ABSTRACT

Superoxide dismutase has been extracted from animal tissues, purified and marketed for various pharmaceutical uses. As an alternative to this, few microorganisms that produce higher concentrations of superoxide dismutase were screened and a fermentative production process was developed. In this regard, 5 wild type yeast strains were screened to know the quantity of superoxide dismutase they synthesize on various carbon and nitrogen sources such as dextrose, maltose, lactose, sucrose, peptone, urea, ammonium sulphate and ammonium orthosulphate at various temperature and pH values.

*S. mellis* was found to produce highest concentration of superoxide dismutase 59.0 U Mg\(^{-1}\) on YPD media with sucrose as the carbon source and 55.0 U Mg\(^{-1}\), when maltose was used as carbon source. Parameters such as pH, temperature and various carbon sources were studied during fermentative cycles. To analyze the most supporting carbon source for superoxide dismutase production, 5 different carbon sources were used and finally superoxide dismutase specific activity produced by five wild strains of yeasts were compared, biomass yield was good on sucrose, similarly superoxide dismutase specific activity was higher on sucrose than on dextrose or maltose or lactose, similarly 5 carbon sources were experimented and compared to analyze the best carbon source that promotes maximum biomass
yield. Biomass yield was good on sucrose. Hence sucrose could be recommended as good substrate for industrial scale production of superoxide dismutase when *S mellis* was used as inoculum.

The fungal strains *S. mellis*, *S. ludwiggi* and mutant *P. fermentans* synthesizes glycosylated Cu/Zn SOD as a part of their metabolic activity. Experiments were conducted to enhance the yield of Cu, Zn-SOD in these organisms. Parameter such as increased concentration of dissolved oxygen was imposed on the experimental setup to examine its effect on growth and enzyme biosynthesis. It was found that an average of 1.7-fold increase in superoxide dismutase activity under 20% dissolved oxygen controlled conditions. Superoxide dismutase activity was considerably less under dissolved oxygen-uncontrolled conditions. Highest enzyme productivity was approximately 381x10^3 U/Kg (kg wet biomass)^{-1} was observed in *S. mellis cultures* under 20% dissolved oxygen controlled cultures. The recovered enzyme was purified with electrophoretic homogeneity. Atomic absorption spectrometry was performed to confirm the presence of Cu and Zn motifs. The molecular weights of *S. mellis*, *S. ludwiggi* and mutant *P. fermentans* Cu/Zn superoxide dismutase's were reported respectively. Purified Cu, Zn- superoxide dismutase's from these microbes has showed high degree of homology with Cu/Zn superoxide dismutase’s of other prokaryotic and eukaryotic organisms. This is revealed by N-terminal sequence analysis.