Journal of Tropical Biology and Conservation 17: 181–186, 2020 ISSN 1823-3902
E-ISSN 2550-1909

Short Notes

Effect of Different Solvent Extractions on Total Phenols, Tannins, and Flavonoids Content of Indigenous Medicinal Plant *Blumea arnakidophora* Mattf. from Sabah.

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Abstract

This research represents the first study on the effect of different solvent extractions on the total phenols, tannins, and flavonoids content of indigenous medicinal plant *Blumea arnakidophora* from Sabah. A total of three solvent types were used in this study: 80% methanol, hot water and distilled water. Determination of phytochemical contents mentioned above was determined using Folin-Ciocalteu Reagent (FRC) method and Aluminium Chloride Colorimetry (ACC) method. The highest total phenols content (71.7 ± 7.0 mg GAE/g) and flavonoids content (33.7 ± 0.6 mg CE/g) were obtained from the 80% methanol extract from the leaves, whereas the highest tannin content (4.9 ± 0.7 mg GAE/g) was obtained from hot water extract from the leaves. From the statistical analyses, the phenols content extracted from the leaves with distilled water showed significant difference ($p < 0.05$) with hot water and 80% methanol extracts. The tannin content and flavonoid content extracted from the stems and leaves did not show any significant difference ($p > 0.05$) among the extraction solvent used. This work provides a preliminary result on selecting an effective extraction solvent for phytochemicals investigation on *B. arnakidophora*.

Keywords: *Blumea arnakidophora*, Total Phenols, Tannins, Flavonoids, Sabah

Received 08 July 2020
Reviewed 22 July 2020
Accepted 23 July 2020
Published 15 October 2020

Introduction

The indigenous people in Sabah have practised collecting plants as herbal medicine to be consumed since modern medicine was not easily available in the past (Kulip, 2003). *Blumea arnakidophora* Mattf., or commonly known as *Tawawo* among the indigenous people in Sabah, is a shrub that originated from Southeast Asia. *Tawawo* is believed to be rich in biologically active substances which have good anti-oxidant and anti-microbial effects. The extracts of *Tawawo* were used by the Sabah people to relieve fever and the leave-soaked water was used as herbal bath for mothers after giving birth (Ahmad & Ismail, 2003). This kind of traditional medicinal knowledge was transferred from generation to generation without knowing the phytochemicals content and the actual potential of the plant. To date, there is no scientific report on the phytochemicals content of the medicinal plant *B. arnakidophora*. This work represents the pioneer study on the total phenols, tannins, and flavonoids content of different extraction solvents from *B. arnakidophora* in Sabah.

Materials and Methods

Approximately 200 g of specimens were collected from Mount Alab sub-station (5°49'47''N, 116°20'30''E), Sabah, Malaysia in 2013. The voucher specimens were deposited in the BORNEENSIS Herbarium of Institute for Tropical Biology and Conservation (BORH), Universiti Malaysia Sabah as well as in Sabah Parks' Herbarium. These specimens were cleaned with distilled water to remove impurities prior to drying in an oven at 40°C for two days. The extraction was conducted according to Majuakim et al. (2014) with slight modification. Dried samples (0.1 g) were extracted with 30 ml 80% methanol and 30 ml distilled water respectively, for two hours on an orbital shaker (200 rpm). Hot water extracts were obtained following Wang et al. (2006) with slight modification. Dried samples (0.1 g) were mixed with distilled water, stirred with magnetic stirrer and boiled. The obtained 80% methanol extracts, distilled water extracts, and hot water extracts were then filtered with Whatman No. 1 filter paper and ready to be used for further analysis. Total phenols were determined using Folin-Ciocalteu method adapted from Velioglu et al. (1998). Determination of total flavonoids content was carried out using Aluminium Chloride Colorimetry method (Zhishen et al., 1999). Determination of total tannins content was performed using Folin-Ciocalteu method (Tamilselvi et al., 2012). Each analysis was carried out in triplicate and the data were presented as mean ± standard deviation (SD). All the total phenols, tannins, and flavonoids data were analysed using one-way ANOVA and the level of statistical significance was set at $p < 0.05$ (SPSS version 23.0).

Results and Discussion

The results of total phenols, tannins, and flavonoids content from the leaves and stems of the specimen in different extraction solvents are shown in Figure 1, Figure 2, and Figure 3, respectively. The 80% methanol extract from leaves showed the highest total phenols (71.7 ±7.0 mg GAE/g) and flavonoids content (33.7 ± 0.6 mg CE/g). Highest tannins content (4.9 ± 0.7 mg GAE/g) was recorded from the leaves of hot water extract. The lowest total phenols (6.4 ± 0.7 mg GAE/g), (tannins 1.2 ± 0.2 mg GAE/g), and flavonoids (4.7 ± 0.3 mg CE/g) content was found in distilled water extract from the stems. It may be attributable to the higher non-phenol compounds present in the distilled water extracts. Our findings are in accordance with published literature where the lower yields were obtained from the stems, compared to the leaves (Stankovic et al., 2011). Extraction yields are highly dependent on the solvent with varying polarity, pH, temperature, extraction time, and composition of the sample (Do et al., 2014). The highest yields have been found in 80% methanol extracts maybe because the combination of water and organic solvent facilitated the extraction of chemicals that are soluble in water and/or organic solvent. Hot water extract from the leaves gave the second highest yield of total phenols and flavonoids content, with no significant difference as compared to the highest total phenols and flavonoids yield from 80% methanol. Besides, hot water extracts gave the highest tannins content. Temperature may have contributed substantially to increase the extraction of chemicals' yield. Under the same extraction time, temperature, solvent and composition of sample are the vital parameters for extraction yields (Spigno et al., 2007). These results suggest that aqueous methanol is the best solvent choice depending on the target compound of interest. We would like to recommend hot aqueous methanol to be used for future work in order to obtain optimized yield of extracts. Future study regarding the bioactive properties of *Blumea arnakidophora* such as anti-oxidant and anti-microbial is also recommended as to provide deeper scientific proof to support medicinal usage among indigenous people in Sabah.

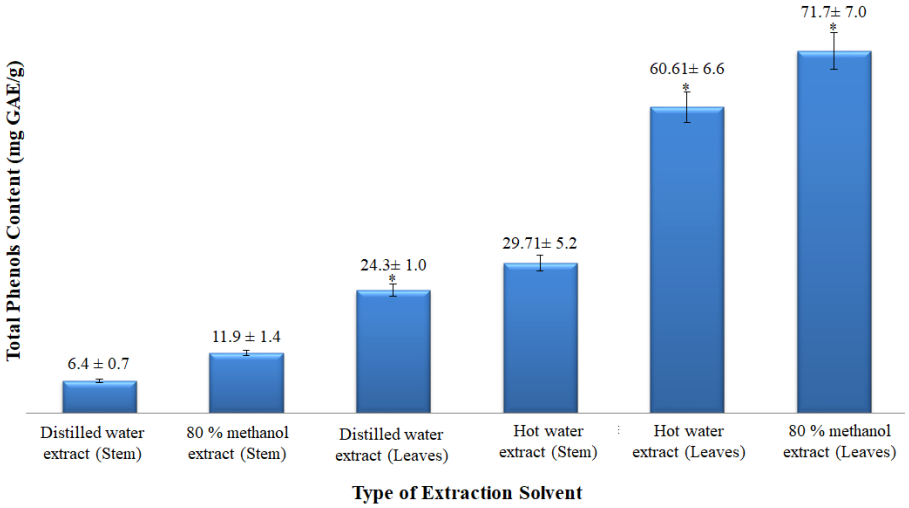

Figure 1. Comparison of total phenols content in different types of extraction solvent.

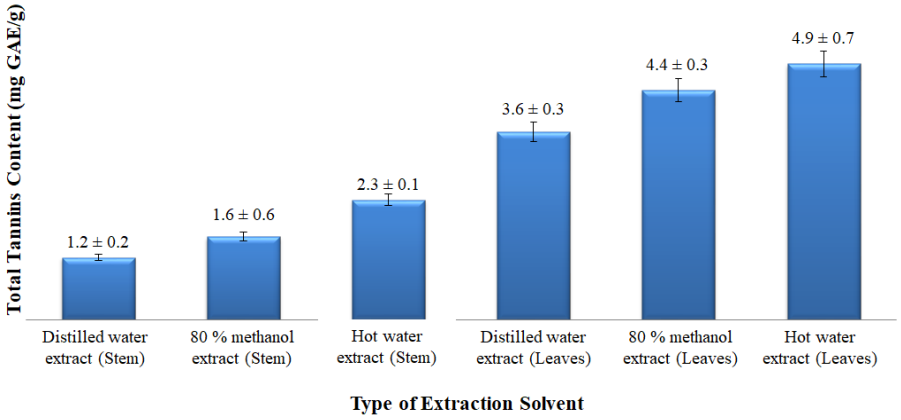

Figure 2. Comparison of total tannins content in different types of extraction solvent.

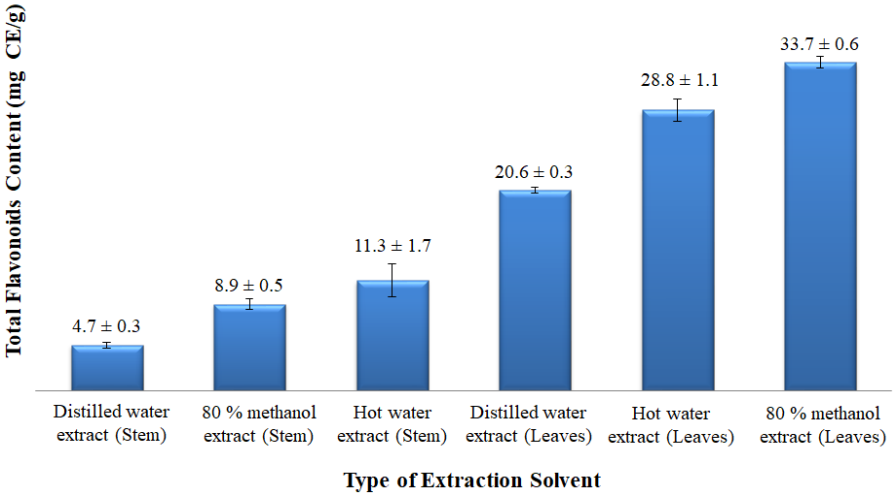

Figure 3. Comparison of total flavonoids content in different types of extraction solvent.

Acknowledgements

This work was funded by the Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah. The authors would like to thank Sabah Parks for the permission to carry out research in Mount Alab, and for verifying the specimens particulaly to Mr. Dolois Sumbin and Madam Kinahim Sampang of Kinabalu Park Herbarium.

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