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PHYTOCHEMICAL PROFILING AND ANTIMICROBIAL POTENTIAL OF DIFFERENT SOLVENT LEAF EXTRACTS OF *STEPHANOTIS VOLUBILIS* (L.F.) S. REUSS, LIEDE & MEVE.

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ABSTRACT

The present study aimed to evaluate the phytochemical constituents and antimicrobial activity of leaf extracts of *Stephanotis volubilis* obtained using different solvents. Phytochemical screening revealed the presence of several bioactive compounds, including alkaloids, flavonoids, glycosides, coumarins, saponins, tannins, terpenoids, steroids, and phenols. The antimicrobial activity of the extracts was assessed using the well diffusion method against six bacterial strains, viz. *Bacillus cereus, Staphylococcus epidermidis, Escherichiacoli, Pseudomonas aeruginosa, Beauveriabassiana* and *Candidaalbicans.* Among the extracts tested, the ethyl acetate extract exhibited the greatest diversity of phytochemical constituents; however, it showed comparatively lower antimicrobial activity against all tested bacteria. In contrast, the methanolic extract demonstrated significant antimicrobial activity against all bacterial species examined. The results indicate that the leaves of *Stephanotis volubilis* are a rich source of bioactive phytochemicals and possess promising antibacterial properties, highlighting their potential for the development of natural antimicrobial agents.

KEYWORDS: *Stephanotis volubilis*, leaf extracts, phytochemical screening, antimicrobial activity, bioactive compounds.

INTRODUCTION

Medicinal plants are an important source of bioactive compounds with significant antimicrobial and therapeutic potential[1]. For centuries, plants have been widely used in

traditional medicine across different countries and have contributed to the discovery of numerous effective drugs. They provide a valuable reservoir of chemical constituents that can be explored to develop new chemotherapeutic agents. Evaluation of antimicrobial activity through *in vitro* assays is an essential first step in identifying plants with potential medicinal value[2].Various plant parts, including roots, stems, leaves, flowers, fruits, seeds, bark, and other modified organs, are utilized as raw materials in herbal medicine. These plant-derived materials possess diverse pharmacological properties and are widely used by local communities, traditional healers, and the herbal industry[3]. While some medicinal plants are collected in limited quantities for local healthcare practices, others are harvested and traded on a larger scale for commercial herbal preparations.*Stephanotis volubilis* (L.f.) S. Reuss, Liede&Meve, a member of the family Apocynaceae, is a medicinally important climbing herb. Traditionally, its roots have been used to treat respiratory ailments, sneezing, headaches, snake bites, and eye disorders. Leaf paste prepared with water is applied externally to alleviate skin diseases, pain, and fever. Owing to its ethnomedicinal significance, the present study was undertaken to investigate the phytochemical constituents and evaluate the antimicrobial activity of *Stephanotis volubilis*leaf extracts.

MATERIALS AND METHODS

Plant Material:

The plant material of *Stephanotis volubilis* was collected from its natural populations growing in Daighar Village, Thane District, Maharashtra, India, during October 2026. Healthy and mature plant specimens were collected from different locations within the village and transported to the Research Laboratory, Department of Botany, K. V. Pendharkar College, Dombivli (East), Maharashtra, for further phytochemical and antimicrobial analyses.

Preparation of Extract:

Fresh leaves of *Stephanotis volubilis* were washed thoroughly with distilled water, shade-dried, and powdered. The powdered leaf material (50 g) was subjected to sequential solvent extraction using solvents of increasing polarity, namely hexane, ethyl acetate, and methanol. The sample was placed in a separate conical flask, and 200 ml of hexane was added. The conical flask was kept on a mechanical shaker machine for 24 hrs at room temperature. After extraction, the mixture was filtered through Whatman No. 1 filter paper.

The residue (pellet) obtained after filtration was air-dried and subsequently extracted with ethyl acetate following the same procedure. The process was repeated using methanol as the final solvent. The filtrates obtained from each solvent extraction were concentrated to dryness, and

the crude extracts were collected and stored in a refrigerator at 4°C until further phytochemical and antimicrobial analyses.

Extract Screening:

The prepared leaf extracts of *Stephanotis volubilis* were subjected to preliminary phytochemical screening to identify the presence of various bioactive constituents. The extracts were also evaluated for their antimicrobial activity using standard laboratory methods.

Phytochemical Screening

1. TestforTannins(Braymer'sTest)

1mloftheleafextractwasmixedwith2ml of water. To this, 2 drops of 5% ferric chloride solution were added. Appearanceofdirtygreenprecipitateindicatedthe presence of tannins [4, 5].

2. Testforalkaloids

To1ml ofleafextract,6dropsofMayer'sreagent were added. The formation of yellowish creamish precipitate indicated the presence of alkaloids[4, 5].

3. TestforSaponins(FoamTest)

1 mL of leaf extract was mixed with 5ml of distilled water and heated in a boiling water bath.Formation of persistent froth indicated the presence of saponins[4, 5].

4. Testforphenols

1ml of leaf extract was treated with 3% ferric chloride solution.Development of a deep blue coloration indicated the presence of phenols.[6, 7].

5. Testfor flavonoids

1ml of the leafextract was added to 1ml ofH_2SO_4. Orangecolorformationconfirmedthepresenceofflavonoids [6, 7].

6. TestforQuinones

1ml of the leafextract was treated with 5ml of HCL. Formationofyellow colorprecipitateindicatedthepresence of quinones [6, 7].

7. TestforGlycosides

0.5 mg of extract was dissolved in 1ml of water, followed by the addition of aqueous NaOH solution.Development of a yellow coloration indicated the presence of glycosides.[6, 7].

8. Testforsteroids(SalkowskiTest)

To 2ml of the leafextract, 2ml of chloroform was added,

followedbyconcentratedH_2SO_4.Formationof areddish-brown ring at the junction showed the presence of steroids [5, 8, 9].

9. Testforterpenoids

2ml oftheleafextract wastreated with 2ml acetic acid. Then concentrated $H_2SO_4$was added. Deep red color developmentshowedthepresenceof terpenoids[5, 8, 9].

10. TestforCoumarins

2ml of the extract was taken, and 3ml of 10% NaOHwasadded.Formationofyellowcoloration indicated the presence of coumarins [5, 8, 9].

Statisticalanalysis

All experimental data were obtained from three independent replicates and are presented as mean ± standard deviation (SD). Statistical calculations and data analysis were performed using Microsoft Excel.

RESULTS AND DISCUSSIONS

Thephytochemicalscreeningof*Stephanotis volubilis*.Hexane, Ethyl acetate, and methanol extracts showed thepresence of alkaloids, flavonoids, glycosides, steroids, and quinines (Table 1)

Table1:Preliminaryphytochemicalscreeningofleafextractsof*Stephanotis volubilis.*

Sr. No.	Phytochemicalconstituents	Observationfordifferentsolventextracts		
		Hexane	Ethyl acetate	Metahnol
1.	Alkaloids	-	++	+
2.	Coumarins	-	-	-
3.	Flavonoids	-	++	-
4.	Glycosides	+	++	+
5.	Phenolics	-	-	-
6.	Saponins	-	++	-
7.	Steroids	+	+	-
8.	Tannins	-	-	-
9.	Terpenoids	-	-	-
10.	Quinones	+	+	++

-Absent,+Present,++Moderate

The leaf extracts of *Stephanotis volubilis* exhibited notable antimicrobial activity against both Gram-positive and Gram-negative bacteria, as well as fungal strains. Among the tested extracts, the methanolic extract demonstrated the highest antimicrobial activity, producing inhibition zones of 22 mm against *Staphylococcus epidermidis*, *Escherichia coli*, and *Bacillus cereus*. It also showed considerable activity against *Pseudomonas aeruginosa*and *Candida*

albicans, with inhibition zones of 20 mm. The hexane extract exhibited moderate activity, particularly against *Staphylococcus epidermidis* (22 mm). In contrast, the ethyl acetate extract showed comparatively lower antimicrobial activity, with inhibition zones ranging from 10 to 18 mm. Overall, the antimicrobial efficacy of *Stephanotis volubilis* leaf extracts was comparable to that of commercially available antibiotics, indicating their potential as natural antimicrobial agents against Gram-positive bacteria, Gram-negative bacteria, and fungal pathogens (Table 2).

Table2:Antimicrobialanalysisofleaf extractsof *Stephanotis volubilis.*

Sr. No.	**Fungal Pathogens**	**Zoneofinhibition(mm)**		
		Hexane Extract	**Ethyl acetate Extract**	**Methanol Extract**
1.	*Bacilluscereus*	12±0.3	10±0.8	20±0.6
2.	*Staphylococcusepidermidis*	22±0.6	13±0.7	22±0.5
3.	*Escherichiacoli*	16±0.6	14±0.6	22±0.6
4.	*Pseudomonas aeruginosa*	14±0.3	10±0.7	21±0.2
5.	*Beauveriabassiana*	11±0.4	18±0.3	25±0.8
6.	*Candidaalbicans*	14±0.5	10±0.6	20±0.8

*ValuesareMean±S.Eintriplicates

In recent years, secondary metabolites derived from plants have attracted considerable attention as potential sources of novel therapeutic agents[10]. The search for antimicrobial compounds from natural sources has intensified due to the increasing incidence of antimicrobial resistance and the need for safer alternatives to synthetic drugs. Phytochemicals obtained from medicinal plants serve as valuable lead compounds for the development of effective and less toxic antimicrobial agents capable of controlling the growth of pathogenic microorganisms[11, 12].The present study demonstrated that the methanol, ethyl acetate, and hexane leaf extracts of *Stephanotis volubilis* contain bioactive phytochemical constituents and exhibit antimicrobial activity against selected human pathogens. Among the tested extracts, the methanolic extract showed the highest antimicrobial efficacy against both Gram-positive bacteria (*Bacillus cereus* and *Staphylococcus epidermidis*), Gram-negative bacteria (*Escherichia coli* and *Pseudomonas aeruginosa*), and the fungal pathogen *Candida albicans*. The hexane and ethyl acetate extracts also exhibited varying degrees of antimicrobial activity, indicating the presence of compounds with broad-spectrum antimicrobial potential.The findings of the present investigation suggest that *Stephanotis volubilis* possesses significant antimicrobial properties and may serve as a promising source of natural antimicrobial agents. Further studies are required to isolate,

characterize, and evaluate the specific bioactive compounds responsible for the observed antimicrobial activity and to assess their potential therapeutic applications.

CONCLUSION

Present study demonstrates that *Stephanotis volubilis* possesses significant antimicrobial potential due to the presence of various bioactive phytochemical constituents. The leaf extracts exhibited appreciable antimicrobial activity against selected Gram-positive bacteria, Gram-negative bacteria, and fungal pathogens, thereby supporting the traditional medicinal use of this plant. These findings suggest that *Stephanotis volubilis* may serve as a promising source of natural antimicrobial agents for the development of novel therapeutic drugs. However, further investigations are required to isolate, characterize, and identify the active compounds responsible for the observed antimicrobial activity and to evaluate their potential pharmaceutical applications.

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