CHAPTER 1

Phytochemical screening and pharmacological values of *Strobilanthes scabra* Nees

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Abstract

Strobilanthes scabra is an herbaceous plant usually growing near water bodies, lakes, rivers, and streams. Leaves of *S. scabra* was collected and qualitative phytochemical analysis was carried out. Other pharmacological values are gathered from literature. The findings are presented in this chapter. Hydroethanolic extract of leaves showed the presence of tannin, alkaloids and reducing sugar which reflects its medicinal potential. Further more experimental works are needed in pharmacological aspects.

Keywords: *Strobilanthes*, medicinal, future drug formulation

Introduction

Globally, adequate medicines are a primary need for humans. Earlier, most people were dependent on the primary healthcare systems using traditional therapeutic systems (Kumar et al., 2012). Due to urbanization and the development of allopathic medicines, traditional therapeutic systems are decreasing everywhere, and we are losing the traditional knowledge on medicinal plants. Malpractices in the use of modern medicines lead to antimicrobial resistance and drug failures (Kumar and Jena, 2014). These problems increase the demand for sources for raw materials

and new antimicrobial agents from nature, but unfortunately, the knowledge of plants is declining. Therefore, there is a need to explore the medicinal uses of less known medicinal plants for future drug formulations. Hence, *Strobilanthes scabra* (Figures 1-2) was selected for primary phytochemical screening to gather the available knowledge on its pharmacological potentials.



Figure 1: Flower of *Strobilanthes scabra*



Figure 2: Habitat of *Strobilanthes scabra*



Figure 3: Collected leaves for experimental works

It is an herb with creeping rootstock and hispid or strigose stems. Leaves are elliptic or obovate, crenate-serrate or entire, acute, hispid or pubescent scabrous above, and base tapering. Spikes in short terminal panicles with hairy peduncles. Sepals are linear with long glandular hairs. Corolla is narrowly tubular for 6 mm then ventricose, villous within. Stamens 4 with hairy filaments. Capsule downy, usually 4-seeded. Seeds discoid with broad margins and long silky hairs (Saxena and Brahmam, 1995).

Materials and methods

The leaves of *Strobilanthes scabra* were collected from the bank of Daya river, Dhauli, Odisha, in September 2024 (Figure 3). The senior author identified the plant. Hydroethanolic extract of leaves was obtained and nine different bioactive compounds were detected using standard methods (Kaneria et al., 2012; Devi et al., 2023; Marndi et al., 2024).

Qualitative phytochemical analysis for secondary metabolites

Test for tannin

2-5 drops of 0.1 % lead acetate solution were added to 1 ml of the filtrate of the leaf extract. The white gelatinous precipitate provided a positive result for the presence of tannins.

Test for saponin

1 ml of distilled water was added to 1 ml of the filtrate of the leaf extract and shaken vigorously. The persistent froth formation after shaking indicated the presence of saponin.

Test for flavonoids

2 ml of 2 % NaOH solution and 3 drops of dilute HCl were added to 1 ml of the filtrate of the leaf extract. The colour of the filtrate initially turned to an intense yellow colour with NaOH solution and later turned colourless. This colour change confirmed the presence of flavonoids.

Test for terpenoids

1 ml of the filtrate of leaf extract was added with 6 drops of chloroform and placed in the water bath for a few minutes. Then 6 drops of concentrated H_2SO_4 were added. The reddish-brown interface confirmed the positive result for the presence of terpenoids.

Test for phenolic compounds

1 ml of the filtrate of leaf extract was taken and a few drops of 5 % Ferric chloride solution were added. The bluish-black colour provided the positive result of the phenolic compounds.

Test for reducing sugars

1 ml of the filtrate of leaf extract was taken and 2 drops of Fehling's solution A followed by Fehling's solution B were added and kept in the water bath for a few minutes. The presence of red-orange precipitate confirmed the presence of reducing sugars.

Test for steroids

1 ml of the filtrate of the leaf extract was added with 1 ml of chloroform and 1 ml of concentrated H_2SO_4 were added to it. The appearance of upper red and lower yellow with green fluorescence provided the positive result of the test for steroids.

Test for alkaloids

1 ml of the filtrate of the leaf extract was taken and 3-4 drops of Dragendroff's reagent was added to it. The formation of a reddish-brown precipitate confirmed the presence of alkaloids.

Test for carbonyl compounds

1 ml of the filtrate of the leaf extract was taken and 3-4 drops of 2,4-Di-nitrophenylhydrazine reagent was added to it. The formation of yellow crystals confirmed the presence of carbonyl compounds.

Results and discussion

Phytochemical screening revealed that in hydroethanolic extract of leaves of *Strobilanthes scabra* presence of tannin, reducing sugar and steroids (Table 1; Figure 4). Leaves has tannin, so it may be useful as anticarcinogenic and antimicrobial agents (Chung et al., 1998). Presence of steroids might be useful in the treatment of inflammation (Ericson and Kaye, 2014). Presence of reducing sugar in the leaves of *Strobilanthes scabra* might be able to trigger the oxidative modification (Kaneto et al., 1996).

Table 1: Detected bioactive compounds of *Strobilanthes scabra*

Solvent	Parts used	Tested bioactive compounds	Detected bioactive compounds
Hydroethanolic	Leaves	Tannin, Saponin, Flavonoids, Terpenoids, Phenolic compounds, Reducing sugar, Steroids, Alkaloids and Carbonyl compounds.	Tannin, Reducing sugar and Steroids

Literature survey revealed that there is no or less works have done on the plant parts of *Strobilanthes scabra* but some pharmacological potentials are documented on other species of *Strobilanthes.* Ghasemzadeh et al., (2015) reported the antioxidant and anticancer properties of *Strobilanthes crispa*. Till now, there is no documentation of bioactive compounds present in *Strobilanthes scabra*, however, some works have been done on other species of *Strobilanthes* genus. Active constituents like alkaloids, glycosides, flavonoids, terpenoids, saponins, carbohydrates, proteins, and amino acids are found in *S. jomyi* extracts in chloroform and methanol solvents (Shabnam et al., 2023). *S. crispus* has some phytochemically active constituents like phenolic compounds, flavonoids, glycosides, and saponins as major secondary metabolites (Ghasemzadeh et al., 2015). Secondary metabolites like fatty acids, phenols, alkanes, terpenes,

sesquiterpenoids, sterols, etc. responsible for fighting different ailments were reported to be present in different extracts of *S. glutinosus* (Aziz et al., 2022).

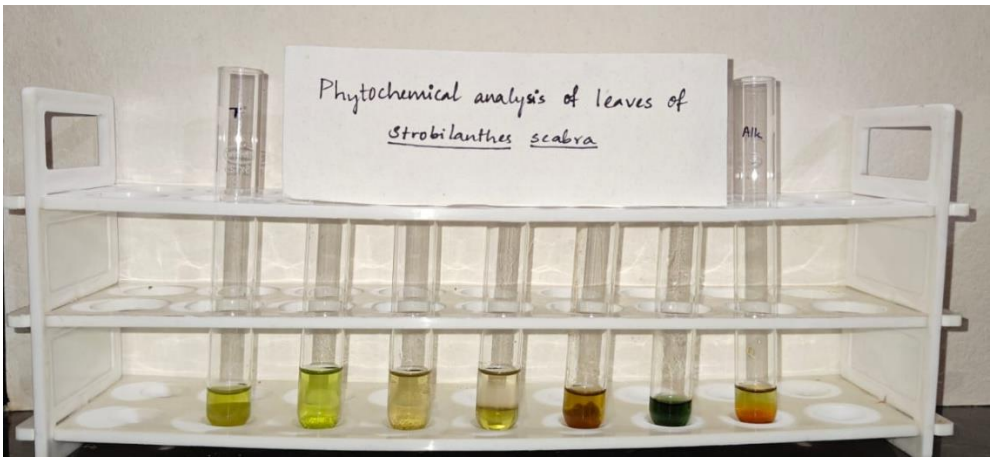


Figure 4: Qualitative phytochemical screening

Conclusion

The present study concludes that there is no or less works have been carried out with the plant parts of *Strobilanthes scabra*. The phytochemical analysis of the present study revealed that detected compounds might be useful to formulate new drugs from the leaves of *Strobilanthes scabra*.

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