Original Article

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PHYTOCHEMICAL ANALYSIS OF *TORENIA THOUARSII* (CHAM. & SCHLTDL.) KUNTZE

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Abstract: ***The plant selected for the present study Torenia thouarsii (Cham. & Schltdl.) Kuntze belongs to the family Linderniaceae. The present study aimed to investigate the presence of phytochemicals in the selected plant. The solvents used were water, methanol, petroleum ether and chloroform. Alkaloid contents of the extracts of the plant were determined by Mayer's reagent method whereas flavonoid contents of the extracts were determined by Salakar's method. Proteins, carbohydrates, phenols, tannins, flavonoids, quinones, fats and oils, resins, mucilage and gums were detected in the plant tested. Our findings provided evidence that crude aqueous and organic solvent extracts of the Torenia thouarsii (Cham. & Schltdl.) Kuntze contains medicinally important bioactive compounds and it justifies their use in traditional medicines for the treatment of different diseases.***

Keywords Torenia thouarsii, Phytochemicals, Alkaloid, Phenolics, Flavanoid, Quinones, Solvents

Introduction

India is endowed with a rich wealth of medicinal plants which have been a valuable source of natural products for maintaining human health. (Aravindganth *et al*., 2015). Nature has provided an important source of remedies to cure all the ailments of mankind. In recent years, all the medicines used were from natural source, especially plants. The plants contain enumerable metabolites.

Medicinal plants are richly available all over the world. Medicinal plants are now more focused than ever because they have the capability of producing many benefits to society indeed to mankind, particularly in the line of medicine. These natural compounds formed the foundation of modern prescription drugs as we know them today. A large number of these medicinal plants are used in several formulations for the management of various diseases caused by pathogens. According to World Health Organization (WHO,. 2002) medicinal plants would be the source of drugs. Nearly 80% of people from developing countries use traditional medicines. (Aravindganth *et al*., 2015). Phytochemicals are divided into two groups which are primary and secondary constituents, according to their functions in plants' metabolism primary constituents comprise common sugars, amino acids protein and chlorophyll while secondary constituents consist of alkaloids terpenoids and

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phenolic compounds and many more such as flavonoids tannins and so on(Krishnaiah *et al*.,2007).

Plants are the richest resource of drugs of traditional systems of medicine, modern medicines, nutraceuticals, food supplements, folk medicines, pharmaceutical intermediates and chemical entities for synthetic drugs. Dietary phytochemicals are considered an effective tool to cure body disorders. They play a vital role as therapeutic agents in the prevention of many diseases (Kareem *et al*., 2010). Among the different plant derivatives, secondary metabolites proved to be the most important group of compounds that showed a wide range of antibacterial and antifungal activity (Savithramma *et al*., 2011). Phytochemical constituents of medicinal plants with pharmacological activity screening of active compounds have led to the discovery of new medicinal drugs which have efficient protection and treatment roles against various diseases (Govindappa *et al*., 2011). Medicinal plants have always been considered a healthy source of life for all people. The therapeutic properties of medicinal plants are very useful in healing various diseases and the advantage of these medicinal plants is being 100% natural (Hussain M.S. *et al*., 2012).

Torenia is a genus of the plant now classified in the family Linderniaceae. This species is often found in moist places. It is native range is Tropical & South Africa, Madagascar and India. In India, it is distributed in Assam, Andrapradesh, Maharashtra, (Sindudhurga), and Karnataka (Western ghats) (Saldahna C.J., 1966). *Torenia thouarsii* (Cham. & Schltdl.) Kuntze is a slender branched, procumbent or weakly ascending herb, that grows up to 40 cm, rooting at the nodes and sometimes along internodes. *Torenia thouarsii* (Cham. & Schltdl.) Kuntze is a well-known plant drug in Ayurvedic, allopathic, and home remedies. The leaf of the plant is used to treat oral treatment, and skin mucosa. The leaves are applied externally and used as a pain killer. The leaves help to reduce symptoms of paralysis and pneumonia. This herb helps soothe the itchy eye and is used to treat eye problems. It is used in the indigenous system of medicine as an anti-inflammatory, antiviral, analgesic, anti-ulcer, antidiabetic and antioxidant.

Materials and Methods

Collection of plant material.

The selected plant species namely *Torenia thouarsii* was collected from the western ghats of Karnataka from Shivamogga and Chikamagalur districts in June 2022.

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Cleaning, drying and powdering.

The collected leaves are taken and washed in water to remove the dust and debris. The washed materials are shade dried for 1-2 weeks at room temperature. The shade-dried leaves were ground to get a powder and this powder is stored in an air-tight container at room temperature.

Preparation of plant extracts.

10g of air-dried plant powder was soaked in 100 ml of organic solvents such as water, methanol, and petroleum ether and chloroform separately for 24 hours in an orbital shaker at 37'C. The extracts were filtered through the Whatman filter paper 1 and stored in a dark condition at room temperature. The resulting extracts were used for phytochemical analysis.

Phytochemical analysis

Test for alkaloids.

Mayer's Test:

A fraction of the extract was treated with Mayer's reagent (1.36 g mercuric chloride and 5 g of potassium iodide dissolved in 100 ml of water). And observe the formation of a cream-colored precipitate. It indicates the presence of alkaloids. (Banu *et al.,* 2015).

Test for Tannin and Phenolic compounds.

Lead acetate Test:

2 ml of extract was treated with distilled water and a few drops of 1% of lead acetate solution the mixture gives a yellow precipitate. It indicates the presence of phenols. (Thilagavathi *et al*., 2015)

Ferric chloride Test:

2 ml of extract reacts with 5% of aqueous ferric chloride solution with the formation of a violet color. It indicates the presence of tannins. (Sangeetha *et al*., 2014).

Test for Flavonoids.

2 ml of extract was treated with a few drops of 1N NaOH solution resulting in the formation of intense yellow color which turns colorless on the addition of dilute HCL. It indicates the presence of flavonoids. (Salalkar *et al*., 2015).

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Test for steroids.

Salkowski Test:

Treat 2 ml of chloroform with 2ml of extract and add 2ml of Conc. H_2SO_4 along the sides of the test tube, a reddish brown layer appears. It indicates the presence of a steroid compound.

Test for carbohydrates

Fehling Test:

The filtrate is treated with Fehling's reagent and boiled in the water bath. A brick-red precipitate indicates the presence of reducing sugars. (Shrestha *et al.*, 2015).

Benedict's Test:

The filtrate was treated with Benedict's reagent & heated for 2 min in the water bath, an orange-red precipitate indicates the presence of reducing sugars. (Tiwari *et al.*,2011).

Test for Terpenoids.

2 ml of extract treated with 2 ml of acetic anhydride and a few drops of Conc. H_2SO_4 along the sides of the test tube resulted in the formation of a blue-green ring. It indicates the presence of terpenoids. (Kumar P. *et al.*, 2008).

Test for anthocyanin.

2 ml of extract was added to 2 ml of 2N HCl and ammonia, the pink color turned blue-violet. It indicates the presence of anthocyanin.

Test for Quinones.

1 ml of extract was added to the 2 ml dilute NaOH resulting in the formation of blue-green or red color indicating the presence of Quinones. (Badoni *et al*., 2016).

Test for proteins.

Biuret Test:

2 ml of filtrate is treated with 1 drop of 2% copper sulfate solution. To this 1ml of ethanol is added followed by an excess of potassium hydroxide pellets. pink color ethanol layer formed indicates the presence of protein. (Banu *et al.*, 2015).

Xanthoproteic Test:

The extract was treated with a few drops of Conc. Nitric acid, resulting in the formation of yellow color. It

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indicates the formation of proteins. (Tiwari *et al.*,2011).

Test for fats and oils.

5 drops of the extract was added to 1ml of 1% CuSO4 solution and treated with a few drops of 10% NaOH, the mixture turns blue color. It indicates the presence of fats and oils.

Test for Resins.

A few ml of plant extract was dissolved in NaOH solution forming of red color. It indicates the presence of resins.

Results and Discussion

Medicinal plants appear to be rich in secondary metabolites, widely used in traditional medicine to cure various ailments. The result of preliminary phytochemical analysis of leaves of *Torenia thouarsii* for alkaloids, tannins, phenolic compounds, carbohydrates, steroids, flavonoids, quinones, fats and oils, resins, amino acids and anthocyanins in various solvent extracts (aqueous, methanol, petroleum ether and chloroform) confirmed the presence of many phytoconstituents (Table 1).

In the aqueous extract of *Torenia thouarsii* alkaloids, tannins, and phenolic compounds, flavonoids, steroids (Salkowski test) carbohydrates (Benedict's test), fats and oils and mucilage and gums are present whereas the quinones, proteins, resins, amino acids and anthocyanins are absent. In the methanol extract flavonoids, quinones, carbohydrates and amino acids and mucilage and gums are present but alkaloids, tannins, steroids, proteins, anthocyanins, fats and oils, and resins are absent. In the petroleum ether extract tannins and phenolic compounds, steroids, proteins, fats and oils, and resins are present. The alkaloids, flavonoids, quinones, carbohydrates, amino acids and anthocyanins are absent in petroleum ether extract. In the chloroform extract carbohydrates, proteins, fats and oils and resins are present. The alkaloids, tannin and phenolic compounds, flavonoids, steroids, anthocyanin, quinone, gum and mucilage and amino acid are absent (Fig 1, 2 and 3).

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Table: 1. Table showing different phytochemicals present in different solvents

Sl.No	Phytochemicals	Test Name	Aqueous	Methanol	Petroleum ether	Chloroform
1	**Alkaloids**	Mayer's test	+	-	-	-
2	**Tannin & phenolic compounds**	Lead acetate test	+	-	+	-
		Ferric chloride test	+	-	-	-
3	**Flavonoids**	Alkaline reagent test	+	+	-	-
4	**Steroids**	Salkowski test	+	-	+	-
5	**Quinone**		-	+	-	-
6	**Carbohydrates**	Benedict's test	+	+	-	-
		Fehling's test	-	-	-	+
7	**Proteins**	Biuret test	-	-	+	+
8	**Fats & Oils**		+	-	+	+
9	**Resins**		-	-	+	+
10	**Amino acid**	Ninhydrin test	-	+	-	-
12	**Anthocyanins**		-	-	-	-
13	**Mucilage and Gums**		+		+	

(+ Indicates presence) **(- Indicates absence)**

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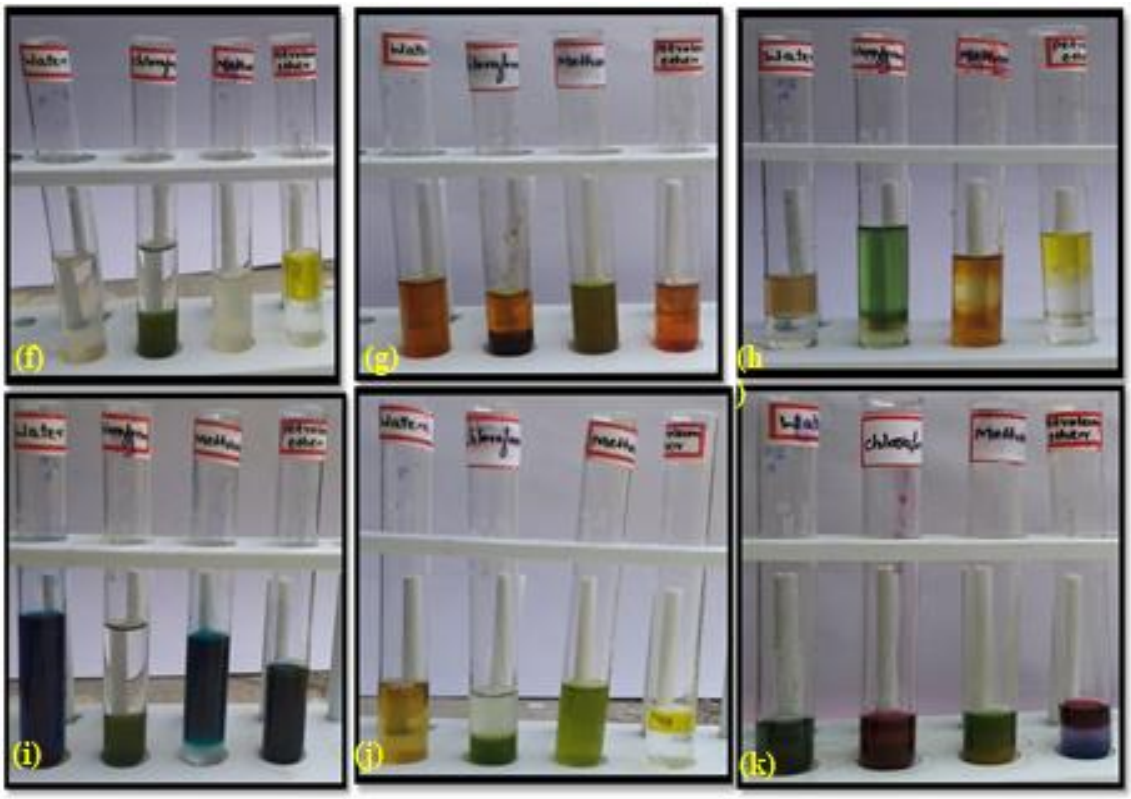

Fig 2. (f) Test for flavanoids (g) Test for steroids (h) Test for terpenoids (i) Test for anthocyanins (j) Test for quinones (k) Test for proteins

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Fig 3. (l) and (m) Test for carbohydrates (l-Benedict's test, m-Fehling's test , (n) Test for fats and oils, (o) Test for resins, (p) Test for amino acids, (q) Test for gums and mucilage

Conclusion

The present study confirmed that solvent extracts of ***Torenia thouarsii*** are rich in phytochemicals such as alkaloids, tannins, phenolic compounds, carbohydrates, steroids, flavonoids, quinones, fats and oils, resins, amino acid, and anthocyanins. Phytochemicals were found to be more in aqueous and petroleum ether extract than other extracts. Quantitative analysis showed that the aqueous extract gave more positive results than the other three extracts (methanol, petroleum ether and chloroform). ***Torenia thouarsii*** is used in the treatment of many ailments in the traditional health system, which is supported by the findings of the study. So it may be concluded that the aqueous, methanol, petroleum ether and chloroform extracts of ***Torenia thouarsii*** act as the potential source of phytochemicals that may be used in traditional medicine for the prevention of several diseases.

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