Histopathological and cholinesterase changes in the gills of Clarias gariepinus as a result of cadmium exposure

ABSTRACT

Aim : The cholinesterase (ChE) based inhibition and histopathological studies from fish were investigated and represented in this study to develop as one of the great potential biomarkers for heavy metals monitoring. Methodology : In this study, the histopathological study of gills were observed a under microscope. The capability of ChE extracted from the gills of Clarias gariepinus was assessed for declining Cd. ChE was purified through affinity chromatography and continued with the optimisation and inhibition study (IC50) of cholinesterase. Results : Histopathological study of gills was carried out and several changes such as aneurysm, necrosis and lamella fusion were noted. Purification fold obtained from purified enzyme was 1.15 with 30% a yield specific activity 20.726. The optimum temperature for purified AChE was 35°C along with acetylthiocholine iodide (ATC) as a preferable substrate that had the highest Vmax value of 0.5452 U mg'1 and the lowest Km value of 0.0311 mM. The optimum pH was observed to be 10 of Tris-HCl as a medium. Meanwhile, the IC50 of cadmium was 6.808 mg l′ with R2 value of 0.9532. Interpretation : 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 baseline data provided can also be used for designing a kit, which would give rapid and accurate result.