

NUTRITIONAL AND PHYTOCHEMICAL SCREENING OF *RANUNCULUS SCELERATUS* L.

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ABSTRACT

The nutritional and phytochemical constituents of Ranunculus sceleratus L were investigated. The air dried aerial parts of Ranunculus sceleratus that is used in traditional medicine were analyzed for the proximate primary metabolites and phytochemical composition. The results obtained showed that, the plant has considerable levels of ash (8%), moisture (8%), crude protein (0.8%), crude fiber (26.8%), fats (2.5%) and carbohydrates (9.41%). Preliminary phytochemical screening of methanolic extract of R. sceleratus revealed the presence of various phytochemicals like sterols, terpenoids, alkaloids, saponins, tannins, phenolics, flavonoids and glycosides. The results obtained demonstrate the nutritional quality that could be provided by this plant to the consumers and the screened phytochemicals indicate the potential of R. sceleratus as a source of drugs.

Keywords: *Ranunculus sceleratus*, nutritional, primary metabolites.

INTRODUCTION

The medicinal importance of plants is closely related to their phytochemicals while the nutritional value is dictated by the proxy composition of primary metabolites. This is the reason why efforts have been done in many studies to elucidate their levels (Omoyeni *et al.*, 2012).

Phytochemicals are chemicals of plant origin that the plants produce to protect itself against diseases. Also recent research illustrated the importance of these phytochemicals in protecting humans against diseases (Argal *et al.*, 2006; Ahmed and Urooj, 2010).

Ranunculus sceleratus is a wild plant belonging to family *Ranunculaceae* and found nearly in all parts of Europe, Asia and North Africa (Aslam *et al.*, 2012). The infusion of the aerial parts of *R. sceleratus* is capable of promoting blood circulation by removing blood stasis, expelling cold, relieving swelling, and removing excessive heat from the liver and the gall bladder. It can also cure internal abscess, malaria, scrofula, snake or scorpion venom, and acute icteric hepatitis. The aerial part of *R. sceleratus* possesses anti-inflammatory and antimicrobial properties (Wang, 1995; Aslam *et al.*, 2012).

This research therefore aims at investigat-

ing both the nutritional and anti-nutritional components of *R. sceleratus* to justify its use as nutritional supplement and in ethnomedicine.

MATERIALS AND METHODS

Plant Materials:

The plant (*R. sceleratus*) used in this study was collected from Damietta district in Egypt during the period from 17-19 March, 2014. The aerial parts of the plant during vegetative stage were collected, cleaned, air dried and grounded into fine powder. The plant was identified and authenticated at Department of Botany, Faculty of Science, Mansoura University. A voucher specimen was deposited in the herbarium of the botany department.

Proximate determination of primary metabolites:

The moisture and ash content were determined according to Cakilcioglu and Khatun (2011), while crude fiber content was estimated according to AOAC (1990).

The metabolic variables including fat, protein and total soluble sugars content were estimated on dry weight moisture-free basis. Fat content was determined according to Arlington (1995), while protein content was estimated according to Bradford protein assay (Bradford, 1976). The total soluble sugars and total carbohydrates content were estimated according to the spectrophotometric method as described by Thayumanavam and Sadasivam (1984).

Plant extraction :

10 grams of the air dried aerial parts of *R. sceleratus* plant were extracted with 100 ml of

80% methanol using soxhlet apparatus. The methanolic extract obtained was evaporated using rotatory evaporator followed by lyophilizer for complete drying. The dry extract obtained was weighed and dissolved in DMSO for further analysis.

Phytochemical analysis :

Primary and secondary plant metabolites were screened. All the reagents used were from standard companies. Standard screening methods were used.

Preliminary phytochemical screening:

The systematic study of any crude drug includes a screening of both primary and secondary active metabolites present in the plant material used for extraction of this drug. Different qualitative tests were carried out for identifying the phytochemical profile of the used extract following the standard procedures described by Harborne (1984) and Kokate *et al.*, (1995).

Test for Sterols :

Salkowski test was used for identifying the presence of sterols in the tested extract. The tested extract was dissolved in chloroform, filtered and few drops of concentrated H_2SO_4 were added to the filtrate, shaken and left to settle. The appearance of red color in bottom layer indicates the presence of sterols.

Test for terpenoids :

Liebermann-Burchard test was used for identifying the presence of triterpenes in the tested extract. The tested extract was dissolved in chloroform, filtered and few drops of acetic anhydride were added to the filtrate, shaken well and left to settle. One ml of con-

concentrated H_2SO_4 was added on the side of the test tube. The appearance of deep red color indicates the presence of triterpenes.

Test for Saponins :

Foaming test was used for identifying the presence of saponins. Small amount of the tested extract was shaken with little quantity of water, if foam produced persists for 10 minutes; it indicates the presence of saponins.

Test for Glycosides :

Kellar Kiliani test was used for identifying the presence of glycosides. The tested extract was dissolved in glacial acetic acid, cooled, 2 drops of ferric chloride solution was added and then all contents were transferred to test tube containing 2 ml of sulphuric acid. Appearance of reddish brown color ring at the junction of two layers indicates the presence of glycosides.

Test for Alkaloids:

The tested extract was basified with ammonia, extracted with chloroform and the chloroform solution was acidified with dilute hydrochloric acid. The acid layer was used for testing the alkaloids.

Dragendorff's reagent (Potassium Bismuth Iodide) was used for identifying the presence of alkaloids: The acid layer was treated with few drops of Dragendorff's reagent. Formation of reddish brown precipitate indicates the presence of alkaloids.

Test for Tannins:

Vanillin hydrochloric acid test was used for identifying the presence of tannins. 1-2 ml of Vanillin hydrochloride reagent was added to a

little amount of the tested extract. The formation of pink to red color indicates the presence of tannins.

Test for Flavonoids:

Ferric chloride test was used for identifying the presence of flavonoids. Few drops of neutral ferric chloride solution were added to little quantity of the tested extract. Formation of blackish green color indicates the presence of flavonoids.

RESULTS AND DISCUSSION

Determination of primary metabolites:

Primary metabolites are of importance for the plants growth, development and reproduction. They act as precursors for pharmacologically active metabolites (Sagwan *et al.*, 2010). Proximate primary metabolites composition (ash, moisture, fibers, proteins, lipids, total soluble sugars and total carbohydrates content in the air dried aerial parts of the investigated *R. sceleratus* plant were quantified and the obtained results are summarized in table1.

A low moisture content of 8% was observed which could be taken as an indication that it is not liable to microbial spoilage. The crude protein value of 0.8% shows that the plant is a good source of protein. The crude fat content of 3% indicated that this plant could be a good source of oil. The fibers content was high 26.8%. Okon *et al.*, (1983), reported that a diet low in fiber is undesirable and could cause constipation, hence many diets are associated with disease of colon like piles, appendicitis and cancer. Conversely, nutritionally, this is of high benefits since it had been reported that food fiber aids absorption of

trace elements in the gut and reduce absorption of cholesterol.

The high content of carbohydrate (9.41%) in *R. sceleratus* shows that it is a good source of energy and also needed for efficient oxidation of fats (Omoyeni and Adeyeye, 2009). This is beneficial since carbohydrate constitutes a major class of naturally occurring organic compounds that are es-

sential for the maintenance of plant and animal life and also provide raw materials for many industries (Ebun-Oluwa and Alade, 2007).

The preliminary phytochemical screening of methanolic *R. sceleratus* extract showed presence of alkaloids, tannins, phenolics, flavonoids, glycosides, saponins and terpenoids and absence of resins (Table 2).

Table (1) : Proximate composition of *Ranunculus sceleratus* primary metabolites.

Parameter	<i>R. sceleratus</i>
Moisture %	8
Ash%	8
Fibers%	26.8
Crude Fat Content%%	2.5
Protein content (g bovine serum albumin equivalent/100gm dried plant material)	0.8
Total soluble sugar (g glucose equivalent /100g dried plant material)	1.67
Total carbohydrates %	9.41

Table (2) : phytochemical screening of methanolic *Ranunculus sceleratus* extract.

Phytochemical components	Results
Terpenoids	+
Tannins	++
Flavonoids	++
Saponins	+
Alkaloids	++
Glycosides	+++
Phenolic glycosides	++
Resins	-

Herbal extract contain pharmacologically active phytochemicals that can be valuable therapeutically. The protective effect of fruits and vegetables has been attributed to the phytochemicals, which are non-nutrient plant compounds.

It has been reported in the literature that *Ranunculus* species have the ability to synthesize certain active metabolites like phenolic acids (Noor *et al.*, 2006), flavonoids (Prieto *et al.*, 2004; Kaya *et al.*, 2010), alkaloids (Kaya *et al.*, 2010; Zhang *et al.*, 2007), triterpene saponins (Marston *et al.*, 2006; Wegner *et al.*, 2000), fatty acids and organic acids (Liang *et al.*, 2008; Chen *et al.*, 2006) and essential oils (Terzioğlu *et al.*, 2008) that are potentially helpful for human in protection against chronic diseases.

The identified phytochemicals have been found to possess a wide range of activities that may help in protection against many chronic diseases. For instant, glycosides, saponins, flavonoids, tannins and alkaloids have hypoglycemic activities; anti-inflammatory activities (Augusti and Cherian, 2008). Saponins possess hypocholesterolemic and antidiabetic properties (Rupasinghe *et al.*, 2003).

The terpenoids have also been shown to decrease blood sugar level in animal studies. Steroids, triterpenoids and saponins showed the analgesic properties and central nervous system activities (Argal and Pathak, 2006; Mandal *et al.*, 2009; Shaikh *et al.*, 2010).

CONCLUSION

Secondary metabolites like flavonoids, alkaloids, tannins, steroids, phenols are well

known to have pharmacological and antimicrobial activity against pathogens (Ghosh *et al.*, 2010). In our preliminary phytochemical screening, we found that the Methanolic Extract of *Ranunculus sceleratus* possess sterols, flavonoids, terpenes, alkaloids, saponins, glycosides, and tannins in addition to its rich primary metabolites profile and that suggests that aerial parts of this plant may possess anti-inflammatory, analgesic, anti-diarrhoeal, antimicrobial, antioxidant, immune-modulatory, anthelmintic, antitumor and insecticidal activities. However further studies are needed to be done for characterization of the chemical structure and assessing of the biological activity of the extracts from this plant.

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الملخص العربي

دراسة القيمة الغذائية والمحتوى الكيميائي لنبات الحوذان *Ranunculus sceleratus* L

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تمت دراسة محتوى الأجزاء الهوائية لنبات *Ranunculus sceleratus* L المستخدم في الطب الشعبي من المكونات ذات القيمة الغذائية والمكونات الكيميائية ذات القيمة الصيدلانية.

وقد تم تعيين محتوى النبات من مركبات الأيض الأولية ذات القيمة الغذائية. وقد وجد أن نسبة كل من الرماد والرطوبة كانت ٨٪ بينما كانت نسبة الألياف ٢٦,٨٪ والبروتينات ٠,٨٪ والدهون ٢,٥٪ وكانت نسبة السكريات الكلية ٩,٤١٪ ودراسة المحتوى الكيميائي من مركبات الأيض الثانوية ذات القيمة الطبية وجد أن المستخلص الميثانولي لذلك النبات يحتوى على العديد من المركبات ذات الأهمية الطبية وهي التربينات والقلويدات والصابونينات والتانينات بالإضافة إلى المواد الفينولية والفلافونيدات والجلوكوسيدات. وقد أوضحت النتائج مدى القيمة الغذائية لهذا النبات بالإضافة لأهميته كمصدر للدواء نتيجة وجود المركبات النشطة ذات القيمة الطبية به.

JOESE 5

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