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Phytochemical Screening of Some Pakistanian Medicinal Plants

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Abstract: Phytochemicals are the dependable sources for the treatment of different health problems. The present work revels phytochemical screening of twenty different medicinal plants, which were collected from the different regions of the province Khyber Pakhtunkhwa, Pakistan. In most of the samples all the phytochemicals i.e reducing suger, Anthra quinones, Terpenoids, Flavonoids, Saponins, tannins, alkaloids and cardiac glycosides were present. However in some samples the educing suger and the tannins were absent.

Key words: Medicinal plants · Reducing suger · Anthra quinones · Terpenoids · Flavonoids · Saponins · Tannins · Alkaloids and cardiac glycosides

INTRODUCTION

Plants which have one or more of its organs containing substances that can be used for the therapeutic purpose, are called medicinal plants [1]. A knowledge of the chemical constituents of plants is desirable, not only for the discovery of therapeutic agents, but also because such information may be of value in disclosing new sources of such economic materials as tannins, oils, gums, precursors for the synthesis of complex chemical substances, etc. In addition, the knowledge of the chemical constituents of plants would further be valuable in discovering the actual value of folkloric remedies [2].

Several phytochemical surveys have been published, including the random sampling approach which involved some plant accessions collected from all parts of the world. The major chemical substances of interest in these surveys have been the alkaloids and steroidal sapogenins (saponins), however, other diverse groups of naturally occurring phytochemicals such as flavonoids, tannins, unsaturated sterols, triterpenoids, essential oils, etc. have also been reported [3].

Alkaloids are very important in medicine and constitute most of the valuable drugs. They have physiological effect on animals [4]. Phenolic compounds are widely distributed in the plant kingdom. Presence of phenols is considered to be potentially toxic to the growth and development of pathogen [5]. Most of these chemical groups are expectorant and emulsifying agent. Tannins are fairly potent bioactive compounds found in medicinal plant frequently encountered in food products of plant parts that can be used for therapeutic purpose or which vegetable origin such as tea and many fruits. The are precursors for the synthesis of useful drugs [6] Alkaloids such as solasodine have been indicated as a starting material in the manufacturing of steroidal drugs [7]. The oxidation inhibiting activity of tannins have been known for a long time and it is assumed to be due to the presence of gallic and diagallic acids [8]. Flavonoids are 15-carbon compounds generally distributed throughout the plant kingdom [9]. Saponins are glycoside of both triterpenes and sterols and have been detected in over seventy families of plants [10]. Some isoflavones act as allelochemics widely used in insecticides. They might also play a role in plant disease resistance [11]. Plants offer a large range of natural compounds belonging to different molecular families which have various properties to humans.

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The main purpose of the present study was to evaluate the presence of various phytochemicals in twenty Pakistanian plants.

MATERIALS AND METHODS

Collection and Identification of Plant Materials: Twenty medicinal plants were collected from around Peshawar area while some were purchased from the market. These were identified by Mr. Shahid Khan, PCSIR Labs Complex Peshawar, Khyber Pakhtunkhwa, Pakistan.

Extraction of Plant Materials: The plant materials were air-dried at room temperature (26°C) for 2 weeks, after which it was grinded to a uniform powder. The ethanol extracts were prepared by soaking 100 g each of the dry powdered plant materials in 1 L of ethanol at room temperature for 48 h. The extracts were filtered separately after 48 h, first through a Whatmann filter paper No. 42 (125mm) and then through cotton wool. The extracts were concentrated using a rotary evaporator with the water bath set at 40°C. The percentage yield of extracts ranged from 7–19%w/w.

Phytochemical Screening: Phytochemical screening was perfomed using standard procedures [13-14].

Test for Reducing Sugars (Fehling's Test): The aqueous ethanol extract (0.5 g in 5 ml of water) was added to boiling Fehling's solution (A and B) in a test tube and the colour reaction was observed.

Test for Anthraquinones: 0.5 g of the extract was boiled with 10 ml of sulphuric acid (H_2SO_4) and filtered while hot. The filtrate was shaken with 5 ml of chloroform. The chloroform layer was pipette into another test tube and 1 ml of dilute ammonia was added. The resulting solution was observed for colour changes.

Test for Terpenoids (Salkowski Test): To 0.5 g each of the extract was added 2 ml of chloroform. Concentrated H_2S0_4 (3 ml) was carefully added to form a layer. A reddish brown colouration of the interface indicates the presence of terpenoids.

Test for Flavonoids: Three methods were used to test for flavonoids. First, dilute ammonia (5 ml) was added to a portion of an aqueous filtrate of the extract. Concentrated sulphuric acid (1 ml) was added. A yellow colouration that disappear on standing indicates the presence of flavonoids. Second, a few drops of 1% aluminium solution were added to a portion of the filtrate. A yellow colouration indicates the presence of flavonoids. Third, a portion of the extract was heated with 10 ml of ethyl acetate over a steam bath for 3 min. The mixture was filtered and 4 ml of the filtrate was shaken with 1 ml of dilute ammonia solution. A yellow colouration indicates the presence of flavonoids.

Test for Saponins: To 0.5 g of extract was added 5 ml of distilled water in a test tube. The solution was shaken vigourously and observed for a stable persistent froth. The frothing was mixed with 3 drops of olive oil and shaken vigourously after which it was observed for the formation of an emulsion.

Test for Tannins: About 0.5 g of the extract was boiled in 10 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 colouration.

Test for Alkaloids: 0.5 g of extract was diluted to 10 ml with acidified alcohol, boiled and filtered. To 5 ml of the filtrate was added 2 ml of dilute ammonia. 5 ml of chloroform was added and shaken gently to extract the alkaloidal base. The chloroform layer was extracted with 10 ml of acetic acid. This was divided into two portions and Mayer's reagent was added to one portion, while Draggendorff's reagent to the other. The formation of a cream (with Mayer's reagent) or reddish brown precipitate (with Draggendorff's reagent) was regarded as positive for the presence of alkaloids.

Test for Cardiac Glycosides (Keller-Killiani Test): To 0.5 g of extract diluted to 5 ml in water, 2 ml of glacial acetic acid containing one drop of ferric chloride solution was added. This was underlayed with 1 ml of concentrated sulphuric acid. A brown ring at the interface indicated the presence of a deoxysugar characteristic of cardenolides. A violet ring may appear below the brown ring, while in the acetic acid layer a greenish ring may form just above the brown ring and gradually spread throughout this layer.

RESULTS AND DISCUSSION

The analytical results of the qualitative phytochemical analysis of the medicinal plants are given in the Phytochemical screening of the plants revealed some differences in the constituents of the twenty different plants tested. From Table-1, in both the *M. spicata* and *W. coagulaus* all the phytochemicals i.e

Table 1: Results of the Phytochemical analysis of the studied medicinal plants

S. No	Plant samples	Reducing suger	Anthra- quinone	Terpenoids	Flavonoid	Saponins	Tannin	Alkaloids	Cardiac glycosides
1.	*Mentha spicata*	-	+	+	+	+	+	+	+
2.	*Withania coagulaus*	-	+	+	+	+	+	+	+
3.	*Perilla frutescums*	+	+	+	+	+	-	+	+
4.	*Oenothcra bienris*	+	+	+	+	+	+	+	+
5.	*Cannabis stative*	+	+	+	+	+	-	+	+
6.	*Tribulus terrists*	+	+	+	+	+	+	+	+
7.	*Acorus calamus*	+	+	+	+	+	+	+	+
8.	*Adhatoda vasica*	+	+	+	+	+	-	+	+
9.	*Achyranthus asper*	+	+	+	+	+	+	+	+
10.	*Medicago sativan*	+	+	+	+	+	+	+	+
11.	*Myrtus commanis*	+	+	+	+	+	-	+	+
12.	*Chenopodium*	+	+	+	+	+	+	+	+
13.	*Conuolvulus arrenisis*	+	+	+	+	+	+	+	+
14.	*Erigeron steroids*	+	+	+	+	+	-	+	+
15.	*Tegetis erecta*	+	-	+	+	+	+	+	+
16.	*Solanumus nigrum*	+	+	+	+	+	+	+	+
17.	*Echinacea purpurea*	+	-	+	+	+	+	+	+
18.	*Withania sommifera*	+	+	+	+	+	+	+	+
19.	*Paillea fruticosa*	+	+	+	+	+	-	+	+
20.	*Mentha longifolia*	+	+	+	+	+	-	+	+

+ = Presence - = absence

Anthraquinones, Terpenoids, Flavonoids, Saponins, tannins, alkaloids and cardiac glycosides were present, except the reducing sugars. In plants like *P. frutescums*, *C. stative*, *A.a vasica*, *M. commanis*, *Erigeron steroids*, *P. fruticosa* and *M. longifolia*, the tannins were absent, however the rest of the phytochemicals were present in all the selected plants. Unlike the other tested plants no Anthra quinones were found in the *Tegetis erecta* and *E. purpurea*. In the rest of the plants like *Oenothcra bienris*, *T. terrists*, *A. calamus*, *A. asper*, *M. sativan*, *Chenopodium*, *C. arrenisis*, *S. nigrum* and *W.sommifera* all the phytochemicals were presented. Although, the absence of certain phytochemicals in one sample and its presence in the other can be safely attributed to the various physiological and biothynthetic reactions taking place inside the plant, the effect of the environment should not be neglected, as the environment always modify the things.

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