



**A REVIEW ON PLANT DERIVED ESSENTIAL OILS FOR TREATMENT OF  
RINGWORM INFECTIONS**

**Dr. Richa Sharma<sup>\*1</sup> and Dr. Ved Prakash Mamoria<sup>2</sup>**

<sup>1</sup>Assistant Professor, Department of Microbiology, Mahatma Gandhi University of Medical Science & Technology, Jaipur.

<sup>2</sup>Professor & Head, Department of Microbiology, Mahatma Gandhi University of Medical Science & Technology, Jaipur.

**\*Corresponding Author: Dr. Richa Sharma**

Assistant Professor, Department of Microbiology, Mahatma Gandhi University of Medical Science & Technology, Jaipur.

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**ABSTRACT**

Microbial and fungal infections are reported one of the major causes of most of epidemics and communicable disease which is affected the clinical burden on social, health and economical growth of many developing and underdeveloped countries. Emergence of resistance against well known pathogenic bacteria, viruses and fungi is posing a great challenge to the current world and therefore it is needed to discover novel herbal therapy of naturally occurring antibactericidal and antifungicidal plants parts. Spices have been using from ancient time as antibacterial and antifungal agents to treat many disease. Plant essential oils are potential source of antimicrobials of natural origin. Essential oils and extracts obtained from many plants have recently gained a great popularity and scientific interest. Consumer demand for natural preservatives has increased, whereas the safety aspect of chemical additives has been questioned. The plant Essential oils have been reported to have antibacterial, antifungal, antiviral, antiparasitic and antidermatophytic properties. It is now considered as a valuable source of natural products for development of medicines against various diseases and also for the development of industrial products. The present review is a compilation of updated information on plant essential oils with antifungal properties. They are popular as very cost effective and potent antimicrobial agents to treat various pathogenic diseases from ancient times.

**KEYWORDS:** Plants, Essential oils, Antidermatophytic, Herbal Medicines.

**INTRODUCTON**

Essential oils contain highly volatile substances that are isolated by a physical method or process from plants of a single botanical species. The essential oils normally bear the name of the plant species from which they are derived. Essential oils are so termed as they are believed to represent the very essence of odor and flavor. Essential oil plants and culinary herbs include a broad range of plant species that are used for their aromatic value as flavorings in foods and beverages and as fragrances in pharmaceutical and industrial products. Essential oils derive from aromatic plants of many genera distributed worldwide. Oils are used in the embalming process, in medicine and in purification rituals. There are also over 200 references to aromatics, incense and ointments in the old and new testaments. There are about three hundred essential oils in general use today by professional practitioners. Continual bombardment of viral, bacterial, parasitic and fungal contamination occurs in our body. Essential oils are a great benefit to help protect our bodies and homes from

this onslaught of pathogens. Immune system needs support and these essential oils can give the required endorsement.<sup>[1]</sup> It is estimated that there are 250,000 to 500,000 species of plants on earth. A relatively small percentage (1 to 10%) of these is used as foods by both humans and other animal species. It is possible that even more are used for medicinal purposes.<sup>[2]</sup> studies have reported that while 625 species of plants have been used by various Native American groups as food, 2,564 have found use as drugs. According to his calculations, this leaves approximately 18,000 species of plants which were used for neither food nor drugs.<sup>[3]</sup> Plant oils and extracts have been used for a wide variety of purposes for many thousands of years.<sup>[4]</sup> These purposes vary from the use of rosewood and cedar wood in perfumery, to flavoring drinks with lime, fennel or juniper berry oil, and the application of lemongrass oil for the preservation of stored food crops. In particular the antimicrobial activity of plant oils and extracts has formed the basis of many applications including raw and processed food preservation, pharmaceuticals, alternative medicine and

natural therapies. Since ancient times, herbs and their essential oils have been known for their varying degrees of antimicrobial activity. More recently, medicinal plant extracts were developed and proposed for use in food as natural antimicrobials.

### SOURCES OF NATURAL ESSENTIAL OILS

Essential oils are generally derived from one or more plant parts, such as fruits (Bergamot, Orange, Lemon, and Juniper), rhizomes (e.g. Ginger, Calamus, Curcuma, Orris) and gums or oleoresin exudations (e.g. Balsam of Peru, Myroxylon balsamum, Storax, Myrrh, Benzoin) flowers (e.g. Rose, Jasmine, Carnation, Clove, Mimosa, Rosemary, Lavender), leaves (e.g. Mint, Ocimum spp., Lemongrass, Jamrosa), leaves and stems (e.g. Geranium, Patchouli, Petitgrain, Verbena, Cinnamon), bark (e.g. Cinnamon, Cassia, Canella), wood (e.g. Cedar, Sandal, Pine), roots (e.g. Angelica, Sassafras, Vetiver, Saussurea, Valerian), seeds (e.g. Fennel, Coriander, Caraway, Dill, Nutmeg),

### METHODS OF PRODUCING ESSENTIAL OILS

Regarding hydro distillation, the essential oils industry has developed terminology to distinguish three types water distillation; water and steam distillation; and direct steam distillation. Originally introduced by von rechenberg, these terms have become established in the essential oil industry. All three methods are subject to the same theoretical considerations which deal with distillation of two-phase systems. The differences lie mainly in the methods of handling the material. Some volatile oils cannot be distilled without decomposition and thus are usually obtained by expression (orange oil, lemon oil) or by other mechanical oils. In certain countries, the general method for obtaining citrus oil involves puncturing the oil glands by rolling the fruit and flower over a trough lined with sharp projections that are long enough to penetrate the epidermis and pierce the oil glands located within outer portion of the peel (Ecuelle method). A pressing action on the fruit removes the oil from the glands, and a fine spray of water washes the oil from the mashed peel while the juice is extracted through a central tube that cores the fruit. The resulting oil-water emulsion is separated by centrifugation. A variation of this process is to remove the peel from the fruit before the oil is extracted. Often, the volatile oil content of fresh plant parts (flower petals and fruit) is so small that oil removal is not commercially feasible by the aforementioned methods. In such instances, an odorless, bland, fixed oil or fat is spread in a thin layer on glass plates. The flower petals are placed on the fat for a few hours; then repeatedly, the oil petals are removed, and a new layer of petals is introduced. After the fat has absorbed as much fragrance as possible, the oil may be removed by extraction with alcohol. This process, known as Effleurage, was formerly used extensively in the production of perfumes and pomades. In the perfume industry, most modern essential oil production is accomplished by extraction, using volatile solvents such as petroleum ether and hexane. The chief advantages of

extraction over distillation is that uniform temperature (usually 50°C) can be maintained during the process, As a result, extracted oils have a more natural odor that is unmatched by distilled oils, which may have undergone chemical alteration by the high temperature. This feature is of considerable importance to the perfume industry; however, the established distillation method is of lower cost than the extraction process. Destructive distillation means distilling volatile oil in the absence of air.

### PHARMACOLOGICAL ACTIVITIES OF ESSENTIAL OILS

#### Analgesic Activity of Essential Oils

The grain alcohol extract and essential oil of nut grass square measure according to possess analgesic activity. The analgesic activity was performed by tail-flick methodology. The protecting role of nut grass could also be thanks to the presence of torpedoed jointly of their constituents.<sup>[5,6,7]</sup>

#### ANTICANCER ACTIVITY OF ESSENTIAL OILS

Cyperus rotundus ethanol extract and volatile oil possess anti-cancer activity. For ethanolic extract used neuro-2a cells for screening of plants with tumoricidal effects. And volatile oil was terribly effective against L1210 leucaemia cells line. The protecting role of Cyprus rotundus could also be because of the presence of constituent sesquiterpenes.<sup>[8,9]</sup> The cancer chemotherapy regimens make use of highly cytotoxic drugs that target proliferating cell populations. The non-discriminatory nature of these drugs leads to severe side effects in normal cells with a high proliferative index, such as those of the gastrointestinal tract and bone marrow, thus limiting the effective dose of anticancer drug that can be administered. The diverse therapeutic potential of essential oils has drawn the attention of researchers to test them for anticancer activity, taking advantage of the fact that their mechanism of action is dissimilar to that of the classic cytotoxic chemotherapeutic agents.<sup>[10]</sup> Previous worker reported had indicated that essential oils components, especially monoterpenes, have multiple pharmacological effects on mevalonate metabolism which could account for the terrene-tumor suppressive activity.<sup>[11]</sup> The fruits and vegetables are considered as the main anti-cancer foods, because of their abundant antioxidants such as phenols, vitamin C, vitamin E, beta-carotene and lipotene. Citrus is the most interesting one among these fruits Vital capacity test and Ames test were used to consider anticancer of *Citrus medica* Linn. Effect with special emphasises on application of *salmonella typhimurium* to identify antimutagenesis and anticancer level of chemicals. In this research, half-ripe and ripe fruit juice displayed anticancer and antimutagenesis effect and among them halfripe fruit juice was more effective than ripe fruit juice.<sup>[12]</sup>

#### ANTIBACTERIAL ACTIVITY OF ESSENTIAL OILS

Essential oils of Cyprus rotundus are according to possess anti-microorganism activity. The anti-

microorganism activity was performed by inhibition zone technique. The minimum repressing concentration and minimum antiseptic concentration for every microorganism were calculable. The protecting role of *Cyperus rotundus* could also be because of the presence of flavonoids united of their constituents. The oil of *Cyperus rotundus* showed a noteworthy activity against gram-positive bacterium *Cocci aureus* and *Enterococcus faecalis*.<sup>[13,14]</sup> The major mode of infection transmission in hospital acquired infections is thought to be through hand carrying of pathogens from staff to patient, and from patient to patient<sup>[15,16]</sup> and a relationship between hand hygiene and reduced transmission of infections been reported.<sup>[17]</sup> Most antiseptic agents can damage the skin, leading to a change in microbial flora, and an increased shedding of the original protective bacterial flora of the hand leads to an increased risk of transmission of pathogenic microorganisms.<sup>[18]</sup> Studies have reported use of formulations containing tea tree essential oil (TTO) does not lead to dermatological problems, nor affect the original protective bacterial flora of the skin<sup>[19]</sup> so the antibacterial activity of some skin-wash formulas containing TTO as well as pure TTO was evaluated against *Staphylococcus aureus*, *Acinetobacter baumannii*, *Escherichia coli* and *Pseudomonas aeruginosa*.<sup>[20,21]</sup> The potential of essential oils as antibacterial agents is well established. Essential oils are mixtures of volatile secondary metabolites isolated from different parts of aromatic plants.<sup>[22]</sup> Tea tree oil is widely used natural antidandruff agents in many marketed formulations like anti dandruff shampoos, ointments; creams and lotions demonstrated that the essential oil of tea tree inhibits the growth of *Mfurfur*.<sup>[23]</sup> An antidandruff shampoo containing 5% tea tree oil is reported to be effective in the treatment of mild to moderate dandruff.<sup>[24]</sup> Cinnamon oil is obtained from the bark of the plant *Cinnamomum zeylanicum* Blume (Lauraceae). The bark yields 0.35% oil containing cinnamaldehyde and eugenol as major constituents. Presence of cinnamylacetate, linalool, 1,8 cineol, p-cymene, cuminaldehyde is also reported. The oil is carminative, stimulant, aromatic, powerful germicide and an active fungicide.<sup>[25]</sup>

#### ANTIFUNGAL ACTIVITY OF ESSENTIAL OILS

Various plant materials are believed to have antifungal activity and many essential oils have been reported to have antifungal activities with no side effects on humans and animals.<sup>[26]</sup> Previous in vitro and in vivo investigations suggested that the essential oils could be used as effective antifungal agents.<sup>[27]</sup> The selection of plants for evaluation was based on traditional usage for essential oils treatment of infectious diseases.<sup>[28,29]</sup> In general, plant-derived essential oils and extracts are considered as non-phytotoxic compounds and potentially effective against several microorganisms including many fungal pathogens.<sup>[30,31]</sup> The increasing resistance to antifungal compounds and the reduced number of available drugs led us to search for the new alternatives among aromatic plants and their essential oils, used for

their antifungal properties. The antifungal activity can be attributed to the presence of some components such as carvacrol,  $\alpha$ -terpininly acetate, cymene, thymol, pinene, linalool which are already known to exhibit antimicrobial activity.<sup>[32,33]</sup> In recent years, several researchers have reported the mono- and sesquiterpene hydrocarbons as the major components of plant essential oils with enormous potential to inhibit microbial pathogens.<sup>[34,35]</sup> The active antimicrobial compounds of essential oils are generally terpenes, which are phenolic in nature, attack the pathogens through cell wall and cell membrane. The active phenolic compounds might have several invasive targets which could lead to the inhibition of human infectious pathogens fungal.

#### HYPOGLYCAEMIC AND ANTICHOLINESTERASE ACTIVITY OF ESSENTIAL OILS

The role of phenolic acid and flavonoids as natural anti-oxidants and free radical scavenger has been of interest due to their pharmacological behavior. Phenolic acids present in the plant showed the anti-oxidant profile.<sup>[36]</sup> The antioxidant activity of *Oregano (Origanum vulgare L., ssp. hirtum)* essential oil was comparable to that of  $\alpha$ -tocopherol and BHT but less effective than ascorbic acid.<sup>[37]</sup> The most powerful scavenging constituents comprising neral geranial, citronellal, isomenthone and menthone. Tea tree (*Melaleuca alternifolia*) oil has been suggested as a natural antioxidant alternative for BHT<sup>[38]</sup> with the inherent antioxidant activity attributed mainly to the  $\alpha$ -terpinene,  $\gamma$ -terpinene and  $\alpha$ -terpinolene content. Essential oils isolated from *Mentha aquatica L.*, *Mentha longifolia L.* and *Mentha piperita L.*, were able to reduce DPPH radicals into the neutral DPPHH form.<sup>[39]</sup> The most powerful scavenging constituents was found to be 1,8-cineole for the oil of *M. aquatica* while menthone and isomenthone were the active principles of *M. longifolia* and *M. piperita*. It is clear that essential oils may be considered as potential natural antioxidants and could perhaps be formulated as a part of daily supplements or additives to prevent oxidative stress that contributes to many degenerative diseases. Oxidative damage, caused by the action of free radicals, may initiate and promote the progression of a number of chronic diseases, including diabetes and Alzheimer's disease. The *n*-hexane extract of Diamante citron (*Citrus medica L. cv. Diamante*) peel, which is characterized by the presence of monoterpenes and sesquiterpenes showed significant antioxidant activity that was carried out using different assays (DPPH test,  $\beta$ - carotene bleaching test and bovine brain peroxidation assay). Diamante citron peel extract showed hypoglycaemic activity and an anticholinesterase effect. So, these in vitro activities of Diamante citron suggest that it can be used in treatment of diabetes and Alzheimer's disease.<sup>[40]</sup>

#### AROMATHERAPY ACTIVITY OF ESSENTIAL OILS

The aromatherapy combines two words aroma a fragrance or sweet smell and therapy a treatment of

essential oils. Aroma and massage therapy are the practice of using essential oils for psychological and physical well-being via inhalation or massage. The term aromatherapy may be confusing to no specialists because it is used to describe a wide range of practices involving odorous substances. The massage therapy even when using essential oils cannot be considered as aromatherapy. Only aroma delivery through inhalation to induce psychological or physical effects the defined as aromatherapy (Buchbauer and Jirovetz, 1993, 1994). Nevertheless the clinical use of essential oils and their volatile constituents via inhalation or massage has expanded worldwide. Aromatic materials topically applied the showed positive effects on lung mucus clearance in patients with chronic airway obstruction.<sup>[41]</sup> The foot soaking in warm water containing lavender essential oil followed by reflexology treatment with jojoba oil containing Lavender and Tea seed appeared to be effective for alleviating fatigue in terminally ill cancer patients.<sup>[42]</sup> Massage therapy using essential oil can be useful in the treatment for humans suffering from dementia. The term dementia is used to describe the symptoms that occur when the brain is affected by specific diseases and conditions, including alzheimer's disease, stroke and other rarer conditions. Symptoms of dementia include loss of memory, confusion and problems with speech and understanding. Previous workers reports have indicated positive effects of massage therapy using selected essential oils for managing behavioral and psychological symptoms in dementia. The essential oil of *Melissa officinalis* Lemon balm applied cutaneously in a lotion to patients with severe dementia was found to be an effective treatment.<sup>[43]</sup> The potential efficiency of massage therapy with essential oils to decrease agitation in patients suffering dementia raise the question of whether inhalation of the essential oils its cutaneous delivery through massage is responsible for the alleviative effect<sup>[44]</sup> indicated that inhalation of lavender essential oils did not decrease agitation in severely demented patients and a similar result had previously been reported by.<sup>[45]</sup> Many essential oils have been reported to use in the aromatherapy due to presence of essential or volatile oils in different essential oils.

## CONCLUSION

Essential oils are naturally occurring phytochemicals which have various applications and have long been known and used throughout the world for treatment of many fungal diseases, and there is at least some evidence that natural products such as essential oils and extracts may tend to have less side effects than corresponding synthetic drugs. Also, the resurgence of interest in natural control of human infectious fungal pathogens and increasing demand for effective, safe, natural products, that quantitative data on plant oils and extracts are required and could lead to a new antifungal agent, which could support the use of the plant to treat various infective diseases. Medicinal plants are very important to human beings in preserving our health. There is a

growing interest in the pharmacological evaluation of various plants used in Indian traditional system of medicine. The new attraction for natural products obtained from proper phytochemical and pharmacological study is required, which shall open new pharmacological avenues for this magnificent plant (delete it) which are helpful for clinical experimentation and also in the development of novel drugs

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