บทความวิจัย

การตรวจสอบปริมาณสารประกอบฟีโนลิกส์ของสารสกัดจากสมุนไพรท้องถิ่นบางชนิด ที่มีฤทธิ์ต้านโรคมะเร็ง เบาหวานและภูมิแพ้

Determinations of Total Phenolic Compounds of Some Extracted Ethnopharmacological Plants Against Cancers, Diabetes and Allergies

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บทคัดย่อ

การศึกษานี้มีวัตถุประสงค์เพื่อตรวจสอบปริมาณสารประกอบฟีโนลิกส์ของสารสกัดน้ำและเอธิลแอลกอฮอร์ในพืชสมุนไพรท้องถิ่น ตำบลบ้านพร้าว อำเภอป่าพะยอม จังหวัดพัทลุง ที่มีฤทธิ์ต้านโรคมะเร็ง เบาหวานและภูมิแพ้ 15 ชนิดปริมาณสารประกอบฟีโนลิกส์ตรวจสอบจากการวัดค่าการดูดกลืนแสงด้วยวิธี Folin-Ciocalteu แล้วคำนวณเทียบค่ามาตรฐาน gallic acid equivalents (GAE) ปริมาณสารประกอบฟีโนลิกส์สูงพบในสารสกัดหยาบเอธิลแอลกอฮอร์ของ Phyllanthus oxyphyllus Miq. (2,119.25±7.560 µgGAE/gdw) ส่วนค่าต่ำพบในสารสกัดหยาบเอธิลแอลกอฮอร์ของMomordica charantin L. (343±6.443 µgGAE/gdw) การนำค่าปริมาณสารประกอบฟีโนลิกส์ในธรรมชาติไปใช้ประโยชน์ต่อไป จำเป็นต้องมีการประเมินสารต้านอนุมูลอิสระประกอบ

คำสำคัญ : สารสกัดจากพืช สารประกอบฟีโนลิกส์ สมุนไพรท้องถิ่น

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จากงานประชุมวิชาการระดับชาติครั้งที่ 22 ปี 2555

Abstracts

This study aimed to investigate the total phenolic compounds of water and ethanolic extracts of fifteen traditional medicinal plants against cancers, diabetes and allergies, collected from Ban Praw area, Amphur Phapayom, Phatthalung. The content of total phenolics in the extracts was determined spectrometrically according to the Folin-Ciocalteu procedure and calculated as gallic acid equivalents (GAE). High total phenolic compounds was found in water crude extract of Phyllanthus oxyphyllus Miq. (2,119.25±7.560 µgGAE/gdw) even though the total phenolic compounds in ethanolic crude extract of Momordica charantin L. was low (343±6.443 µgGAE/gdw). To utilize these significant sources of natural total phenolic compounds, further evaluation of antioxidants is needed.

Keywords : Plant extracts, Total Phenolics, Traditional Medicinal Plants

Introduction

Dietary factors play an important role in human health and in the development of certain diseases. Many kinds of traditional medicines have been used over a long period of time in Asia. However, the active principles in traditional medicines are still unknown. In order to realize the full potential of these medicines, it is important to isolate the specific compounds and to identify the chief active principles in them [1]. Total phenolic compounds are plant metabolites widely spread throughout the plant kingdom. Recent interest in phenolic content stems from their potential protective role, through ingestion of fruits and vegetables, against oxidative damage diseases (coronary heart disease, stroke, and cancers) [2]. Total phenolic compounds are essential for the growth and reproduction of plants, and are produced as a response for defending injured plants against pathogens. The importance of antioxidant activities of total phenolic compounds and their possible usage in processed foods as a natural antioxidant have reached a new high in recent years. The purpose of this study was to evaluate a variety of traditional medicinal plants against cancers, diabetes and allergies that were growing in the same location with respect to their total phenolic content and antioxidant activity to find new potential sources of natural antioxidants.

Materials and methods

Chemicals and reagents

Sodium carbonate were purchased from Riedel-de Haën, Seelze, Germany. Folin-Ciocalteu's reagent (FCR) were from Carlo Erba Reagenti (Milano, Italy).

Extraction

Plant samples were washed, dried in hot-air oven at 50 °C for 72 h and powdered in a blender for 1 min at maximal speed then divided into smaller aliquots and frozen at -20°C until use. Each crude (100 g) was extracted into 2 cycles in 70% (v/v) ethanol and water at 60°C, 48 h by using Büchi B-811 universal extraction system then evaporated, lyophilized and stored at -80°C for further investigation.

Determination of total phenolic compounds

Total phenolic compounds were determined the Folin-Ciocalteau colorimetric method using gallic\ acid as a standard by a modified procedure [3] For the preparation of calibration curve, 0.5 mL aliquots of 50-300 µg/mL ethanolic gallic acid solution (50% ethanol, w/v) were mixed with 2.5 mL of Folin-Ciocalteau reagent, FCR and 2 mL of 2% (w/v) sodium carbonate solution. Dried crudes were dissolved in 50% (v/v) ethanol to a final concentration of 20 mg/mL. The sample solutions (0.5 mL) were mixed with the same reagents as described above. The absorbance of standard and samples were then measured at 760 nm after standing at room temperature (25°C) for 30 min. All the tests were performed in triplicate. Results were expressed as µg gallic acid equivalents per g. Data were subjected to analysis of variance, and means were compared by least significant difference (LSD). Differences at $p < 0.05$ were considered to be significant.

Results and discussion

The total phenolic contents in the po mace ethanolic extract and wine were measured according to the Folin-Ciocalteu method. The Folin-Ciocalteu reagent determines total phenols (and other easily oxidized substances), producing a blue colour by reducing yellow heteropolyphos phomolybdate-tungstate anions. This method gives a general measure of phenolic content; however, it is not completely specific for any specific phe nolic compounds and not all phenolic compounds exhibit the same level of activity in the assay. The total phenolic contents were determined from regression equation of calibration curve using gallic acid as a standard and expressed as gallic acid equivalents (GAE).

From Table 1 and Fig. 1, the maximal total phenolic compounds was Phyllanthus oxyphyllus Miq. water crude extract contained of 2,119.25±7.560 µgGAE/gdw ($p<0.05$) which was higher than the maximal ethanolic extract of Lagerstroemia speciosa (L.) Pers. (1,282.75±6.182 µgGAE/gdw). The minimal total phenolic compounds was Momordica charantin L. water crude extract (343±6.443 µgGAE/gdw). The significant correlations could be found between the total phenolic content and antioxidant activity of the plant extracts in any of the studied subgroups. It is known that different phenolic compounds have different responses in the Folin-Ciocalteu method. Similarily the molecular antioxidant response of phenolic compounds depending on their chemical structure [4]. Our results showed that many spices were rich in phenolic constituents and trend to demonstrated good antioxidant capacity in further evaluations.

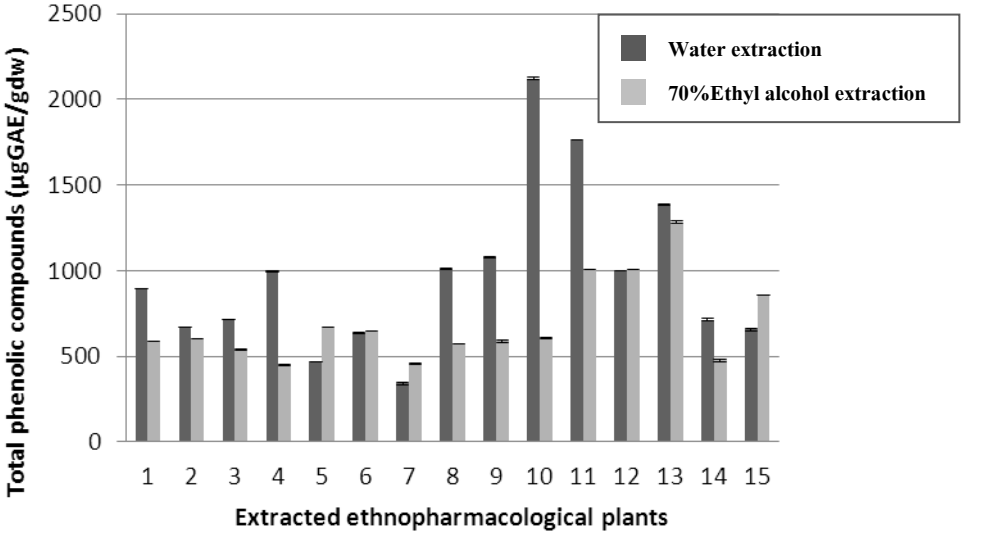

Fig. 1 Total phenolic compounds of 15 extracted ethophamacological plants. The plant list includes all known species of the following Table 1. Results were expressed as µg gallic acid equivalents per g dried weight and each value represents the mean±SD ($n = 3$, $p<0.05$).

Conclusion

Qualitative and quantitative analysis of major individual phenolics in the spices could be helpful for revealing the relationships of antioxidant phenolics in the spices and also useful for explaining the relationships between total antioxidant capacity and total phenolic contents in the spices. Through our systematically comparative study of 15 spices, some spices with high level of total phenolic compounds, such as Yai-joong-lan, Look-tai-bai, In-ta-nin-nam, Ma-yom, Fak-khao, and Khee-lek.

Acknowledgments

We would also like to thank the staff of Department of Biology, Thaksin University. The present study was financially supported by Project Fund (2010), Faculty of Science, Thaksin University.

Table 1 List of ethnopharmacological plants against cancers, diabetes and allergies and determination of total phenolic compounds

No.	Family	Botanical name	Local name	Life form	Part used	Ethnopharmacological use	Total phenolic compounds (µgGAE/gdw)	
							Water	70%(v/v) Ethyl alcohol
1	Acanthaceae	*Acanthus ebracteatus* Vahl	Ngeuak-pla-mo	S	L	Allergies	896.577±0.003	591.5±0.003
2	Aloaceae	*Aloe barbadensis* Mill.	Wan-hang-jo-ra-che	H	L	Allergies	672±0.003	600.25±0.002
3	Apocynaceae	*Alstonia scholaris* R. Br.	Sat-ta-bun	T	L	Cancer	715.75±2.858	540.155±3.595
4	Caricaceae	*Carica papyya* L.	Ma-la-ko	S	F	Cancers	993.3±3.596	449.155±2.947
5	Convolvulaceae	*Ipomcea aquatica* Forsk.	Phak-bung	C	L	Allergies	466.655±0.002	666.75±0.003
6	Cucurbitaceae	*Coccinia grandis* L. Voigt	Tam-leung	C	L	Cancers	634.65±3.595	647.5±1.649
7		*Momordica charantin* L.	Mara-khee-nok	C	F	Cancers	343±6.443	458.5±4.365
8		*M. cochinnensis* (Lour.) Spreng	Fak-khao	C	F	Cancers	1,012.077±6.229	572.832±2.656
9	Euphobiaceae	*Phyllanthus acidus* Skeels	Ma-yom	T	L	Diabetes	1,079.05±2.182	588±6.443
10		*P. oxyphyllus* Miq.	Yai-joong-lan	H	L	Diabetes	2,119.25±7.560	606.55±2.237
11		*P. urinaria* L.	Look-tai-bai	H	L	Allergies	1,761.725±0.0004	1,003.905±0.002
12	Fabaceae	*Cassia siamea* Lamk	Khee-lek	T	L	Allergies	998±0.002	1,004.5±0.003
13	Lythraceae	*Lagerstroemia speciosa* (L.) Pers.	In-ta-nin-nam	T	L	Diabetes	1,388.275±3.423	1,282.75±6.182
14	Piperaceae	*Piper sarmentosum* Roxb.	Cha-phlu	H	L	Diabetes	714±5.715	477.75±6.547
15	Solanaceae	*Physalis angulata* L.	Thong-Theng	H	L	Diabetes	657.3±5.948	857.5±2.857

Each value represents the mean ± SD (n = 3, $p<0.05$). T: tree, S: shrub, H: herb, C: climber, L: leave, F: fruit

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