Phytochemical Analysis of *Bergenia ciliata* (Haw.) Sternb

Sabreena Rafi*, Azra N. Kamili, Bashir A. Ganai, Mohammad Yaseen Mir and Javid A. Parray

Centre of Research for Development, University of Kashmir, Srinagar-190006, J & K, India
***Corresponding author: sabreenjanwari@gmail.com**

Abstract
Herbal medicines are being used by about 80% of the world population primarily in the developing countries for primary health care. They have stood the test of time for their safety, efficacy, cultural acceptability and lesser side effects. The chemical constituents present in them are a part of the physiological functions of living flora and hence they are believed to have better compatibility with the human body. *Bergenia ciliata* is one of the important medicinal plants of Kashmir Himalaya. The plant is reported to contain numerous phytochemicals which show diverse medicinal properties. The bioactive compounds which were present in the methanolic extracts of rhizomes and leaves of *B. ciliata* include alkaloids, amino acids, carbohydrates, glycosides, phenolics, steroids and tannins. However, the extracts showed negative results for terpenoids, flavinoids and saponins.
Keywords: *Bergenia ciliate*, phytochemicals, Kashmir Himalaya

Introduction

Medicinal plants, since times immemorial, have been used virtually by all cultures as a source of medicine (Rafi *et al.*, 2016). Herbal medicines are being used by about 80% of the world population primarily in the developing countries for primary health care. They have stood the test of time for their safety, efficacy, cultural acceptability and lesser side effects. The chemical constituents present in them are a part of the physiological functions of living flora and hence they are believed to have better compatibility with the human body (Kamboj, 2000; Li and Wang 2014). *Bergenia ciliata* is one of the important medicinal plants of Kashmir Himalaya and is popularly known as 'Paashanbheda' (meaning 'to dissolve the stone'). In Indian systems of medicine, the rhizomes of *B. ciliata* have been used for centuries in herbal formulations for dissolution of kidney and bladder stones. It is distributed in the temperate Himalaya (from Kashmir to Nepal) from 2000 to 2700 m and is very common in Pakistan and Central and East Asia. In Kashmir Himalaya, *Bergenia ciliata* has been reported from Pir Panjal region and Kolahai mountains (Rafi *et al.*, 2016). The plant is reported to contain numerous plants which show diverse medicinal properties. The present work is an attempt to report the phytochemicals present in the plants collected from Zabarwan area of Kashmir Himalaya.

Materials and Methods

Selection/collection of plant material

The whole plants of *B. ciliata* were collected from Zabarwan Hills, Srinagar, Kashmir. The specimen was submitted to KASH herbarium under voucher specimen no. 2047-KASH herbarium, University of Kashmir, Srinagar.

Preparation of plant extract

The plants were shade dried at room temperature. The dried plant material was grinded to a coarse powdered form and extracted exhaustively with methanol at 45°C temperature in a Soxhlet extractor. The extracts were concentrated in Vacuum Rotary Evaporator and dried for further analysis.

Qualitative phytochemical analysis

Tannins

About 0.5 g of the dried powdered samples were boiled in 20 ml of water in a test tube and then filtered. A few drops of 0.1% ferric chloride was added and observed for brownish green or a blue- black coloration (Jigna and Sumitra, 2007).

Aminoacids

To the extract, 0.25% (w/v) ninhydrin reagent was added and boiled for few minutes. Formation of blue colour indicates the presence of amino acid (Mir *et al.*, 2015).

Saponins

About 2 g of the powdered sample was boiled in 20 ml of distilled water in a water bath and filtered. 10ml of the filtrate was mixed with 5 ml of distilled water and shaken vigorously for a stable persistent froth. The frothing was mixed constituency with 3 drops of olive oil and shaken vigorously, then observed for the formation of emulsion (Harborne, 1984).

Flavonoids

5 ml of dilute ammonia solution were added to a portion of the aqueous filtrate of each plant extract followed by addition of concentrated H_2SO_4. A yellow colouration observed in each extract indicated the presence of flavonoids (Harbrone, 1984).

Steroids

2 ml of acetic anhydride was added to 0.5 g methanolic extract of each sample with 2 ml H_2SO_4. The colour changed from violet to blue or green in some samples indicating the presence of steroids (Sofowara, 1993).

Glycosides (Liebermann's test)

Crude extract was mixed with each of 2ml of chloroform and 2ml of acetic acid. The mixture was cooled in ice. Carefully concentrated H_2SO_4 was added. A colour change from violet to blue to green indicated the presence of steroidal nucleus, i.e., glycone portion of glycoside (Yadav and Agarwala 2011).

Phenols (Ferric Chloride Test)

Extracts were treated with 3-4 drops of ferric chloride solution. Formation of bluish black colour indicates the presence of phenols (Tiwari *et al.*, 2011).

Carbohydrates (Molisch's Test)

Extracts were treated with 2 drops of alcoholic α-naphthol solution in a test tube. Formation of the violet ring at the junction indicates the presence of carbohydrates (Tiwar *et al.*, 2011).

Alkaloids (Dragendroff's Test)

Plant extracts were treated with dragendroff's reagent (solution of potassium bismuth iodide). Formation of red precipitate indicates the presence of alkaloids (Harborne, 1984).

Terpenoids

Crude extract was dissolved in 2ml of chloroform and evaporated to dryness. To this, 2ml of concentrated H2SO4 was added and heated for about 2 minutes. A grayish colour indicated the presence of terpenoids (Yadav and Agarwala 2011).

Results and Discussion

The phytochemical tests on the crude methanolic extract of rhizomes and leaves of *B. ciliata* were done. It was found that majority of the tests performed showed positive results. The bioactive compounds which were present included alkaloids, amino acids, carbohydrates, glycosides, phenolics, steroids and tannins. However, the extracts showed negative results for terpenoids, flavinoids and saponins (**Table 1**). As the present data is very basic and preliminary, therefore, the presence or absence of any phytoconstituent in the present study doesnot gives any precise information about the class of compounds present in the plant. Many authors have reported various phytocompounds from *Bergenia* species which include tannic acid, gallic acid, glucose, mucilage, wax, albumen and mineral salts, bergenin, catechin, arbutin which mostly belong to the class of compounds analysed in the present study (Chauhan *et al.*, 2013, Boros *et al.*, 2014, Arok *et al.*, 2012, Singh *et al.*, 2007).

Table 1: Phytochemical analysis of methanol exracts of *B. ciliate*

Bioactive compounds	**Rhizome**	**Leaf**
Alkaloids	+	+
Aminoacids	+	+
Carbohydrates	+	+
Phenolics	+	+
Tannins	+	+
Glycosides	+	+
Flavonoids	-	-
Saponins	-	-
Steroids	+	+
Terpenoids	-	-

Presence (+) and absence (-)

Conclusion

It can be concluded that both rhizomes and leaves of *Bergenia ciliata* are medicinally important. Much work regarding identification, isolation and purification of medicinally/comercially important compounds from *Bergenia* spp. has been done in the past. Further work to explore new compounds from this plant needs to be done.

Acknowledgement

The authors are thankful to DST for financial support and Director CORD for providing necessary facilities and cooperation during this research work.

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