Sea cucumbers have been a dietary delicacy and important ingredient in Asian traditional medicinal over many centuries. In this study, edible sea cucumber Holothuria edulis was evaluated for its in vitro anticancer potential. An aqueous fraction of the edible sea cucumber (ESC-AQ) has been shown to deliver a strong cytotoxic effect against the human HL-60 leukaemia cell line. An induction effect of apoptotic body formation in response to ESC-AQ treatment was confirmed in HL-60 cells stained with Hoechst 33342 and confirmed via flow cytometry analysis. The up regulation of Bax and caspase-3 protein expression was observed while the expression of Bcl-xL protein was down regulated in ESC-AQ treated HL-60 cells. Due to the profound anticancer activity, ESC-AQ appears to be an economically important biomass fraction that can be exploited in numerous industrial applications as a source of functional ingredients.