Chapter 1
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*Candida albicans* is the most common etiological agent of candidiasis. Candidiasis threatens people living with weak immune system, those who have undergone organ transplantation, AIDS or cancer patients (Sanders *et al.*, 2016, Polvi *et al.*, 2015). *C. albicans* biofilms are intrinsically resistant to conventional antifungal therapeutics and the host immune system. Biofilm-based infections are a significant clinical challenge (Gulati & Nobile 2016, Tusi *et al.*, 2016). Inherent toxicity, cost and emergence of resistance remain major problems in clinics, and the available antifungal agents are still limited (Liu *et al.*, 2016). These problems point to an urgent need for the development of new antifungal agents. Unfortunately, the rapidity of developing new antifungal drugs has been extremely slow (Pierce *et al.*, 2015). To defeat the problem of toxicity and drug resistance associated with monotherapy, two-drug combination strategies have been studied both for planktonic and biofilm cells of *C. albicans* (Cui *et al.*, 2015). Therefore, more attention have been waged to drug combination, of which, the combination of drugs are used. The synergistic antifungal properties in combination with some known antifungal agents such as Ketoconazole, Fluconazole have been reported. In addition to inhibition of planktonic cell or biofilm formation, the established antifungal mechanisms were identified (De Cremer *et al.*, 2015, Liu *et al.*, 2015).

Many phytochemicals have promising activity against growth and virulence factors of *C. albicans* (Martins *et al.*, 2015). In this study we have reported the potential of using plant molecules and antioxidants as synergistic activators of the drug doxorubicin against *C. albicans*. We have achieved reduction of dosages of doxorubicin through the
Doxorubicin in combination with phytochemicals and antioxidants could be used against *Candida albicans* ATCC 90018.

**Objectives**

1. To study the potential of molecules of plant origin as chemosensitizers of anti-cancer drugs in *Candida albicans* model.
2. To identify synergistic drug combinations.
3. Establishment of MIC values of anticancer drugs against planktonic growth and biofilm forms in *C. albicans*.
4. To study toxicity of selected combinations on human erythrocytes.
5. To study the efficacy anticancer drug in combination with selected antioxidants against growth and biofilm formation of *C. albicans*.

**Structures of anticancer drugs, Phytochemicals and Antioxidants**

![Doxorubicin](image1.png) ![Etoposide](image2.png) ![5-Flurouracil](image3.png)

Doxorubicin  Etoposide  5-Flurouracil
Carboplatin  Cisplatin  Decarbazine

Docetaxel  Gemcitabine  Irinotecan

Leucovorin  Oxaloplatin  Paclitaxel

Tamoxifen  Vinblastine  Vincristine
Bleomycin  Beta-Citronellol  Beta-Ionone

Camphene  Carvacrol  Citral

Citronellol  Eugenol  Geraniol  Ascorbic acid

Thymol  Gallic Acid  Quercetin