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Research Article

Phytochemical Analysis of Some Traditional Medicinal Plants

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Abstract

Screening of phytochemicals is a precious stair in the detection of bioactive principles present in particular medicinal plant and may lead to novel drug discovery. In the present study, principal phytoconstituents of 25 traditional medicinal plants were identified in order to relate their presence with bioactivities of the plants. Screening of the plants was performed using standard methods and resulted in the detection of the presence of tannins, flavonoids, phenolics, saponins, steroids, cardiac glycosides and alkaloids. Flavonoids were present in 19 of 25 plants while alkaloids were present in sixteen plants. The presence of these phytochemicals can be correlated with medicinal potential of these plants. Further studies are needed with these plants to evaluate their pharmacological potentials, isolate, characterize and elucidate the structures of the bioactive compounds responsible for their activities and other medicinal values.

INTRODUCTION

Natural products especially from plant sources, including species have been investigated for their characteristics and health effects. Plants have designed the basis of classy traditional medicine practices that have been used for thousands of years by people in China, India and many other countries (Sneader, 2005). Some of the earliest records of the usage of plants are drugs are found in the Artharvaveda, which is the basis for Ayurvedic medicine in India, the clay tablets in Mesopotamis (1700 BCE), and the Eber Papyrus in Egypt (1550 BCE) (Sneader, 2005). Plant chemicals are regarded as secondary metabolites because the plants that manufacture them may have little need for them. They are synthesized in all parts of the plant body; bark, leaves, stem, root, flower, fruits, seeds etc. i.e. any part of the plant body may contain active components (Solomon Charles *et al*., 2013). This chemicals work with nutrients and fibers to form an integrated part of defense system against various diseases and stress conditions (Thilagavathi *et al*., 2015). These chemical substances are called secondary metabolites. The most important of these bioactive groups of plants are alkaloids, terpenoids, tannins, saponins and phenolic compounds (Edeoga *et al*., 2005). 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 disease as well (Pandey *et al*., 2013). Generally, the presence of different phytochemicals in crude plant extracts has been linked to the detrimental effects of leachates, root exudates or decomposing residues of such plants on the other vegetation or succeeding crops (Mubashir and Wajaht, 2011). Owing to the significance in the above context, such preliminary phytochemical screening of plants is the need of the hour in order to discover and develop novel therapeutic agents with improved efficacy. Phytochemical analyses of several species

of medicinal plants and allelopathic activities of the crude chemical compounds on crops and plants have yielded positive results (Fujii *et al*., 2004). The present study revealed the qualitative phytochemistry of twenty five medicinal plants used by the peoples of Tiruchirappalli district, Tamilnadu, India.

MATERIALS AND METHODS

Collection of Plant Materials

Fresh plant samples were collected from three different zones i.e. Manapparai, Tiruchirappalli and Thuraiyur, Tiruchirappalli District, Tamilnadu, India during 2012 – 2013. Each plant sample was then air dried and milled to a coarse powder.

Phytochemical screening

Preliminary qualitative phytochemical screening was carried out with the following methods (Shanmugam *et al*., 2010).

Alkaloids

Wagner's test: About 1ml of leaf extract and 1ml of Wagner's reagent (dilute iodine solution) are added and mixed. Formation of reddish brown precipitates indicates the presence of alkaloids.

Flavonoids

Shinoda test: To 1ml of the extract, add 8 - 10 drops of concentrate HCl and a pinch of magnesium powder or filing. Boil for 10 to 15 minutes and cool. A red colouration indicates the presence of flavonoids.

Steroids

Libermann Burchard test: To 0.5 ml of the extract, add 2ml of acetic anhydride and 2ml of concentrate H2SO4 along the sides of the tube. The formation of green colour indicates the presence of steroids.

Glycosides

Keller-Killani test: To 5ml of the extract is treated with 2ml of glacial acetic acid containing one drop of ferric chloride solution and 1ml of concentrated sulphuric acid. A brown ring at the interface indicates the presence of cardiac glycosides.

Terpenoids

Salkowski test: To 5ml of the extract, add 2ml of chloroform and 3ml of concentrated H_2SO_4. Formation of yellow colour ring at the interface of the two liquids that turns reddish brown colour after two minutes, showed the presence of terpenoids.

Phenols

Liebermann's test: To 1ml of extract add 1ml of sodium nitrite, few drops of diluted sulphuric acid and 2ml of diluted NaOH. Appearance of deep red or green or blue colour indicates presence of phenol.

Tannins

Modified Prussian blue test: To 1ml of the extract, add 1ml of 0.008M potassium ferricyanide and 1ml of 0.02M $FeCl_3$ in 0.1 M HCl. Appearance of blue colour indicates the presence of tannins.

Saponins

Forth test: About 2g of the powdered sample is boiled with 20ml of distilled water in a water bath and filter. 10 ml of the filtrate is mixed with 5 ml of distilled water and shake vigorously for a stable persistent forth. The frothing is mixed with 3 drop of olive oil and shakes vigorously. The formation of emulsion for the positive result can be observed.

Gum and Mucilage

To 1ml of extract add 2.5ml of absolute alcohol and stirring constantly. Then the precipitate was dried in air and examine for its swelling properties. Swelling was observed that will indicate presence of gum and mucilage.

Lignin

(Klason lignin) Phlorglucinol + Conc. HCl, Red colouration on the fibres of Xylem and phloem tissue.

Starch

50% Iodine solution, Blue black spot was observed.

RESULTS AND DISCUSSION

The preliminary qualitative phytochemical screening of the crude powder of 25 plants was done to assess the presence of bioactive components. The presence of alkaloids, flavonoids, tannins, phenols, steroids, glycosides, terpenoids and saponins was determined (Table 1).Among these compounds alkaloids, phenols, flavonoids, saponins and tannins are important secondary metabolites and are responsible principles for medicinal values of the respective plant. Terpenoids are found in 12 medicinal plants out of 25 plants selected. Terpenoids and tannins are attributed for analgesic and anti-inflammatory activities. Apart from this tannins contribute property of astringency i.e. faster the healing of wounds and inflamed mucous membrane (Okwu and Josiah, 2006). Steroids compounds are found in 14 plants out of 25 medicinal plants.

Table 1: Preliminary qualitative phytochemical analysis of some traditional medicinal plants, Tiruchirappalli District

Plant Name	Phytochemicals										
	Al	**Fl.**	**St**	**Gly**	**Ter**	**Ph**	**Tan**	**Sap**	**G & M**	**Lig**	**St**
Acalypha indica L.	+	+	-	+	-	+	+	+	-	-	-
Achyranthes aspera L.	+	-	-	-	-	-	+	-	-	+	+
Amaranthus spinosus L.	+	+	-	-	-	+	+	+	-	-	-
Anisomeles malabarica (L.) Kuntze	+	+	+	-	+	+	+	+	-	+	+
Aponogeton natans (L.) Engl. & K.Krause	-	+	-	-	+	+	+	-	-	-	-
Aristolochia bracteolata Lam.	+	+	+	+	+	+	-	+	-	-	+
Asparagus racemosus Willd.	+	+	+	-	-	+	+	+	-	-	-
Azadirachta indica Adr. Juss.	+	+	-	-	+	+	+	+	-	-	-
Cardiospermum halicacabum L.	+	+	+	-	-	-	+	+	-	-	+
Cissus quadrangularis L. Mart.	-	+	+	-	-	+	+	+	+	-	+
Cissus setosa Wallich	-	+	-	-	-	+	+	-	-	-	+
Coldenia procumbens L.	+	+	+	-	-	+	-	-	-	-	-
Corchorus aestuans L.	-	+	+	+	-	+	+	+	+	-	-
Crinum asiaticum L.	+	-	-	+	-	+	+	+	-	-	+
Euphorbia cycthophora L.	+	+	-	+	+	-	-	+	-	-	-
Gloriosa superba L.	+	-	-	+	-	-	-	+	-	-	+
Heliotropium indicum L.	-	+	-	+	-	+	-	+	-	-	-
Martynia annua L.	+	+	+	+	+	-	+	-	-	-	-
Nasturtium indicum DC	-	-	-	+	-	+	-	-	+	+	-
Pedalium murex L.	+	+	+	+	-	-	-	-	-	-	-
Phyllanthus amarus Schum & Thonn	+	+	-	-	+	+	+	-	-	+	-
Plumbago zeylanica L.	-	-	+	+	+	+	+	-	-	-	-
Portulaca oleracea L.	-	+	+	-	-	+	-	+	-	-	-
Ricinus communis L.	+	+	+	-	-	+	+	+	-	-	+
Sarcostemma intermedium Dcne	+	-	+	+	-	+	+	-	-	-	-

(+) Indicate the presence of phytochemicals and **(-)** Indicate the absence of phytochemicals

Abbreviations

Al: Alkaloids; **Fl**: Flavonoids; **St**. Steriods; **Gly**: Glycosides; **Ter**: Terpenoids; **Ph**: Phenols; **Tan**: Tannins; **Sap**: Saponins; **G & M**: Gum & Mucilage; **Lig**: Lignin; **St**: Starch

It should be noted that steroidal compounds are of importance and of interest in pharmacy due to their relationship with sex hormones (Anubha Arora, 2013). The phytochemical screening demonstrated the presence of different types of phytocompounds like alkaloids, saponins, flavonids, steroids, tannins etc which could be responsible for the various pharmacological properties. Phytochemical constituents such as tannins, flavonoids, alkaloids and several other aromatic compounds or secondary metabolites of plants serve as defense mechanism against predation by many microorganism, insects and herbivores. The curative properties of medicinal plants are perhaps due to the presence of various secondary metabolites such as alkaloids, flavonoids, glycosides, phenols, saponins, steroids etc (Anubha Arora, 2013). Saponins natural tendency to ward off microbes makes them good candidates for treating fungal and yeast infections. These compounds served as natural antibiotics, which help the body to fight infections and microbial invasion (Santhi *et al*., 2011). The biological functions of flavanoids apart from its antioxidant properties include protection against allergies, inflammation, free radicals, platelet aggregation, microbes, ulcers, hepatoxins, viruses and tumors (Barakat *et al*., 1993).

Cardiac glycosides content was found in methanol extract. Cardiac glycosides have been used for over two centuries as stimulant in case of cardiac failure (Trease and Evans, 1998; Olayinki *et al*., 1992).

The major chemical substances of interest in the earlier reports 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. also have been reported (Farnsworth *et al*., 1966). In the present report all the plant samples showed the presence of alkaloids, flavonoids, tannins and saponins.

Conclusion

The present study leads to the further research in the way of isolation and identification of the activity compound from the selected plants using chromatographic and spectroscopic techniques.

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