

Research Article



Preliminary Phytochemical Screening of Some Andean Plants

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ABSTRACT

Phytochemical screening of 7 Andean plants traditionally used in urinary infections were used to determine the secondary metabolic composition. Phytochemical investigation revealed the presence of tannins, saponins, alkaloids, flavonoids, leuco-anthocyanins, steroids, triterpenes and deoxy-sugars. The result indicated that of the 7 examined plants extracts, *Lasiocephalus ovatus*, *Opuntia cylindrica*, *Bidens andicola*, *Peperomia peltigera* and *Echeveria quitensis* presented most of the tested phytochemicals. To our knowledge, no scientific information is available concerning to phytochemical screening of *Campyloneurum amphostenon*, *Chuiraga jussieui*, *Opuntia cylindrica*, *Peperomia peltigera* and *Echeveria quitensis*. The preliminary information obtained from these Andean species will be helpful for further phytochemical and pharmacological studies.

Keywords: Medicinal plants, phytochemical, ethnomedicinal, Ecuador, Tropical Andes.

INTRODUCTION

Today, a great percentage of the world population, in particular in developing countries, uses plants for facing primary needs of medical assistance¹. Pharmacological effects has commonly been attributed to the wide range of active compounds produced by plants. Secondary metabolites have long been known as a source of effective medical therapies, such as anti-bacterial and anti-cancer².

Ecuador is a country known for possessing the highest biodiversity in the world and for its numerous indigenous culture³. However, it is situated in an important position in the crisis of tropical deforestation⁴, and also in the cultural crisis which includes the loss of indigenous knowledge⁵. Traditional knowledge of the use of plants has been transmitted orally from generation to generation. Therefore, documentation and preservation of the indigenous knowledge is important for the conservation and utilization of biological resources⁶.

Basic phytochemical investigation of plants is vital to discover their major phytoconstituents. Ecuador, due to its endemic Andean flora⁷ and great knowledge of folkloric medicines, represent a potential resource for such studies. In the present study, the ethanolic extract from 7 Andean tropical plants traditionally used in urinary infections were screened for phytochemical constituents.

MATERIALS AND METHODS

Plant material

For every plant species, a voucher specimen was collected in May 2013. All the plants were identified at Universidad Técnica de Ambato and are available on request from the authors. All the plants were identified using the Catalogue of the Vascular Plants of Ecuador³ and the additions

published on "Cinco años de adiciones a la flora del Ecuador"⁸.

Preparation of plant extracts

The plant materials were dried at room temperature and then powdered using a grinder. A sample (100 g) of each powdered plant material was soaked in 80% ethanol (300 ml), heated in double boiler for 1 h. and kept at room temperature for 24 h. The slurry was then filtered, after which it was dried under reduced pressure and redissolved in 50 ml of the solvent (or water in the case of tannins and phenols) to determinate concentration. The slurry was again filtered and the gram of crude droga per millimeter of extract was calculated.

Qualitative phytochemical analysis

Test for alkaloids

Crude extract was mixed with 2ml of 2NHCl and heated gently. Mayer's, S.R. Wagner's and Dragendorff's reagents were then added to the mixture. Turbidity of the resulting precipitate was taken as evidence for the presence of alkaloids.

Test for saponins

Crude extract was mixed with 5ml of distilled water in a test tube and it was shaken vigorously. The formation of stable foam was taken as an indication for the presence of saponins.

Test for steroids

Crude extract was mixed with 10ml of chloroform and 100 mg anhydrous sodium sulfate was added sidewise. Then the slurry was filtered.

a) Liebermann's test: crude extract was mixed with 1ml of acetic acid. Carefully 1 ml concentrated H₂SO₄ was



added. A colour change indicated the presence of steroidal nucleus and triterpenes.

b) Salkowski Test: crude extract was mixed with 2ml concentrated sulphuric acid. A red colour in the chloroform layer indicated the presence of steroids.

Test for lactones

Crude extract was added in a filter paper with different concentration of 0.1, 0.2 and 0.3 ml. The filter paper was dried. Then Kedde's reactive was added to filter paper. The presence of a purple spot in the filter paper indicated the presence of lactones.

Tests for Glycosides

Test for the identification of 2-deoxysugar: 10 ml of ethanolic extract was mixed with 3 ml of FeCl₃ 10% in 50 ml of acetic acid. 1 ml of concentrated sulfuric acid was added to it. A violet ring in the interface indicated the presence of 2-deoxysugar.

Bornträger Test for the identification of anthraquinone glycosides: the extract equivalent to 1 gr. was boiled. Then added 30 ml distilled water and filtered. After the sample was cooled, the slurry was mixed with 10 ml of benzene. Then the lower layer of benzene was separated and shaken it with 5 ml of dilute ammonia. A red colour produced in the ammonical layer indicated the presence of anthraquinones.

Detection of cyanogenic glycoside: they were detected using the technique of the picrate-impregnated paper. 5 g of fresh dried vegetal material were mixed with 125 ml. of distilled water. The tube was stoppered containing a strip of picrate-impregnated paper hanging down from the stopper, and incubated at 35°C for 3 h. A brown-red coloration within 3 h indicated the presence of cyanogenic glycoside. No colour change after 48 h indicated that the test was negative for cyanogenic glycoside.

Tests for Flavonoids

a) Test for Cyanidin: crude alcoholic extract was mixed with 0.5 ml of concentrated HCL and three pieces of magnesium was added. It was taken note of any color change within ten minutes. If any color persisted, the sample was diluted with an equal volumen of water. Then, it was added 1 ml of octyl alcohol, shaken and allowed to separate. The colours in different layers were compared with test tube that served as control.

b) Test for leuco-anthocyanins: crude alcoholic extract was mixed with 0.5 ml of concentrated HCL and heated for 5 minutes. A red colour indicated the presence of leuco-anthocyanins.

Tests for tannins and phenols

5 ml of ethanolic extract were heated in double boiler for 1 h. The hot slurry was mixed with 25 ml of distilled water and stood at room temperature until it cools. Then the mixture was filtrated.

Ferric chloride Test: 3 ml of aqueous extracts were treated with 3 to 4 drops of 1% FeCl₃ solution. Formation of bluish black colour indicates the presence of phenol. Formation of green or blue-black ink on the extract after added with FeCl₃, indicated the presence of tannins.

Gelatine test: 3 ml of aqueous extract were treated with 5 drops of 5% gelatin. Formation of a precipitate indicated the presence of phenols.

Gelatine-NaCl test: 3 ml of aqueous extract were treated with 5 drops of 5% gelatin-NaCl (1% gelatin, 10% NaCl). Formation of a precipitate indicated the presence of phenols.

RESULTS AND DISCUSSION

Preliminary phytochemical investigation revealed the presence of tannins, saponins, alkaloids, flavonoids, leuco-anthocyanins, steroids, triterpenes and deoxy-sugars, as indicated in Table 1.

The results showed that *Bidens andicola*, *Lasiocephalus ovatus*, *Echeveria quitensis*, *Opuntia cylindrica* and *Peperomia peltigera*, demonstrated most the phytochemicals tested. *Peperomia peltigera* was the species that presented a considerable amount of the tested phytochemicals. This species, together with *Lasiocephalus ovatus*, *Chuquiraga jussieui*, *Opuntia cylindrica*, *Bidens andicola* and *Echeveria quitensis*, presented considerable amount of secondary metabolites such as alkaloids, flavonoids, saponins, steroids and tannins. These metabolites have been reported to possess antimicrobial activity⁹.

Especially flavonoids were reported to be responsible for antimicrobial activity¹⁰, tannins are shown to have direct anthelmintic effects¹¹, and some saponins could be precursors of detergents, adjuvants and cosmetics¹². The presence of some of these compounds has been demonstrated previously by other researchers. For example, studies related to in vitro antioxidant and antimicrobial potential of an ethanolic extract of *Lasiocephalus ovatus*, demonstrated the presence of major flavonoid constituents, which is concordant with the results obtained in this study¹³.

The correlation between antioxidant, anti-inflammatory, antifungal activity and total polyphenolic content in other species of *Chuquiraga* has been determined by other authors¹⁴. The results obtained by Ordoñez et al.¹⁵ for *Bidens andicola* are concordant with the results obtained in this study. To our knowledge, no scientific information is available concerning to phytochemical screening of *Campyloneurum amphostenon*, *Chuquiraga jussieui*, *Opuntia cylindrica*, *Peperomia peltigera* and *Echeveria quitensis*.



Table 1: Phytochemical constituents of seven medicinal plants studied.

Species name	A	S	T	F	LA	ST	TR	2D	CG	AN	L
<i>Lasiocephalus ovatus</i> Schldl.	+++	+	+++	++	++	++	+++	++	-	-	-
<i>Campyloneurum amphostenon</i> (Kunze ex Klotzsch) Fée.	+	-	+++	++	+++	++	+	++	-	-	-
<i>Chuquiraga jussieui</i> J.F. Gmel.	+++	+	++	++	-	+++	+	++	-	-	-
<i>Opuntia cylindrica</i> (Lam.) DC.	+++	++	+++	++	+	++	+++	+	-	-	-
<i>Bidens andicola</i> Kunth	++	++	++	+++	+	++	+	++	-	-	-
<i>Peperomia peltigera</i> C. DC.	+++	+++	+++	++	+	++	+++	+	-	-	-
<i>Echeveria quitensis</i> (Kunth) Lindl.	++	+	+++	+	+++	++	+	++	-	-	-

Key: A= Alkaloids; S= saponins; T= tannins; F= flavonoids; LA= leuco-anthocyanins; ST=steroids; T=triterpenes; 2D=2-deoxysugar; CG= cyanogenic glycoside; AN= anthraquinone glycosides, L= lactones; "+" = little presence of phytochemical, "++" = moderate, "+++ = abundant; "-": absence of phytochemical.

CONCLUSION

The results revealed an important medicinally constituent in the plant studied. Many evidences gathered in previous studies confirmed the bioactive function of the identified phytochemicals. However, the preliminary information obtained from *Campyloneurum amphostenon*, *Chuquiraga jussieui*, *Peperomia peltigera* and *Echeveria quitensis* will be helpful for further phytochemical and pharmacological studies. This is especially important due to the poor knowledge of Andean ecosystem that we have. The habitat loss is highest in these ecosystems and the rapid and accelerating loss of biodiversity is the most significant challenge we face today. Therefore, it is of vital importance continuing the investigations in this area to preserve the variety of ecosystems and ancestral knowledge of the use of the plants in Tropical Andes.

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