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Anti-Fungal Properties of Herbs: A Review

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ABSTRACT

Antifungal herbs have been used in traditional medicine for centuries to treat fungal infections. Some commonly used herbs for this purpose include garlic, oregano, tea tree oil, thyme, and cinnamon. Garlic contains allicin, which has antifungal activity against a variety of fungi, while oregano oil has been shown to be effective against candida, a common fungal infection. These herbs contain compounds that have antifungal properties, such as allicin in garlic and thymol in thyme. They can be used to treat a wide range of fungal infections, including candida overgrowth, ringworm and athlete's foot. These herbs and plants contain compounds such as terpenoids, flavonoids, and phenolic acids that have antifungal properties. Herbal antifungal medicine refers to natural remedies sourced from plants, herbs, and roots that have been found to possess antifungal properties. Many plants contain compounds that can inhibit the growth of fungi and help treat fungal infections. Herbal antifungals are often used as an alternative to conventional antifungal medications and are believed to have fewer side effects. However, it's important to consult a healthcare professional before using any herbal remedies, as they may interact with other medications or have adverse effects.

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INTRODUCTION:

Herbs are known for their antifungal properties, which can help treat and prevent fungal infections. Tea tree oil is also effective against candida and other fungal infections, while thyme and cinnamon have potent antifungal compounds that can be used both internally and topically. Incorporating these herbs into your diet or using them in herbal remedies can help fight off fungal infections.

Antifungal herbs have been used for centuries to combat fungal infections without the side effects of traditional medications. Each herb has its own unique properties and can be used to treat different types of fungal infections.

ANTI FUNGAL HERBS

TURMERIC

Turmeric is a medicinal flowering herb obtained from *Curcuma longa* L. belongs to family Zingiberaceae. Turmeric root, Indian saffron, *Curcuma aromatica*, *Curcuma domestica* are the synonym. It is native to Indian subcontinent and Southeast Asia, having deep orange-yellow colour. It has warm and bitter like flavour and aroma of earthy mustard. The rhizomes of turmeric are used as traditional medicines which is used to treat disorders of skin, upper respiratory tract, joints and digestive system.

The phytochemicals in turmeric include 5%curcuminoids (yellow colouring matter) and essential oils. Curcuminoids include curcumin, desmethoxycurcumin, bisdemethoxycurcumin. Curcumin and turmeric oil possess antifungal activity, which mainly acts against Phytophagous fungi such as *Fusarium solani* and *Helminthophobia oryzae.*

Turmeric possesses antifungal activity. Turmeric oil possesses an inhibitory activity in *Trichophyton*-induced dermatophytosis. Methanol extract of turmeric shows antifungal activity against *Cryptococcus neoformans* and *Candida albicans.* Reduction in proteinase secretion and alteration of membrane properties lead to antifungal activity of curcumin.

It is also used to treat inflammation, arthritis, hyper lipedemia, indigestion.

CLOVE

Clove (*Syzygium aromaticum)* belong to family Myrtaceae, is an evergreen tree, tall about 8-12meter have large leaves and crimson flowers. They are mostly cultivated in Indonesia, Srilanka, Brazil, Tanzania, Madagascar. Studies show that clove oil exhibit wide-spectrum antifungal activity. Clove essential oil is fast and effective in killing fungal infections. The powerful antifungal activity of cloves are used to treat a variety of fungal infections and fungal-related symptoms such as Candida overgrowth, Athlete's foot.

The essential oil extracted from cloves comprises of 72-90% eugenol, which is responsible for aromatic odour. Other phytochemicals present in clove oil include acetyl eugenol, beta-caryophyllene, vanillin, tannins (yellow tannic acid), methyl salicylate and eugenitin.

Eugenol is the most powerful of these, with antiseptic properties that have been shown to kill Candida yeast cells. Eugenol is also an immune system stimulant, which means it helps to increase the body's disease-fighting powers. Clove essential oil is both fast and effective in killing fungal infections. Clove oil had a "fast killing effect" on certain yeast cells, and its fungicidal activity on Candida albicans.

CINNAMON

Cinnamon is an important spice and aromatic crop isolated from the inner bark of several tree species of Cinnamomum zeylanicum belongs to family Lauraceae. Amber, bay, bister are some of the synonyms of cinnamon. Cinnamomum zeylanicum is native to Sri Lanka but some types of cinnamomus species are grown in China and many parts of Asia. Cinnamon is a warm brownish-orange colour, has a sweet and woody like aroma with a hint of spice. There are four species of cinnamon commercially cultivated such as, Cinnamomum verum, Cinnamomum burmanii, Cinnamomum cassia, Cinnamomum loureiroi.

The phytochemicals of cinnamon include a variety of resinous compounds, such as cinnamaldehyde, eugenol, cinnamate, cinnamic acid, and numerous essential oils. Among this constituent Cinnamaldehyde possessed the strongest antifungal activities.

Cinnamon has antifungal property against Candida albicans, Aspergillus niger, Fusarium sambucinum, Pythium sulcatum and Rhizopus stolonifera by inhibitory effects of cinnamonon which inhibit the growth of mycelial of various spoilage pathogens.

Cinnamomum zeylanicum can be used as antifungal treatment for the above organism that causes skin, oral infections. The main use of cinnamon is antifungal property, whereas it should have antioxidant, antidiabetic , anti-inflammatory , insecticidal , antimycotic, and anticancer agent.

SPEARMINT

Spearmint (menthe spicata) is a perennial aromatic herb,belonging to family Lamiaceae. Spearmint is also known as garden mint, common mint, lamb mint, etc. Spearmint includes its leaves in either fresh or dried form.

Spearmint land of origin is considered to Europe and Asia, extending from Southeren china in the east to Ireland in the west. USA is the major producer of spearmint.

A total of about 63 chemical constituents have been identified in spearmint oil using gas chromatography/ mass spectroscopy. The main constituents identified were carvone (40.8%± 1.23%) and limonene (20.8%±1.12%) ,1,8-cineole (17.0%±0.60%), β-pinene (2.2%±0.25%), cis-di- hydrocarvone (1.9%±0.49%) , and dihydrocarveol(1.7%±0.31%).The oil contains 50.6%oxygenated monoterpenes,45.1%monoterpene hydrocarbons and 2.8% sesquiterpene hydrocarbons.

The spearmint oil is used as a soothing agent in many skin problems , headaches, nausea, vomiting, respiratory problems and cold symptoms. Spearmint shows antifungal activity against C. albicans, C.tropicalis, C.krusei etc. other activities of spearmint oil include ant-oxidant, anti-inflammatory and stimulant activity.

GARLIC

Garlic is the edible bulb from a plant *Allium sativum* belonging to family Liliaceae. It is native to Asia and is cultivated in China, North Africa and Europe. Garlic have pungent odour and spicy taste.

It mainly consists of sulphur containing compounds like ajoenes, thiosulfinates (allicin), diallyl disulfide and diallyl trisulfide.

It possesses properties like anti-carcinogenic, anti-oxidant, anti-diabetic, anti-fungal, anti hypertensive.

Allicin is the main component of garlic which has antifungal actions and also bactericidal and anti-viral action.

The ethanolic extract of garlic shows inhibitory activity on fungi like *Fusarium spp* and *Rhizopus spp*. Aqueous garlic extract indicates anti-fungal activity against *Aspergillus niger, Aspergillus fumigatus* which is responsible for otomycosis.

ALOE

Aloe is a shrubby, xerophytic, perennial, pea-green colour plant from *Aloe barbadensis miller* belongs to family Liliaceae. It mainly grows in the dry region of America, Africa, Asia. Aloe Africana, Aloe capensis, Aloe ferox are the synonyms of aloe. Aloe latex having a yellowish colour with strong bitter taste.

The main chemical constituents of aloe are Anthraquinone, Catechin, Vanillic acid, Catechol, Aloesin. Aloe vera plant has been used for health, beauty and skin care products. The anti-fungal activity of Aloe is due to the presence of some secondary metabolites such as anthraquinones, saponins and tannins etc. The hydroalcoholic extract of aloe vera leaves shows anti fungal activity against mycelial growth of *B.gladiolorum, F.oxysporum* .

Aloe is mainly used for fungal infection, to reduce acne and plaque, helps in hydrating and moisturising the skin.

NEEM

Neem (*Azadirachta indica*) is a tropical evergreen tree belonging to family Meliacae. It is native to India, Pakistan, Malaysia, Indonesia, Myanmar, Thailand and Africa. It has been widely used in ayurveda medicine in the treatment and prevention of various diseases. The flowers, fruits, leaves, bark and essential oil can be used for various therapeutic purposes. It is commonly known as margosa, neem tree or Indian lilac.

The chemical constituents in Neem are azadirachtin, nimbolinin, nimbin, nimbidin, nimbidol, salanin, β-sitosterol and quercetin, in which quercetin and β-sitosterol have antifungal and antibacterial activity. The most active compound is azadirachtin.

The alcoholic extract of neem was known to have potential antifungal activity against Aspergillus and Rhizopus. Neem acts as an effective antifungal and antimicrobial agent by inhibiting their growth through cell wall breakdown.

Moreover, Neem shows Anticancer, Antidiabetic, Antimalarial, Antiviral, Antibacterial, Antioxidant, Hepatoprotective and Anti nephrotoxicity activity.

THYME

Thyme *(Thymus vulgaris*) is an aromatic perennial evergreen sub-shrub herb belonging to family Lamiaceae. They are native to Mediterranean region. It has warm pungent taste. Thyme is enriched with vitamins, phytonutrients and minerals. Thyme has been used historically for its medicinal and cosmetic purposes. It is also known as Garden thymus, Thymus serpyllum, Wild thyme, Creeping thyme, French thyme. Thyme flowers, leaves and oil are commonly used for medicinal purposes due to their pharmacological and biological properties.

T.vulgaris contains chemical compounds such as essential oil including phenols, thymol(major constituent), carvacrol, glycosides, flavonoids γ-terpinene, p-cymene, antioxidants.

Thymol shows antifungal activity against fungus like *Aspergillus parasiticus* , *Aspergillus flavus* and *Candida albicans* by suppressing its fungal growth.

Phenol in thyme contains high antioxidant activity. The chemical compounds p-cymene, γ-terpinene, carvacrol show powerful antibacterial, antifungal and antioxidant activity. Apart from this it also shows spasmolytic activity, anti-inflammatory, antimicrobial activity. It is also used in bronchitis and cough.

OREGANO

Oregano (*Origanum vulgare*) is a perennial herb belonging to family Lamiaceae. It is native to Mediterranean region. Widely distributed across Asia, Europe and Canada. It has aromatic pungent flavour. It is also known Marjoram, Pot marjoram, Wild marjoram, Winter sweet. Dried leaves and flowers from the stems of oregano are used for their medicinal purpose. It is a very effective medicinal plant, it helps to treat many human diseases such as heart disease, allergies, swelling, bronchitis.

The major constituents of oregano were carvacrol, β-fenchyl alcohol, thymol and γ-terpinene. Terpenoid phenols in oregano show potent antifungal activity against *Candida albicans*.

It shows antimicrobial activity by suppressing the growth of gram-positive and gram-negative bacteria, yeast and some fungi. Oregano helps to regulate blood glucose level. Apart from this therapeutic activity it also shows anticancer, antibacterial and antioxidant properties.

DISCUSSION AND CONCLUSION

Antifungal herbs have shown tremendous potential in managing fungal infections. Their effectiveness in treating infections can be attributed to their natural properties, such as anti-inflammatory, anti-bacterial, and anti-viral. Various herbs such as garlic, oregano, lavender, tea tree, and thyme are known for their antimicrobial properties. Scientific research has demonstrated that these herbs are effective in killing certain types of fungi.

In conclusion, the use of fungicidal herbs can be an effective and natural way to combat fungal infections. Herbs like garlic, tea tree oil, and oregano oil have been shown to have antifungal properties and can be used both topically and orally. However, it is important to note that proper diagnosis and treatment by a healthcare professional should not be replaced by the use of herbs alone.

A fungicidal herb is a plant that has properties to control or kill microorganisms such as fungi. These herbs contain active compounds that act on the specific enzymes and metabolic pathways of the target microorganism, thus disrupting its growth and reproduction. These herbs can be used to treat fungal infections such as athlete's foot, ringworm, and candidiasis. They can also be used as preventative measures to protect plants from fungal diseases.

Inhibitory herbs on fungi are natural remedies that help prevent or stop the growth of various types of fungi. They can be used topically or internally, depending on the type and severity of the fungal infection. The use of inhibitory herbs on fungi is considered safe and effective, with little to no side effects.

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