

2.19 AIMS AND OBJECTIVES

*Candida albicans* is an opportunistic fungal pathogen capable of life-threatening disseminated infections particularly in immunocompromised patients. The majority of the clinically used antifungals suffer from various drawbacks in terms of toxicity, drug-drug interactions, and lack of fungicidal efficacy, limited in number, high cost and emergence of resistant strains caused by the frequent use of some of them. These drawbacks have created a need to identify and develop a new generation of compounds for therapeutic use. It makes necessary to discover new classes of antifungal compounds to cure fungal infections.

Since antiquity plants have been used in the treatment of a number of diseases. Plants like *Aloe vera*, Turmeric (*Curcuma longa L.*), Neem (*Azadirachta indica L.*) and Mint (*Mentha piperita L.*) have been reported to possess a wide range of bioactive molecules which have provided a source of inspiration for development of novel drugs. In fact many commercially available drugs used in modern medicine were initially used in the crude form. The development of pharmaceuticals begins with the identification of active principles, detailed biological assays and dosage formulations, followed by clinical studies to establish safety, efficacy and pharmacokinetic profile of new drugs. Characterization of effective plant products, therefore, becomes essential to identify novel antimicrobial compounds.

Plant essential oils and their bioactive components are known to possess antimicrobial activities but the mode of action remains unknown for most of them. Although there are many reports that predict therapeutic benefits of plant products, the existing information is not consistent and
limited for human fungal pathogens. Also conventional antifungal drugs clinically in use suffer from various drawbacks in terms of toxicity, drug interactions, lack of fungicidal efficacy, cost and emergence of resistant strains. Even though new antifungal drugs have been introduced, there is still a great demand for more effective and less toxic compounds.

With this background, the objective of the present study were-

1. To characterize the Mint essential oil by GC-MS analysis and study the antifungal efficacy of its major bioactive components against *Candida spp.*

2. To investigate the effects of sub-MIC concentrations of Mint EO and its three major components on pathogenicity markers of *Candida albicans*. Hence examine the effects of Mint EO, Carvone, Menthol and Menthone on the secretion of proteinases and phospholipases and on yeast to hyphal transition in this pathogenic fungus.

3. To test the effect of Mint EO and its major constituents on the structural and functional integrity of cytoplasmic membranes of *Candida* isolates in terms of total ergosterol content and the plasma membrane H⁺ ATPase mediated H⁺-efflux.

4. To explore the mechanism of action of Mint EO and its active compound in *Candida albicans* and to study the morphological alterations revealed by Scanning Electron Microscopy (SEM).

5. To evaluate the antifungal synergistic activity of Mint EO, with commonly prescribed azole fluconazole (FLC) by broth micro dilution checkerboard assay.

6. To rule out the possibility of any additional allied toxicity to host cells by studying hemolytic activity using human erythrocytes.