Phytochemical Analysis of Microctis Folium, Puerariae Lobatae Radix and Puerariae Thomsonii Radix

By

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Supervisor

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碩士學位論文

布渣葉、葛根和粉葛的化學成份分析

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Abstract

As three flavonoid-rich Chinese medicines, Microctis Folium (MF), Puerariae Lobatae Radix (PL) and Puerariae Thomsonii Radix (PT), all of which showed antidiabetic effects in some degree, are frequently consumed as edible herbs in people's daily life. With the increasing claim for people's health, standardization is a fundamental practice for the quality control of botanical preparations consumed as health products and dietary supplements.

For MF, all studies are around three main flavonoid glycosides, namely vitexin (1), isovitexin (2) and isorhamnetin 3-*O*-*β*-D-rutinoside (3). At first, the separation process using column chromatography and high performance centrifugal partition chromatography (HPCPC) were carried out, providing quick and efficient ways to obtain related main compounds from MF. Then, *α*-glucosidase inhibitory effects of these three flavonoid glycosides and MF extract were illustrated, suggesting that MF might be a promising antidiabetic drug candidate. Simultaneous quantification of MF using three major flavonoid glycosides as markers by HPLC-UV was developed, pointing out a valid condition for qualitative and quantitative analysis of MF by HPLC.

For PL and PT, a new approach for discrimination of PL and PT to ensure the proper use was developed. In this part, metabolic differentiations of PL and PT using ^{1}H-NMR spectroscopy and multivariate statistical analysis were showed. Comparison of NMR metabolite fingerprints of PR was conducted by applying Principal Component Analysis (PCA) and Partial Least Square Discrimination Analysis (PLS-DA) modes successfully. Quick determinations of puerarin and total isoflavones in PR were also achieved by q^{1}H NMR, revealing that the content of puerarin and total isoflavones in PL are much higher than that of PT.

澳門大學

摘　要

布渣葉、葛根和粉葛是三種富含黃酮類化合物的藥食兩用藥材，除了臨床藥用外，它們還分別被廣泛使用於泡制涼茶和煲湯。研究表明這些藥材有不同程度上的降血糖效用。隨著人們對健康需求的加強，建立藥食兩用藥材的標準化方法對藥材質量控制起著至關重要的作用。

在本文中針對布渣葉的研究主要集中在三個主要黃酮類成份上，即牡荊苷、異牡荊苷、異鼠李素-3-*O*-*β*-D-芸香糖苷。首先，分別採用經典柱色譜及高效離心分配色譜（HPCPC）對三個化合物的分離方法進行闡述，提供了從布渣葉中分離這三種主要化合物的快速有效的不同方法。接著，為了进一步验证布渣叶的降糖效果, 對三個所得到的黃酮類成分及布渣葉提取物進行體外 *α*-糖苷酶抑制效果測試，發現這三個化合物和布渣葉提取物都有一定的降糖功效。最後，建立了有效的高效液相色譜法（HPLC-UV）對三個黃酮類成分同時進行檢測。

在葛根和粉葛研究部份，本文在前人研究的基礎上進行了化學成份比對分析，採用核磁共振指纹图谱法（NMR）結合數據統計軟件，選取主成份分析（Principal Component Analysis, PCA）和偏最小二乘法判別分析(Partial Least Square Discrimination Analysis, PLS-DA)，對葛根和粉葛代謝組分的差異進行了比較分析。結果顯示該方法可以很好地區分葛根和粉葛甲醇提取物。同時，本文對葛根和粉葛中的葛根素和總黃酮用 NMR 進行了定量分析，結果顯示葛根中葛根素和總黃酮的含量遠高於粉葛。

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LIST OF ABBREVIATIONS

Microctis Folium	MF
Puerariae Radix	PR
Puerariae Lobatae Radix	PL
Puerariae Thomsonii Radix	PT
Thin Layer Chromatography	TLC
High Performance Liquid Chromatography	HPLC
High Performance Centrifugal Partition Chromatography	HPCPC
Nuclear Magnetic Resonance	NMR
Quantitative ^{1}H Nuclear Magnetic Resonance	q^{1}H NMR
Total Peaks Area	TPA
Total Flavonoids	TF
Principal Component Analysis	PCA
Partial Least Square Discrimination analysis	PLS-DA