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Phytochemical Analysis of *Ayapana triplinervis* and *Thespesia populnea* : The Wonder Plants of Traditional Medicine

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ABSTRACT

Knowledge about medicinal herbs has been a part various cultures worldwide and the traditional ethnobotanical knowledge has a solution to every health-related problem. This realization has led to the increase in the research on plants for a better understanding of the secondary metabolites of the plants. These secondary metabolites, commonly called as phytochemicals are responsible for the medicinal properties of every plant and the types and amounts of the different phytochemicals vary the overall activity of the plant.

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INTRODUCTION

It is said that the best medicine is found in nature and these are the safest ones as well. The traditional cure to all the diseases was developed from plants and plant products and according to the World Health Organisation, 80% of the early inhabitants of our planet were dependent on natural products for their health-related needs (Sandhya *et al*., 2006). This has gained attention in the current times as well. More research into the active components of plants has unveiled new solutions to many existing health problems and this has paved way for new medicinal formulations with more herbal and less chemical composition.

Ayapana triplinervis (also known as Eupatorium ayapana) is a tropical herb which belongs to the Asteraceae family and is native to South America with especially Brazil (Trang *et al.*, 1993). However, it is also found in Hawaii, India, Vietnam, and the Mascarene Islands (Gauvin-Bialecki & Marodon, 2009). It is a perennial shrub-like plant which has a long slender stem with a reddish hue, long slender leaves which are aromatic and small pink flowers (Gauvin-Bialecki & Marodon, 2009). It has been known since olden times to possess a number of medicinal properties in different cultures worldwide. This plant is known to possess analgesic, anticoagulant, antianorexic, antiparasitic, anthelmintic, sedative, antifungal, and antibacterial properties have been reported (Bose *et al.*, 2007; Chaurasia & Kher, 1978; Garg & Nakhare, 1993; Gupta *et al*., 2002; Jelager *et al.*, 1998; Kokate et al., 1971; Verpoorte & Dihal, 1987; Yadava & Saini, 1990). It has also been used as an antiseptic to treat ulcers, hemorrhages (Ghani, 1998), and also as a sedative, anxiolytic, and antidepressive (Melo *et al.*, 2013).

Thespesia populnea (also called Hibiscus Populnea) belongs to the family: Malvaceae. It is an evergreen tree with greyish bark and is very common in India. This tree has been a part of the Indian traditional medicine and a wide variety of medicinal used are known. The bark, leaves, flower, and fruits are useful in treating a cutaneous infection such as scabies, psoriasis, eczema, ringworm, and guinea worm. Oil from the bark and capsules is useful in curing urethritis and gonorrhea. The bark, root, fruits have been used as a medicine for treating dysentery, cholera, and hemorrhoids. The fruits of the plant are used in ayurvedic medicine for the control of diabetes (Satyanarayana *et al*., 2004). The juice of the unripe fruit is used to treat piles. An ayurvedic preparation called “panchavalkala” possess free radical scavenging activity and *Thespesia populnea* is one of the major component (anandjiwala *et al*., 2008). The barks and flowers possess astringent, hepatoprotective, antioxidant and anti-

inflammatory activities in rats (Illavarasan *et al*., 2003; Illavarasan *et al*., 2003; Shirwaikar *et al*., 1995; Manivasudevan *et al*., 2007) and also supposed to improve the memory (Vasudevan and Parle, 2006).

The medicinal properties of the herbs are due to the presence of certain active components in these plants, which are called as phytochemicals. Alkaloids, terpenoids, flavonoids etc. are some of the commonly found phytochemicals and the presence or absence of these in varying concentrations, form the basis of the medicinal ability of the plants. Hence this study focuses on understanding the phytochemistry of the above said traditional medicinal herbs.

MATERIALS AND METHODS

Plant collection

The leaves of both *Thespesia populnea* and *Ayapana triplinervis* were collected and washed twice with tap water and once with distilled water to remove all dirt and dust particles. After washing, the leaves were dried in shade and further finely grounded using an electric blender. The powder was stored in airtight ziplock covers.

Preparing the acetone extract of the leaves

The acetone extracts of *Thespesia populnea* and *Ayapana triplinervis* was prepared by Soxhlet extraction. 25 gm of the powdered leaf was placed inside the thimble of the Soxhlet apparatus and extracted with 250 mL of acetone for each leaf powder. The temperature of extraction was set to the boiling point of acetone and the extraction was carried out till the color of the extracted solvent cleared.after extraction, the solvent was evaporated off and the extracts were collected and stored at 4ºC till further use.

Phytochemical analysis

The acetone extracts of both *Thespesia populnea* and *Ayapana triplinervis* were subjected to qualitative analysis of various phytochemicals as described below

Test for Saponins

In 5 mL of distilled water, 0.5 mg of the extract was added and mixed well in a graduated cylinder. The formation of stable honeycomb foam which shows the presence of saponins (Yadav *et al.*, 2011).

Test for Glycosides

Keller-Killani test (for deoxy sugar):

To 1ml of glacial acetic acid with traces of Ferric chloride and 1ml of conc. H_2SO_4 and 0.5 mg of the extract were added. Formation of a reddish brown color at the junction of two layers with the upper layer turning Bluish green indicates the presences of glycosides (Sarla Saklani, 2012).

Test for Terpenoids

The acetone extract was dissolved in 2 ml of chloroform and evaporated to dryness. 2 ml of concentrated Sulphuric acid was added to this and heated for 2 minutes. Presence of terpenoids was confirmed on the appearance of a grayish color (Yadav *et al.*, 2011).

Test for Phenols

Ferric chloride test

In 5 ml of distilled water, 500 mg of the extract was dissolved. To this 5% of neutral ferric chloride solution was added in drops. Formation of deep blue or black color indicates the presence of Phenols (Solomon Charles Ugochukwu *et al.*, 2013).

Test for Steroids

In a test tube, 2 ml of chloroform was added to a pinch of the extract. To this, concentrated Sulphuric acid was added to the sides of the test tube. The formation of a reddish hue in the lower chloroform layers shows the presence of steroids (Yadav *et al.*, 2011).

Test for Flavanoids

The acetone extract was dissolved in distilled water and filtered. To this, 2 ml of 10% Sodium hydroxide was added, which produced a yellow color. The change of this yellow solution to a colorless on the addition of dilute HCl indicates the presence of flavonoids (Abdul Wadood *et al.*, 2013).

Test for Reducing sugars

In a test tube, about 0.5g of the extract was dissolved in 5ml of distilled water. 1 ml of ethanol was heated and boiled with 1 ml each of Fehling's solution A and B in another test tube. This was then poured into the test tube containing the dissolved extract. The appearance of color indicates that reducing sugars are present (Abdul Wadood *et al.*, 2013).

Test for Proteins

Millon's test

In a test tube, when the crude extract was added with 2ml of Millon's reagent, a white precipitate is produced. If this white precipitate turns red on heating gently, the presence of proteins is confirmed (Yadav *et al.*, 2011).

Test for Carbohydrates

Benedict's test

To a small amount of extract in a test tube, with 2 ml Benedict's reagent was added and gently heated. The presence of carbohydrates was indicated by the development of Orange - Red precipitate (Prashanth Tiwari *et al.*, 2011).

Test for Alkaloids

To 0.2g of the plant sample in a test tube, 3 ml of hexane was added, mixed well, shaken and then filtered. 2% HCl (5 mL) was added to the test tube and heated. The contents were filtered and a few drops of picric acid was added into it and checked for the formation of yellow coloration, which is indicative of the presence of alkaloids (Abdul Wadood *et al.*, 2013).

RESULTS AND DISCUSSION

The results of the phytochemical analysis have been tabulated in Table 1. Phytochemicals like alkaloids, flavonoids, terpenoids, glycosides, phenols, reducing sugars, carbohydrates, steroids, and alkaloids were present in *Thespesia populnea* whereas in *Ayapana triplinervis* all these with the exception of steroids were present. Saponins were absent in the extracts of both the plants.

Table 1: Phytochemical analysis results of *Thespesia populnea* and *Ayapana triplinervis*

Phytochemical	*Ayapana triplinervis*	*Thespesia populnea*
Saponins	-	-
Glycosides	+	+
Terpenoids	+	+
Phenols	+	+
Steroids	-	+
Flavonoids	+	+
Reducing sugar	+	+
Proteins	+	+
Carbohydrates	+	+
Alkaloids	+	+

The presence of various different phytochemicals in plants yields different properties to the plants. The presence of alkaloids in plants is responsible for the ability of the plant to cure pain and also renders a toxicity to the plants, the level of which depends on the type and amount of the alkaloids present. A class of Phenols called as polyphenols, on the other hand, are responsible for the antioxidant properties of the plant (Parr and Bolwell, 2000). Thus here, in the study, almost all the phytochemicals tested yielded a positive result and this yields the plants medically significant.

CONCLUSION

The present study was carried out to check the presence of some main phytochemical components in *Thespesia populnea* and *Ayapana triplinervis,* which are two medicinally valuable plants in India and has been used from ancient times, as a part of our traditional knowledge. These plants are known to possess a wide variety of medicinal values and this is due to the presence of various secondary metabolites. This study has been successful in evaluating the presence of certain phytochemicals which are medically significant.

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