



TO SCREEN SOME MEDICINAL PLANTS OF DISTRICT SIRMAUR, HIMACHAL PRADESH FOR THE PRESENCE OF DIFFERENT PHYTOCHEMICALS IN THEM

Ved Prakash^{1*}, Anand Sagar¹, Rinku Jhamta², Preeti Kaundal¹, Shelly Rana¹, Kalpna Kumari¹
and Jagriti Rana¹

¹Department of Biosciences, Himachal Pradesh University, Shimla - 171 005 (H.P.), India.

²Department of Botany, Panjab University, Chandigarh - 160 014 (Punjab), India.

Abstract

The knowledge of the bioactive chemical constituents of medicinal plants is desirable to understand herbal drugs and their preparations. Additionally, the knowledge of the chemical constituents of plants would be valuable in discovering the actual value of folkloric remedies. In the present study, preliminary qualitative phytochemical screening of the different extracts (acetone, methanol and aqueous) of six medicinal plants (*Achyranthes aspera*, *Prunus persica*, *Rhododendron arboreum*, *R. campanulatum*, *Taxus baccata* and *Vitex negundo*) of District Sirmour (identified on the basis of their antibacterial and antioxidant properties) was done to assess the presence of bioactive components present in them. It could be summarised that phenols and flavonoids were present in all the extracts of tested plants. Tannins were also reported in all the extracts of plants except aqueous extract of *A. aspera*. Saponins were absent in the leaves of *A. aspera* and *P. persica*. Alkaloids were absent only in the leaves of *V. negundo*. Terpenoids were reported only in the methanol leaf extract of *A. aspera*, *P. persica*, *R. arboreum*, *R. campanulatum* and *V. negundo*. Thus, the plants described here can be seen as a potential source of new useful drugs. The phytochemical characterization of their extracts, the identification and isolation of responsible bioactive components and quality standards are necessary for future studies.

Key words : Medicinal plants, plant extracts, phytochemicals, qualitative analysis.

Introduction

The medicinal plants are useful for healing as well as for curing of various human diseases because of the presence of different phytochemical constituents in them (Nostro *et al.*, 2000; Prakash *et al.*, 2016). Phytochemicals (from the Greek word *phyto* meaning plant) are naturally occurring chemical compounds synthesized during various metabolic reactions. These chemicals are often called secondary metabolites and serve as plant defence mechanisms against numerous pathogenic microbes (Hasler and Blumberg, 1999, Prakash *et al.*, 2017). They protect plants from disease and damage and contribute to plant's colour, aroma and flavour. In short, the plant chemicals that protect plant cells from environmental hazards such as pollution, stress, drought, UV exposure and pathogenic attack are

commonly known as phytochemicals (Gibson *et al.*, 1998; Mathai, 2000). Now, it has been well established that they have roles in the protection of human health when their dietary intake is significant. More than 4,000 phytochemicals have been catalogued and classified based on their protective functions along with their physical and chemical characteristics (Meagher and Thomson, 1999).

Phytochemicals accumulate in different parts of the plants such as roots, stems, leaves, flowers, fruits and seeds (Costa *et al.*, 1999). Many phytochemicals particularly the pigment molecules are often concentrated in the outer layers of the various plant tissues or organs and their levels vary from plant to plant. Phytochemicals are also available in supplementary forms but evidence is lacking that they provide the same health benefits as dietary phytochemicals (Moorachian, 2000; Prakash *et*

*Author for correspondence : E-mail : vedp685@gmail.com

al., 2016).

These phytochemicals are classified as phenols, flavonoids, alkaloids, quinones, tannins, terpenes, glycosides and polysaccharides (Sas *et al.*, 2007; Sagar *et al.*, 2018). The quantity and quality of phytochemical constituents present in plant parts may differ from one part to another depending upon the variety, processing and growth conditions (King and Young, 1999). In fact, there is lack of sufficient information available on the distribution of the biological activity in different plant parts essentially related to the difference in distribution of active metabolites, which are more frequent in some plant parts than in others.

Hence proposed research work was taken up to screen some medicinal plants (*Achyranthes aspera*, *Prunus persica*, *Rhododendron arboreum*, *Rhododendron campanulatum*, *Taxus baccata* and *Vitex negundo*) for the presence of different phytochemicals in them exclusively from District Sirmaur of H.P. because of the fact that a few reports of work are available on them and majority of them are being used by the local healers to cure different ailments.

Materials and Methods

To survey, collect and identify medicinal plants (herbs, shrubs and trees) of District Sirmaur of Himachal Pradesh

Different areas of District Sirmaur of Himachal Pradesh (Choordhar, Nohradhar, Devamanal, Singholi, Ghandoori, Pallar, Haripurdhar, Bhawai, LannaPallar, Rajgarh etc.) were visited regularly for the collection of six medicinal plants *viz.*, *Achyranthes aspera*, *Prunus persica*, *Rhododendron arboreum*, *Rhododendron campanulatum*, *Taxus baccata* and *Vitex negundo* and identification was done by following standard literature. All the six medicinal plants under study were collected during flowering season of the year. Finally for ensuring the correct identity of the collected material, necessary comparison of the specimen with authentic material in the herbarium was made.

Preparation of different plant extracts

Three extracts *i.e.* acetone, methanol and aqueous of different plants have been prepared to check their antimicrobial activity. 5 g dried plant material was taken in separate Erlenmeyer flasks to which 50 mL of required solvents (acetone, methanol and aqueous) were added. The flasks were properly covered with aluminium foil and allowed to stand for 3-5 days for extraction. All the three extracts were filtered through Whatman filter paper no. 1 and evaporated at 40°C using rotary evaporator.

Then these extracts were collected and weighed. Finally, a stock solution of conc. 50 mg/mL was prepared.

To screen these medicinal plants for the presence of different phytochemicals in them

In the present study, methanol, acetone and aqueous extracts of six best plants *viz.*, *Achyranthes aspera*, *Prunus persica*, *Rhododendron arboreum*, *R. campanulatum*, *Taxus baccata* and *Vitex negundo* selected out from the earlier tested activities *i.e.* antibacterial, antioxidant and antienzyme, were subjected to qualitative phytochemical analysis.

Qualitative phytochemical analysis

Phytochemical screening was carried out for methanol, acetone and aqueous extracts by using standard methods (Harborne, 1973; Sofowora, 1993; Roopashree *et al.*, 2008; Das *et al.*, 2010; Harborne, 2012).

Test for alkaloids

Mayer's reagent test : Each of the three extracts were dissolved individually in dilute hydrochloric acid and filtered. Then the filtrates were separately treated with Mayer's reagent to test for the presence of alkaloids. Appearance of yellow creamy precipitates indicated the presence of alkaloids.

Test for flavonoids

Alkaline Reagent test : In this test, extracts were treated with 5 mL of sodium hydroxide and then observed. Intense yellow colour appeared after few minutes which indicated the presence of flavonoids.

Test for Saponins

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

Test for phenols

Ferric chloride test : Here the sample was mixed with 2 mL of 2% solution of FeCl₃. A blue green or black coloration confirmed the presence of phenols and tannins.

Test for tannins

Gelatin test : In this test, extracts were treated with 5 mL of 1% gelatin solution containing NaCl and results were observed. Formation of white precipitates indicated the presence of tannins.

Test for terpenoids

Copper acetate test : 2 drops of copper acetate solution was added to the aqueous solution of extracts and then observed. Formation of bright green coloration was taken as an evidence for the presence of terpenoids.

Table 1 : Phytochemical analysis of various extracts of medicinal plants.

| Extracts | Tested Medicinal Plants | | | | | | | | | | | | | | | | | |
|--------------------------|-------------------------|----|----|-------------------|----|----|--------------------|----|----|------------------------|----|----|-------------------|----|----|-------------------|----|----|
| | <i>A. aspera</i> | | | <i>P. persica</i> | | | <i>R. arboreum</i> | | | <i>R. campanulatum</i> | | | <i>T. baccata</i> | | | <i>V. negundo</i> | | |
| | Met | Ac | Aq | Met | Ac | Aq | Met | Ac | Aq | Met | Ac | Aq | Met | Ac | Aq | Met | Ac | Aq |
| Alkaloids | + | - | - | + | - | - | + | + | - | + | + | - | + | - | - | - | - | - |
| Flavonoids | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Saponins | - | - | - | - | - | - | - | + | - | + | - | - | + | + | - | + | - | - |
| Phenols | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Tannins | + | + | - | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Terpenoids | + | - | - | + | - | - | + | - | - | + | - | - | - | - | - | + | - | - |
| Carbohydrates | + | - | - | - | + | - | - | + | - | + | - | - | + | - | - | + | - | - |
| Proteins and amino acids | + | - | - | + | + | - | + | - | - | + | - | - | + | - | - | + | - | - |

Met = Methanol; Ac = Acetone; Aq = Aqueous.

Test for carbohydrates

Molisch's reagent test : Extracts were dissolved individually in 5 mL distilled water and filtered. Then the filtrates were separately treated with Molisch's reagent to test for the presence of carbohydrates. Appearance of violet ring confirmed the presence of carbohydrates.

Test for proteins

Xanthoproteic test : In this test, extracts were treated with 2 drops of concentrated HNO₃ and observed. Yellow colour appeared after few minutes which indicated the presence of proteins.

Results and Discussion

Preliminary qualitative phytochemical screening of different extracts (methanol, acetone and aqueous) of six medicinal plants was done to assess the presence of bioactive components as summarised in table 1.

In the present study, preliminary qualitative phytochemical screening of the different extracts (acetone, methanol and aqueous) of six plants (identified on the basis of their antibacterial, antioxidant and other useful properties) was done to assess the presence of bioactive components present in them. From the table 1, it is clearly visible that phenols and flavonoids were present in all the extracts of tested plants (*A. aspera*, *P. persica*, *R. arboreum*, *R. campanulatum*, *T. baccata* and *V. negundo*). Tannins were reported in all the extracts of plants except aqueous extract of *A. aspera*. Saponins were not detected in the leaves of *A. aspera* and *P. persica*. Alkaloids were absent only in the leaves of *Vitex negundo*. Terpenoids were seen only in the methanol leaf extract of *A. aspera*, *P. persica*, *R. arboreum*, *R. campanulatum* and *V. negundo*. Results of the present study are in accordance with the findings of Okuda *et al.*

(1983), Joshi and Joshi (2000), Danial (2006), Chhetri *et al.* (2008), Durairaj *et al.* (2014); Edrah *et al.* (2015) and Asif *et al.* (2016).

Conclusion

Phytochemical screening conducted on the plant extracts revealed the presence of phytochemical constituents such as phenols, flavonoids, tannins, saponins, alkaloids, terpenoids, carbohydrates, proteins and amino acids. Further, it is evident from the results that phenols, flavonoids and tannins along with some other constituents present in the plant samples tested could be responsible for the medicinal properties of these plants. Thus, the plants described here can be seen as a potential source of new useful drugs and this study lays the foundations for future research in the area of isolation, identification and purification of bioactive molecules for pharmaceutical purposes.

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