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Preliminary Phytochemical Screening and Antioxidant Activity of *Bergenia caliata*

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Abstract: *Bergenia caliata* is widely used is folk medicines for treatment of fevers, diarrhea and pulmonary affection. The root of *Bergenia caliata* has a high reputation in indigenous systems of medicine for dissolving stones of kidneys. Phytochemical screening is an important step for the isolation of biological active chemical constituents. The phytochemical screening revealed the presence of different classes of secondary metabolites steroid, terpenoids, saponins, flavonides and anthraquinones. The crude water extract showed the presence of steroid, flavonides and tannins. The crude MeOH and chloroform extract showed the presence of steroid, terpenoids, saponins, flavonides and anthraquinone. The n-hexane extract indicated the presence of steroids and steroids only. The extracts of *Bergenia caliata* were studied for their antioxidant capacity using DPPH radical scavenging assay. All fractions were subjected to DPPH radical scavenging assay using different concentrations. The DPPH radical scavenging assay showed that n-hexane, chloroform and water extracts had scavenging activity.

Key word: Phytochemical Screening % *Bergenia caliata* % Saxifragaceae % Antioxidant Activity

INTRODUCTION

Bergenia ciliata Sternb, belongs to family Saxifragaceae [1], the genus *Bergenia* consists of about 6 species, found in the Himalayas and Central and East Asia. Two species of *Bergenia* are found in Pakistan namely *Bergenia ciliata* and *Bergenia stracheyi*. *Bergenia ciliata is* a herb tall up to 50 cm, found mostly in temperate Himalayan region [2]. The root of *Bergenia ciliata* has been regarded as demulcent and deobstruent relieves pain in ribs and chest due toexcessive cold hmours, acts as effective diuretic and emmenagogue. Get-rid of kidney's and bladder stone sand obstructions or toxic waste products, which remain in the alimentary canal and urinary excretory system. The infusion is considered to be more active than root. In asthma, bronchitis, pilepsy and spasmodic affections and to relieve flatulent colic in children. Root is effective to cambat chronic venereal disease [3]. *Bergenia ciliate* is used as a traditional medicine for the treatment of diarrhea, vomiting, fever, cough, pulmonary affections, menorrhagia and excessive uterine hemorrhage [4]. *Bergenia ciliate* leaves are traditionally reputed to be useful in the treatment of kidney stones in the remote areas of the Chota Shimla, Himachal Pradesh.

It is already reported that *B. ciliate* is helpful in dissolving kidney stones [5]. *B. ciliata* issued in traditional ayurvedic medicine for the treatment of several diseases in Nepal, India, Pakistan, Bhutan and some other countries. Thus the aim of the present study was to evaluate phytochemical and biological activities of the title plant.

MATERIALS AND METHODS

Plant Material: The plant material of *Bergenia caliata* was collected from Abbothabad Khyber Pakhtunkhwa province of Pakistan in December, 2011. The plant was identified by Abdur Rashid, Department of Botany, University of Peshawar, Peshawar, KPK, Pakistan and a

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Voucher specimen (Ab/ 0879) was deposited at the herbarium of Botany Department, University of Peshawar and Peshawar, Pakistan.

Extraction and Fractionation: Shade dried plant was powdered with Grinder machine. The powdered material was soaked in Water for 5 days. The extract was concentrated by putting the beaker contain water fraction on water both for 20 hours at 60°C which resulted water fraction. To obtain MeOH crude extract 30.066 gm of the powder material was soaked in MeOH for 7 days to obtain MeOH fraction. The extract was concentrated under vacuum at 59°C, using a rotavapor. The combined methanolic extract was concentrated under vacuum into thick syrup and fractionated into n-hexane, chloroform and ethyl acetate fractions. These crude extracts of water and MeOH were further subjected for preliminary phytochemical and antioxidant screening.

Antioxidant Activity: The hydrogen atom or electron donation abilities of the consequent extracts/fractions and standards were measured from the bleaching of the purple-colored methanol solution of 2, 2-diphenyl-1-picrylhydrazyl (DPPH.) Experiments were carried out according to the method of Blois [6]with a slight modification. Briefly, a 1mM solution of DPPH radical solution in methanol was prepared and 1ml of this solution was mixed with 3ml of sample solutions in ethanol (containing 20-100*u*g) and control (without sample). After 30 min, the absorbance was measured at 517 nm. Decreasing of the DPPH solution absorbance indicates an increase of the DPPH radical-scavenging activity. Scavenging of free radicals by DPPH as percent radical scavenging activities (%RSA) was calculated as follows:

$$\text{DPPH\%} = \frac{\text{Control abs} - \text{Extract abs}}{\text{Control}} \times 100$$

Phytochemical Screening: The chemical tests were performed on the water, n-hexane, chloroform, methanolic and extracts of *Bergenia caliata* followed the standard procedures [7, 8] for identification of the chemical constituents.

RESULTS AND DISCUSSION

Various fractions of *Bergenia caliata* whole plant namely n-hexane, chloroform, water and methanol fractions were obtained as discussed in the experimental section. The weight and percentage compositions are shown in Table 1. The methanol fraction contains a greater proportion by mass of the polar phytoconsitutants. The fractions of *Bergenia caliata* were screened for their phytochemicals and showed different phytochemicals. These extracts showed the presence of bioactive secondary metabolites constituents such as anthraquinone, steroids, flavonoids, saponins, tannins and terpenoids (Table 2).

Table 1: Total weight of crude extract and percentage yield of crude extract of *Bergenia caliata*

Solvent	Weight of crude extract	Percentage yield
n-Hexane extract (g)	0.84	10
Chloroform extract (g)	1.6	18
Water extract (g)	2.7	28
Methanol extract (g)	6.1	1.01

Table 2: Phytochemical screening of n-hexane, chloroform, water and methanolic crude extracts of *Bergenia caliata*

Chemical components	n-Hexane ext	Chloroform ext	Water ext	Methanol ext
Alkaloids	-	-	-	-
Steroids	+	+	+	
Terpenoids	-	+	+	+
Flavonoids	-	-	+	+
Anthraquinone	-	+	+	-
Tannins	-	+	+	+
Phlobatanins	-	-	-	-
Saponins	-	+	+	+
Glycoside	-	-	-	-
Reducing sugars	-	-	-	-

Key: – = absent, + = present, ext = extract. Key= – absent, + = present

Phytochemical screening of extracts revealed the presence of steroids, terpenoids, flavonoids, tannins, saponins. Terpenoids were present in chloroform, water and methanol extracts and steroids were present in chloroform, n-hexane fraction and crude water extract. While flavonoids were present in chloroform and methanol extract. Fractions obtained were also screened for the radical scavenging activity using DPPH. Different fractions showed activity at their extent (Fig. 1). Methanol and water extracts sowed highest scavenging activity while hexane found the least one. The activity of extracts and medicinal properties such as antioxidant activity of various extract and fractions may be attributed to the presence of bioactive compounds. The water and methanol extracts showed the presence of steroids, terpenoids and tannins and flavonoids. The presence of such components in these fractions may be responsible for antioxidant activity. The hexane fractions showed only steroids and therefore remain least active. The chloroform fraction showed the presence of all components except flavonoids and therefore found moderate active.

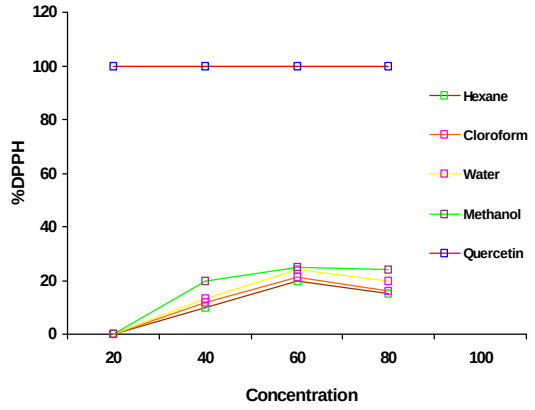

Fig. 1: DPPH radical scavenging activities of various extracts of *Bergenia caliata*

CONCLUSIONS

From the results achieved it can be concluded that *Bergenia caliata* contained interesting biological active phytoconsitutants which may be exhibited significance potential in folk medicine and can also bring potential natural products. The title plant also contained phenolic compounds which showed moderated antioxidant activity. After toxicological studies on some eventual harmful chemical constituents present in the extracts or their fractions, we suggest using this material as natural antioxidant for nutraceuticals.

REFERENCES

1. Anonymous, 1948. The Wealth of India. A Dictionary of Indian Raw Materials and Industrial Products Publication and Information Directorate, CSIR, New Delhi, I: 179.
2. Sanghamitra, S., T.M. Kuntal Maiti, J.R. Gayen, P. Basudeb, M. Pal and B.P. Saha, 2001. Antibacterial activity of Bergenia ciliata rhizome, Fitoterapia, 72: 550-552.
3. Usmanghani, K., A. Saeed and M.T. Alam, 1997. Indusynic Medicine, BCCT Press University of Karachi, pp: 122.
4. Biswas, K., 1955. Common medicinal plants of Darjeeling and Sikkim Himalayas. Calcutta, India, Herbarium, Indian Botanic Garden, pp: 54.
5. Islam, M., I.Azhar, U. Khan, M. Aslam, A. Ahmad and Shahbuddin, 2002. Bioactivity evaluation of Bergenia ciliata, Pakistan Journal Pharm Scince, 15(1): 15-33.
6. Blois, M.S., 1958. Antioxidant determinations by the use of a stable free radical. Nature, 181: 1199-1200.
7. Ghias, U., A. Rauf, T.U. Rehman and M. Qaisar, 2011. Phytochemical screening of pistacia chinensis var. integerrima. Middle-East Journal of Scientific Research, 7(5): 707-711.
8. Ghias, U., A. Rauf, M. Qaisar, T.U. Rehman, A. Latif and Mumtaz Ali, 2011. Preliminary phytochemical screening and antimicrobial activity of Hedera helix L, Middle East Journal of Scientific Research, 8(1): 198-202.