

**INTERNATIONAL JOURNAL OF ADVANCES IN
PHARMACY, BIOLOGY AND CHEMISTRY**

Research Article

**Preliminary phytochemical screening of
Pleiospermium alatum (wight & arn.) *Toddalia
asiatica* (l.) Lam., *Atalantia wightii* yu. Tanaka.**

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ABSTRACT

The scientific world of today demands that the traditional knowledge associated with medicinal plants and their usage have to be tested through stringent pharmacological methodologies based on phytochemical analysis. The unique feature of traditional medicine in India is that it flourishes at multiple levels. In modern medicinal practices, secondary metabolites of plants constitute an ever more important source of modern pharmaceutical drug, and they are becoming an increasingly valuable commodity in expanding market for herbal remedies. The objective of present study was to investigate the presence of preliminary phytochemical from aqueous, chloroform and ethanolic leaf extracts of *Pleiospermium alatum*, *Toddalia asiatica*, *Atalantia wightii*. The biologically active compounds like alkaloids, flavonoids, tannins, glycosides, protein, and amino acid and phenolic compounds were identified.

Keywords: phytochemical, biological compounds, *Pleiospermium alatum*, *Toddalia asiatica*, *Atalantia wightii*

INTRODUCTION

Medicinal plants act as raw material base for the elaboration of more complex semi-synthetic chemical compounds. Many of these isolations from the medicinal plants are based on the uses of the agents in traditional medicine. During the last few decades, there has been an increasing interest in the study of medicinal plants and their traditional uses¹. There has been resurgence in the consumption and demand of medicinal plants. Traditional medical knowledge of medicinal plants and their use by indigenous cultures are not only useful for the conservation of cultural traditions and biodiversity but also for community healthcare and drug development in the future. Now there is a growing interest in correlating each phytochemical constituent of a plant with its pharmacological activity². The biologically active compounds like alkaloids, flavonoids, tannins and phenolic compounds are the main reason for the medicinal value of plants that produce a definite

physiological action on the body if it is administered³.

The present study investigates the preliminary phytochemical analysis of *Pleiospermium alatum*, *Toddalia asiatica* and *Atalantia wightii*.

MATERIALS AND METHODS

Plant collections

The plant materials *Pleiospermium alatum*, *Toddalia asiatica* and *Atalantia wightii* were collected from Palni Hills of Western Ghats, Tamilnadu. Taxonomic identification of these plants was carried out by S John Britto, Director and Head, The Rapinat Herbarium, St. Joseph's College, Tiruchirappalli. A voucher specimen of each experimental plant was deposited at the Rapinat Herbarium bearing the following numbers: *Pleiospermium alatum* (RHT 56231), *Toddalia asiatica* (RHT 56233) and *Atalantia wightii* (RHT 56236).

Plant descriptions**Pleiospermium alatum**

Tamil: Kurunthumulthazhai

Armed *shrub* or *tree*, 5-8(12) m; branchlets tomentose; spine solitary, axillary, to 2 cm, straight. *Leaves* 3-foliolate, 3.5-7 cm; leaflets obovate, ovate or elliptic, 2.5-6.5 × 2-4 cm, thin-coriaceous, glabrous, base cuneate, margin subentire, apex obtuse, retuse; petiole winged, to 2.5 cm; petiolule 0. *Panicles* terminal and/or axillary, to 8 cm; peduncle to 2 cm. *Flowers* 4- or 5-merous, *bisexual*, 1.5 cm; pedicel to 3 mm. *Calyx*-tube campanulate, gland-dotted, pubescent; lobes 4 or 5, ovate, 2 mm. *Petals* 4 or 5, cream, obovate, 8 × 3.5 mm, puberulous without, clawed. *Disk* thick, cupular, *c.* 10-lobed. *Stamens* 10, free; filaments to 5 mm; anthers oblong. *Ovary* obovoid, 5-celled; ovules 2 per cell, obliquely superposed; style to 3 mm; stigmas capitate. *Berry* globose, to 2.5 cm; seeds *c.* 4, to 1.5×1 cm.

Foothills (locally abundant) to 500(900) m; less in the plains to the coast in scrub jungles.

Densely foliaceous tree. Leaves dark green. *Flowers* January-April, fragrant. *Fruits* through the year⁴.

The stem bark of this plant, along with that of *Azadirachta indica* are boiled in water and the decoction is given orally for post-natal complaints⁵.

Toddalia asiatica

Armed *straggler*; branchlets glandular-tomentose, prickles recurved. *Leaves* 3-foliolate; leaflets sessile. *Inflorescence* axillary and/or terminal, of racemes or panicles. *Flowers* 5-merous, *unisexual* (*dioecious*). 0: *Calyx*-tube small, campanulate; lobes 5. *Petals* 5. *Stamens* 5, free; pistillodes prominent. 1: *Ovary* oblong, 4- or 5-celled; ovules 2 per cell; style short or 0; stigma capitate. *Berry* 1-seeded⁴.

This plant cure stomach problems, malaria, cough, chest pain, food poisoning, sore throat were treated⁶.

Atalantia wightii

Armed (with single, straight spine) *shrub* or *tree*. *Leaves* alternate, elliptic, to 10 x 5 cm, subcoriaceous, base acute, apex retuse, surfaces veiny; petiole to 0.6 cm. *Fascicles* axillary, to 2 x 2 cm, to 9-flowered; pedicel 0.2 cm. *Flowers* 0.8 cm wide; pedicel 0.6 cm. *Calyx* cupular; lobes (4)5, margins wavy. *Petals* (4)5, cream, obovate, to 6 x 2.5 mm. *Stamens* generally 5 + 5 (4 + 4), free; filaments (of the two whorls) subequal, subulate, to 2 mm. *Ovary* oblong, 2-celled, each with 2 collateral ovules. *Berry* oblong-ovoid, 2 x 1.2 cm; seed(s) 1 or 2 per cell. (4)

Phytochemical screenings**Preliminary Phytochemical Analysis**

Qualitative phytochemical tests for the identification of alkaloids, flavonoids, steroids and terpenoids were carried out for all the extracts by the method described by Mukherjee⁶.

Test for Phenol**Ferric chloride test**

To 1 ml of the leaf extract and 1ml of tuber extract 2 ml of distilled water was added followed by few drops of 10% ferric chloride. Formation of blue or black colour indicated the presence of phenols.

Test for Steroids**Liebermann-Burchard test**

To the test solution, 3-4 drops of acetic anhydride was added, the solution was boiled cooled and conc. Sulphuric acid (3 drops) was added. A brown ring appeared at the junction of the two layers. The upper layer turns green showed the presence of steroids.

Test for Tannins**Gelatin test**

To 2 ml test solution, 1% Gelatin solution containing 10% sodium chloride was added to obtain a white precipitate.

Test for Flavanoids**(a) Zinc chloride reduction test**

To 2 ml test solution, a mixture of zinc dust (Merck, India) and conc. HCl (Qualigens, India) was added. A red colour was obtained after few minutes.

(b) Alkaline reagent test: To 2 ml test solution, sodium hydroxide (Qualigens, India) solution was added to give a yellow or red colour.

Test for Alkaloids**Mayer's test**

To 2 ml test solution, 2N HCl was added. The aqueous layer formed was decanted and Mayer's reagent (Qualigens, India) was added to it. A cream coloured precipitate indicated the presence of alkaloids.

Test for fats and fixed oils**(a) Stain test**

Small amount of the extract was pressed between two filter papers; the stain on the filter paper indicated the presence of fixed oils.

(b) Saponification test

Few drops of 0.5N alcoholic potassium hydroxide was added in small quantity to the extract solution with a drop of phenolphthalein and heated on a water bath for 1-2h. The formation of soap or partial neutralization for the alkali indicated the presence of fats and fixed oils.

Test for Glycosides

To 2 ml test solution, equal quantity of Fehling's solution A and B was added and solution was heated. A brick red precipitate indicated the presence of glycosides.

Test for proteins and amino acids**(a) Millon's test**

To 2 ml test solution, Millon's reagent was added which gives a white precipitate, which on heating changed to red.

(b) Ninhydrin test

To 2 ml test solution, Ninhydrin solution was added and the solution was boiled. Amino acids and proteins when boiled with 0.2% Ninhydrin reagent showed a violet colour.

RESULT AND DISCUSSION

The extracts were examined for their physical characterization like colour, odor and consistency. The color of the aqueous extracts of the experimental samples were greenish brown to green and while ethanolic extracts showed the colour of dark greenish to green. The color of the chloroform extracts of the experimental samples were greenish brown to green. The consistency level of all the extracts were semi-solids and the odors were characteristics in two samples and sample tuber was odorless. Presence of odor showed the presence of desired phytochemicals. The result of the above study is compiled in Table 1. Different chemical tests were performed to determine the nature of the chemical constituents.

The triphytochemical screening (aqueous, ethanolic and chloroform) of the extracts of *Pleiospermium*

alatum leaf revealed the presence of tannins, flavonoids, amino acids and proteins in aqueous, ethanolic extracts. Phenols and steroids were observed in ethanolic and aqueous. Alkaloids were present in ethanolic and aqueous extract and while glycoside was present only in ethanolic. Saponins was absent in all extract (Table 2).

The triphytochemical screening (aqueous, ethanolic and chloroform) of the extracts of *Toddalia asiatica* leaf revealed the presence of flavonoids, amino acids and proteins in all extracts. Alkaloids, Phenol, Steroids, tannin were observed in ethanolic and aqueous extracts. Glycosides were present only in Chloroform and Aqueous. Saponins were present only in Aqueous (Table 3). Previous study of this plant shows presents of sugars, alkaloids, phenolic compounds, catechins, saponins were present.

The triphytochemical screening (aqueous, ethanolic and chloroform) of the extracts of *Atalantia wightii* leaf revealed the presence of Tannins, proteins, Amino acids in all extracts. Phenols, Steroids, Flavonoids were present only in Ethanolic and Aqueous extracts. Alkaloids, saponins and Glycosides were absent in all extracts (Table 4)

Therefore, now there is a need to look back towards the traditional medicine which can serve as novel therapeutics. The pharmacological value of secondary metabolites from the plants is increasing as these can act as lead chemicals for new drug development. Plant synthesized many compounds with complex molecular structures, as a result of secondary metabolism. Some of the compounds and their derivatives such as alkaloids, flavonoids, flavonoids, tannins, glycosides, terpenes and phenolic compounds have antimicrobial properties.

Table 1
Physical characteristics of the extracts

Name of the Extracts	Name of plant	Part used	Consistency	Colour	Odor
Ethanolic extract	<i>Pleiospermium alatum</i>	leaf	Semi-solid	dark green	characteristic
Aqueous extract			Semi-solid	greenish brown	characteristic
Chloroform extract			Semi-solid	greenish brown	characteristic
Ethanolic extract	<i>Toddalia asiatica</i>	leaf	Semi-solid	dark green	characteristic
Aqueous extract			Semi-solid	greenish brown	characteristic
Chloroform extract			Semi-solid	greenish brown	characteristic
Ethanolic extract	<i>Atalantia wightii</i>	leaf	Semi-solid	greenish	characteristic
Aqueous extract			Semi-solid	greenish	characteristic
Chloroform extract			Semi-solid	greenish	characteristic

Table 2
Phytochemical test in the leaf of Ethanolic, Chloroform and
Aqueous extracts of *Pleiospermium alatum*

S.No	Phytoconstituents	Ethanol	Chloroform	Aqueous
1	Phenol	+	-	+
2	Steroids	+	-	+
3	Tannins	+	-	+
4	Flavonoids	+	-	+
5	Alkaloids	+	-	+
6	Saponins	-	-	-
7	Glycosides	+	-	-
8	Proteins	+	+	+
9	Aminoacids	+	+	+

A= Aqueous, E= Ethanolic, C= Chloroform; (+) Present, (-) Absent).

Table 3
Phytochemical test in the leaf of Ethanolic, Chloroform and
Aqueous extracts of *Toddalia asiatica*

S.No	Phytoconstituents	Ethanol	Chloroform	Aqueous
1	Phenol	+	-	+
2	Steroids	+	-	+
3	Tannins	+	-	+
4	Flavonoids	+	+	+
5	Alkaloids	+	-	+
6	Saponins	-	-	+
7	Glycosides	-	+	+
8	Proteins	+	+	+
9	Aminoacids	+	+	+

A= Aqueous, E= Ethanolic, C= Chloroform; (+) Present, (-) Absent).

Table 4
Phytochemical test in the leaf of Ethanolic, Chloroform and
Aqueous extracts of *Atalantia wightii*

S.No	Phytoconstituents	Ethanol	Chloroform	Aqueous
1	Phenol	+	-	+
2	Steroids	+	-	+
3	Tannins	+	+	+
4	Flavonoids	+	-	+
5	Alkaloids	-	-	-
6	Saponins	-	-	-
7	Glycosides	-	-	-
8	Proteins	+	+	+
9	Aminoacids	+	+	+

A= Aqueous, E= Ethanolic, C= Chloroform; (+) Present, (-) Absent).

The importance of alkaloids and tannins in various antibiotics used in treating common pathogenic strains has recently been reported. In an overview of the bioactivity data obtained from the current investigation, it can be highlighted that the tested extracts have many phytoconstituents. Bioactive substances from this plant can therefore be employed in ethnomedicine.

CONCLUSION

In conclusion, the presence of phytoconstituents justify the use of selected species for treating different ailments and have a potential of providing useful drugs of human use. In the present study, it is seen that most of the biologically active phytochemicals were present in all extracts. The results of the present investigation suggest that *Pleiospermium alatum*, *Toddalia asiatica*, *Atalantia wightii* yielded the presence of alkaloids, flavonoids, tannins, glycosides, protein, and amino acid and phenolic compounds.

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