DNA protection and tyrosinase inhibition activities in the raspberry (*Rubus idaeus*) extracts

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Objective: Raspberry (*Rubus idaeus*), has been reported to contain high phenolic and anthocyanin content and has been shown to inhibit liposome oxidation. The aim of the present study was to examine the DNA protection and tyrosinase inhibition activities of raspberry with different extraction methods. The ethanol and aqueous extracts and their ethyl acetate (EA) fractions were used in this study. To evaluate the effect of raspberry extracts on UV induced DNA damages and tyrosinase inhibition, the DNA protection and tyrosinase inhibition assays were employed.

Materials and methods: Induction of DNA strand breaks by hydroxyl radical was measured by the conversion of supercoiled pUC119 plasmid DNA to open circular and linear forms. The pUC119 DNA was irradiated with UV in a solution containing 0.3 % hydrogen peroxide. Tyrosinase inhibitory activity of plant extracts was determined by spectrophotometric method. Each sample was diluted with phosphate buffer (pH 6.8) in a test tube. This was followed by addition of L-tyrosine solution and finally mushroom tyrosinase was added. The test mixture was incubated for 60 min and absorbance at 490 nm was measured.

Results: Results shown that EA fractions partitioned from ethanol extracts had the stronger activities. UV irradiation of DNA with hydrogen peroxide resulted in the formation of linear forms of DNA, indicating double-strand DNA breaks. Addition of raspberry extracts at 0.03-6 mg/mL to DNA resulted in a partial inhibition of the conversion of supercoiled DNA to linear forms, indicating that these raspberry extracts are able to protect plasmid DNA against hydroxyl radical induced oxidative damage. The inhibition of hydroxyl radical induced DNA strand breaks by raspberry extracts exhibited a concentration dependent relationship. The IC_{50} in EA fractions of ethanol extracts was 0.88 mg/mL. Furthermore, the tyrosinase inhibition assay was also conducted. Results shown that the tyrosinase inhibition activities of EA fraction (IC_{50}, 0.311 mg/mL) were stronger than ethanol and aqueous extracts.

Conclusion: Raspberry extracts shown great antioxidant, DNA protection and tyrosinase inhibition activities. EA fractions were found the main contributors for these activities of raspberry fruits.