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Full Length Research Paper

Evaluation of the chemical composition and element analysis of *Urtica dioca*

Ahmed A. Abdeltawab[1], Zain Ullah[2], [3], Abdulaziz M. Al-Othman[4], Riaz Ullah[5,6], Iqbal Hussain[8], Shabir Ahmad[8] and Muhammad Talha[7]

[1]Department of Chemistry, College of Science, King Saud University, Riyadh 11451, Saudi Arabia.
[2]Department of Chemistry, Gomal University, Dera Ismail Khan, Pakistan.
[3]Diabetis and Nutritional Sciences Division, King's College London.
[4]Department of Community Health Sciences, College of Applied Medical Science, King Saud University, Riyadh 11433, Saudi Arabia.
[5]Department of Chemistry, GDC Ara Khel Jawaki FR Kohat KPK, Pakistan.
[6]Department of Chemical Engineering, College of Engineering, King Saud University, P. O. Box 800, Riyadh 11421, Kingdom of Saudi Arabia.
[7]College of Science Research Centre, King Saud University, P. O. Box 2455, Riyadh 11451, Saudi Arabia.
[8]Department of Chemistry, Kohat University of Science and Technology, KPK Pakistan.

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This study was conducted to evaluate the chemical composition and elemental analysis of ethyl acetate crude fraction of *Urtica dioca*. The result obtained shows that all bioactive constituents are present in this fraction of plant. The ethyl acetate fraction was screened which comprises flavonoid (1.88 mg/100 g), alkaloid (1.32 mg/100 g), phenol (0.09 mg/100 g), saponin (1.64 mg/100 g) and tannins (0.8 mg/100 g). Small amount of elements Na, k, Ca, Mg, Zn, Fe and P are also present in this fraction of plant.

Key words: *Urtica dioca*, Urticaceae, chemical composition.

INTRODUCTION

The world is lush with medicinal plants. Nowadays, medicinal plants are the great center of attention than before as they have the potential to give benefits to mankind, particularly, in the field of medicine and pharmacology. Phytochemical constituents are the main source of medicinal power of these plants. These are the phytochemicals which cause definite pharmacological actions on human body (Akinmoladun et al., 2007). These are natural products that occur in medicinal plants, vegetables and fruits that work with nutrients and fibers to act against ailments. Phytochemicals are classified into two main categories (Krishnaiah et al., 2009), namely, primary constituents which includes amino acids, (Lemos et al., 1990), anticonstipative (Ferdous et al., 1992), spasmolytic (Sontos et al., 1998), antiplasmodial (Benoitvical et al., 2001), and antioxidant (Vardar-unlu et common sugars, proteins, chlorophyll, etc., and secondary constituents consisting of alkaloids, essential oils, flavonoids, tannins, terpenoids, saponins, phenolic compounds, etc (Krishnaiah et al., 2007; Edeoga et al., 2005).

Greater part of phytochemicals have been identified to put up with precious therapeutic activities, such as insecticidals (Kambu et al., 1982), antimicrobial al., 2003) activities. The medicinal importance of plants, thus, is due to the respective phytochemical constituents they contain. Infectious diseases are the foremost reasons of death throughout the world (Demissew and Dagne, 2001). *Urtica dioca* (Urticaceae) are medicinally very important plants and are used extensively in pharmaceutical formulations and are also used by local practitioners for a variety of human diseases (Iqbal et al., 2011).

Hence, the plan of this study was to find out the phytochemical constituents and to determine their uses in traditional medicines.

*Corresponding author. E-mail: zain_kust@yahoo.com.

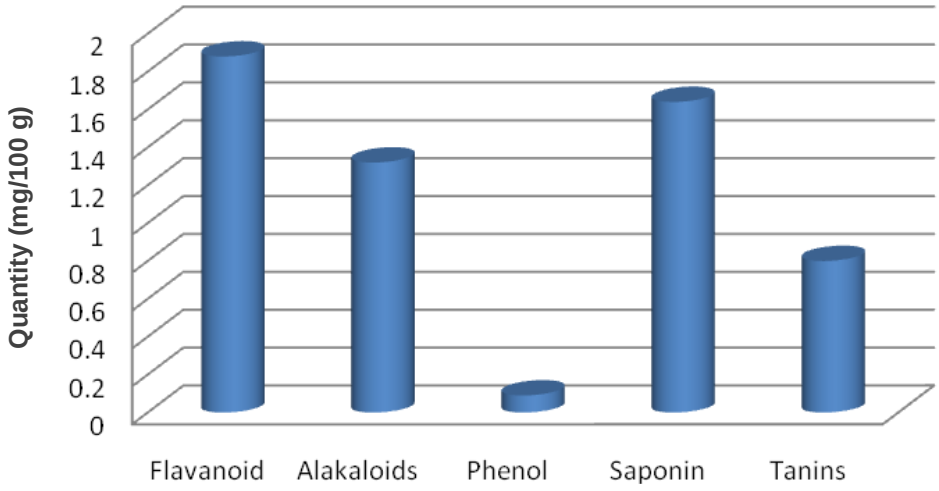

Figure 1. Phytochemical composition of *U. dioca*.

MATERIALS AND METHODS

Preparation of sample

The aqueous extract of each sample was prepared by soaking 10 g of powdered samples in 200 ml of distilled water for 12 h. The extract was filtered through Wattman filter paper. The phytochemicals in each sample was determined quantitatively (Krishnaiah et al., 2009; Mattila and Hellström, 2007).

Quantitative analysis

Alkaloids

Plant sample of 5 g was prepared in a beaker and 200 ml of 10% CH_3CO_2H in C_2H_5OH is added to the plant sample. The mixture is covered and allowed to stand for 4 h. The mixture was then filtered and the extract is allowed to become concentrated in a water bath until it reaches ¼ of the original volume. Concentrated ammonium hydroxide was added until the precipitation is complete. The whole solution is allowed to settle and the precipitate is collected and washed with dilute ammonium hydroxide, and was then filtered. The residue is alkaloid, which is then dried and weighed (Harborne, 1973).

Flavonoids

Plant sample of 10 g was extracted with 100 ml of 80% aqueous methanol at room temperature. The whole solution was filtered and the filtrate was then transferred into a water bath. The solution was evaporated to dryness and weighed to a constant weight (Williamson and Manach, 2005; Mattila and Hellström, 2007).

Saponins

Ground plant samples of 20 g each were put into a conical flask and 100 ml of 20% ethanol was added to the plant sample. The said sample is heated over a water bath for 4 h at about 55°C with continuous stirring. The extracted mixture is then filtered and the residue is then re-extracted again with 200 ml of 20% ethanol. The collective residues are reduced to 40 ml over a hot water bath. The concentrate is then transferred to a separating funnel and 20 ml of diethyl ether is added to the plant extract and was shaken vigorously. The aqueous layer was recovered while the organic layer was discarded and the process of purification was repeated. n-Butanol of 60 ml was added, and combined n-Butanol extract were washed twice with 10 ml of 5% sodium chloride. The remaining solution was then heated on water bath and after evaporation; the samples were dried in oven to a constant weight.

Tannins

500 mg of plant sample was weighed and transferred to 50 ml flask. Then added 50 ml of distilled water and stirred for 1 h. Sample was filtered into a 50 ml volumetric flask and the volume was made up to the mark. 5 ml of the filtered sample was pipette into test tube and then mixed with 2 ml of 0.1 M ferric chloride. The absorbance was measured using spectrophotometer at 395 nm wavelength within 10 min (Tyler, 1994; Harborne, 1973).

Phenols

Plants sample was boiled for 15 min with 50 ml of $(CH_3CH_2)_2O$. 5 ml of the sample was pipette into 50 ml flask, and 10 ml of distilled water was added. Then 2 ml of NH_4OH solution and 5 ml of concentrated CH_3 $(CH_2)_3CH_2OH$ was added to the mixture. The sample was made up to the mark and left to react for 30 min for color development and measured for 505 nm wave length using a spectrophotometer (Tyler, 1994; Harborne, 1973).

Elemental analysis

The major element comprising Na, k, Ca, Mg, Zn, Fe and Mn were determined according to the method of Shahidi et al. (1999).

RESULTS AND DISCUSSION

The chemical composition of ethyl acetate crude fraction

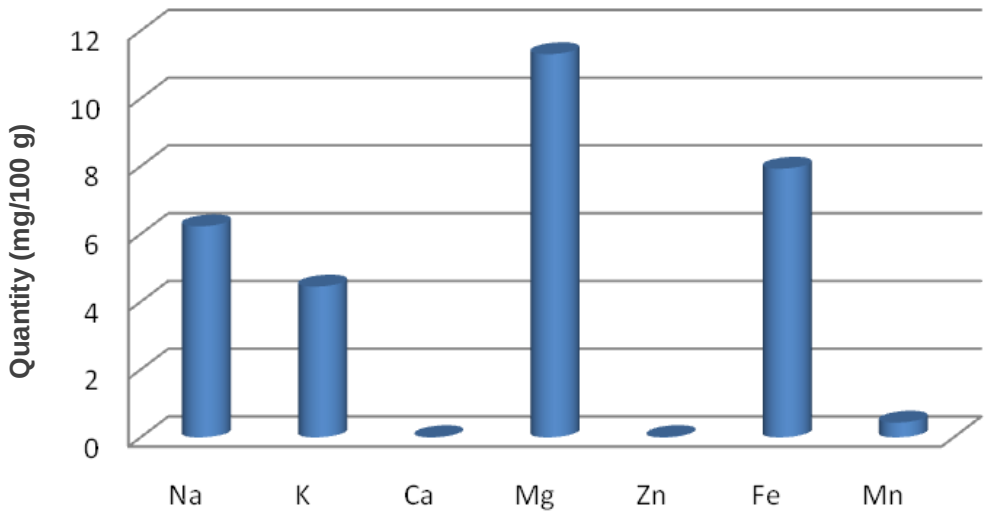

Figure 2. Elemental composition of *U. dioca*.

Table 1. Phytochemical composition of *U. dioca*.

Phytochemical	Quantity (mg/100 g)
Flavanoid	1.88
Alkaloids	1.32
Phenol	0.09
Saponin	1.64
Tannins	0.8

Table 2. Elemental composition of *U. dioca*.

Element	Quantity (mg/100 g)
Na	6.231 ± 0.2
K	4.453 ± 0.2
Ca	0.008 ± 0.2
Mg	11.312 ± 0.2
Zn	0.012 ± 0.2
Fe	7.932 ± 0.2
Mn	0.437 ± 0.2

of *U. dioca* showed the higher percentage of favanoids 1.88 mg/100 mg, then followed by sapnonis 1.64 mg. The amount of alkaloid that resulted is 1.32 mg. Very less amount of phenol and tanins were found (Figure 1 and Table 1). However, these result showed that *U. dioca* is a rich source for flavanoid and alkaloid. It need to be further subjected for isolation and purification of natural product, but concentration should be given to flavonid and alkaloids. Elemental analysis of the whole plant crude extract showed that it consist of higher amount of Fe 7.932±0.2, followed by Na 6.231±0.2, while very less amount of Ca, Zn, and Mn were found in these species (Table 2 and Figure 2).

The presence of phenolic compounds in the plants indicates that these plants may be anti-microbial agent (Ofokansi et al., 2005). Pure isolated alkaloids and their synthetic derivatives are used as basic medicinal agents for their analgesic, antispasmodic and bactericidal effects. They exhibit marked physiological activity when administered to animals. Flavonoids, on the other hand, are potent water-soluble antioxidants and free radical scavengers, which prevent oxidative cell damage, and have strong anticancer activity. Flavonoids in intestinal tract lower the risk of heart disease. As antioxidants, flavonoids from these plants provide anti-inflammatory activity (Okwu and Josiah, 2006). *Urtica dioca* is a rich source of phytochemicals, minerals and can be a used as a potential source of useful drugs. This study provoke researcher to work on the ethyacetae fraction of this plant for isolation of bio active pure compounds: flavanoids, triterpene, saponin, alkaloid and tannins. These are important natural product and can be used in formulation of differend drugs. Tannins are basically use for the treatment of inflammation, leucorrhoea, gonorrhea, burn, piles, diarrhea and as antidote in the treatment of alcaloidal poisoning (Buzzini et al., 2008). They are also used for tannin of animal hides to convert them to leather. Pharmacological activities have been reported about saponins such as antibiotic, antifungal, antiviral, hepatoprotective anti-inflammatory and anti-ulcer (Oakenfull, 1986; Zhang, 2001). The use of alkaloid contains plants as dyes, spices, drugs or poisons can be traced back almost to the beginning of civilization (Roberts and Wink, 1998).

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REFERENCES

Akinmoladun AC, Ibukun EO, Afor E, Obuotor EM, Farombi EO (2007). Pytochemical constituents and antioxidant activity of extract from the leaves of the *Ocimum graticcimum*. Sci. Res. Essay, 2: 163-166.

Benoitvical F, Valentin A, Mallic M, bassierc JM (2001). Antiplasmodial activity of Colchlospermum planchonii and C. tinctorium tubercle essential oils. J. Essent. Oil Res., 13: 65-67.

Buzzini P, Arapitsas P, Goretti M, Brand E, Turchetti B, Pinelli P, Leri F, Romani A (2008). Antimicrobial and antiviral activity of hydrolysable tannins Mini. Rev. Med. Chem., 8: 1179-1178.

Bylka W, Szaufer M, Matalwaska I (2004). Antimicrobial activity of isocytisoside and of Aquilegia valgaris L. Lett. Appl. Micro., 39: 93-97.

Demissew S, Dagne E (2001). Basic and Applied Research on Medicinal Plants of Ethiopia, In: Proceedings of National Workshop on Conservation and Sustainable Use of Medicinal Plants in Ethiopia, Addis Ababa, p. 29.

Edeoga HO, Okwu D, Mbaebie BO (2005). Phytochemical constituents of some Nigerian Medicinal plants. Afr. J. Biotechnol., 4(7): 685-688.

Ferdous AJ, Islam SM, Ahsan M, Hassan CM, Ahmad ZV (1992). In vitro antibacterial activity of the volatile oil of Nigella sativa seeds against multiple drug-resistant isolates of Shigella spp. and isolates of Vibrio cholerae and *Escherichia coli*: Phytother. Res., 6: 137-140,

Harborne JB (1973). Phytochemical methods, London Chapman and Hall, Ltd, pp. 49-88.

Iqbal H, Moneeb URK, Riazullah, Zia M, Naeem K, Farhat AK, Zahoor U, Sajjad H (2011). Phytochemicals screening and antimicrobial activities of selected medicinal plants of Khyberpakhtunkhwa Pakistan. Afr. J. Pharm. Pharmacol., 5(6): 746-750.

Kambu K, Di Phenzu, N Coune C, Wauter JN, Angenot L (1982). Plants Med. Phytother., p. 34.

Krishnaiah D, Devi T, Bono A, Sarbatly R (2009). Studies on phytochemical constituents of six Malaysian medicinal plants. J. Med. Plants Res., 3(2): 67-72.

Krishnaiah D, Sarbatly R, Bono A (2007). Phytochemical antioxidants for health and medicine – A move towards nature. Biotechnol. Mol. Biol, Rev., 1(4): 097-104.

Lemos TLG, Matos FJA, Alencar JW, Crareiro AA, Clark AM, Chesnary JD (1990). Antimicrobial activity of essential oils of Brazilian plants: Phytopther. Res., 4: 82-84.

Lewis WH, Elvin-Lweis PF (2003). Medical botany: Plants affecting human health. 2 editions John Wiley & Sons, Washington.

Mattila P, Hellström J (2007). Phenolic acids in potatoes, vegetables, and some of their products. J. Food Compost. Anal., 20: 152-60.

Oakenfull DG (1986). Aggregation of bile acids and saponins in aqueous solution, Austr. J. Chem., 39 1671-1683.

Ofokansi KC, Esimone CO, Anele CK (2005). Evaluation of the in Vitro combined anti bacterial effects of the leaf extracts of Bryophyllum pinnatum (Fam: crassulaceae) and Ocimum gratissium (Fam: Labiate). Plant Prod. Res. J., 9: 23-27.

Okwu DE, Josiah C (2006). Evaluation of the chemical composition of two Nigerian medicinal plants, Afr. J. Biotechnol., 5(4): 357-361.

Roberts MF, Wink M (1998). Alkaloids: Biochemistry. Ecology and Medicinal Applications. Plenum Press, Wew York. Sontos FA, Rao VSN, silveria ER (1998). Investigations on the antinociceptive effect of Psidium guajava leaf essential oil and its major constituents. Phytother. Res., 12: 24-27.

Taiz L, Ziegler E (2006). Plant Physiology. 4th edn, ch. Sinauer Associates, Publishers, Massamchusetts, 13: 315-344.

Tyler V (1994). Phytomedicines in Western Europe: their potential impact on herbal medicine in the United States. Herbalgram, 30: 24-30 .

Vardar-unlu G, Cadan F, Sokmen A (2003). Deferera, Polissiou, M. Sokmen, M. Donmez, E and tap bektas, J. Agric. Food. Chem., pp. 51-63.

Williamson G, Manach C (2005). Bioavailability and bioefficacy of polyphenols in humans. II. Review of 93 intervention studies. Am. J. Clin. Nutr., 81(1): 243-255.

Zhang YW, Due DQ, Zhang L, Chen YJ, Yao XS (2001). Effects of Ginsenosides from Panax ginseng on cell-to-cell communication function mediated by gap junctions, Plants Med., 67: 417-422.

Shahidi F, Chavan UD, Mckenzie DB (1999). Chemical Composition of Beach pea (*Lathyrus maritimus* L). Plant Parts Food Chem., 64: 39-44.