aureus* (MRSA). Other substances including hydroxyapatite nanoparticles, actinidine dihydrochloride, nystatin, chloramphenicol, ciprofloxacin, and fluidic acid can also have their antibacterial activity enhanced by LEO.

Petrolatum (Petroleum Jelly)

It has been demonstrated that petroleum ether extracts work well against bacteria that are resistant to many drugs, such as

Figure 2: Lavender Essential oil.

MRSA, *Pseudomonas aeruginosa*, and *E. coli*. Out of all the extracts examined, the extract made from petroleum ether exhibits the strongest antibacterial activity.

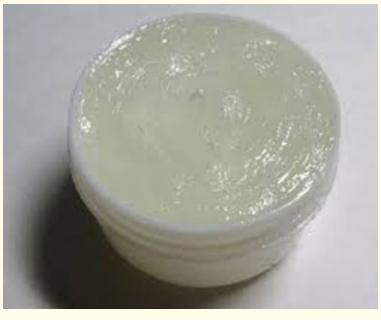

Figure 3: Petroleum Jelly

Shea butter

The antibacterial properties of other compounds, such fluidic acid (FA), can be strengthened by shea butter. Shea butter can enhance FA's antibacterial properties when added to solid lipid nanoparticles (SLNs). Shea butter has some chemical components that have antibacterial qualities. According to a research, shea butter's crude yellow extract exhibited stronger inhibitory effects than its most basic white and ivory extracts.

Figure 4: Shea butter.

Coconut oil

A fatty acid that accounts for over half of the medium-chain triglycerides (MCTs) in coconut oil. Lauric acid works well against bacteria that cause illness, such as *Staphylococcus aureus*. According to one study, the best fatty acid for preventing bacterial development was lauric acid.

Figure 5: Coconut oil.

Vitamin E oil

By preventing lipocalin binding, vitamin E can make bactericidal drugs more efficient. Bacterial proteins called lipocalins have the ability to stop antibiotics from getting to bacterial cells. Microorganisms that might trigger infections related to health care (HCAIs) can build biofilms, which vitamin E can help prevent.

Figure 6: Vitamin E.

Aloe vera gel

Numerous bacterial infections, such as those brought on by *Salmonella typhi*, *Propionibacterium acne*, *Helicobacter pylori*, *Pseudomonas aeruginosa*, the bacteria *Streptococcus pyogenes Staphylococcus aureus*, *Klebsiella pneumoniae*, and *Bacterium aeruginosa*, can be treated with aloe vera.

Figure 7: Aloe vera Gel.

Evaluation

An ointment's ability to safely and efficiently distribute medications through the skin is assessed. A range of assays are used to assess ointments, including:

Appearance: The ointment's hue, scent, and consistency

- **Viscosity:** The ointment's viscosity, which shows how uniform and straightforward it is to utilize
- **pH:** The ointment's pH level, which shows how effectively it will work chemically with skin
- **Spread ability:** The ease with which the ointment covers the skin
- **Drug absorption rate:** The rate at which the medications in the ointment enter the bloodstream
- **Extrudability:** The amount of force needed to push the ointment out of a tube
- **Water content**: The ointment's water content, which influences the texture and smoothness.

Market evaluation

S, no	Marketed product	Composition
01	Triple Antibiotic Ointment	Bacitracin, Neomycin, and Polymyxin B antibiotics
02	Neosporin	Neomycin/polymyxin B/bacitracin
03	Bactimo ointment	Bawachi, Neem, and Haritaki.
04	POLYBAMYCIN	Bacitracin, Neomycin, Polymyxin B
05	Mupi Ointment	Mupirocin
06	Biotine Ointment	Tetracycline Hydrochloride
07	Single Antibiotic Ointment	Bacitracin zinc
08	DermaSyn/Ag	Antibacterial silver

Table 1

Future prospective

Topical antibiotics are receiving a lot of attention again and are being used more widely than ever as we start a new decade. For a number of dermatoses, topical therapy is preferred over oral therapy due to the lower risk of adverse reactions in the system, the prevention of rebellion selection in the gut microbiota, the higher concentration of antibiotic that can be achieved at the site of action, and the overall use of less medication. It may surprise you to learn that topical therapy does not lower treatment expenses. In addition to fluidic acid, chloramphenicol, and pseudomonas acid, the list of antibiotics approved for topical application has grown in recent years and now includes members of the tetracycline, macrolide, glycosamide, aminoglycoside, and peptide families. There are differing views on the therapeutic effectiveness of topical antibiotics, and for the majority of cases, there are substitute oral treatments. Topical antibiotics are the preferred medication for treating ocular and external ear infections as well as for removing *Staphylococcus aureus* nasal carriage. Additionally, they work well for managing localized infectious dermatitis and treating impetigo and other shallow pyodermas. In mild to severe instances, topical formulations of erythromycin, clindamycin, and tetracycline are beneficial for treating acne and are frequently given. Topical antibiotics are being utilized more widely than ever before and are the focus of a lot of increased study. For a number of dermatoses, topical therapy is preferred over oral therapy due to the lower risk of systemic side effects, the prevention of resistance selection in the gut microbiota, the higher concentration of antibiotic that can be achieved at the site of action, and the overall use of less medication. It may surprise you to learn that topical therapy does not lower treatment expenses [1-20].

Conclusion

Ultimately, the study's findings demonstrated that topical lavender ointment administration successfully promoted wound contraction, raised the activity of antioxidant enzymes, and restored tissue health in the treated. The current ointment offers a topical combination for the medical management of wounds and burned skin that is efficient, stable, pleasant, reasonably priced, readily controlled, and used and administered safely, in light of the growing interest in natural preparations. lavender aromatherapy oil, all of which have been shown to have genuine therapeutic potential and significance by several studies in the literature. To evaluate the whole spectrum of ointment qualities, the most effective indications, and practical delivery modes, more *in vivo* and clinical research are required.

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