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Research Article

PRELIMINARY PHYTOCHEMICAL SCREENING OF *SOLANUM TRILOBATUM* (L.) YOUNG LEAVES

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ABSTRACT
Medicinal plant is factually any plant which in one or more of its parts contains substances that can be used for therapeutic purposes or which precursors for the synthesis are of direct therapeutic agents. Ethno botanical and traditional uses of natural compounds, especially of plant origin received much attention in recent years as they are well tested for their efficacy and generally believed to be safe for human use. In our present investigation phytochemical analysis of *Solanum trilobatum* young leaves has been evaluated for the presence of bioactive compounds using various polarity solvents including petroleum ether, chloroform, 80 % ethanol and water. The study revealed the presence of alkaloids, flavonoids, amino acids, terpenoids, phenolic compounds, glycosides, carbohydrates and tannins. The results also suggested that 80 % ethanolic extract of *Solanum trilobatum* has a promising therapeutic potential.
Keywords: *Solanum trilobatum*, phytochemical analysis, bioactive compounds, amino acids

INTRODUCTION

Nature has a source of medicinal agents for thousands of years and an impressive number of modern drugs have been isolated from natural sources, many based on their use in traditional medicine[1]. Plant derived substances have recently become of great interest owing to their versatile applications. Medicinal plants are the local heritage with global importance and world is endowed with a rich wealth of medicinal plants[2]. Medicinal plants are used by 80 % of the world population as the only available medicines especially in developing countries[3]. Medicinal plants form a large group of economically important plants that provide the basic raw materials for indigenous pharmaceuticals. Medicinal plants are the richest bio-resource of drugs of traditional systems of medicine, modern medicines, nutraceuticals, food supplements, folk medicines, pharmaceutical intermediates and chemical entities for synthetic drugs[4]. The plant *Solanum trilobatum* Linn (Solanacea) is a thorny shrub widely distributed in Bengal, Uttar Pradesh, Southern India. This plant is well known in Ayurveda and Siddha system as "Alarka" and "Tuduvelai". Pharmacological investigations have demonstrated that *Solanum trilobatum* posse's antioxidant, hepatoprotective, anti inflammatory and analgesics activities[5]. *Solanum trilobatum* was reported to harbour hepatoprotective activity, antimicrobial activity, larvicidal activity, antidiabetic activity, cytotoxic activity and anticancer activity. The leaves and stem of *Solanum trilobatum* are reported to possess anti mitotic, anti-inflammatory and anti-ulcerogenic properties. The leaf extracts are used to increase male fertility and to cure snake poison[6]. It is used with ghee in siddha for treating tuberculosis, as decoction in case of acute and chronic bronchitis, root and berries for treating cough[7]. The curative properties of medicinal plants are mainly due to the presence of various complex chemical substances of different composition which occur as secondary metabolites. Phytochemicals are divided into two groups, which are primary and secondary constituents according to their functions in plant metabolism. Primary constituents comprise common sugars, amino acids, proteins and chlorophyll while secondary constituents consist of alkaloids, terpenoids, flavonoids, tannins, phenolic compounds[8]. It is necessary to focus and develop these compounds to be more effective drugs. Systematic searches on bioactive compounds of useful medicinal plants are now considered to be a rational approach in nutraceutical and drug research. In view of its medicinal value, the present study is aimed to screen the pharmaceutically important bioactive substances from that greatly contribute the ethno medicinal properties.

MATERIALS AND METHODS

Collection of plant material

The young leaves of *Solanum trilobatum* were collected from Coimbatore and authenticated by Botanical Survey of India, Coimbatore, Tamil Nadu, India. A voucher specimen has been deposited in the laboratory for future reference (BSI/SRC/5/23/2012-13/Tech.371). The specimen was later shade dried, powdered and stored in an air-tight container for further use. The powdered material was used for pharmacological investigation, while for phytochemical screening the powder was extracted with different solvents in their increasing order of polarity such as petroleum ether, chloroform, 80 % ethanol and water on orbital shaker. All the extracts were concentrated by distilling the solvent in a rotary flash evaporator and stored at 4ºC. The crude extracts were collected in amber colored sample bottles and stored. All chemicals and reagents used including the solvents were of analytical grade.

Preliminary Phytochemical Screening

Phytochemical screening of all extracts was carried out by following standard procedures[9-11].

Test for alkaloids

Dragendroff's test

To 5 ml of the extract few drops of Dragendroff's reagent was added for the formation of orange colored precipitate.

Mayer's test
To 5 ml of the extract few drops of Mayer's reagent was added for the formation of cream colored precipitate.

Wagner's test
To 5 ml of the extract few drops of Wagner's reagent was added for the formation of reddish brown colored precipitate.

Hager's test
To 3 ml of the extract few drops of Hager's reagent was added for the formation of prominent yellow precipitate.

Test for flavonoids
To 3 ml of the extract few magnesium ribbons are dipped and conc. HCl was added over them and observed for the formation of magenta (brick red) color indicating the presence of flavonoids.

Test for Amino acids
To 3 ml of the extract few drops of 0.2 % ninhydrin reagent was added and heated. Formation of violet color indicated the presence of amino acids.

Test for proteins
Biuret test
To 3 ml of the extract few drops of 10 % sodium chloride and 1 % copper sulphate was added for the formation of violet or purple color. On addition of alkali, it becomes dark violet.

Millon's test
To 3 ml of the extract few drops of Millon's reagent was added for the formation of red color.

Test for carbohydrates
Molisch's test
To a small amount of the extract few drops of Molisch's reagent was added followed by the addition of conc. H_2SO_4 along the sides of the test tube. The mixture was then allowed to stand for 2 minutes and then diluted with 5 ml of distilled water. Formation of red or dull violet color at the inter phase of two layers indicates the presence of carbohydrates.

Fehling's test
The extract was treated with 5 ml of Fehling's solution (A and B) and kept in boiling water bath. The formation of yellow or red color precipitate indicates the presence of reducing sugar.

Test for tannins
A fraction of the extract was dissolved in water and then it was subjected to water bath at 37^0 C for 1 h and treated with ferric chloride solution and observed for the formation of dark green color.

Test for sterols
Liebermann-Burchard test
To a small amount of the extract few drops of chloroform, acetic anhydride and H_2SO_4 was added along the sides of the test tube to observe the formation of dark red or pink color.

Test for glycosides
Baljet's Test
To 5 ml of the extract few drops of sodium picrate was added to observe yellow to orange color.

Keller-Killiani test
To 5 ml of the extract few drops of ferric chloride solution was added and mixed, then sulphuric acid containing ferric chloride solution was added, it forms two layer showed reddish brown while upper layer turns bluish green indicates the presence of glycosides.

Test for phenols
Ferric chloride test
A fraction of the extract was treated with 5 % ferric chloride solution and observed for the formation of deep blue or black color.

Test for saponins
Foam test
To a small amount of the extract few drops of distilled water was added and shaken vigorously until persistent foam was observed.

Test for terpenoids
Chloroform test
To 5 ml of the extract few drops of chloroform and conc. H_2SO_4 was added carefully along the sides of the test tube to form a layer and observed for the presence of reddish brown color.

Table 1: Phytochemical Screening of Young Leaves of *Solanum trilobatum* in Various Extracts

Phytoconstituents	Petroleum ether	Chloroform	80 % Ethanol	Water
Alkaloids	+	-	+	+
Flavonoids	+	+	+	+
Aminoacids	-	-	+	+
Proteins	-	+	+	+
Carbohydrates	-	-	+	+
Tannins	+	-	+	+
Sterols	+	+	+	-
Glycosides	-	-	+	+
Phenols	-	-	+	+
Saponins	-	-	+	-
Terpenoids	+	-	+	+

"+" present, "-" absent

RESULTS AND DISCUSSION

Powdered young leaves of *Solanum trilobatum* were subjected to various qualitative tests for the identification of phytochemical constituents includes tests for alkaloids (Dragendroff's test, Mayer's test, Hager's test, Wagner's test), saponins, glycosides (Baljet's test, Kellar-Killiani test), carbohydrates (Molisch's test, Fehling's test), proteins (Biuret test, Xanthoprotein test, Millon's test), tests for tannins, amino acids, flavonoids, steroids (Liebermann-burchard test), phenols, terpenoids were performed using specific reagents. Preliminary phytochemical screening of *Solanum trilobatum* young leaves revealed the presence of bioactive compounds such as alkaloids, amino acids, tannins, phenols, terpenoids, flavonoids, glycosides, carbohydrates and saponins in different extracts (Table 1). The 80 % ethanolic extract of *Solanum trilobatum* showed the maximum presence of bioactive constituents.

CONCLUSION

Medicinal plants are believed to be an important source of new chemical substances with potential therapeutic effects. The use of traditional medicine is widespread and plants still present a large source of novel active biological compounds with different activities, including anti-inflammatory, anti-cancer, antiviral, and antibacterial and cardio protective activities. Even today plant materials continue to play a major role in primary health care as therapeutic remedies in developing countries. The millenarian use of *Solanum trilobatum* in folk medicine suggests that they represent an economic and safe alternative to treat various diseases. As the pharmacologists are looking forward to develop new drugs from natural sources, development of modern drugs from *Solanum trilobatum* can be intended for their better monetary and therapeutic utilization.

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