

Abstract

The present study aimed to isolate a bioactive compound from Sri Lankan edible marine brown algae, *Chnoospora minima*, to manage diabetes. The de-polysaccharide crude methanolic extract was partitioned using hexane, chloroform, and ethyl acetate with increased polarity. The samples were subjected to determine the quantitative phytochemical analysis, antioxidants, and antidiabetic potentials. Further, the potent antidiabetic fraction was selected to isolate an active compound using bioactivity-guided fractionation. From the selected extract, the chloroform fraction exhibited comparatively high TPC (59.01 ± 1.86 mg GAE/g), TFC (5.14 ± 0.43 mg QE/g) and alkaloid content (2.79 ± 0.31 PE/g of extract). Crude methanol extract exhibited a potent DPPH activity (IC_{50} : 0.48 ± 0.01 mg/mL) whereas the ethyl acetate fraction elicited a maximum ABTS activity (IC_{50} : 0.064 ± 0.001 mg/mL) and a ferrous iron-chelating capacity (IC_{50} : 0.019 mg/mL). Similarly, the chloroform fraction exhibited the highest FRAP (20.34 ± 1.72 mg TE/g) and ORAC (19.72 ± 2.92 mg TE/g) capacities. The potent inhibitory activity of α -amylase (IC_{50} : 3.17 ± 0.02 μ g/mL) and α -glucosidase (IC_{50} : 1.99 ± 0.01 μ g/mL) enzymes and glucose diffusion was observed in the chloroform fraction. Similarly, the chloroform extract exhibited a potent BSA-glucose (IC_{50} : 202.43 ± 5.71 μ g/mL), BSA-MGO (IC_{50} : 124.30 ± 2.85 μ g/mL) antiglycation model and reversing activities ($EC_{50BSAglucose}$: 98.99 ± 0.35 μ g/mL; $EC_{50BSA-MGO}$: 118.89 ± 1.58 μ g/mL). Depending on the hypoglycemic activity, fucoxanthin was isolated as the active compound which showed a notable change in the functional group. Molecular docking studies were conducted on the compound, and binding energy was observed to be -6.56 kcal/mol and -4.83 kcal/mol for α -amylase and α -glucosidase enzymes, respectively, which confirmed the hypoglycemic effect of the isolated compounds. However, more studies are required to understand the mechanistic insights of these observations.

Keywords: *C. minima*; Antidiabetic; Antioxidant; Bioactivity; Carotenoid; Fucoxanthin.