ABSTRACT

The present study deals with the immobilization of glutamic acid decarboxylase for its increase catalytic efficiency and stability to produce γ- aminobutyric acid (GABA) from *Lactobacillus casei* IIB-09. A 2-fold increase in GAD activity (2.59±0.03 IU/ml) was observed by utilizing immobilized GAD. Various cultural parameters were optimized and a significant enhancement in GABA production was attained with 0.5% of monosodium glutamate concentration as substrate, 6.5 pH, 48 h of incubation time and 2% of inoculum size. Superior quality enzyme extract was immobilized on MSNPs followed by their characterization to determine their morphology, surface composition and dispersion properties. The UV-Vis absorption peak at 285 nm confirmed the immobilization of MSNPs and XRD analysis revealed their spherical crystalline nature. SEM showed the MSNPs were of 80-104 nm in size. The FTIR spectrum band observed at 1053.78/cm indicated the stretching vibration of Si-O bond. Maximum GAD activity was obtained with 0.4 g beads, 0.8 ml GAD extract at 40 min of holding time. The GAD activity of free and immobilized GAD were compared on the basis of the methanol, α-ketoglutarate concentrations and thermophilic behavior. Employing methanol showed best GAD activity at 1ml for free GAD with 2.76±0.02 mM GABA and at 1.5 ml for immobilized GAD with 2.76±0.01 mM GABA. Comparing α-ketoglutarate on free and immobilized GAD resulted in 120±0.05 mM GABA and 125±0.02 mM GABA with 50 µl and 75 µl of its concentration. While a temperature of 45°C was found to be the best for GAD activity in either of free and immobilized GAD with 112±0.02 and 119±0.03 mM of GABA output respectively.