Comparative study of the antidiabetic potential of Paederia foetida twig extracts and compounds from two different locations in Malaysia

ABSTRACT

Context: Paederia foetida L. (Rubiaceae) is an edible plant distributed in Asian countries including Malaysia. Fresh leaves have been traditionally used as a remedy for indigestion and diarrhea. Several phytochemical studies of the leaves have been documented, but there are few reports on twigs.

Objective: This study investigates the enzyme inhibition of P. foetida twig extracts and compound isolated from them. In addition, in silico molecular docking of scopoletin was investigated.

Materials and methods: Plants were obtained from two locations in Malaysia, Johor (PFJ) and Pahang (PFP). Hexane, chloroform and methanol extracts along with isolated compound (scopoletin) were evaluated for their enzyme inhibition activities (10,000-0.000016 µg/mL). The separation and identification of bio-active compounds were carried out using column chromatography and spectroscopic techniques, respectively. In silico molecular docking of scopoletin with receptors (α-amylase and α-glucosidase) was carried out using AutoDock 4.2.

Results: The IC50 values of α-amylase and α-glucosidase inhibition activity of PFJ chloroform extract were 9.60 and 245.6 µg/mL, respectively. PFP chloroform extract exhibited α-amylase and α-glucosidase inhibition activity (IC50 = 14.83 and 257.2 µg/mL, respectively). The α-amylase and α-glucosidase inhibitory activity of scopoletin from both locations had IC50 values of 0.052 and 0.057 µM, respectively.

Discussion and conclusions: Separation of PFJ chloroform extract afforded scopoletin (1), stigmasterol (2) and γ-sitosterol (3) and the PFP chloroform extract yielded (1), (2), (3) and ergost-5-en-3-ol (4). Scopoletin was isolated from this species for the first time. In silico calculations gave a binding energy between scopoletin and α-amylase of -6.03 kcal/mol.

Keyword: A-Amylase; A-glucosidase; Molecular docking; DPPH; Beta-carotene bleaching assay