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Research Article

QUALITATIVE PHYTOCHEMICAL SCREENING OF DIFFERENT SOLVENT EXTRACTS OF *TINOSPORA CORDIFOLIA* STEM AND *LANTANA CAMARA* FLOWER

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Abstract: *Tinospora cordifolia* and *Lantana camara* are well known for their versatile medicinal properties. Qualitative phytochemical screening of these two plant species were carried out in the present study. Four solvents viz; water, ethanol, chloroform and petroleum ether were used to obtain extracts of whole plant. The extracts were subjected to qualitative phytochemical screening using standard procedures. Results revealed the presence of glycosides, carbohydrates, phenolic compounds, alkaloids, flavonoids, tannins, saponins, steroids and terpenoids. The presence of these secondary metabolites signifies the potential of these medicinal plants as a source of therapeutic agent.

Keywords: *Tinospora cordifolia, Lantana camar,* phytochemicals

Introduction

Plants consist of a number of biologically active ingredients such as alkaloids, flavonoids, steroids, glycosides, Terpenes, tannins and phenolic compounds. These phytochemicals are synthesized in all parts of the plant body and are mainly attributed to the pharmacological actions. Medicinal plants are usually screened for phytochemicals that may lead to its further isolation, purification and characterization of active principle. The active compound can be then used as the basis for a new pharmaceutical product. Determination of biologically active compounds from plant material is highly dependent on the type of solvent used in the extraction procedure [1]. This emphasizes the need to try as much solvents as possible in screening plant parts for phytochemicals. In the present study therefore four different solvents viz; water, ethanol, chloroform and petroleum ether were used to obtain extracts of *Tinospora cordifolia* and *Lantana camara* in order to screen for the presence of phytochemicals.

Tinospora cordifolia (fig.1) (family Menispermacea; commonly known as Guduchi or Giloy), a glabrous climbing shrub, is widely used in folk and ayurvedic system of medicine in India since ancient times [2]. The whole plant is used for therapeutic purpose. Its remarkable and notable medicinal properties such as antidiabetic, antiperiodic, antispasmodic, antimalarial, antiflammatory, antiarthritic, antioxidant, antiallergic, antistress, antileprotic, hepatoprotective, immunomodulatory, blood purification, and antineoplastic activities are well documented.[3,4]

Fig.1 *Lantana camara* flower

Lantana camara Linn. (fig.2) (family *Verbenaceae)* is rugged evergreen shrub growing to 1.8 m high and available throughout central and south India in most dry stony hills and black soil. The leaves of the plant are boiled for tea and the decoction is a remedy against cough. The decoction of the whole plant is given as treatment against tetanus, rheumatism, malaria and ataxia of abdominal viscera. It is used as a lotion for wounds. Pounded leaves are applied to cuts, ulcers and swellings.[5]

Fig. 2 *Tinospora cordifolia* Stem

Materials and methods

Plant Material

Plant materials were collected from Banerghatta national Park-Bangalore and Botanical garden- Gujarat during the month of December 2012.

Processing of plant materials

The stem bark and flowers were washed in running water and cut into small bits to facilitate drying. The plant materials were dried for 48 hrs in a hot air oven at 40^0C. The dried plant materials (stem bark and flowers) were taken separately and ground using an electric blender to obtain a fine powder. The powdered samples were used for further analysis.

Solvent extraction

About 20g portions of powdered plant materials were each separately dispersed in 200 ml of each water, 70% ethanol, chloroform and petroleum ether. The solution was left to stand at room temperature for 3-4 days and was filtered with Whatman No. 1 filter paper. The filtrate was used for the phytochemical screening using the following tests.

Phytochemical Screening

Test for Alkaloids (Wagner's reagent)

0.5g of each extract was stirred with 5ml of one per cent aqueous hydrochloric acid on a water bath; 1ml of the filtrate was treated with a few drops of Wagner's reagent (0.254g of iodine + 0.4g of KI in 20ml Dis.H2O). Turbidity of precipitation with either of those reagents was taken as preliminary evidence for the presence of alkaloids.

Tests for 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 Saponins 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.

Test for Tannins

Gelatine Test: The solvent extract (corresponding to 1 g of plant material) was evaporated and the residue was extracted by 10ml of hot 0.9% NaCl solution, filtered and divided into 3 equal portions, sodium chloride solution was added to one portion of the test extract, 1% gelatine solution to a second portion and the gelatine-salt reagent to a third portion. Precipitation with the latter reagent or with both the second and third reagent was indicative of the presence of tannins. Positive tests are confirmed by the addition of FeCl3 solution to the extract and that resulted in a characteristic blue – black, green or blue green colour and precipitate.

Test for Phenols

The Solvent plant extract was treated with few drops of neutral ferric chloride solution 5%, intense colour developed to violet or blue-black indicates the presence of phenols.

Test for Flavonoid

The solvent extract (5 ml, corresponding to 1 g of plant material) was treated with a few drops of concentrated HCl and 10% led acetate. The presence of flavonoids was indicative if– yellow colour developed within 3 min.

Test for carbohydrate

Molisch's test: Filtrates were treated with 2 drops of alcoholic 25% α-naphthol solution in a test tube and 2 ml. of conc. Sulphuric acid was added carefully along the sides of the test tube. Formation of violet ring at the junction indicates the presence of carbohydrates.

Detection of phytosterols: Test for Terpanoid

Salkowski's Test: 0.5g of the extract was dissolved in 2ml of chloroform. Sulphuric acid is then carefully added to form a lower layer. A reddish-brown colour at the interface indicated the presence of a steroidal ring (i.e. aglycones portion of the cardiac glycoside).

Detection of Diterpines:

Copper acetate Test: Extracts were dissolved in water and treated with a few drops of copper acetate solution. Formation emerald green colour indicated the presence of Diterpenes.

Detection of proteins and amino acids:

a) **Xanthoproteic Test:** The extracts were treated with a few drops of concentrated Nitric acid solution. Formation of yellow color indicated the presence of proteins.

b) **Ninhydrin Test:** To the extract, 0.25% Ninhydrin reagent was added and boiled

for a few minutes. Formation of blue color indicated the presence of amino acids.

Detection of phytosterols:

a) **Salkowski's Test:** Extracts were treated with chloroform and filtered. The filtrates were treated with a few drops of conc. Sulphuric acid, shaken and allowed to stand. The appearance of golden yellow colour indicated the presence of triterpenes.

b) **Liebermann Burchard's Test:** Extracts were treated with chloroform and filtered. The filtrates were treated with a few drops of acetic anhydride, boiled and cooled. Concentrated sulphuric acid was added carefully along the sides of the test tube. The formation of brown ring at the junction indicated the presence of phytosterols.

Results and Discussion

The preliminary phytochemical screening showed the presence of various bioactive secondary metabolites constituents in T*inospora cordifolia* stem bark and *Lantana camara* flower. Phytochemical study of the flower extract of T*inospora cordifolia* revealed the presence of alkaloids, carbohydrates, proteins, tannins, flavonoid, sterols, terpenes, glycosides and seponins (Table 1).

Table 1. Qualitative phytochemical screening of *Tinospora cordifolia* stem

Analysis	Chloroform extract of *T. cordifolia*	Ethanol extract of *T. cordifolia*	Pet. Ether extract of *T. cordifolia*	Dis.H2O extract of *T. cordifolia*
Molisch's test	+VE	+VE	+VE	+VE
Flavonoid test	-VE	+VE	-VE	-VE
Terpenoid test	+VE	+VE	-VE	-VE
Xentoprotic test	+VE	-VE	+VE	+VE
Gelatin test	-VE	+VE	-VE	+VE
Alkaloid test	+VE	+VE	-VE	-VE
Ninhydrin test	-VE	+VE	+VE	-VE
Steroid	-VE	-VE	-VE	+VE
Phenol test	-VE	+VE	-VE	-VE

-VE= absences, +VE= presents

The same phytochemicals were also found to be present in the different extracts of *Lantana camara* flower (Table 2).

Table 2. Qualitative phytochemical screening of *Lantana camara* flower extract.

Analysis	Chloroform extract of *L. camara*	Ethanol extract of *L. camara*	Pet.ether extract of *L. camara*	Dis.H2O extract of *L. camara*
Molisch's test	-VE	+VE	+VE	+VE
Flavonoid test	-VE	+VE	-VE	-VE
Terpanoid test	+VE	+VE	+VE	-VE
Xentoprotic test	+VE	-VE	+VE	+VE
Gelatin test	-VE	+VE	-VE	+VE
Alkaloids test	+VE	+VE	-VE	-VE
Ninhydrin test	-VE	+VE	-VE	+VE
Steroid	-VE	-VE	-VE	+VE
Phenol test	-VE	+VE	-VE	-VE

-VE= absences, +VE= presents

The ethanolic extract of T*inospora cordifolia* stem bark and *Lantana camara* flower effectively identifies the presence of various phytochemicals when compared with other solvents used for extract preparation. The factors affecting the choice of solvent are; quantity of phytochemicals to be extracted, rate of extraction, diversity of different compounds extracted, diversity of inhibitory compounds extracted, ease of subsequent handling of the extracts, toxicity of the solvent in the bioassay process, potential health hazard of the extractant[6]. The reason for using different solvents when screening for phytochemicals in plant materials was clearly validated in this study. For instance, the results showed that alkaloids, terpenoid, flavonoid, phenols were exceptionally present in ethanolic extracts of both the plant species but these phytochemicals were found to be absent in water extract.

The present study results also substantiates these two plant species as source of pharmaceutically important phytochemicals via alkaloids, terpenoid, flavonoid, phenols and tannins . Alkaloids play some metabolic role and control development in living system[7]. They are also involved in protective function in animals and are used as medicine especially the steroidal alkaloids[7]. Tannins are known to inhibit pathogenic fungi[7]. The flavonoids and phenolic compounds in plant have been reported to exert multiple biological effects including antioxidant, free radical scavenging abilities, anti inflammatory, anti carcinogenic etc.[7]

Further, it has already been reported that T*inospora cordifolia* possess antidiabetic, antiperiodic, antispasmodic, antimalarial, antiflammatory, antiarthritic, antioxidant, antiallergic, antistress, antileprotic, hepatoprotective, immunomodulatory, blood purification, and antineoplastic activities.

Lantana camara has been used to treat a wide variety of disorders, in the folk medicine especially for tumours and cancer. A tea prepared from the leaves and flowers is taken against fever, influenza and stomach ache. With other preparations of the plant fever, cold, rheumatism, asthma and high blood pressure are treated[8].

Presence of various phytochemicals reported in the present study could be responsible for the versatile pharmacological actions of T*inospora cordifolia* and *Lantana camara*.

Conclusion

The present study revealed the presence of pharmaceutically important phytochemicals via alkaloids, carbohydrates, proteins, tannins, flavonoid, sterols, terpenes, glycosides and seponins in *Tinospora cordifolia* stem bark and *Lantana camara* flower. These secondary metabolites are considered to be mainly involved in the various medicinal properties of these plants.

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