PHENYLPROPANOIDS ELICIT OXIDATIVE STRESS TO CANDIDA ALBICANS

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Introduction and Objectives: Reliance on drugs and hospital procedures has increased incidences of opportunistic fungal infections worldwide like Candidiasis. Limited number of available antifungals are besotted with increased microbial resistance and host toxicity. Plant derived secondary phenylpropanoids such as ferulic acid and isoeugenol, are vigorously explored as alternate antifungals. These compounds have been studied as antioxidants for mammalian system. This work investigated antioxidant enzymatic status and membrane integrity on Candida albicans. Materials and Methods: Cells grown in the presence of sub-MIC concentrations of ferulic acid and isoeugenol were collected and the cell free extracts were evaluated for eight oxidative stress markers. Cell viability and membrane integrity were assessed by WST-1 cell cytotoxicity assay and confocal microscopy. Results and Conclusion: Ferulic acid and isoeugenol increased both LPO (81% and 104%, respectively) and SOD (5 and 3 fold, respectively), while catalase activity did not as much. Coherently, GSH content decreased by 57% and 70%. Colorimetric signal decreased of 32% and 69% for ferulic and isoeugenol, respectively, during WST-1 assessment. Confocal microscopy data showed that 71% and 25% of cells died in the presence of ferulic and isoeugenol, respectively. Therefore, it was suggested that these molecules impose oxidative stress to yeast cells. However, since the catalase activity increase did not correspond to that of the SOD activity, this suggested the building up of H₂O₂ for hormesis effect. The decrease in GSH could be understood in terms of decreased glucose 6-P dehydrogenase activity and NADPH level. Decreased colorimetric signal arising from inhibited mitochondrial enzymes suggests that redox activity is impeded, in presence of two tested molecules causing decreased growth and reduced viability. The selected phenylpropanoids showed antifungal activity since they disrupted membrane integrity and did not confer any advantage to yeast cells against oxidative stress.

Keywords: Phenylpropanoids, Candida albicans, Oxidative stress.