Int J Pharm Bio Sci 2016 Jan; 7(1): (P) 77 - 81

Original Research Article **Pharmaceutics**

International Journal of Pharma and Bio Sciences **ISSN 0975-6299**

PRELIMINARY PHYTOCHEMICAL SCREENING OF SIX MEDICINAL PLANTS USED AS TRADITIONAL MEDICINE

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ABSTRACT

Preliminary screening of phytochemicals is a valuable step, in the detection of the bioactive principles present in medicinal plants and subsequently may lead to drug discovery and development. In the present study, chief phytoconstituents of the six selected medicinal plants of different families were identified in order to relate their presence with bioactivities of the plants. Screening of six selected medicinal plants were performed for the presence of tannins, flavonoids, terpenoids, saponins, steroids, phlobatannins, carbohydrates, glycosides, coumarins, alkaloids, proteins, emodins and anthraquinones using standard methods. All the selected medicinal plants were found to contain Steroids and Coumarins except *Urginea indica* (Roxb.) Kunth and *Wrightia tinctoria* R.Br.respectively. Moreover, tannins and terpenoids were present only in *Spatholobus purpureus* Hassk. On the other hand, saponins were present in *Terminalia bellirica* L.*, Parthenocissus quinquefolia* L. *and Spatholobus purpureus* Hassk. Carbohydrate were present in *Wrightia tinctoria* R.Br. and *Spatholobus purpureus* Hassk. plants. While alkaloids are present in *Cyclea peltata* Arn. ex Wight and *Wrightia tinctoria* R.Br. Whereas phlobatannins, emodins and glycosides were absent in all the selected six plants. It is evident from the study that *Spatholobus purpureus* Hassk. and *Wrightia tinctoria* R.Br. is of highest therapeutic efficacy possessing majority of phytochemical classes of compounds and *Urginea indica* (Roxb.) Kunth is of lowest therapeutic potential due to the absence of majority of phytoconstituents.

KEYWORDS: **Medicinal plants, Phytochemical Screening, Traditional Medicine.**

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INTRODUCTION

Medicinal plants besides therapeutic agents also offer a big source of information for a wide variety of chemical constituents which could be developed as drugs with precise selectivity. These are the reservoirs of potentially useful chemical compounds which could serve as newer leads and clues for modern drug design[1]. The most important of these bioactive constituents of plants are alkaloids, tannins, flavonoids and phenolic compounds [2]. Correlation between the phytoconstituents and the bioactivity of plant is desirable to know for the synthesis of compounds with specific activities to treat various health ailments and chronic diseases as well[3]. Owing to the significance in the above context, such preliminary phytochemical screening of plants was the need of the hour in order to discover and develop novel therapeutic agents with improved efficacy. Numerous research groups have also reported such studies throughout the world[4-8]. The present study deals with the screening based on phytochemical tests of six medicinal plants viz., *Urginea indica*, *Cyclea peltata, Terminalia bellirica*, *Wrightia tinctoria, Parthenocissus quinquefolia* and *Spatholobus purpureus* for identifying their chemical constituents. All these plants possess different therapeutic properties which were later correlated with the presence of some specific phytoconstituents.

MATERIALS AND METHODS

Plant materials

Fresh bulbs of *Urginea indica* (Family: Liliaceae) Vou. No. 510/BMV/184, rhizome of *Cyclea peltat* (Family: Menispermaceae) Vou. No. 510/BMV/185,Bark of *Terminalia bellirica* (Family: Combretaceae)Vou. No. 510/BMV/186 and *Wrightia tinctoria* (Family: Apocynaceae) Vou. No. 510/BMV/187, roots of *Parthenocissus quinquefolia* (Family: Vitaceae) Vou. No. 510/BMV/188 and *Spatholobus purpureus* (Family: Fabaceae) Vou. No. 510/BMV/189 were collected forest areas in Betul district, M.P., India and got identified by Prof. A.B. Seerwani Taxonomist, Department of Botany, Ahilya Holkar University,Indore, M. P., India. Voucher specimens have been submitted to the Department of Botany, Bharatiya Mahavidyalaya, Amravati.

Preparation of plant extracts

Medicinally significant plant parts were collected from the field; bark of (*T. bellirica* & *W. tinctoria*), roots of (*P. quinquefolia* & *S. purpureus*), rhizome of (*C. peltata*) and bulb of (*U. indica*) were washed well, shade dried and crushed them to prepare a fine powder. These dried powders were successively extracted in Ethanol solvent for preliminary phytochemical screening.

Phytochemical tests

Screening of the above six selected medicinal plants for various phytochemical constituents were carried out using standard methods [9-11]as described in Table 1:

Table1
Preliminary phytochemical tests for plant extracts

Phytoconstituents	Test	Observation
Tannins ***(Braymer's Test)***	2ml extract + 2ml H_2O + 2-3 drops $FeCl_3$ (5%)	Green precipitate
Flavonoids	1ml extract + 1ml $Pb(OAc)_4$ (10%)	Yellow coloration
Terpenoids	2ml extract + 2ml $(CH_3CO)_2O$ + 2-3 drops conc. H_2SO_4	Deep red coloration
Saponins ***(Foam Test)***	(a) 5ml extract + 5ml H_2O + heat (b) (b) 5ml extract + Olive oil (few drops)	Froth appears Emulsion forms
Steroids ***(Salkowski Test)***	2ml extract + 2ml $CHCl_3$ + 2ml H_2SO_4 (conc.)	Reddish brown ring at the junction
Phlobatannins (***Precipitate Test)***	2ml extract + 2ml HCl (1%) + heat	Red precipitate
Carbohydrates ***(Molisch's Test)***	2ml extract + 10 ml H_2O + 2 drops Ethanolic α- naphthol (20%) +2ml H_2SO_4 (conc.)	Reddish violet ring at the junction
Glycosides ***(Liebermann's Test)***	2ml extract + 2ml $CHCl_3$ + 2ml CH_3COOH	Violet to Blue to Green coloration
Coumarins	2ml extract + 3ml NaOH (10%)	Yellow coloration
Alkaloids ***(Hager's Test)***	2ml extract + few drops of Hager's reagent	Yellow precipitate
Proteins***(Xanthoproteic Test)***	1ml extract + 1ml H_2SO_4(conc.)	White precipitate
Emodins	2ml extract + 2ml NH4OH + 3ml Benzene	Red coloration
Anthraquinones ***(Borntrager's Test)***	3ml extract + 3ml Benzene + 5ml NH_3(10%)	Pink, Violet or Red coloration in ammonical layer

RESULTS

The data in Table 2 shows screening of aqueous extracts of different parts of six medicinal plants viz., *Urginea indica*, *Cyclea peltata, Terminalia bellirica*, *Wrightia tinctoria, Parthenocissus quinquefolia* and *Spatholobus purpureus* of ethanolic extract based on phytochemical tests. These tests reveal the presence of various bioactive secondary metabolites which might be

responsible for their medicinal attributes. The observations and inferences made in the phytochemical tests are presented as follows:

Tannins
A green precipitate was not observed in all the extracts indicating thereby the absences of tannins in all medicinal plants analysed except *S. purpureus*.

Flavonoids
A yellow coloration was also observed in all the extracts indicating thereby the presence of flavonoids in medicinal plants screened except *U. indica* and *C. peltata*.

Terpenoids
A deep red color was observed only in *S. purpureus* extract.

Saponins
Persistent frothing on warming the extract of *T. bellirica, P. quinquefolia and S. purpureus* indicated the presence of saponins in these plants. The same extract with a few drops of olive oil formed a soluble emulsion, confirming the presence of saponins.

Steroids
A reddish brown ring at the interface was observed in all the extract out of six screened plants indicating the presence of steroids except *U. indica*.

Phlobatannins
Absence of a red precipitate was taken as an evidence for the absence of phlobatannins in all six medicinally important plants.

Carbohydrates
Appearance red violet ring at the junction in of the extracts confirmed the presence of carbohydrates except *U.indica, C. peltata, T. bellirica and P. quinquefolia*.

Glycosides
No change in color from violet to blue to green confirming the absence of glycosides was observed in all six extracts.

Coumarins
Interestingly, formation of yellow color as an indication of coumarin presence was also found in all extract except *W. tinctoria*.

Alkaloids
A yellow precipitate was observed in three extracts confirming the presence of alkaloids in *C. peltata* and *W. tinctoria*.

Proteins
White precipitate formation which turns yellow on boiling was only observed in the extract of *W. tinctoria* showing the presence of proteins and confirming thereby the absence of proteins in rest of the extracts.

Emodins
Absence of red color indicated the absence of emodins in all the six extracts.

Anthraquinones
Absence of a pink, violet or red coloration in ammonical layer indicated the absence of free anthraquinones in all the four extracts except *U.indica* and *W. tinctoria*.

Table 2
Results of phytochemical analysis of the selected six medicinal plants in ethanol extract

Variable	*U. indica*	*C. peltata*	*T. bellirica*	*W. tinctoria*	*P. quinquefolia*	*S. purpureus*
Tannins	-	-	-	-	-	+
Flavonoids	-	-	+	+	+	+
Terpenoids	-	-	-	-	-	+
Saponins	-	-	+	-	+	+
Steroids	-	+	+	+	+	+
Phlobatannins	-	-	-	-	-	-
Carbohydrates	-	-	-	+	-	+
Glycosides	-	-	-	-	-	-
Coumarins	+	+	+	-	+	+
Alkaloids	-	+	-	+	-	-
Proteins	-	-	-	+	-	-
Emodins	-	-	-	-	-	-
Anthraquinones	+	-	-	+	-	-

(+) = Presence, (-) = Absence

DISCUSSION

These secondary metabolites contribute significantly towards the biological activities of medicinal plants such as hypoglycemic, antidiabetic, antioxidant, antimicrobial, antiinflammatory, anticarcinogenic, antimalarial, anticholinergic, antileprosy etc[12]. *S. purpureus* plant for screening was found to possess tannins. Tannins have amazing stringent properties. They are known to hasten the healing of wounds and inflamed mucous membranes. Flavonoids are also present in four selected medicinal plants as a potent water-soluble antioxidant and free radical scavenger, which prevent oxidative cell damage and also have strong anticancer activity [13-14]. It also helps in managing diabetes induced oxidative stress. Terpenoids have been found to be useful in the prevention and therapy of several diseases, including cancer. They are also known to possess antimicrobial,

antifungal, antiparasitic, antiviral, anti-allergenic, antispasmodic, antihyperglycemic, antiinflammatory and immunomodulatory properties[15-16]. In addition, terpenoids can be used as protective substances in storing agricultural products as they are known to have insecticidal properties as well[17]. But, surprisingly it was present only in *S. purpureus*, indicating thereby its low medicinal value in comparison to other screened plants.Numerous studies have confirmed that saponins possess the unique property of precipitating and coagulating red blood cells [18-19] and steroids are responsible for cholesterol-reducing properties. Steroids also help in regulating the immune response [20]. Interestingly, both saponins and steroids are present in *C. peltata, T. bellirica, P. quinquefolia and S. purpureus* which is supposed to be of maximum medicinal value out of the six investigated plants as it possesses majority of identified phytoconstituents. In traditional system of medicine, *S. purpureus* has been regularly used as a blood purifier and also as a blood glucose lowering agent. Phlobatannins have been reported to possess astringent properties [21] and it was not found in all the screened plants. Though, the majority of analysed natural products were found to be absent in *U. indica* except the most common ones viz., tannins, flavonoids and terpenoids, out of thirteen phytoconstituents for which these six mediinal plants were screened carbohydrates, glycosides and coumarins were found to be absent in *U. indica* as well as *C. peltata* suggesting thereby the absence of therapeutic efficacies associated with these phytoconstituents in these two plants. Plants containing carbohydrates, glycosides and coumarins are known to exert a beneficial action on immune system by increasing body strength and hence are valuable as dietary supplements. Coumarins can be suggested to be beneficial for hyperproliferative skin diseases on the basis of their antimicrobial and antiinflammatory effects [22]. Moreover, alkaloids represent a class which affects the central nervous system, reduces appetite and behaves as diuretic [23]. It was found only in *C. peltata* and W.*tinctoria*. Proteins are the building blocks of life. The body needs protein to repair and maintain itself. Since it was present only in *W. tinctoria* therefore nutritional power of these plants as protein supplements cannot be ignored[24]. Thus, from the present investigation medicinal properties of the selected six plants can be identified based on the phytoconstituents present in them.

CONCLUSION

Screening of six selected medicinal plants clearly reveals that the maximum classes of phytoconstituents are present in *S. purpureus* extract as compared to other five selected plant extracts. Hence, the above plant extract could be explored for its highest therapeutic efficacy by pharmaceutical companies in order to develop safe drugs for various ailments. The other five studied plants are of equal importance due to the presence of most of the tested major phytoconstituents. Since past century these plants have been used in the treatment of different ailments, the medicinal roles of these plants could be related to such identified bioactive compounds. The quantitative analyses of these phytocompounds will be an interesting area for further study. Efforts should be geared up to exploit the biomedical applications of these screened plants due to the presence of certain class of phytocompounds for their full utilization.

REFERENCES

1. Vijyalakshmi R., Ravindran R. Preliminary comparative phytochemical screening of root extracts of *Diospyrus ferrea* (Wild.) Bakh and *Aerva lanata* (L.) Juss. Ex Schultes. Asian J. Plant Sci Res, 2: 581-587, (2012).
2. Doss A. Preliminary phytochemical screening of some Indian medicinal plants. Anc. Sci. Life, 29: 12-16, (2009).
3. Pandey P., Mehta R., Upadhyay R. Physico-chemical and preliminary phytochemical screening of *Psoralea corylifolia*. Arch. Appl. Sci. Res, 5:261-265, (2013).
4. Raphael E. Phytochemical constituents of some leaves extract of *Aloe vera* and *Azadirachta indica* plant species. Glo. Adv. Res. J. Environ. Sci. Toxicol, 1:14-17, (2012).
5. Kumari S.P.K., Sridevi V., Lakshmi M.V.V.C. Studies on Phytochemical screening of aqueous extract collected from fertilizers affected two medicinal plants. J. Chem. Bio. Phy. Sci, 2:1326-1332, (2012).
6. Kharat S.S., Kumkar P.B., Siddhesh R.R., Sonawane K.S. Qualitative phytochemical screening of *Gnidia glauca* (Fresen) Gilg. Plant extract. Int. J. Pharm. Bio. Sci, 4:144-148, (2013).
7. Kavitha R., Premalakshmi V. Phytochemical analysis of ethanolic extract of leaves of *Clitoria ternatea* L. Int. J. Pharm. Bio. Sci, 4:236-242, (2013).
8. Dasgupta S., Parmar A., Patel H. Preliminary phytochemical studies of *Kalanchoe Gastonis-bonnieri.* Int. J. Pharm. Bio. Sci*,* 4:550-557, (2013).
9. Sofowara A. Medicinal plants and traditional medicine in Africa. Spectrum Books Ltd., Ibadan: Nigeria. 289-300, (1993).
10. Harborne J.B. Phytochemical Methods. Chapman and hall Ltd., London: U.K., 49-188, (1973).
11. Ogbuewu I.P. Physiological responses of rabbits fed graded levels of neem (*Azadirachta indica*) leaf meal. Federal University of Technology: Owerri, 2008.
12. Negi J.S., Singh P., Rawat B. Chemical constituents and biological importance of *Swertia*: a review. Curr. Res. Chem*,* 3:1-15, (2011).
13. Rio D.A., Obdululio B.G., Casfillo J., Marin F.G. and Ortuno A. Uses and properties of citrus

flavonoids. J. Agric. Food. Chem, 45:4505-4515, (1997).
14. Salah N., Miler N.J., Pagange G., Tijburg L., Bolwell G.P., Rice E. et al. Polyphenolic flavonoids as scavenger of aqueous phase radicals as chain breaking antioxidant. Arch. Biochem. Broph, 2:339-46, (1995).
15. Rabi T., Bishayee A. Terpenoids and breast cancer chemoprevention. Breast Cancer Res. Treat, 115:223-239, (2009).
16. Wagner K.H., Elmadfa I. Biological relevance of terpenoids: Overview focusing on mono-di and tetraterpenes. Ann. Nutr. Metab, 47:95-106, (2003).
17. Sultana N., Ata A. Oleanolic acid and related derivatives as medicinally important compounds. *J. Enzyme.* Inhib. Med. Chem 23:739-756, (2008).
18. Okwu D.E. Phytochemicals and vitamin content of indigenous spices of southeastern Nigeria. J. Sustain. Agric. Environ, 6:30-37, (2004).
19. Sodipo O.A., Akiniyi J.A., Ogunbamosu J.U. Studies on certain characteristics of extracts of bark of *Pansinystalia macruceras* (K schemp) *Pierre Exbeille*. Global J. Pure. Appl. Sci, 6:83-87, (2000).
20. Shah B.A., Qazi G.N., Taneja S.C. Boswellic acids: a group of medicinally important compounds. Nat. Prod. Rep, 26:72-89, (2009).
21. Setchell K.D., Cassidy A. Dietary isoflavones: biological effects and relevance to human health. J. Nut, 29:758-767, (1991).
22. Theis N., Lerdau M. The evolution of function in plant secondary metabolites. Int. J. Plant. Sci, 164:S93-S103, (2003).
23. United States Department of Agriculture. Center for Nutrition Policy and Promotion. Dietary Guidelines for Americans. National Academy Press, Washington DC: USA, (2010).
24. Ojala T. , Remes S., Haansuu P., Vuorela H., Hiltunen R., Haahtela K. Antimicrobial activity of some coumarin containing herbal plants growing in Finland. J. Ethnopharmacol, 73: 299-305, (2000).