

Preliminary Study: Vitamin C in *Paederia Foetida* Leaves

Nor Habibah Mohd Rosli^{1,*}, Nazrizawati Ahmad Tajuddin¹ and Sharafatinnajiha Shafie²

¹International Education College (INTEC), UiTM Campus Section 17, 40200 Shah Alam, Malaysia

²Faculty of Chemical Engineering, Universiti Teknologi MARA, 40450 Shah Alam, Malaysia

Abstract: *Paederia foetida* is an important perennial climbing medicinal herb native to eastern Asia. It is used as a remedy for diarrhea, dysentery, rheumatism and fever in Asia. Malay called this plant 'akar sekentut' and it is often eaten raw or steamed by local people rather than using it as traditional medicine. This preliminary study aims to determine the amount of vitamin C (ascorbic acid) in local *Paederia foetida* leaves. The dried leaves were soaked in ethanol for one day at room temperature before being evaporated to obtain the extract. Then, high performance liquid chromatography analysis has been used to analyze the samples. Results obtained show amount of vitamin C in mature leaves is higher than young leaves with 66 ppm and 64 ppm respectively. This showed that, *paederia foetida* leaves consist considerable high amount of vitamin C and more study should be done on this local species to investigate chemical active compounds with biological function potential.

Keywords: Vitamin C, local, *Paederia foetida*.

1. INTRODUCTION

Human is using plants since years to treat various diseases, disorder and as food. The interaction of human and plants lead to the establishment of the traditional knowledge of plants. Through scientific research, human has proved some plants have chemical active compounds with biological functions. *Paederia foetida* or the Malay name 'akar sekentut' have been reported to have anti-inflammatory, antidiarrheal, antitumor, antimicrobial, anti-tussive and hepatoprotective activities and also used for the treatment of rheumatism and aphrodisiac [1-3]. Eventhough not many scientific research have been done to investigate the toxicity of this plant, local people especially Malay community eat this plant as traditional vegetables that can be eaten raw or steamed [4] rather than use it as a traditional remedy.

Paederia foetida is important as medicinal herbs and medical plants since it contains various phytochemical compounds such as saponin, tannin, phenol, flavonoid, terpenoid, cardiac glycoside, alkaloid and reducing sugar [5].

Content of active chemical compounds in plants are influence by cultivation condition and season of collection, whereby under sunny condition and if the leaves was collected in the summer amount of active compounds are more abundant [6]. Since Malaysia located in tropical region, this country will receive more sunlight throughout the year, therefore amount of chemical active compounds in medicinal plant in Malaysia should be more abundant. Furthermore not many researches have been done to study amount of active chemical compounds in this local species.

Vitamin C is a potent water-soluble antioxidant in human [7] and the best way to get enough vitamin C is through fruits and vegetable rather than taking supplements. Vitamin C has shown to be effective in treating more than 40 separate health concerns in either a primary role or supporting role. The four most noted functions of vitamin C affect are antioxidant activity, collagen synthesis, cardiovascular system and immune system [8]. Antioxidant is best known to prevent oxidative damage including reactive free radicals [9]. Recently, finding natural antioxidant has been a great interest due to the carcinogenic effect of synthetic antioxidant [10]. Thus this study aims to determine amount of vitamin C in local *Paederia foetida* as a preliminary work.

From literatures, many studies quantified amount of chemical compounds from the leaves, root and some used the whole plant of *Paederia foetida*, but no research has been reported to analyze amount of active compounds in mature leaves and old leaves of *Paederia foetida* independently. Therefore, in this work the mature leaves and old leaves were used.

2. MATERIALS AND METHODOLOGY

2.1. Materials

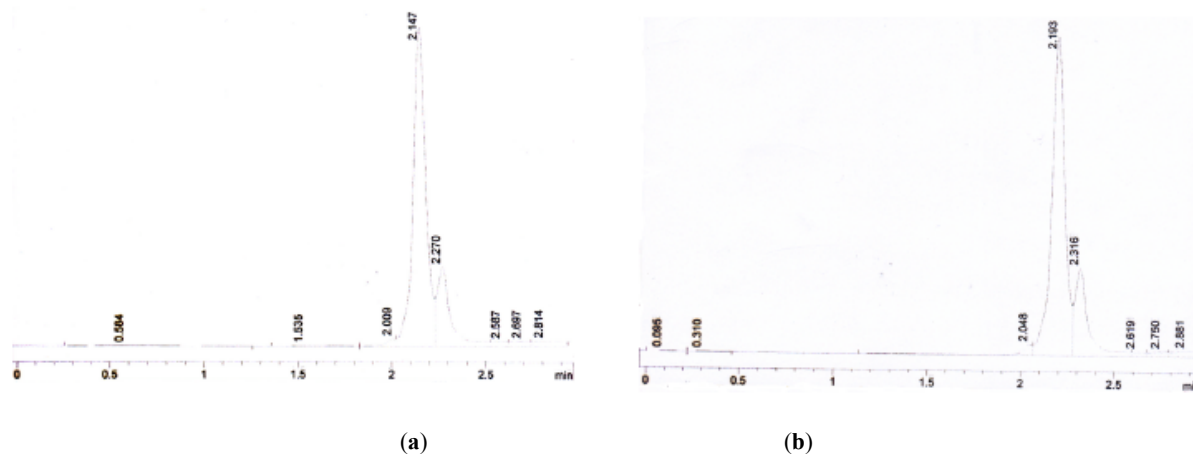
All the chemicals were analytical grade. Solvent for the extraction was purchased from Merck. Ascorbic acid standard was acquired from sigma.

Leaves of *Paederia foetida* were collected from Terengganu, Malaysia. In this study, *Paederia foetida* leaves were divided into two groups according to the leaves stage of maturity. The young leaves referred to the ones from the apex of the branch, with light green colour. The old leaves were mostly from the branch position close to the stem with darker green colour.

*Address correspondence to this author at the International Education College (INTEC), UiTM Campus Section 17, 40200 Shah Alam, Malaysia; E-mail: norha505@salam.uitm.edu.my

Table 1. Content of Vitamin C (AA) in *Paederia Foetida* Leaves Extract

	Young Leaves	Old Leaves
Vitamin C (AA), ppm	64	66

**Fig. (1).** Chromatograms for (a) young leaves and (b) old leaves of *Paederia foetida* leaves extract.

2.2. Extraction of Leaves

The extraction procedures were same as reported by reference [2]. Dried and powdered leaves of *Paederia foetida* (1 kg) were extracted by soaking the powder in ethanol for one day at room temperature. After filtration, the extracts were evaporated to dryness to yield the extract (50 g).

2.3. Analysis of Vitamin C

For the analysis of vitamin C, a C-18 column and a UV-Vis diode array detector set at 210 nm were used. The column temperature was 25 °C. The prepared extracts were introduced onto column through an auto sampler equipped with a sample loop (10 µL). A primary mobile phase consisting of 85% ethanol in distilled water was used. The flow rate was set up at 1.0 ml/min. Vitamin c (ascorbic acid) was used as the standard.

3. RESULTS AND DISCUSSION

3.1. Content of Vitamin C

Total content of vitamin C is the content of ascorbic acid (AA) with dehydroascorbic acid (DHAA). This preliminary work quantified content of vitamin C (AA) from *Paederia foetida* leaves because AA was always the predominant form of vitamin C [11]. The extracts from *Paederia foetida* leaves were prepared as discussed above and were analyzed for the determination of vitamin C (AA) using High Performance Liquid Chromatography. A four points of calibration curve were constructed in the range of 25 – 100 ppm of ascorbic acid standard solution. The calibration curve was linear over this range. Chromatograms showed peak for ascorbic acid appeared after two minutes and detection time was done for three minutes.

The amount of vitamin C (AA) in *Paederia foetida* leaves are shown in Table 1. The content of vitamin C (AA) in old leaves extract was slightly higher than young leaves.

The vitamin C (AA) in old leaves was found to be 66 ppm and young leaves was 64 ppm. Although the amount is not significantly higher, this may be due to the reduction of DHAA to AA [11] that will contribute to the higher amount of AA in old leaves. However, details study should be done to investigate the effect of leaves maturity to the amount of chemical compounds in *Paederia foetida* leaves. Commonly fruits contain high amount of vitamin C especially citrus fruits including some vegetables. However, green leaves are considered as a main source of vitamin C as well [12]. The results obtained show that local *Paederia foetida* have considerably high amount of vitamin C (AA), thus this plant can be considered as a good source of vitamin C.

As shown in Fig. (1), peak for vitamin C (AA) in young leaves extract eluted at 2.147 min and peak for old leaves extract appeared at 2.193 min. Chromatograms for the leaves extracts also showed several peaks appeared within three minutes elution. These peaks showed that other chemical compounds also present in the extract. Based on the retention time, these compounds can be water or fat soluble vitamin such as thiamine, nicotamide and pyridoxine hydrochloride [13] and phenolic compounds such as gallic acid and protocatechuic acid [14]. Phenolic compounds such as gallic acid, ellagic acid, quercetin, kaempferol, catechin, rutin, ferullic acid, syringic acid, caffeic acid and salicylic acid exhibit antioxidant activity [15]. Fruits or plants with higher total phenolic contents possess higher antioxidant capacities [16]. All these chemically active compounds have benefit to human health. Therefore further work should be conducted to study antioxidant potent of local *Paederia foetida*.

4. CONCLUSION

Vitamin C (AA) has been identified in *Paederia foetida* leaves extract in both young and old leaves. The leaves extract contain considerably high amount of vitamin C (AA). Thus, this preliminary work will be a superior reference for further investigation of local *Paederia foetida* for its potent

as a source of vitamin C as well as other biological active compounds.

CONFLICT OF INTEREST

The authors confirm that this article content has no conflicts of interest.

ACKNOWLEDGEMENT

Declared none.

REFERENCES

- [1] Alam, A.; Khan, M.; Hassan, M.; Ara, K.Z.G.; Jahan, R.; Rahmatullah, M. Clonal Propagation of *Paederia Foetida* L. *J. Biotechnol.*, **2008**, *136S*, S147-S169.
- [2] Afroz, S.; Alamgir, M.; Khan, M.T.H.; Jabbar, S.; Nahar, N.; Choudhuri, M.S.K. Antidiarrhoeal Activity of the Ethanol Extract of *Paederia Foetida* Linn. (Rubiaceae). *J. Ethnopharmacol.*, **2006**, *105*, 125-130.
- [3] Devendra, K. S; Vikas S; Nagendra S C; Dixit, V.K. Effect of Ethanolic Extract of *Paederia Foetida* Linn. Leaves on Sexual Behavior and Spermatogenesis in Male Rats. *J Men Health*, **2012**, *9*(4), 268-276.
- [4] Osman, H.; Rahim A.A.; Isa N.M.; Naemah M. Bakhir, N.M. Antioxidant Activity and Phenolic Content of *Paederia Foetida* and *Syzygium Aqueum*. *Molecules*, **2009**, *14*, 970-978.
- [5] Sristisri, U. Screening of Phytochemicals, Nutritional Status, Antioxidant and Antimicrobial Activity of *Paederia Foetida* Linn. From Different Localities of Assam, India. *J. Pharm. Res.*, **2013**, *7*(1), 139-141.
- [6] Muzitano, M.F.; Bergonzi, M.C.; De Melo, G.O.; Lage, C.L.S.; Bilia, A.R.; Vincieri, F.F.; Rossi-Bergmann, B.; Costa, S.S. Influence of Cultivation Conditions, Season of Collection and Extraction Method on The Content of Antileishmanial Flavonoids From *Kalanchoe Pinnata*. *J. Ethnopharmacol.*, **2011**, *133*, 132-137.
- [7] Padayatty, S. J.; Katz, A.; Wang, Y.; Eck, P.; Kwon, O.; Lee, J. H.; Chen, S.; Corpe, C.; Dutta, A.; Dutta, S. K.; Levine, M. Vitamin C as Antioxidant: Evaluation of its role in disease prevention. *J. Am. Coll. Nutr.*, **2003**, *22*, 18-35.
- [8] Juntilla, H.: Vitamin C Stops The Growth of Some Cancerous Tumors In Mice. **2009**, Available from: http://www.natural-news.com/026262_vitamin_c_cancer_antioxidant
- [9] Hernandez, Y.; Lobo, M. G.; Gonzalez, M.; Determination of vitamin C in Tropical Fruits: A Comparative Evaluation of Methods. *Food Chem.*, **2006**, *96*, 654-664.
- [10] Zheng, W.; Wang, S. Y.: Antioxidant Activity and Phenolic Compounds In Selected Herbs. *J. Agric. Food Chem.*, **2001**, *49*, 5165-5170.
- [11] Spinola, V.; Mendez, B.; JCamara, J.S.; Castilho, P.C. Effect of Time and Temperature on Vitamin C Stability In Horticultural Extracts: UHPLC-PDA vs Iodometric Titration As Analytical Methods. *Food Sci. Technol.*, **2013**, *50*, 489-495.
- [12] Sarma, H.; Sarma, A.; Sarma, C.M.: Traditional Knowledge of Weeds: A Study of Herbal Medicine and Vegetables Used By the Assamese People (India). *Herb. Pol.*, **2008**, *54* (2), 80-88.
- [13] Technocal Note 89: Determination of Water and Fat Soluble Vitamins By HPLC. **2010**. Available from: <http://www.dionex.com/en-us/webdocs/88784-TN89-HPLC-WaterFatSolubleVitamins>
- [14] Akbar, J.; Iqbal, S.; Batoool, F.; Karim, A.; Chan, K.W. Predicting Retention Time of Naturally Occurring Phenolic Compounds in Reversed-Phased Liquid Chromatography: A Qualitative Structure-Retention Relationship (QSRR) Approach. *Int. J. Mol. Sci.*, **2012**, *13*, 15387-154000.
- [15] Nantitanon, W.; Yotsawimonwat, S.; Okonogi, S. Factors Influencing Antioxidant Activities and Total Phenolic Content of Guava Leaf Extract. *Food Sci. Technol.*, **2010**, *43*, 1095-1103.
- [16] Petra, T; Barbara, C; Natasa, P. U; Helena, A. Studies of The Correlation Between Antioxidant Properties and the Total Phenolic Compounds of Different Oil Cake Extracts. *Ind. Crop. Prod.*, **2012**, *39*, 210-217.

Received: May 29, 2013

Revised: August 22, 2013

Accepted: September 04, 2013

© Rosli et al.; Licensee Bentham Open.

This is an open access article licensed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0/>), which permits unrestricted, non-commercial use, distribution and reproduction in any medium, provided the work is properly cited.