

Short Communication

PRELIMINARY STUDIES ON *ACALYPHA INDICA*: PROXIMATE ANALYSIS AND PHYTOCHEMICAL SCREENING

NURUL NADIA MOHD NAZRI¹, NORAZLANSHAH HAZALI¹⁺, MUHAMMAD IBRAHIM¹, MASHITA MASRI¹, MOHD KHAN AYOB²

¹Department of Nutrition Sciences, Kulliyah of Allied Health Sciences International Islamic University Malaysia, Kuantan, Pahang, Malaysia,

²School of Chemical Sciences and Food Technology, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, Bangi, Malaysia
Email: norazlanshahazali@gmail.com

Received: 08 Apr 2015 Revised and Accepted: 03 Feb 2016

ABSTRACT

Objective: This study aims to evaluate the proximate composition and phytochemicals content of *Acalypha indica*.

Methods: The dried samples of root, leaves, stem and whole plant were analysed for protein, total fat, ash, moisture, water activity and crude fibre according to guideline by Association of Official Analytical Chemist. The phytochemicals content were based on standard method.

Results: The proximate analysis showed that the leaves contain the highest moisture (9.49%), ash (12.83%) and protein (23.98%). The root contains the highest carbohydrate (76.33%), crude fibre (42.05%) and gross energy (1453.94 kJ) content. The root also showed the lowest total fat (0.54+0.17%) and water activity (0.51+0.00 A_w). Besides that, the secondary metabolite such as alkaloid was identified in dried whole plant while tannin was detected in dried leaves and dried whole plant. The triterpenes, steroid and flavonoids were a presence in all samples analysed.

Conclusion: The present of nutrition and phytochemicals support the traditional use of *Acalypha indica* as an alternative treatment for curing certain health conditions.

Keywords: *Acalypha indica*, Medicinal herbs, Proximate analysis, Phytochemicals

© 2016 The Authors. Published by Innovare Academic Sciences Pvt Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>)

Natural products have been extensively used globally since ages for treatment of various diseases. *Acalypha indica* is one of the medicinal herbs widely distributed in Malaysia. It is a weed that usually grows along the roadsides and gardens that have sandy soil. All parts of the plants have medicinal values such as the flower that contain flavonoids [1] as well as the leaves and twigs that contain acalyphamide [2]. The extract of dried leaves helps in dermal wound healing as it elevates the synthesis of collagen due to its antioxidant activity [3]. Other than that, the root of the plant has antihelminthic properties [4] while the whole plant extract possesses antiarthritic activity [5]. Even though it has been used traditionally in treating ailments but to date, limited scientific data has been revealed about this medicinal herb.

The herb was collected from Sungai Buloh, Selangor, Malaysia, washed thoroughly with distilled water and separated to the whole plant, leaf, stem and root. Then, all samples were dried at room temperature for a week. Every sample was ground using a grinder and kept in airtight container before further analysis. Later, each sample was analysed in triplicate for protein, total fat, ash, moisture and crude fiber according to a standard method based on standard guideline [6]. The dietary fiber was based on previous research [7]. Water activity equipment, AquaLab CX-2 (Decagon Device Inc., USA) was used to measure the water activity. The carbohydrate contents were determined by subtraction difference method [100-(protein+fat+moisture+ash)] [8]. The gross energy value was calculated as kcal/100g based on the formula as follows:

$$\text{Gross energy} = (\% \text{ carbohydrate} \times 4) + (\% \text{ crude fat} \times 9) + (\% \text{ crude protein} \times 4) [9].$$

The qualitative phytochemicals screening were carried out by observing different color reaction that reflects the presence of compounds [10]. The alkaloids, saponins, flavonoids, tannins, triterpenes and steroid, were tested according to the procedure stated in the book of "Kimia Hasil Semula Jadi dan Tumbuhan Ubatan" [11].

Leaves and the root of the plant have the most abundant composition of nutrient and chemical content. Among nutrients

found naturally in *Acalypha indica* are protein, ash, carbohydrate and fiber (table 1). Nutrients and bioactive compounds are richly available in herbs and possess therapeutic effect that can help to protect against diseases [9,12]. High ash content, especially in leaves, may become a source of inorganic minerals [13]. Water activity and moisture content are related to the susceptibility of food against microorganisms. The root of *Acalypha indica* has the lowest water activity and moisture, and it may contribute to a better storage and longer shelf life [9]. Moreover, the leaves showed the highest moisture content as moisture aid in stabilizing the plant by maintaining the protoplasmic content of the cells and make it perishable [14]. The current study revealed the crude fiber content of *Acalypha indica* leaves (8.97+0.02) was higher than the leaves crude fiber of *Acalypha racemosa* (7.20+0.03) but lower than *Acalypha hispida* (10.25+0.11) and *Acalypha marginata* (11.50+0.00) [15]. Crude fiber is a necessity in daily human nutrition as it reduce the risk of certain diseases including coronary heart diseases, diabetes, hypertension and various digestive disorders [14, 16]. *Acalypha indica* indicate the high value of carbohydrate in and agrees with the finding on other *Acalypha* species [15]. A study conducted on *Pennisetum purpureum* suggested that a relative proportion of certain nutrients can be elevated by dehydrating the plant [17]. Dried samples were prepared to be used in the current study, and the result showed a high value of protein especially in leaves of *Acalypha indica* (23.98+0.15). This value was higher than some of Euphorbiaceae species including *Euphorbia heterophylla* (5.85+0.46), *Euphorbia hirta* (12.00+0.06) [12] and *Chrozophora tinctoria* (20.00+0.00) [18].

The intensity of the reactions reflected the quantity of phytochemicals and recorded based on the number of positive signs where the most positive signs indicate a stronger reaction. The triterpenes and steroid were highly presence in the dried whole plant and dried leaves. The presence of tannins was detected in dried whole plant and leaves while alkaloids only present in the dried whole plant. Furthermore, flavonoids were a presence in all samples (table 2). Phytochemicals bioactive compounds are secondary plant products that have been related to the medicinal properties of diverse plants. Qualitative analysis conducted on

medicinal herbs found that these phytochemicals varied within fractions [19]. Several studies discovered the presence of alkaloids, saponin and steroids in *Acalypha indica* as well as other medicinal herbs in India [20,21]. Tannins have been reported in the aqueous extract of leaves of *Acalypha indica* which is in agreement with current study [22]. Tannins in *Acalypha indica* contribute to the protection of underlying tissue thus; it helps in wound healing [23].

Other study showed that tannins have anti-diarrheal, antioxidant and anti-microbes activities [13,24,25]. Flavonoids are a phenolic compound usually discovered in plants and exhibit antioxidants properties. The flavonoids in *Acalypha indica* has contributed to hepatoprotective activity against toxic drug [26]. Each part of the plant contains flavonoids and in agreement with results found by [27, 13]. It is also related to antimicrobial and antifungal activity [28].

Table 1: Proximate analysis of *Acalypha indica*

	Root	Stem	Leaves	Whole plant
Moisture (%)	7.20±0.01	8.43±0.01	9.49±0.03	7.66±0.01
Ash (%)	6.72±0.01	7.25±0.15	12.83±0.04	9.36±0.16
Protein (%)	5.42±0.12	7.39±0.88	23.98±0.15	11.10±0.49
Total fat (%)	0.54±0.17	0.59±0.10	2.59±0.03	1.09±0.08
Carbohydrate	80.13±0.31	76.33±0.27	51.10±0.25	69.90±0.73
Crude fibre (%)	42.05±0.51	35.32±0.37	8.97±0.20	32.01±0.10
Gross energy (kJ)	1453.94±2.97	1424.65±2.97	1356.00±0.00	1412.10±2.97
Total dietary fibre (% w/w)	64.24	66.74	36.17	52.01
Water activity (a _w)	0.51±0.00	0.54±0.01	0.59±0.01	0.52±0.01

Note: Values were the means±standard deviations of three replicates analysis

Table 2: Phytochemical screening of *Acalypha indica*

	Dried root	Dried stem	Dried leaves	Dried whole plant
Alkaloids	-	-	-	+
Saponins	-	-	-	-
Flavonoids	++	+	+	+
Tannins	-	-	+	+
Triterpenes	+	++	+++	+++
Steroid	+	++	+++	+++

Note: (-) = Not present, (+) = slightly present, (++) = moderately present, (+++) = highly present

CONCLUSION

In conclusion, this study indicates that the nutrients and phytochemicals in *Acalypha indica* may serve as a source of nutrition and supplement. It also provides supporting evidence regarding medicinal values of this herb thus can be an alternative treatment for certain diseases.

ACKNOWLEDGEMENT

We are thankful to the Kulliyah of Allied Health Sciences, International Islamic University Malaysia, Research Acculturation Collaborative Effort (RACE) Grant (project no: 12-004-0004) and Myra Incentive Research Grant Scheme (project no: 13-01-001-0005) for providing the laboratory facilities and supporting the work.

CONFLICT OF INTERESTS

We declared that we have no conflict of interest.

REFERENCES

- Nahrstedt A, Hungeling M, Petereit F. Flavonoids from *Acalypha indica*. *Fitoterapia* 2006;77:484-6.
- Deep M. *Ethnobotany: Journal of Society of Ethnobotanists*. Vol. 13-16. New Delhi; 2001.
- Ganeshkumar M, Ponrasu T, Krithika R, Iyappan K, Gayathri VS, Suguna L. Topical application of *Acalypha indica* accelerates rat cutaneous wound healing by up-regulating the expression of type I and III collagen. *J Ethnopharmacol* 2012;142:14-22.
- Chengaiyah B, Kumar K, Alagusundaram M, Sasikala C, Chetty C. *In vitro* anthelmintic activity of roots of *Acalypha indica* Linn. *Int J PharmTech Res* 2009;1:1499-502.
- Krishna VL, Chitra V, Reddy JS. Antiarthritic activity of the whole plant *Acalypha indica* on type II collagen-induced arthritis in Wistar rats. *Int J Pharm Pharm Sci* 2011;3:4-7.
- Association of Official Analytical Chemists. Vol. 2. Association of Official Analytical Chemists Inc.; 2003.
- Proskey L, Asp NG, Furda I, DeVries JW, Schweizer TF, Harland BF. Determination of total dietary fiber in foods and food products: collaborative study. *J Assoc Off Anal Chem* 1988;68:677-9.
- Aberoumand A. Investigations on the nutritional and medicinal potentials of an under exploited food plant *Alocasia indica*. *Food Biol* 2011;1:1-6.
- Nurhazni K, Darina I, Muhammad I, Nor A, Norazmir M, Khairul Anuar M, et al. Proximate composition and antioxidant activity of dried belimbing dayak (*Baccaurea angulata*) fruits. *Sains Malaysiana* 2013;42:129-34.
- Hardainiyah S, Nandy BC, Saxena R. Phytochemical investigation of fruit extract of *Elaeocarpus ganitrus*. *Int J Pharm Pharm Sci* 2015;7:415-8.
- Fasihuddin A, Hasmah R. Penyaringan fitokimia. kimia hasilan semula jadi dan tumbuhan ubatan, Kuala Lumpur: Dewan Bahasa dan Pustaka; 1993. p. 99-105.
- Abidemi O. Proximate composition and vitamin levels of seven medicinal plants. *Int J Engineering Sci Invention* 2013;2:47-50.
- Tadhani M, Subhash R. Preliminary studies on *Stevia rebaudiana* leaves: proximal composition, mineral analysis and phytochemical screening. *J Med Sci* 2006;6:321-6.
- Ihedioha J, Okoye C. Nutritional evaluation of *Mucuna flagellipes* leaves: an underutilized legume in Eastern Nigeria. *Am J Plant Nutrition Fertilization Technol* 2011;1:55-63.
- Iniaighe O, Malomo S, Adebayo J. Proximate composition and phytochemical constituents of leaves of some *Acalypha* species. *Pakistan J Nutr* 2009;8:256-8.
- Ikewuchi JC, Onyeike EN, Uwakwe A a, Ikewuchi CC. Effect of aqueous extract of the leaves of *Acalypha wilkesiana* "Godseffiana" Muell Arg (Euphorbiaceae) on the hematology, plasma biochemistry and ocular indices of oxidative stress in alloxan induced diabetic rats. *J Ethnopharmacol* 2011;137:1415-24. Doi: 10.1016/j.jep.2011.08.015. [Article in Press]
- Okaraonye C, Ikewuchi J. Nutritional and antinutritional components of *Pennisetum purpureum* (Schumach). *Pakistan J Nutr* 2009;8:32-4.

18. Dastagir G, Hussain F, Khattak K. Nutritional evaluation of plants of family Zygophyllaceae and Euphorbiaceae. Pak J Bot 2014;46:1703-7.
19. Noumedem JA, Tamokou JDD, Teke GN, Momo RC, Kuete V, Kuate JR. Phytochemical analysis, antimicrobial and radical-scavenging properties of *Acalypha manniana* leaves. Springerplus 2013;2:503.
20. Chitravadivu C, Manian S, Kalaichelvi K. Qualitative analysis of selected medicinal plants, Tamilnadu, India. Middle-East J Sci Res 2009;4:144-6.
21. Paindla P, Mamidala E. Phytochemical and chromatographic studies in the leaves extract of *Acalypha indica*. Online Int Interdisciplinary Res J 2014;4:175-82.
22. Selvamani S, Balamurugan S, Savitha G. Preliminary phytochemical screening and antibacterial activity of (*Acalypha indica* L). Int J Res Biol Sci 2013;3:161-4.
23. Madziga H. Phytochemical and elemental analysis of *Acalypha wilkesiana* leaf. J Am Sci 2010;6:510-4.
24. Selvan R, Mohideen A, Sheriff M, Azmathullah N. Phytochemical screening of *Acalypha indica* L. leaf extracts. Int J Appl Biol Pharm Technol 2012;3:158-61.
25. Bahari E-A, Zaaba NE, Haron N, Dasiman R, Amom Z. Antioxidant activity characterization, phytochemical screening, and proximate analysis of cermela hutan (*Phyllanthus gomphocarpus* Hook. F) roots and leaves. Med Sci Monitor Basic Res 2014;20:170-5.
26. Kumar SV, Kumar C, Vardhan A. Hepatoprotective activity of *Acalypha indica* Linn against thioacetamide-induced toxicity. Int J Pharm Pharm Sci 2013;5:3-6.
27. Mohan C, Dinakar S, Anand T. Phytochemical, GC-MS analysis and antibacterial activity of a medicinal plant *Acalypha indica*. Int J PharmTech Res 2012;4:1050-4.
28. Narwade V, Waghmare A, Vaidya A. Detection of flavonoids from *Acalypha indica* L. J Ecobiotechnol 2011;3:5-7.