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Rapid investigation of alpha-glucosidase inhibitory activity of Phaleria macrocarpa extracts using FTIR-ATR based fingerprinting

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Abstract

Phaleria macrocarpa, known as "Mahkota Dewa", is a widely used medicinal plant in Malaysia. This study focused on the characterization of alpha-glucosidase inhibitory activity of P. macrocarpa extracts using Fourier transform infrared spectroscopy (FTIR)-based metabolomics. P. macrocarpa and its extracts contain thousands of compounds having synergistic effect. Generally, their variability exists, and there are many active components in meager amounts. Thus, the conventional measurement methods of a single component for the quality control are time consuming, laborious, expensive, and unreliable. It is of great interest to develop a rapid prediction method for herbal quality control to investigate the alpha-glucosidase inhibitory activity of P. macrocarpa by multicomponent analyses. In this study, a rapid and simple analytical method was developed using FTIR spectroscopy-based fingerprinting. A total of 36 extracts of different ethanol concentrations were prepared and tested on inhibitory potential and fingerprinted using FTIR spectroscopy, coupled with chemometrics of orthogonal partial least square (OPLS) at the 4000-400 cm⁻¹ frequency region and resolution of 4 cm⁻¹. The OPLS model generated the highest regression coefficient with (RY)-Y² = 0.98 and Q(2)Y = 0.70, lowest root meansquare error estimation = 17.17, and rootmeansquare error of cross validation = 57.29. A five-component (1+4+0) predictive model was build up to correlate FTIR spectrawith activity, and the responsible functional groups, such as -CH, -NH, -COOH, and -OH, were identified for the bioactivity. A successful multivariate model was constructed using FTIR-attenuated total reflection as a simple and rapid technique to predict the inhibitory activity. Copyright (C) 2016, Food and Drug Administration, Taiwan. Published by Elsevier Taiwan LLC.

Keywords

Author Keywords: alpha-glucosidase inhibitory activity; Fourier transform infrared spectroscopy; metabolomics; orthogonal partial least squares; Phaleria macrocarpa

KeyWords Plus: NEAR-INFRARED SPECTROSCOPY; ANTIOXIDANT ACTIVITY; ANTIHYPERGLYCEMIC ACTIVITY; PLANT-EXTRACTS; AMYLASE; CHEMOMETRICS; METABOLOMICS

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