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# A Review on Essential oils for Treatment of Fungle infection

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**ABSTRACT :-**
Human skin acts as a physical barrier; however, sometimes the skin gets infected by fungi, which becomes more severe if the infection occurs on the third layer of the skin. Azole derivative-based antifungal oil, liquids, or sprays are available to treat fungal infections; however, these formulations show various side effects on the application site. Over the past few years, herbal extracts and various essential oils have shown effective antifungal activity. Additionally, autoxidation and epimerization are significant problems with the direct use of herbal extracts. Hence, to overcome these obstacles, polysaccharide-based nanohydrogels embedded with natural plant extracts and oils have become the primary choice of pharmaceutical scientists. These gels protect plant-based bioactive compounds and are effective delivery agents because they release multiple bioactive compounds in the targeted area. Itriconazole drug based oil can be applied to infected areas, and due to their contagious nature and penetration power, they get directly absorbed through the skin, quickly reaching the skin's third layer and effectively reducing the fungal infection. In this review, we explain various skin fungal infections, possible treatments, and the effective utilization of plant extract essential oils and oil-embedded

**Keywords**:- fungal infections, itraconazole drug,skin, polysaccharide, essential oils

## I. INTRODUCTION

Skin acts as a protector of the internal organs by shielding against external agents, sunburn, and by regulating body temperature; however, sometimes pathogens invade the body and disturb the skin protective properties, leading to skin diseases or infections.

The demand of minimally processed food has promoted the use of naturally occurring antimicrobials. Essential oils (Eos) are secondary metabolites of plants which can be extracted from herbs and spices. Many studies have reported antimicrobial activity of Essential oils of different plant origin and the antimicrobial properties of Eos can be attributed to the presence of bioactive compounds. These activities may be enhanced many folds if the EO is applied in the form of small droplets (preferably in Nano-range).

The present review focuses on updated account on the antifungal activity, and antifungal mode of action of various plant based Eos, and to recognize the prospective application of Essentialas Nano sizeoil droplets.

**2.1Essential oils:-**

Essential oils or ethereal oils are natural, volatile secondary metabolites produced by aromatic plants (Guenther 1952). The term "essential oil" is supposedly derived from the term quinta essentia coined by the Swiss reformer of medicine Paracelsus von Hohenheim in the sixteenth century, which means effective component of a drug (Guenther 1952). There is an increasing demand to reduce the use of chemicals as antimicrobial agents in the field of nutrition and to combat various infections due to increasingly aggressive and increasingly endogenous microorganisms that are resistant to the use of synthetic antimicrobials. In this direction, substances derived from plants, such as hydro-alcoholic extracts or essential oils, can certainly play a fundamental role. The versatility of such substances is enormous; the same plant can provide a pool of substances with a very broad spectrum of action due to their different chemical structure. Furthermore, the hypersensitivity and toxicity to the drugs, because of their improper and excessive application, represent some of the major problems of the conventional medicine consequences of the presently excessive use of synthetic antimicrobials. Public awareness has therefore generated interest in the application of natural substances already used throughout the ages for the treatment.

**2.3.Sources of essential oil**

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About 3000 Eos from different plant species have been reported, but only 300 of them are economically important and used in the fragrance, food, pharmaceutical, agricultural, and sanitary industries (Burt 2004). Eos are stored in secretory cells, cavities, canals, epidermic cells, and glandular trichomes of plant organs (Bakkali et al. 2008). The composition of an EO is affected by harvesting season, geographical location, maturity, and part of the plant utilized, genetic variation, postharvest drying, and storage conditions (Hussain et al. 2008).

### 2.3.Chemistry of essential oil

Carbon, hydrogen, and oxygen are three elements which make up the basis of EO. They are the complex natural mixture of about 20–60 chemical components with major components at relatively high concentration (20–70%), and rest are minor components present in trace amounts (Burt 2004). Most common class of compound found in Eos is the terpenes. Terpenes are combinations of several 5-carbon-base (C5) units called isoprene (Guenther 1952). Terpenes form the building blocks of monoterpenes (C10), sesquiterpenes (C15), diterpenes (C20), triterpenes (C30) tetraterpenes (C40) and large sequences (Bakkali et al. 2008). A terpene containing oxygen is called a terpenoid. The monoterpenes formed by conjoining of two isoprene units in a head-to-tail configuration. They constitute 80–90% components of EO and allow a large variety of structures.

## II. ANTIFUNGAL ACTIVITY OF ESSENTIAL OIL

Antimicrobial activity of various Essential oil is recognized for a long time now. Presence of bioactive compounds provides antimicrobial properties to Essential oils.

Among earlier studies on the antimicrobial activity of EO of betel leaf, Dubey and Tripathi (1987) have reported fungistatic nature of EO of Piper betle L. leaves against Aspergillum flavus. Nguefack et al. (2004) has shown complete inhibition of conidial germination and the mycelial growth of three fungi (Fusarium moniliforme, A. flavus, A. fumigatus) on corn meal agar using Ocimum gratissimum (African basil), Thymus vulgaris (thyme) and Cymbopogon citratus (lemongrass) EO at 800, 1000, and 1200 ppm, respectively. Vági et al. (2005) investigated antifungal properties of Origanum majorana L. EO against three foodborne fungi (A. niger, Trichoderma viride, Penicillium cyclopium).

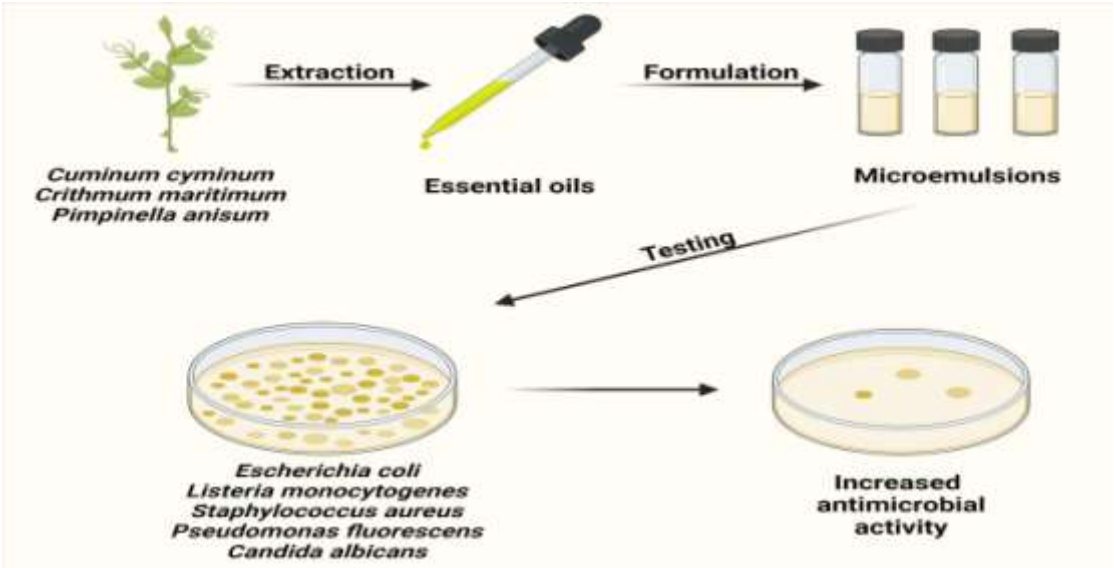


Fig.1 :- Antifungal activity of Essential oil.

Fungal infections are caused by eukaryotic organisms, and it is therefore more difficult to ascertain their presence and apply the appropriate therapeutic treatment compared to bacterial infections. The cell wall of fungi may be considered as the prime target for selectively toxic antifungal agents because of its chitin structure, which is absent in human cells. Chemical treatments are largely effective, but resistant strains and intrinsically resistant species can be developed.

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The onset and severity of the fungal infection depends on the inoculum charge, the host's immunological state and resistance.

## III. MODE OF ACTION OF ESSENTIAL OIL ON FUNGAL INFECTION

Most of the studies reported the cytotoxic nature of Eos and its constituents is due to their capability to disrupt cell wall and cell membrane, coagulate the cytoplasm, while disrupting various layers of polysaccharide, fatty acids and phospholipids eventually making them permeable (Helal et al. 2006; Rammanee and Hongpattarakere 2011; Dwivedy et al. 2016). Hydrophobic components present in EO could change the permeability of microbial cell membrane for cations such as H+ and K+, which change the flow of protons, modifying cellular pH and affecting the chemical composition of the cells and their activity (Hyldgaard et al. 2012; da Cruz Cabral et al. 2013). However, the magnitude of antimicrobial activity of EO or its active compounds depends on the differential permeability of the cell membrane (da Cruz Cabral et al. 2013). The loss in differential permeability results in an imbalance in intracellular osmotic pressure, which subsequently disrupt intracellular organelles, leakage of cytoplasmic contents and sometimes Fig

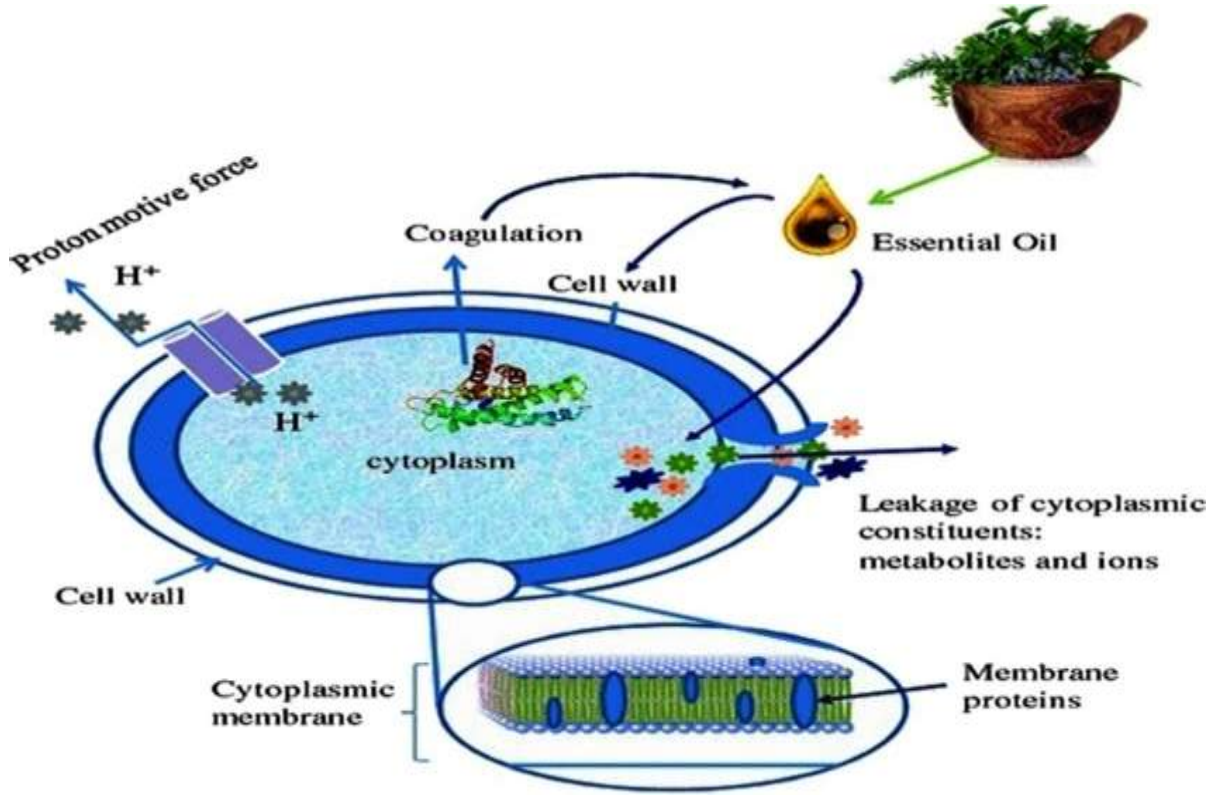


Fig. 2 :- Essential oil mode of action

## IV. TYPES OF ANTIFUNGAL ESSENTIAL OILS

The essential oils of herbs and spices are some of the most powerful antimicrobialTrusted Source essential oils. Thyme, cinnamon, oregano, clove, and mint are all examples of these kinds of oilsCitronella, geranium, lemongrass, eucalyptus, and peppermint, among others, have been testedTrusted Source specifically against fungi and found to be effective antimicrobials for that purpose. Tea tree oil is another essential oil that has demonstrated Trusted Source antifungal capabilities

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Fig- 3 :- Types of Essential oils

## V. ESSENTIAL OIL TOXICITY

Plants used for therapeutic purposes are normally assumed to be safe and free of toxicity. This misconception is mainly due to the long-term usage of medicinal plants for the treatment of diseases based on basic knowledge accumulated and shared from generation to generation over many centuries. However, scientific studies and reports have highlighted the toxic effects of essential oils used to treat skin ailments, which are known to produce adverse effects such as allergic contact dermatitis, skin irritation, or photosensitization [300]. Phenols and aldehyde containing oils may often cause irritation [352]. Furanocoumarin containing essential oils (such as C. Bergamo) have been proven to induce phototoxicity. The evidence based review on botanicals in dermatology by Reuter et al. [18] identifies certain medicinal plants which have been used for dermatological purposes, which have also reported toxic effects. These include C. bergamia and M. recutita. Mentha piperita oil has been reported to cause dermal irritation [356]. Prashar et al. [357] have shown in an in vitro study that . angustifolia oil and linalool (one of the main compounds) are cytotoxic to human fibroblast and endothelial cells . There have also been a few case reports on . angustifolia use resulting in contact dermatitis

## VI. CONCLUSIONS.

In conclusion, our review underlines the fact that the importance of antifungal agents Eos is widely recognized. Their roles in reducing the severity of fungal infections vary according to species and origin. Based on our review, we strongly believe that Eos should be explored for commercial applications as alternatives to over-the-counter antifungal agents. In addition, commercial applications could be further enhanced with nonconventional strategies in combination with other components, such as fluconazole and Tween 80. Hence, it is vital that efforts continue for the development of EO-based skin antifungal therapies

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