

Effects of the Phytoconstituent Citral on *Candida Spp*

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ISSN: 2637-7802



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Submission:  April 02, 2019

Published:  April 10, 2019

Volume 4 - Issue 2

How to cite this article: Palhano F J, Souza M W, Figueirêdo E, Pereira J, Ribeiro E, et al. Effects of the Phytoconstituent Citral on *Candida Spp*. Adv Complement Alt Med. 4(2). ACAM.000584.2019.

DOI: [10.31031/ACAM.2019.04.000584](https://doi.org/10.31031/ACAM.2019.04.000584).

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Abstract

Oral candidiasis is prevalent and *Candida* species are associated with its onset. Microbial resistance and recurrence of the disease have been observed against conventional drugs. Thus, alternative or complementary treatments from medicinal plants and their phytoconstituents are researched. This review examined the effects of Citral on *Candida spp.* and observed its antifungal activity. New studies are needed to elucidate its properties and to develop a phytomedicine applicable to oral candidiasis.

Keywords: *Candida albicans*; Phytotherapy; Plants; Medicinal

Introduction

Oral candidiasis is a pathology of high prevalence and presents mucous with diffuse erythematous or stippled features. *Candida* fungal species are present in this condition and *C. albicans* is the most frequently associated. Microbial resistance and recurrence of injury occur in comparison to conventional drugs. Therefore, new forms of complementary or alternative treatment involving medicinal plants and their phytoconstituent with antifungal potential are investigated [1-6]. The present study reviewed the effects of Citral on *Candida spp.*

Citral and its characteristics

Medicinal plants and essential oils can be explored as alternative therapies. Essential oils have been used in ethnomedicine as antifungal agents against infections by *Candida spp* [7]. They consist mainly of terpenoids, widely distributed in nature. These constituents are responsible for antiseptic, antibacterial, antifungal and antiparasitic properties [8]. Terpenes form structurally and functionally different classes. They are made by combinations of several 5-carbon-base (C5) units called isoprene. The main terpenes are the monoterpenes (C10) and sesquiterpenes (C15) [9]. Citral is the name given to a natural mixture of two isomeric acyclic monoterpene aldehydes: geranial (trans-citral, citral A) and neral (cis-citral, citral B). They are present in several essential oils, such as Lemon grass, and correspond to the main constituent of the essential oil of the popular name *Cymbopogon citratus*: holy grass, among others [9-12].

Effects of citral on *Candida spp*

Silva et al. [13] studied the antifungal activity of citronella and citral oil and found potential *in vitro* against *Candida species*, including *C. albicans*. Zore et al. [14] evaluated the anti-*Candida* potential of six terpenoids (Linalol, citral, eugenol, citronellol, benzyl benzoate and linalool acetate), which demonstrated excellent activity against *C. albicans* and non *albicans*, with linalool and the most effective, inhibiting all isolates. Khan and Ahmad [7] investigated the antibiofilm activity of four phytocompounds (cinnamaldehyde, citral, eugenol and geraniol) and their synergy with fluconazole and amphotericin B against preformed biofilms of *C. albicans*. Among the results, citral inhibited the formation of biofilms, but was less effective than cinnamaldehyde and geraniol.

In a study on the activity against *Candida spp*, Lima et al. [6] verified that citral inhibits the growth of *C. albicans*, and the probable mechanism of action did not involve the cell wall or ergosterol. Leite et al. [5] analyzed the antifungal activity and mechanism of action of citral against *C. albicans*, concluding that the involvement with the cell wall and the

binding to ergosterol are not possible mechanisms of action, and demonstrated its antifungal potential. The authors emphasized the need for further studies on its effects before being used as a component of new antifungal drugs.

The study by Freire et al. [3] found resistance of *C. albicans* strains isolated of users of denture to nystatin and verified the antifungal effect of Citral. The minimum inhibitory concentration and minimum fungicidal concentration were determined in 32µg/mL, demonstrating a fungicidal activity. However, the phytoconstituent did not modulate the action of nystatin when associated with the drug. Studies that observe the ethnobotanical knowledge in communities have verified that medicinal plants like *Cymbopogon Citratus*, which have citral as phytoconstituent, are widely used by the population [4,15-17]. Thus, it is important to note the search for scientific evidence by researchers about the effects that medicinal plants and their components have on microorganisms.

Conclusion

Citral has been shown to be a phytoconstituent with an antifungal effect on *Candida species*. The importance of new studies to elucidate its properties and the development of a phytomedicine applicable to oral candidiasis is emphasized.

References

- Lewis MAO, Williams DW (2017) Diagnosis and management of oral candidosis. Br Dent J 223(9): 675-681.
- Dias IJ, Trajano ERIS, Castro RD, Ferreira GLS, Medeiros HCM, et al. (2017) Antifungal activity of linalool in cases of *Candida* spp. isolated from individuals with oral candidiasis. Braz J Biol 78(2).
- Freire JCP, Oliveira JK, Silva DF, Souza JP, Guerra FQS, et al. (2017) Antifungal activity of essential oils against *Candida albicans* strains isolated from users of dental prostheses. Evidence-Based Complementary and Alternative Medicine 17: 1-9.
- Silva MDP, Marini FS, Melo RS (2015) Levantamento de plantas medicinais cultivadas no município de Solânea, agreste paraibano: Reconhecimento e valorização do saber tradicional. Rev Bras Plantas Med 17(4) supl 2: 881-890.
- Leite MCA, Bezerra APB, Sousa JP, Guerra FQS, Lima EO (2014) Evaluation of antifungal activity and mechanism of action of citral against *Candida albicans*. Evidence Based Complementary and Alternative Medicine 1-9.
- Lima IO, Nóbrega FM, Oliveira WA, Lima EO, Menezes EA, et al. (2012) Anti-candida albicans effectiveness of citral and investigation of mode of action. Pharm Biol 50(12): 1536-1541.
- Khan MS, Malik A, Ahmad I (2012) Anti candidal activity of essential oils alone and in combination with amphotericin B or fluconazole against multi-drug resistant isolates of *Candida albicans*. Med Mycol 50(1): 33-42.
- Sharma N, Tripathi A (2008) Effects of citrus sinensis (l) osbeck epicarp essential oil on growth and morphogenesis of aspergillus niger (l) van tieghem. Microbiol Res 163(3): 337-344.
- Bakkali F, Averbeck S, Averbeck D, Idaomar M (2008) Biological effects of essential oils-A review. Food Chem Toxicol 46(2): 446-475.
- Boukhatef MN, Ferhat MA, Kameli A, Saidi F, Kebir HT (2014) Lemon grass (*Cymbopogon citratus*) essential oil as a potent anti-inflammatory and antifungal drugs. Libyan J Med 9: 25431.
- Tadtong S, Watthanachaiyingcharoen R, Kamkaen N (2014) Antimicrobial constituents and synergism effect of the essential oils from *cymbopogon citratus* and *alpinia galanga*. Nat Prod Commun 9(2): 277-280.
- Siddiqui ZN, Farooq F, Musthafa TNM, Ahamad A, Khan AU (2013) Synthesis, characterization and antimicrobial evaluation of novel halopyrazole derivatives. Journal of Saudi Chemical Society 17(2): 237-243.
- Silva CB, Guterres SS, Weisheimer V, Schapoval EE (2008) Antifungal activity of the lemongrass oil and citral against *Candida* spp. Braz J Infect Dis 12(1): 63-66.
- Zore GB, Thakre AD, Jadhav S, Karuppayil SM (2011) Terpenoids inhibit *Candida albicans* growth by affecting membrane integrity and arrest of cell cycle. Phytomedicine 18(13): 1181-1190.
- Costa JC, Marinho MG (2016) Etnobotânica de plantas medicinais em duas comunidades do município de Picuí, Paraíba, Brasil. Rev bras plantas med 18(1): 125-134.
- Lima IEO, Nascimento LAM, Silva MS (2016) Comercialização de plantas medicinais no município de Arapiraca-AL. Rev Bras Pl Med 18(2): 462-472.
- Sousa JP, Costa AOC, Leite MCA, Guerra FQS, Silva VA, et al. (2016) Antifungal activity of citral by disruption of ergosterol biosynthesis in fluconazole resistant *Candida tropicalis*. International Journal of TROPICAL DISEASE & Health 11(4): 1-11.

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