Characterisation of cholinesterase from kidney tissue of Asian seabass (Lates calcarifer) and its inhibition in presence of metal ion

Abstract

Aim: The cholinesterase (ChE) based inhibition studies from fish were investigated and presented here emerged to be one of the great potential biomarkers for heavy metals monitoring.

Methodology: In this study, the capability of ChE extracted from the kidney of Lates calcarifer was assessed for of metal. ChE was purified through ammonium sulphate precipitation and ion exchange chromatography.

Results: The purified enzyme gave 12 fold purification with the recovery of 12.17% with specific activity of 2.889 U mg-1. The Michaelis-Menten constant (Km) and Vmax value obtained was 0.1426 mM and 0.0217 ﷺmol min-1mg-1, respectively. The enzyme has the ability to hydrolyse acetylthiocholine iodide (ATC) at a faster rate compared to other two synthetic substrates, propionylthiocholine iodide (PTC) and butyrylthiocholine iodide (BTC). ChE gave highest activity at 20-30ﷺC in Tris-HCl buffer pH 8.0. The results showed that cholinesterase from L. calcarifer kidney was very sensitive to sensitive to copper and lead after being tested argentum, arsenic, cadmium, chromium, copper, cobalt, mercury, nickel, lead and zinc.

Interpretation: The effect of heavy metals studied on the activity of ChE differed from each other. The result of the study can be used as a tool for further developing a biomarker for the detection of heavy metals in aquatic ecosystems. In addition, the information can also be used for designing a kit, that would give a rapid and accurate result.