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Inhibitory Potential of Essential Oils on *Malassezia* Strains by Various Plants

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Abstract: There are imperative to opportunistic skin pathogens and skin commensals for *Malassezia* genus of the yeasts. Recently, in the eastern and western US nine types of bats skins were isolated as new *Malassezia* species in the subfamily *Myotinae*. Factually, wild-type *Malassezia* are typically susceptible to azoles because of the developed azole resistance except for fluconazole this has been related to either alterations or quadruplication on the *ERG11* gene. Because of developed resistance substitute antifungal drugs like chlorhexidine, and plant essential oils used. The purposes of this investigation were to assess atopic dermatitis (AD) along with in *Malassezia* species and the effect of the inhibition by different plants essential oils against pathogenic *Malassezia* isolates. The yeasts of the class *Malassezia* are known for causing different ailments in human skin like psoriasis, atopic dermatitis, dandruff, seborrheic dermatitis, folliculitis, *Malassezia* (*Pityrosporum*) and *Pityriasis versicolor*, and—less generally—with other dermatologic issues, for example, transient acantholytic dermatosis, onychomycosis, and reticulated and confluent papillomatosis. These days, the medications accessible to treat this fungal infection are not many. In order to treat fungal infections, there was an urgent need for test the capacity of different essential oils in treating against *Malassezia* species.

Keywords: *Malassezia strains*; phytochemicals; essential oils; antifungal activity; atopic dermatitis; *Pityriasis versicolor*; dandruff.

Introduction

Malassezia class incorporates a cluster of lipophilic and typically lipid-subordinate yeasts perceived as individuals from the ordinary skin microbiome of both human and other homoeothermic life forms. Malassezia is an unscrupulous species and when certain conditions they may also cause folliculitis, and *Pityriasis (P) versicolor*, can be related with exacerbate numerous dermal infections like atopic dermatitis. Typically, these *Malassezia*-related fungal infections are treated with topical therapies. Polyenes and azoles like ketoconazole, itraconazole, and posaconazole are most often used against *Malassezia*-related fungal infections. Though, the development of resistance to the existing antifungals in the market exposed that the progress in novel antifungals is essential approach to overwhelmed problems come across in treating this infection. The main purpose of this review is inhibiting effects of EOs towards *Malassezia*-related fungal diseases have been studied to indication on their probable effects.

Materials and Methods

Data on inhibitory potential of essential oils from various plants against *Malassezia* species was collected from online data bases such as Science Direct, Scopus, PubMed, Taylor, Web of Science, Google Scholar published materials, including E-books. Covering the period from January 2008 and November 2020.

Results and Discussion

Author's reported various essential oils against *Malassezia spp*. with evaluating dissimilar assays to antifungal properties. The most used assay is broth microdilution, followed by the vapor phase method and agar disk diffusion tests. All the authors stated in tables with their antifungal activity of various essential oils and also their MIC (µg/ml) values against various *Malassezia spp*.

Table-1 Activity of EOs against *Malassezia* species using the broth microdilution method, the MIC standards in µg/mL or µL/mL

Source	Main constituents	MIC
Cinnamomun zeylanicum	cinnamaldehyde, eugenol	32 µg/ml
Ocimum kilimandscharicum	camphor, limonene, camphene	128 µg/ml
Malaleuca leucadendrun (L.)	1,8 cineole, p-cymene, linalool	64 µg/ml
Malaleuca alternifolia (Maiden & Betche) Cheel	not specified	32 µg/ml
Zataria multiflora Boiss.	thymol, carvacrol	35 µg/ml, 30 µg/ml, 80 µg/ml 50 µg/ml, 60 µg/ml, 30 µg/ml 40 µg/ml
Thymus kotschyanus Boiss.	thymol, carvacrol	60 µg/ml, 60 µg/ml, 80 µg/ml 80 µg/ml, 80 µg/ml, 30 µg/ml 110 µg/ml
Mentha spicata L.	carvone, limonene	125 µg/ml, 100 µg/ml 100 µg/ml, 250 µg/ml 85 µg/ml, 65 µg/ml, 85µg/ml
Artemisia sieberi	α thujone, β thujone	250 µg/ml, 85 µg/ml 150 µg/ml, 50 µg/ml 155 µg/ml, 110 µg/ml
Salvia rosmarinus Schleid	α pinene, 1,8 cineole linalool	260 µg/ml, 250µg/ml 420 µg/ml, 410 µg/ml 850µg/ml, 100 µg/ml 350 µg/ml
Syzygium aromaticum (L.) Merrill & Perry	eugenol and β caryophillene	0.625 µl/ml
Foeniculum vulgare Mill	not specified	1.250 µl/ml
Trachyspermum ammi L.	not specified	0.312 µl/ml

Table-2 Activity of some EOs obtained by steam distillation and tested by different methods: Disk diffusion (1-9), Vapour phase (10)

Essential oils	Active compounds	Zone of Inhibition
Cinnamomun zeylanicum Blume	cinnamaldehyde, eugenol	14 +/-0. 51 mm
Ocimum kilimandscharicum Gürke	champhor, limonene, camphene	8 +/- 0.057 mm
Eucalyptus globulus Labill.	cineol, p-cymene	0mm
Malaleuca leucadendrun (L.) L.	1,8 cineole p-cymene, linalool	12 +/- 0 mm
Malaleuca alternifolia (Maiden & Betche) Cheel	not specified	22 +/- 0.057 mm
Pongamia glabra Vent.	karanjin, pongapin, pongaglabrone	0 mm
Lavandula stoechas L.	fenchone, camphor,	46.7 +/-8.2 mm
	1,8 cineole	50 +/- 0 mm
		43.7 +/- 12.5 mm
Cuminum cyminum L.	α pinene, 1,8 cineole	50 +/- 0 mm
	linalool	50 +/- 0 mm
		50 +/- 0 mm
Artemisia sieberi Besser	α thujone, camphor	43.3 +/- 14.1 mm
	β thujone	35 +/- 14.1mm
		32.5 +/- 11.9 mm
Artemisia annua L.	Volatile emissions: α pinene 1,8 cineole, camphor	MIC - 0.41 µl/cm³ MIC - 0.34 µl/cm³

Conclusion

This **study will provide much more intelligences on current trends on the activity of EOs those which inhibits various *Malassezia* species, by different assay methods like broth microdilution, vapor phase method, and agar disk diffusion tests**. Nowadays essential oils have been mainly examined against microbials as for more efficacy, less side effects, low cost, and decreased resistance. From **this above study results it is proven that the essential oils have promising role to against to fight *Malassezia*-related dermal infections**. Though, essential oils might signify thought-provoking constituents for medical applications. **These days, the medications accessible to treat this fungal infection are not many. In order to treat fungal infections there was an urgent need for test the capacity of different essential oils in treating against *Malassezia* species.**

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