Summary

- Sixteen anticancer drugs were analyzed for their efficacy against developing and mature biofilm growth of *C. albicans*.

- Out of sixteen anticancer drugs, six i.e. Vinblastine, Vincristine, Carboplatin, Cisplatin, Flurouracil and Decarbazine were good inhibitors of biofilm.

- We compared the targets of six classes of anticancer drugs targets in humans and their homologs in *C. albicans*. It was found that the genes of *C. albicans* shared considerable identity to the corresponding genes in humans.

- We have explored the potential of Doxorubicin in combination with Phytochemicals and five antioxidants against planktonic growth and biofilm forms of *C. albicans* has been evaluated in *C. albicans* for the first time.

- MIC of Doxorubicin for planktonic growth and biofilm formation was reduced by addition of selected phytochemicals by several folds.

- MIC of Doxorubicin for growth and developing biofilm was lowered concentration in combination with phytochemicals and this interaction was synergistic.

- Combination of Doxorubicin-Beta-Citronellol, Doxorubicin-β-ionone and Dox-citral, Geraniol, Eugenol were found to be synergistic in interaction against planktonic growth of *C. albicans* while Doxorubicin-Thymol interaction was not synergistic against planktonic growth and biofilm forms of *C. albicans*.

- Addition of Camphene reduced the MIC by seventy one fold. β-citronellol, carvacrol and Terpinolene reduced by sixteen fold.
While addition of β-ionone reduced the MIC of doxorubicin by thirty three fold against planktonic and biofilm forms of *C. albicans*.

- Combination of five antioxidants vitamin E, Ascorbic acid, Curcumin, Gallic acid and Quercetin were tested *in vitro* against planktonic and biofilm growth of *C. albicans*.

- Doxorubicin and antioxidant combination reduced MIC of doxorubicin-Curcumin and doxorubicin-Ascorbic acid by the four and eight fold.

- The synergistic combinations of Doxorubicin-Curcumin, Doxorubicin-Ascorbic acid possess potent inhibitory activity against growth and biofilm forms of *Candida albicans*.

- MIC value of doxorubicin were reduced in the presence of selected phytochemicals that may reduce the risk of toxicity. So, combination of doxorubicin with phytochemicals and antioxidants would be an effective strategy to fight against infectious diseases.

- These combinations may successfully overcome the drug resistance associated with biofilms.

- The anti cancer drugs could be dual purpose agents targeting both cancer growth as well as *C. albicans* biofilm. However this hypothesis needs to be tested in *in vivo* models.

- The outcome of this *in vitro* study suggest the use of phytochemicals and antioxidants with doxorubicin as a strategy for avoidance of side effects associated with high concentration, reduce the toxicity and multidrug resistance.