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Biological and Analytical Investigations of Alpha-Glucosidase Inhibitory and Anti-Oxidant Activities on Selected Malaysian Medicinal Plants

(Penyelidikan Biologi dan Analisis Perencatan Alfa-Glukosidase serta Aktiviti Anti-Oksidan dalam Tumbuhan Ubat-ubatan Terpilih di Malaysia)

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ABSTRACT

This study was performed to establish anti-diabetic and anti-oxidant properties, and to carry out phytochemical analysis of selected local plants which are traditionally used as medicinal plants. Local plants involved in this study were Lawsonia inermis, Punica granatum, Dryobalanops aromatica, Ziziphus mauritiana, *and* Ocimum basilicum. *Solvent extraction was performed using maceration method with solvents of increasing polarity. Alpha-glucosidase inhibition assay was performed on all extracts to ascertain their anti-diabetic potentials. The extracts were screened for antioxidant activity using anti-oxidant assays (FRAP, DPPH, TAOC, ABTS, and BCB) and quantitative phytochemical analyses (TPC and TFC). Chemical profiling using LCMS and GCMS was performed on extracts with high biological activities. Methanol extracts of* D. aromatica *bark and leaves showed the most potent inhibition of alpha-glucosidase with* IC_{50} *values of 0.63 ± 0.03 µg/mL and 0.98 ± 0.02 µg/mL, respectively. Both extracts exhibited similar anti-oxidant activity on all five assays and possessed high phenolic contents with values of 266.79 and 261.69 GAE, respectively. The results obtained suggested that amongst the selected plants studied,* D. aromatica *showed high anti-oxidant activity and anti-diabetic activity (*via *inhibition of alpha-glucosidase). This is the first report that highlights the anti-diabetic potential of* D. aromatica.

Keywords: Alpha-glucosidase; anti-diabetic; anti-oxidant; Dryobalanops aromatica; *medicinal plants*

ABSTRAK

Kajian ini dijalankan bagi mengenal pasti ciri-ciri anti-diabetik dan anti-oksidan, serta analisis fitokimia terhadap tumbuhan tempatan terpilih yang digunakan secara tradisi sebagai tumbuhan ubatan. Tumbuhan tempatan yang terlibat dalam kajian ini adalah Lawsonia inermis, Punica granatum, Dryobalanops aromatica, Ziziphus mauritiana *dan* Ocimum basilicum. *Pengekstrakan pelarut telah dijalankan melalui kaedah maserasi menggunakan pelarut-pelarut dengan peningkatan kepolaran. Asai perencatan alfa-glukosidase telah dijalankan ke atas semua ekstrak bagi mengenal pasti keupayaan anti-diabetik. Kesemua ekstrak juga telah disaring untuk aktiviti anti-oksidan menggunakan asai-asai anti-oksidan (FRAP, DPPH, TAOC, ABTS dan BCB) dan analisis fitokimia kuantitatif (TPC dan TFC). Pemprofilan kimia telah dijalankan ke atas ekstrak dan fraksi yang mempunyai aktiviti biologi yang tinggi dengan menggunakan LCMS dan GCMS. Ekstrak metanol bagi kulit dan daun* D. aromatica *menunjukkan perencatan alfa-glukosidase yang paling tinggi dengan nilai* IC_{50} *masing-masing adalah 0.63 ± 0.03 µg/mL dan 0.98 ± 0.02 µg/mL. Kedua-dua ekstrak menunjukkan aktiviti anti-oksidan yang tinggi ke atas kelima-lima ujian anti-oksidan, serta mempunyai kandungan fenol yang tinggi dengan nilai masing-masing 266.79 dan 261.69 GAE. Hasil uji kaji yang diperoleh menunjukkan bahawa* D. aromatica *mempunyai aktiviti anti-oksidan dan aktiviti anti-diabetik yang tinggi (melalui perencatan alfa-glukosidase). Laporan ini adalah yang pertama kalinya merekodkan keupayaan anti-diabetik bagi* D. aromatica.

Kata kunci: Alfa-glukosidase; anti-diabetik; anti-oksidan; Dryobalanops aromatica; *tumbuhan ubatan*