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Phytochemical screening of some Bangladeshi medicinal plants

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Abstract

Alkaloids, flavonoids, saponins, starch, tannins, terpenoids and Vitamin-C distributions in four medicinal plants from different places of Bangladesh were assessed. Fifteen samples of four medicinal plants were investigated namely *Adhatodha vasica* Nees, *Andrographis peniculata* (Burm. f.) Nees, *Withania somnifera* (Linn.) Dunal and *Asparagus racemosus* Willd. These plants are locally known as Basak, Kalomegh, Ashagandha and Sotomuli. Leave samples contain alkaloids, terpenoids, saponins, tannins, flavonoids and Vitamin-C except starch. In root samples alkaloids, flavonoids, saponins and Vitamin-C were present except tannins. Terpenoids were present in sotomuli root, but absent in ashagandha root. Starch was absent in sotomuli root but present in ashagandha root. All of the plants were collected from different districts of Bangladesh.

Keywords: Medicinal plants; Herbal medicine; Phytochemical constituents

Introduction

In Bangladesh medicinal plants play a great role in human life. From ancient time medicinal plants have been used for various diseases. Medical plant is defined as one, which contains substance that can be used for therapeutic purposes and its precursor for the synthesis of useful drugs (Akinmoladun *et. al.,* 2007). These plants are also known as herbal medicine, the indigenous systems of medicine, namely Ayurvedic or Unani. This medicine is also called Folklore medicine because in rural area people use these plants frequently against so many diseases. Medicinal plants are termed as crude drugs of natural or biological origin by pharmacists to describe whole plant or plant parts having medicinal properties (Okwu, 1999, 2001; Okwu *et. al*., 2006). Many of these medicinal plants are used as food suppliment. The medicinal value of these plants lies in its bioactive constituents. *Adhatodha vasica, Andrographis peniculata, Withania somnifera* and *Asparagus racemosus* are using herbal industry for there herbal preparation and formulation. The most important bioactive constituents are alkaloids, tannins, flavonoids, and phenolic compounds (Hill, 1952).

Materials and methods

Collections and Identification of plant materials

The leaves, roots and stems of the plants were collected from six districts i.e. Sirajgonj, Bogra, Rangpur, Joypurhat, Gaibandha and Naogoan in Bangladesh. The samples were identified and supplied by the NGO's working in Bangladesh named Inter Corporation Ltd. The samples were also identified by the help of Bangladesh National Herbarium (BNH). Inter Corporation Ltd. supplied two kinds of samples: dry and fresh. Fresh samples were air dried in our laboratory. Then samples were ground into powder using cyclotec grinding machine except leaves.

Qualitative screening of phytochemicals

The qualitative chemical tests of powdered samples carried out by following standard procedures -Trease and Evans (1989), Harborne (1973), Mukherjee(2002), Sofowara (1993), Indian pharmacopias(1996).

Test of alkaloids

2g of powdered sample was extracted by warming for 2 min with 20 mL of 1% sulphuric acid in a 50 mL conical flask on a water bath with intermittent shaking and centrifuges. 0.1 mL extract was taken in a semi-micro tube, then add one drop of Meyer's reagent. It gives a cream precipitate with alkaloids.

Meyer's reagent

It is prepared by dissolving 1.36g of mercuric chloride in 20

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mL distilled water (A) and 5g of potassium iodide in 20 mL of distilled water (B). A and B were mixed together and the volume was adjusted to 100 mL with water.

Test for flavonoids / flavone

Three test methods were used to identify the presence of flavonoids in the plant sample (Sofowara, 1993; Harbrone, 1973).

Method- (I)

An aqueous filtrate of each plant extract was prepared. A portion of filtrate was taken in a test tube; 5 mL of dilute ammonia solution was added followed by addition of (few drops) concentrated sulphuric acid. A yellow coloration was observed/ appeared indicating the presence of flavonoids. The yellow coloration disappeared on further standing.

Method-(II)

Few drops of 1% Aluminium solution ($AlCl_3$) were added to a portion of each filtrate. A yellow coloration observed/appeared. It indicated the presence of flavonoids.

Method-(III)

A portion of sample heated with 10 mL of ethyl acetate over a steam bath for 3min and then the mixture was filtered. 4 mL of the filtrate was taken and shaken with 1 mL of dilute ammonia solution. A yellow coloration was observed/ appeared. It indicated a positive test of flavonoids.

Test for saponin

2g of the powdered sample was taken and boiled with 20 mL of distilled water in a water bath and then filtered. 10 mL filtrate was mixed with 5 mL of distilled water and shaken vigorously for a stable persistent froth. 3 drops of olive oil was added to this froth and shaken vigorously then observed for the formation of emulsion.

Test for Starch

1g of dry powder was taken in 50 mL of water, boiled for 1 minute and cooled; a thin and cloudy mucilage was produced which gave thick and more transparent mucilage.

0.05 mL of 0.01 M Iodine was added to10 mL of the mucilage; a dark blue color was produced which disappeared on heating and reappeared on cooling.

Test for tannins

About 0.5g of the dried powdered sample was taken in 20 mL water, boiled and then filtered. Few drops of 0.1% ferric Chloride was added and observed for brownish green or a blue-black coloration.

Test for terpenoids (Salkowski test)

5 mL of each extract was taken and mixed with 2 mL of chloroform and carefully 3 mL concentrated sulphuric acid (H_2SO_4) was added to form a layer. A reddish brown coloration of the inner face was formed. It indicated the presence of terpenoids.

Test for vitamin-C or ascorbic acid

Test method I

To 2 mL of 2% w/v solution, 2 mL of water, 0.1g of sodium bicarbonate and about 20 mg of ferrous sulphate were added, shaken and allowed to stand, a deep violet color was produced. 5 mL of 1M sulphuric acid was added then the color disappeared.

Test method II

Vitamin-C gave a violet color with ferric chloride.

Result and discussion

In present study was carried out on the plant samples revealed the presence of medicinally active constituents. Four plants commonly named as Basak, Kalomegh, Ashagandha and Sotomuli and scientific names- *Adhatoda vasica, Andrographis paniculata, Withania Sominifera, Asparagus racemosus* respectively. There were two types of sample dry and green/fresh; both were analyzed. In this 15 samples, 7 samples were dry and 8 samples were fresh. In 7 dry samples,4 from leaves, 2 from roots and 1 from whole plant and in 8 fresh samples 2 from fresh leaves, 4 from fresh roots and 2 from the whole plant.

Alkaloids, terpenoids, saponins, tannins, flavonoids and Vitamin-C were present in all plant leave samples but starch was absent in all leave samples. Alkaloids, flavonoids, saponins and Vitamin-C were present in all root samples but tannins were absent in all root samples. Terpenoids were present in sotomuli root but absent in ashagandha root. Starch was absent in sotomuli root but present in ashagandha root. Whereas in kalomegh whole plant saponins, tan-

Table I. The phytochemical characters of these medicinal plants are summarized in Table-I

Sl. no-	Lab ID	Description of Sample	Alkaloids	Flavonoids (Flavone)	Saponins	Starch	Tanins	Terpenoids	Vitamin-C
1.	A-4687	Basak (Dry leaves)Kumajpur, Nolka, Shahebgonjbajar, Raigonj, Sirajgonj.	+Ve	-Ve	+Ve	-Ve	+Ve	+Ve	+Ve
2	A-4688	Basak (Dry leaves) Digholkandi, Lahiripara, Bogra sadar, Bogra.	+Ve	+Ve	+Ve	-Ve	+Ve	+Ve	+Ve
3	A-4689	Basak (Dry leaves) Borohayatkha, Itakumari, Pirgacha, Rangpur.	+Ve	+Ve	+Ve	-Ve	+Ve	+Ve	+Ve
4	A-4770	Basak (Green leaves) Digholkandi, Lahiripara, Bogra sadar, Bogra.	+Ve	+Ve	+Ve	-Ve	+Ve	+Ve	+Ve
5	A-4771	Basak (Green leaves) Kumajpur, Nolka, Shahebgonjbajar, Raigonj, Sirajgonj.	+Ve	+Ve	+Ve	-Ve	+Ve	+Ve	+Ve
6	A-4776	Basak (Green leaves) Borohayatkha, Itakumari, Pirgacha, Rangpur.	+Ve	+Ve	+Ve	-Ve	+Ve	+Ve	+Ve
7	A-4695	Kalomegh (Dry) Nolchia, Nolka Raigonj, Sirajgonj.	+Ve	-Ve	+Ve	+Ve	+Ve	+Ve	+Ve
8	A-4696	Kalomegh (Fresh) Nolchia, Nolka Raigonj, Sirajgonj.	-Ve	-Ve	+Ve	-Ve	+Ve	+Ve	+Ve
9	A-4697	Kalomegh(Fresh) Patabuka, Panchbibi, Joypurhat.	-Ve	-Ve	+Ve	-Ve	+Ve	+Ve	+Ve
10	A-4698	Ashagandha (Dry) Nolchia, Nolka Raigonj, Sirajgonj.	+Ve	+Ve	+Ve	+Ve	+Ve	-Ve	+Ve
11	A-4825	Ashagandha (Dry) Bhabanipur, Shahpara, Gaibandha.	+Ve	+Ve	+Ve	+Ve	-Ve	-Ve	+Ve
12	A-4772	Satomuli(Fresh) Nolchia, Nolka, Raigonj, Sirajgonj.	+Ve	+Ve	-Ve	-Ve	-Ve	+Ve	+Ve
13	A-4773	Satomuli(Fresh) Mohipur, Panchbibi, Joypurhat.	+Ve	+Ve	+Ve	-Ve	-Ve	+Ve	+Ve
14	A-4774	Satomuli(Fresh root) Chandpara, Lahiripara, Bogra sadar, Bogra.	-Ve	+Ve	+Ve	-Ve	-Ve	+Ve	+Ve
15	A-4775	Satomuli(Fresh) Chalkathitha, Borsail, Sadar, Naogoan.	+Ve	+Ve	+Ve	-Ve	-Ve	+Ve	+Ve

nins, terpenoids, and Vitamin-C were present but flavonoids were absent. Kalomegh dry sample were positively responded with test for alkaloids and starch but fresh sample showed negative response to the test.

The therapeutic potentials of plant and animal origins have been used from ancient times by a simple process without the isolation of pure compounds (i,e. in the form of crude drugs or the galenicals prepared from those). The Pharmacological action of drug is determined by the nature of its constituents (Mukherjee, 2002), such as alkaloids, terpenoids, flavonoids, saponins, tannins etc. The identification of biologically active compounds is an essential requirement for quality control and dose determination of plant based drugs. For quality herbal drug to confirm the quantitative analysis of these active principles. But before quantitative analysis qualitative analysis is necessary.

The presence and the quantity of these active constituents differ with geographical location, condition of harvest, processing of drugs (sundry shade dry, oven dry or fresh), storage etc. The amount and nature of active constituents is not constant throughout the year. The age of plant is also one of considerable importance and governs not only the total quantity of the active constituents produced but also the relative proportions of the active principles (Evans, 2002 and Horonok, 1992). It has been reported that the content of Taxol in *Taxus baccata* leaves and extracts stored at room temperature for one year decreased by 30-40% and 70-80% respectively, while storage in a freezer and out of direct sunlight produced no adverse determination (Das *et al*., 1998).

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