

Phytochemical Screening of Some Species of Iranian Plants

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Abstract

A phytochemical screening of fifty five Iranian plants belonging to 21 families was carried out. A qualitative phytochemical analysis was performed for the presence of alkaloids, tannins, saponins and flavonoids. The medicinal uses of these plants are also reported.

Keyword: Iranian plants; Phytochemical screening; Alkaloids; Tannins; Saponins; Flavonoids.

Introduction

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 (1).

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 saponins (saponins), however, other diverse groups of naturally occurring phytochemicals such as flavonoids, tannins, unsaturated sterols, triterpenoids, essential oils, etc. have also been reported.

Our approach involved the collection, identification, extraction and phytochemical evaluation of extracts derived primarily from a random selection of commonly occurring native plants. At the time of collection, a pressed specimen was prepared and retained in the

Herbarium of the Department of Pharmacognosy, School of Pharmacy, Shaheed Beheshti University of Medical Sciences. Each plant sample was then air-dried and milled to a coarse powder. This article will present the procedures used in preparing the test extracts and the results obtained from the 55 plant successions (2). The results of the chemical screening of fifty five plants, growing in the western region of Iran, are also presented in this paper.

Experimental

Collection and processing of plants

Aerial parts of the plants screened in this investigation were collected from different localities in western Iran (Table 1), during the flowering period, dried in shadow, and then powdered.

Phytochemical screenings were performed as described in previous works. Samples of plant materials were extracted with Soxhlet extractor and hydrous methanol. The following methods were applied:

Alkaloids

The alcoholic extract (corresponding to 2.5 g of plant material) was evaporated to dryness and the residue was heated on a boiling water bath with 2N HCl (5 ml). After cooling, the

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mixture was filtered and the filtrate was divided into two equal portions. One portion was treated with a few drops of Mayer's reagent and the other with equal amounts of Wagner's reagent (3). The samples were then observed for the presence of turbidity or precipitation. A (+) score was recorded if the reagent produced only a slight opaqueness; a (++) score was recorded if a definite turbidity, but no flocculation was observed and a (+++) score was recorded if a definite heavy precipitate or flocculation was produced(4).

Flavonoids

The alcoholic extract (5 ml, corresponding to 1 g of plant material) was treated with a few drops of concentrated HCl and magnesium turnings (0.5 g). The presence of flavonoids was indicative if pink or magenta-red color developed within 3 min (5).

Saponins

About 2.5 g of the plant material was extracted with boiling water. After cooling, the extract was shaken vigorously to froth and was then allowed to stand for 15-20 min and classified for saponin content as follows: no froth = negative; froth less than 1 cm = weakly positive; froth 1.2 cm high = positive; and froth greater than 2 cm high = strongly positive) (6,7).

Tannins

The alcoholic extract (corresponding to 1 g of plant material) was evaporated and the residue was extracted by 10 ml of hot 0.9% NaCl solution, filtered and divided into 3 equal portions. A sodium chloride solution was added to one portion of the text extract, 1% gelatin solution to a second portion and the gelatin-salt reagent to a third portion. Precipitation with the latter reagent or with both the second and third reagent is indicative of the presence of tannins. Positive tests are confirmed by the addition of FeCl₃ solution to the extract and should result in a characteristic blue, blue-black, green or blue-green color and precipitate (phenolic compounds) (8, 9).

Results and Discussion

Table 1 reports the results obtained. Of the investigated plants, 39 were found to be alkaloid bearing, 37 showed the presence of flavonoids, 20 tannins and 44 saponins. The following plant species were found to contain alkaloid and they have not been previously reported in the literature for their alkaloids: *Vaccaria pyramidata* Medicus, *Achillea Bibersteinii* Afan, *Centaurea virgata* Lam. var. *squarosa* Roth., *Bidens tripartita* L., *Lactuca serriola* L., *Pulicaria dycenterica* (L.) Bernh., *Tripleurospermum decipiens* (Fisch. & C. A. Mey) Bornm., *Cardaria draba* (L.) Desv., *Nasturtium officinale* (L.) R. Br., *Rapistrum rugosum* L., *Sinapis arvensis* L. *Marrubium vulgare* L., *Mentha longifolia* (L.) hud., *Phlomis Olivieri* Benth., *Prunella vulgaris* L., *Glycyrriza glabra* L. (herb), *Trifolium pratense* L., *Alcea digitata* (Boiss.) Alef., *Malva neglecta* Wallr., *Plantago lanceolata* L., *Polygonum aviculare* L., *Polygonum persicaria* L., *Veronica Anagalis-aquatica* L., *Astrodaucus orientalis* (L.) Drude, *Chaerophyllum* L. sp., *Lisaea heterocarpa* Boiss., *Urtica dioica* L., *Verbena officinalis* L.

The following plants species were found to contain flavonoid and they have not been previously reported in the literature for their flavonoids: *Vaccaria pyramidata* Medicus, *Achillea Bibersteinii* Afan, *Anthemis leptophylla* Eig, *Centaurea virgata* Lam. var. *squarosa* Roth, *Cichorium intybus* L., *Lactuca serriola* L., *Tripleurospermum decipiens* (Fisch. & C. A. Mey) Bornm, *Cardaria draba* (L.) Desv. *Convolvulus arvensis* L. *Marrubium vulgare* L., *Phlomis Olivieri* Benth., *Prunella vulgaris* L., *Alcea digitata* (Boiss.) Alef., *Malva neglecta* Wallr., *Plantago lanceolata* L., *Papaver dubium* L., *Polygonum aviculare* L., *Polygonum persicaria* L., *Rumex crispus* L., *Chaerophyllum* L. sp., and *Lisaea heterocarpa* Boiss.

The following plant species were found to contain saponin and they have not been previously reported in the literature for their saponin: *Anchusa italica* Retz., *Achillea Bibersteinii* Afan, *Anthemis leptophylla* Eig., *Centaurea virgata* Lam. var. *squarosa* Roth., *Lactuca serriola* L., *Pulicaria dycenterica* (L.) Bernh., *Tripleurospermum decipiens* (Fisch. &

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C. A. Mey) Bornm., *Cardaria draba* (L.) Desv., *Nasturtium officinale* (L.) R. Br., *Marrubium vulgare* L., *Phlomis Olivieri* Benth., *Prunella vulgaris*.

(*Brunella vulgaris* Moench), *Trifolium pratense* L., *Alcea digitata* (Boiss.) Alef., *Malva neglecta* Wallr., *Polygonum aviculare* L., *Polygonum persicaria* L., *Rumex crispus* L., *Veronica Anagalis-aquatica* L., *Astrodaucus orientalis* (L.) Drude, *Chaerophyllum* L. sp., *Lisaea heterocarpa* Boiss., *Urtica dioica* L., and *Verbena officinalis* L.

The following plants species were found to contain tannin and they have not been previously reported in the literature for their tannin: *Chenopodium album* L., *Bidens tripartita* L., *Pulicaria dycenterica* (L.) Bernh., *Tripleurospermum decipiens* (Fisch. & C. A. Mey) Bornm., *Convolvulus arvensis* L., *Equisetum arvense* L., *Euphorbia myrsinites* L., *Mentha longifolia* (L.) Hud., *Melilotus officinalis* (L.) Desr., *Polygonum aviculare* L., *Polygonum persicaria* L., *Rumex crispus* L. and *Bupleurum rotundifolium* L.

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