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REVIEW ARTICLE

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PHYTOTHERAPY FOR *TINEA VERSICOLOR*

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ABSTRACT

Tinea versicolor or pityriasis versicolor is common infection of the stratum corneum with global distribution but it is more prevalent in warm and humid climates and among young men. Although tinea versicolor is not life-threatening, it imposes economic and time burdens on individuals and community because of skin changes and psychological effects. Currently, certain drugs such as propylene glycol, sodium thiosulfate solution, azole compounds (ketoconazole and fluconazole), selenium sulfate, ciclopirox solution or cream, and terbinafine are used to treat tinea versicolor that cause certain side effects. This review was conducted to report the most effective medicinal plants in treating this disease. A total of 82 articles were retrieved from the databases *Google Scholar*, *Science Direct*, *PubMed*, and *Scopus*. Fifty-six articles were selected after duplicate and irrelevant ones were excluded. Then, 15 articles were screened and their findings reported in this review. Available evidence indicates that *Cymbopogon citratus*, *Quercus incana*, *Azadirachta indica*, *Artemisia sieberi*, *Thymus schimperi*, *Curcuma longa*, *Cinnamomum verum*, *Nigella sativa*, *Calendula officinalis*, *Heracleum persicum*, *Nyctanthes arbor-tristis*, *Allium sativum*, *Aloe barbadensis*, *Rosmarinus officinalis*, and eucalyptus species have been reported to be effective on tinea versicolor. These plants can be considered alternatives to produce herbal drugs for tinea versicolor after additional studies.

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INTRODUCTION

Pityriasis versicolor (*Tinea versicolor*) is common infection of the stratum corneum. The disease generally presents with hypopigmentation or hyperpigmentation lesions in the neck, trunk, and arms, and may occasionally cause mild itching. The cause of fungal infections is mostly lipophilia (except for Malassezia dermatitis), from the strain of deuteromycota, the class blastutism, the family Cryptococcus, the genus Malassezia (with over 13 species including furfur, sympodialis, globosa, derrmatitis, slophia, rostrikta, etc.), and from the normal flora of the skin that occur more frequently in the areas with more sebaceous glands (2). Oily skin, immunodeficiency, long-term use of steroids, pregnancy, and malnutrition are some of the predisposing factors for tinea versicolor. In addition, the use of contraceptive pills, abundant sweating, the use of broad-spectrum antibiotics, unsatisfactory health-related behaviors, inappropriate nutrition, stress, genetic factors, and tight-fitting nylon clothes can also predispose one to this disease (3-5). As already mentioned, because these fungi are normal flora of the skin, tinea versicolor is likely to recur until the predisposing factors are not resolved (6). It has global occurrence and is prominent in hot and humid regions and among young men. In Iran, tinea versicolor is more common in warm and humid areas of the south, the coast of the Caspian Sea, and the southern regions of Lake Urmia (7). Disease is usually diagnosable in two ways, one with the help of a bottle lamp by which hypopigmented areas of infection are detected with green-yellow fluorescence, or by observing directly the chips using a microscope and preparing the smear with the addition of potassium hydroxide with plenty of short broad strands and fermentative groups of budding cells described as *spaghetti* (hife) and *meat chips* (yeast) (8-10).

Although tinea versicolor is not life-threatening, it imposes economic and time burdens on individuals and community because of skin changes and psychological effects. In the fungal infections of the tinea versicolor, the saprophytic form of the yeast is converted into a myceliumic pathogenic form. Besides that, dicarboxylic acid is produced by tyrosinase inhibitory *effect in vitro*. This process not only inhibits tyrosinase but also exerts cytotoxic effects on melanocytes and then leads to hypopigmentation through two mechanisms (9-12). Studies have indicated that tinea versicolor is associated with seborrheic dermatitis such that the likelihood of tinea versicolor acquisition is three times higher in the people with seborrheic dermatitis than other people, and 10.3% of patients with tinea versicolor also suffer from seborrheic dermatitis (13,14). In addition, the likelihood of tinea versicolor acquisition in the people with psoriasis (an inflammatory skin disease) is comparatively higher probably due to application of ointments for treatment. Impaired production of lymphokines is a main predisposing factor for this disease (15).

Currently, certain drugs such as propylene glycol, thiosulfate sodium, azole compounds (ketoconazole and fluconazole), selenium sulfate, ciclopirox solution or cream, and terbinafine are used to treat tinea versicolor. These drugs cause certain side effects that involve the central nervous system (headache), derm (Steven-Johnson syndrome, irritation, itching, dryness), eye, ear, nose, and throat (taste disturbance, visual impairment), gastrointestinal system (diarrhea, indigestion, abdominal pain, nausea, flatulence), hematological (decreased number of lymphocytes), and liver (increased levels of liver enzymes) (16-18). The main problem due to this disease is the long period treatment, no change in pigmentation until a few weeks after the elimination of the yeast, and the likelihood of recurrence (40-60%) (19-21). Chemical and herbal drugs have a number of advantages and disadvantages. Chemical drugs have strong and fast effects, but they also have many side effects. In fact, in the new era, the people who were quickly swallowed by the fast effects of chemical drugs have recently turned to medicinal plants and nature-based treatments because they are now aware of chemical drugs' side effects (22-24). Many chemical drugs have only one active compound and numerous chemicals are used to produce pills, drops, capsules, syrups and other forms of chemical drugs. These substances are used as fillers, binders, diluents, restorers, and coatings and many of the side effects of the chemical drugs are indeed attributable to them (25). Herbal drugs, in contrast to chemical drugs, contain numerous active compounds that are agreeable to human body (26-29). In addition, some plant extracts contain over one thousand compounds some of which are main compounds and some others secondary. Many secondary compounds are effective to prevent the side effects due to main compounds (30-35). In addition, many of these compounds protect different organs of the bot such as heart and liver, neutralize free radicals, exert antioxidant effects, negate the toxins in the body (36-40). Given the number of compounds and various effects and action mechanisms of herbal drugs, they have usually slow effects but cause comparatively fewer side effects and long-term effects (41, 42). It is

noteworthy that one of the problems with medicinal plants and herbal drugs, especially their fluid forms (drops) is their taste that has caused them not to be welcome by patients. Chemical drops and syrups are made tasty adding chemicals with good taste, persuading patients to consume them, while no tasty additives are added to herbal drops because they may interact with the durability and effects of herbal drugs and cause unpleasant side effects (43). We conducted this review to report the most important medicinal plants that are effective to treat tinea versicolor.

For conducting this study, a total of 82 articles were retrieved from the databases *Google Scholar*, *Science Direct*, *PubMed*, and *Scopus*. Fifty-six articles were selected after duplicate and irrelevant ones were excluded. Then, 15 articles were screened and their findings reported in this review. The data on the effective plants are shown in Table 1.

Table 1. Medicinal plants effective on tinea versicolor.

Row	Scientific name	Family name	Persian name	Effects
1	*Cymbopogon citratus*	Poaceae	Pootar	Antifungal effects observed in the clinical trials compared with ketoconazole (44, 45)
2	*Quercus incana*	Fagaceae	Balot abi	Antifungal activity of the plant compounds observed in the studies (46, 47).
3	*Azadirachta indica*	Meliaceae	Cherish	Antimicrobial effect of five irrigants formulated from different parts of the tree *A. indica* was indicated and was compared with 2.5% sodium hypochlorite and 0.2% chlorhexidine gluconate through an agar diffusion test (48).
4	*Artemisia sieberi*	Asteraceae	Dermneh	Observed antifungal activities were related to synergistic effects between different main or minor components of the plant (49, 50).
5	*Thymus schimperi*	Lamiaceae	-	*T. schimperi* have shown strong antimicrobial activity especially against antifungal (51).
6	*Curcuma longa*	Zingiberaceae	Zardchobeh	The methanol extract of turmeric demonstrated antifungal activity with MIC values of 128 and 256 μg/ml (52).
7	*Cinnamomum verum*	Lauraceae	Darchin	Antifungal effects observed in an experimental study (53).
8	*Nigella sativa*	Ranunculaceae	Siyah daneh	Treatment of mice with the plant extract caused a considerable antifungal effect (54).
9	*Calendula officinalis*	Asteraceae	Gole hamisheh bahar	Antifungal effects of the plant observed in in vitro tests (55).
10	*Heracleum Persicum*	Apiaceae	Golpar	In an in vitro study, antifungal effects of the plant observed (56).
11	*Nyctanthes arbor-tristis*	Oleaceae	Yasaman shab gol	The anti-Malassezia potential of *N. arbor-tristis* leaf extracts reflected moderate (57).
12	*Allium sativum*	Amaryllidaceae	Sir	Antifungal effects of the plant compounds observed in *in vitro* tests (58, 59).
13	*Aloe barbadensis*	Asphodelaceae	Aloe vera	The methanol and ethanol portions of *A barbadensi*s leaf extract were shown to display antifungal activity against tested fungi ranging between 11 and 18 mm (60).
14	*Rosmarinus officinalis*	Lamiacea	rosemary	The effectiveness of rosemary on the growth of the tested fungi is probably due to major substances such as thymol, carvacrol and menthol showing antifungal effects (61).
15	Eucalyptus species	Myrtacea	Eucalyptus nili	Seven Eucalyptus essential oils were tested against five fungal strains that comprise one opportunist pathogenic yeast. The antifungal activity of the essential oils has been indicated (62).

Studies have indicated that chemical drugs for fungal infections can cause numerous side effects and also pathogenic species are constantly acquiring resistance to these chemical drugs. In contrast, most herbal and herbal medicines do not cause any side effects and exert potent therapeutic effects against pathogenic species.

According to available evidence, 15 medicinal plants have been reported to be among the most effective medicinal plants to treat tinea versicolor. Overall, many sulfur compounds, phenols, flavonoids, tannins, anthocyanins, etc., give antifungal properties to many plants (23, 24). For example, *Cymbopogon citratus* contains certain compounds such as metalaxyl-mancozeb, z-citral, β-geranial, caryophyllene and tannin that can be effective to treat tinea versicolor (45). Besides that, , *Quercus incana* contains quercetin, methyl gallate, gallic acid, betulinic acid, (Z)-9-octadecenoic acid methyl ester, and β-sitosterol glucoside*; Azadirachta indica* contains azadiradione, azadirachtin, nimbolide, salanin, nimbolin, azadirone, and nimbin; *Artemisia sieberi* contains a-thujone, b-thujone, and achillenol; *Thymus schimperi* contains carvacrol, p-myrcene, γ-terpinene, and α-phellandrene; *Curcuma longa* contains curcumin, bisdemethoxycurcumin, and demethoxycurcumin; *Nigella sativa* contains nigellin**,** melanthin, carvene, carvone, cymene, and thymohydroquinone; *Calendula officinalis* contains δ**-**cadinene, 1,3,5-cadinatriene, α-muurolol, and α-cadinol; *Nyctanthes arbor-tristist* contains β-sitosterol and calceolarioside A; *Allium sativum* contains allicin, diallyl trisulfide, diallyl disulfide, and methyl allyl trisulfide; *Aloe barbadensis* contains anthraquinones *such as* aloin and emodin; *Rosmarinus officinalis* contains α-pinene, 1,8-cineole, camphene, and β-pinene; eucalyptus species contain 1,8-Cineole, α-pinene, and limonene that all of them may be effective to treat tinea versicolor (45-62).

CONCLUSION

Reporting the most important effective plants on the fungal disease tinea versicolor that have so far been identified, this review can provide strategies for additional studies specially to develop new drugs for tinea versicolor.

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Conflicts of interest

There are no competing interests.

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