



Antioxidant Activity and Total Phenolic Content in Different Parts of *Momordica subangulata* Blume

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Momordica subangulata Blume is a plant which belongs to the Cucurbitaceae family. It can be used as herbs and only found in the South of Thailand, especially in Nakhon Si Thammarat. There are no such a report on its antioxidant activity and total phenolic content. The study aims to determine and compare total phenolic content and antioxidant activity in different parts of the plant including its leaves, roots, vines, pulp, barks and seeds. The DPPH assay and the Folin-Ciocalteu assay were applied for determining antioxidant activity and total phenolic content. The methanol extract of dried barks contained the highest antioxidant activity ($IC_{50} = 10.85 \pm 1.13$ mg/L) followed by seeds, pulp, roots, leaves and vines. While the highest phenolic content in total was present in methanol extracts of *M. subangulata* dried leaves (80 ± 1.46 mg GAE/100 g DW). The results suggest that the plant of *M. subangulata* is a good natural source of antioxidants and the further studies on their pharmacological properties should be undertaken.

Keywords: Antioxidant activity, DPPH assay, *Momordica subangulata* Blume, Total phenolic content.

INTRODUCTION

The plant of *Momordica subangulata* Blume is one of the *Momordica* species which found extensively in many South East Asian countries¹. Green fruits and leaves are used as vegetables, a tradition of Asia. Their leaves are used in traditional medicine as antifungal, anti-inflammatory, disease prevention, to prevent infection, the carminatives, digestion stimulate antipyretics stimulation period, laxative and wound healer. Moreover, pharmacological effects showed that the herbs have many bioactivities, such as leaf anti-tumor level high spy after, against, anti-oxidant protection²⁻⁴. The free radicals are induced by oxidation reaction which caused several degenerative diseases by addition to lipid, protein and DNA molecules. Antioxidants are used as free radicals reducing agents. The plant polyphenols are recognized for their abilities to reduce the free radicals and protect the body⁵. However, the evaluation of the antioxidant activity form different part of *Momordica subangulata* Blume has not yet been reported. In this study, we aimed to compare the antioxidant activity and total phenolic content from different extracted part of this species. The characteristics of *Momordica subangulata* Blume are shown in Fig. 1.

EXPERIMENTAL

Sample preparation: The plant of *M. subangulata* Blume were collected in May 2013 from Krung-Ching, Noppitum

District, Nakhon Si Thammarat Province. The desired parts of the plant were washed to remove any residual compost and chopped into small pieces. The samples of each part were dried at 40 °C for 24 h. The methanol crudes were extracted from dry of all samples. The extracts were filtered through Whatman filter paper no.1 and methanol was removed by rotary evaporator.

DPPH radical-scavenging activity: The antioxidant activity was determined using DPPH radical scavenging model with a slight modification⁶. For each extract, five different concentrations ranging from 100 to 6.25 mg/L were tested with a methanolic solution having a final DPPH radical concentration of 2.5 mM. Scavenging capacity was measured spectrophotometrically at 521 nm. Ascorbic acid was used the standard compound. The percentage of DPPH inhibition was calculated from the following equation:

$$\% \text{ DPPH inhibition} = (A_c - A_s) / A_c \times 100$$

Where as the A_c and A_s are the absorbance of control and the sample respectively.

Total phenolic compound analysis: The amount of total phenolic in the herb extracts was determined with the Folin-Ciocalteu reagent according to the method of AOAC⁷ on using gallic acid as a standard. The 0.1 mL of samples was introduced to test cuvettes and then 0.3 mL of Folin Ciocalteu's reagent and 2 mL of Na_2CO_3 (15 %) were added. The absorbance of



Fig. 1. Characteristics of *Momordica subangulata* Blume

all samples was measured at 765 nm. Results were expressed as milligrams of gallic acid equivalent (GAE) per 100 g of dry weight (DW).

RESULTS AND DISCUSSION

Antioxidant properties: The antioxidant activity of the different parts of *M. subangulata* extracts was shown in Table-1. Dry barks showed the highest antioxidant activity with a lowest IC₅₀ value (10.85 ± 1.13 mg/L) followed by dry seeds (13.91 ± 2.02 mg/L), dry pulp (14.95 ± 1.18 mg/L). The methanol extracts of other three parts showed lower antioxidant activities with 21.00 ± 1.14 , 26.10 ± 1.09 and 32.10 ± 0.96 mg/L.

TABLE-1
ANTIOXIDANT CAPACITIES IN
DIFFERENT PARTS OF THE *M. subangulata* PLANT

Samples	R ²	IC ₅₀ (mg/L)
Leaves	0.998	26.10 ± 1.09
Roots	0.958	21.00 ± 1.14
Vines	0.966	32.10 ± 0.96
Pulp	0.996	14.95 ± 1.18
Barks	0.998	10.85 ± 1.13
Seeds	0.995	13.91 ± 2.02

Total phenolic content: The total phenolic contents found in *M. subangulata* extracts were indicated in Table-2. The average values ranged from 11.25 to 102.80 mg GAE/100 g DW. The dry roots showed the highest total phenolic content (102.80 ± 1.46 mg GAE/ 100 g DW), while the lowest shown in dry pulp extracts (11.25 ± 1.09 mg GAE/100 g DW).

TABLE-2
CONCENTRATIONS OF TOTAL PHENOLIC IN
THE DIFFERENT PART OF THE *M. subangulata* PLANT

Samples	Total phenolic contents (mg GAE/ 100 g DW)
Leaves	71.40 ± 2.03
Roots	102.80 ± 1.46
Vines	61.40 ± 1.73
Pulp	11.25 ± 1.09
Barks	42.50 ± 1.32
Seeds	30.00 ± 2.05

In fact, the antioxidant activity of plant materials was well correlated with the content of their phenolic compounds. So, it is important to consider the effect of the total phenolic content on the antioxidant activity of *Momordica subangulata* Blume extracts.

Conclusion

The antioxidative activity and total phenolic content from the part of *Momordica subangulata* Blume i.e., leaves, roots, vines, pulp, barks and seeds showed that the dry barks had highest antioxidant activity with a lowest IC₅₀ value, while dry roots showed the highest total phenolic content. The results suggests that *Momordica subangulata* Blume is a good sources of natural antioxidants and farther studies should be undertaken for their pharmacological properties.

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REFERENCES

1. L.K. Bharathi, H.S. Singh, S. Shivashankar and A.N. Ganeshamurthy, *Sci. Hortic.*, **172**, 143 (2014).
2. J.A. Ojewole and S.O. Adewole, *J. South. Afr.*, **17**, 227 (2006).
3. A. Ganesan, S. Natesan, P.G. Perumal, R. Vellayutham, K. Manickam and N. Ramasamy, *Iranian J. Pharmacol. Ther.*, **7**, 43 (2008).
4. R.I. Bakare, O.A. Magbagbeola, A.I. Akinwande, O.W. Okunowo and M. Green, *J. Pharmacogn. Phytother.*, **3**, 1 (2011).
5. S. Andreescu and M. Hepel, ACS Symposium Series, American Chemical Society, Washington, DC, p. 1083 (2011).
6. M.S. Blois, *Nature*, **181**, 1199 (1958).
7. Association of Official Analytical Chemists, Washington D.C., edn. 15 (1990).