



PHYTOCHEMICAL SCREENING AND ANTIBACTERIAL ACTIVITY OF *ANTIGONON LEPTOPUS*

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ABSTRACT

The rise of antibiotic-resistant infections has renewed scientific interest in plant-based antimicrobial alternatives. *Antigonon leptopus* Hook & Arn. (family Polygonaceae), known as coral vine or Mexican creeper, has a well-documented history in traditional medicine for managing infections, inflammation, and digestive disorders, yet rigorous scientific evidence remains scarce. This study conducted systematic phytochemical screening and evaluated the antibacterial potential of its leaf extracts against *Escherichia coli*. Three solvent extracts-ethanolic, methanolic, and aqueous -were prepared by maceration and filtered through Whatman No. 1 filter paper. Phytochemical screening followed standard qualitative protocols to detect alkaloids, flavonoids, tannins, saponins, terpenoids, sterols, and glycosides. Antibacterial activity was assessed by agar well diffusion assay at 20 µl, 40 µl, and 60 µl, with zones of inhibition recorded after 24-hour incubation at 27°C. Phytochemical analysis revealed the ethanolic extract was rich in saponins and terpenoids, the methanolic extract contained predominantly tannins, and the aqueous extract was abundant in sterols and glycosides; alkaloids and flavonoids were absent across all systems. Antibacterial results showed the ethanolic extract produced the greatest inhibitory effect against *E. coli*, with a zone of inhibition of 14 mm at 60 µl, followed by the methanolic extract at 12 mm. The aqueous extract showed no measurable activity. These findings confirm that *A. leptopus* leaves harbour biologically active compounds with genuine antibacterial properties, strongest in the ethanolic fraction, lending scientific credibility to its traditional uses and highlighting its potential for natural antimicrobial drug development.

Keywords: *Antigonon leptopus*, Phytochemical screening, Antibacterial activity, Zone of inhibition, Leaves.

INTRODUCTION

Medicinal plants have long been recognized as valuable sources of therapeutic compounds, contributing significantly to the traditional medicine system and modern drug discovery. Many medicinal plants offer valued therapeutic effect these do not get replaced for medicinal plant treatment at a time of serious health conditions (Fatima *et al.*, 2023). Therapeutic potential refers to the possibility that a drug, molecule, biological agent, or treatment approach can be used to prevent, manage or cure a disease. The signaling pathway of plant has therapeutic power is harnessed for the sustainable development (Okechukwu *et al.*, 2025). It represents the promise or capability of a candidate therapy to produce beneficial health effect with acceptable safety. In biomedical research

and biotechnology, the concept of therapeutic potential is crucial because it helps scientist identify which compounds or techniques eventually develop into effective clinical treatment. By studying therapeutic potential researchers evaluate how well a substance, how specifically it targets, disease pathway, and whether it is safe for use in humans. This forms the foundation of drug discovery, clinical research, and the development of modern therapeutic strategies.

Some orthodox medicine has its own methods and techniques of applications which aims at healing diseases (Wurochekke *et al.*, 2008). In recent years, the increasing emergence of antibiotic-resistant pathogen has intensified the research for new, effective and safe for Anti-microbial agents. Plant, being rich repository of bioactive, secondary

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metabolite, offer a promising alternative to synthetic antibiotics. Among these medicinal plants, *Antigonon leptopus*-commonly known as coral vine, Mexican creeper, or chain of love-has gained scientific interest due to its diverse pharmacological properties and traditional uses. *Antigonon leptopus* is a rapid growing perennial climber belongs to the family Polygonaceae. It is widely cultivated as an ornamental plant. This plant thrives on sandy pile up along with the coast beside gullies and stream (Mote *et al.*, 2025). Traditionally various parts of plant, especially the leaves, flowers and roots, has been used for treating elements such as cold, sore throat, stomach disorder, inflammation, and skin infection. These traditional applications suggest the presence of several phytochemicals with significant biological activity. As natural plant derive compound, continue to play a major role in the development of antimicrobial and antioxidant agent, systematic, scientific evaluation of *Antigonon leptopus* has become increasingly relevant. Phytochemicals are naturally occurring, biologically, active plant constituents that serve, defensive and protective roles. The phytochemical testing of medicinal plants is important and having a good commercial source of new drug testing for various diseases (Tambe *et al.*, 2021). These compounds include alkaloids, flavonoids, phenolics, tannins, saponins, terpenoids, glycosides and steroids. Many of the secondary metabolites possesses strong antimicrobial, anti-inflammatory, antioxidant, and anticancer properties. Phytochemicals screening of plants, therefore, become essential to identify the types of compounds present and to ensure their potential, Pharmacological importance. Evaluating these constituents in *Antigonon leptopus* helps in understanding its medicinal value and provides insights into the mechanism behind its traditional uses.

The invention of microorganism that resist antibiotic has to thrust scientist towards the discovery of antibacterial drug (Ahmed *et al.*, 2019). The antibacterial potential of plant extract is particularly important in the context of rising global antimicrobial resistance. Bacterial infection caused by pathogen such as *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Bacillus subtilis* remain as bacteria evolve a major public health

concern. Many synthetic antibiotics are becoming less effective as bacteria evolve resistance mechanism, creating an urgent need for novel antimicrobial sources. Medicinal plant like *Antigonon leptopus* may serve as promising candidates for developing new antibacterial agents due to their complex, chemical composition, which make it more difficult for bacteria to develop resistance. The study aims to determine the antibacterial activity of *Antigonon leptopus* extract and to conduct a comprehensive phytochemical. By analyzing the presence of secondary metabolites and evaluating their effect against selected bacterial strain, the research provides scientific evidence supporting the plant's traditional medicinal uses. Overall, evaluating the phytochemicals profile and antibacterial potential of *Antigonon leptopus* not only enhances our understanding of its medicinal significance, but also supports the ongoing search for plant-based alternatives to conventional antibiotics.

MATERIALS AND METHODS

Collection of Plant material

Plant samples were collected from Theological College, South Civil Line, Jabalpur, Madhya Pradesh, India.

Preparation of Plant Extract

Wash the leaves thoroughly with distilled water and allow them to air-dry. Next, crush the leaves using a mortar and pestle to form a smooth paste. Squeeze the paste into a beaker to collect the crude plant extract, then filter this liquid through filter paper into a separate beaker to obtain the pure extract.

Solvent Extraction

10ml sample added in 90ml of ethanol, methanol and distilled water. Extract was kept for 24hr at room temperature. The mixture was then filtered with the help of Whatman's NO.1 filter paper. The filtrate was used for the antibacterial activity and phytochemical screening using following test.

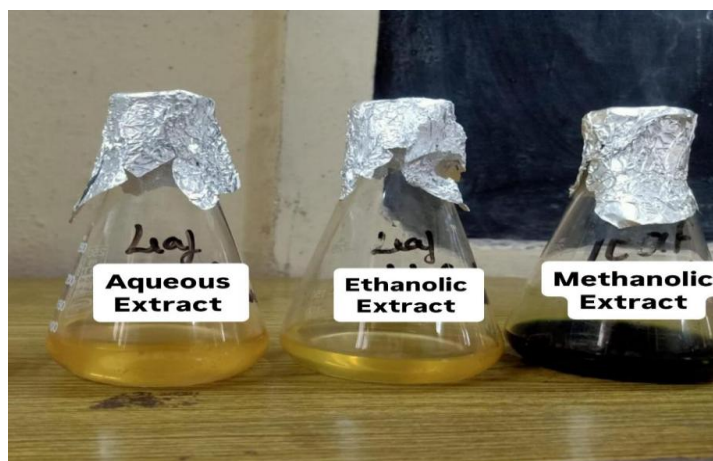


Figure 1. Represent Aqueous, Ethanolic, Methanolic fresh extract of plant *Antigonon leptopus*.

Phytochemical Screening

The Phytochemical screening of plant extract was performed to identify the main classes of compound (Tannins, Saponins, Alkaloid, Phenols, Glycosides, Steroids, and Terpenoids) present in the extracts following standard protocol.

Test for Alkaloids

Mayers Reagent is a chemical solution used to test for the presence of alkaloids which often found in natural product it is prepared by mixing Potassium Iodide and Mercuric chloride in water (Shaikh, J. R., & Patil, M. 2020).

Test for Flavonoids

Alkaline reagent test, the test solution, a few drops of NaOH solution were added formation of intense yellow color which turns to colorless by addition of few drops of dilute acetic acid indicated the presence of flavonoids (Yadav *et al.*, 2017).

Test for Tannins

Ferric chloride test, the test solution was added. An intense green, purple, blue or black color indicated the presence of them (Yadav *et al.*, 2014).

Test for Saponins

Froth test extract was added to 2-3ml of distilled water. The mixture was shaken vigorously. Formation of foam indicated the presence of saponin (Rangnathrao *et al.*, 2018).

Test for Terpenoids

Salkowski test is a chemical test used to detect the presence of terpenoids. A positive result is indicated by the reddish-brown or yellow layer formation (Ayoola *et al.*, 2008).

Test for Keller-Killiani test

Keller-Killiani test is a chemical series to identify cardiac glycosides. A positive result is shown by a reddish brown forming at junction of two liquids (Shreshtha *et al.*, 2015).

Test for Steroids- Liebermann

Burchard test, a chemical test used for the detection and qualification of sterols and steroids (Zohra *et al.*, 2012).

Antibacterial Testing

Test Organism- *E. coli* was procured from Central Research Laboratory, Mata Gujri Mahila Mahavidyalaya (Autonomous) Jabalpur (M.P). Antibacterial Testing- Antibacterial activity was performed by Agar well diffusion assay. Then plates were prepared 20ul, 40ul, and 60ul bacteria suspension was played on the prepared NAM (nutrient agar) plates under laminar air flow by spread plate method. Well of 4-5mm diameter was prepared on the plates with the help of sterilize cork borer. The filtrate was filled in the well with the help of micropipette. These plates then kept in bacteriological incubator at 27° for 24 hours. After incubation, the activity was recorded in terms of zone of inhibition in mm.

RESULTS AND DISCUSSION

Phytochemical Screening of different extract of *Antigonon leptopus* was done. Flavonoids, Tannins, Alkaloids, Glycosides were not present whereas, Saponins, Terpenoids, Sterol, are present in the ethanolic extract of *Antigonon leptopus* in first 24hrs in which Terpenoids comes highly accurate which means high amount of terpenoid are present. Similar observation has also been seen by so many workers. Flavonoids, Sterol, Alkaloids, Glycosides, are not present whereas, Saponins, Tannins, Terpenoids are present in the methanolic extract of *Antigonon leptopus* after 24hrs in which Tannins comes highly accurate which means high number of Tannins are present. Similar observation has also been seen by so many workers. Flavonoids, Tannins, Alkaloids are not present whereas, Saponins, Terpenoids, Sterol, Glycosides are present in aqueous extract of *Antigonon leptopus*. In which high amount of Sterol and Glycosides are present. Similar observation has been reported by so many other workers. In the present study, the leaf extract of *Antigonon leptopus* was evaluated for its antibacterial activity against *E. coli* (bacterial strain) using the Agar well diffusion method. The result revealed that the extract exhibits inhibitory effect on the growth of the tested microorganism across all concentration, used zone of inhibition was observed, indicating the presence of anti-bacterial potential in the leaf under the experimental conditions. They suggest that the active phytochemicals responsible for antimicrobial properties present in the leaves part of the plant *Antigonon leptopus*. The detailed result is summarized in the table below. Anti-bacterial activity of leaf ethanolic extract (20µl/ml, 40µl/ml, 60µl/ml) and control tetracyclin was evaluated. Maximum zone of inhibition showed at 60µl/ml comparing to other concentrations. Leaf ethanolic extract has showed maximum antibacterial activity by *E. coli* (60µl/ml) concentration (Figure 2).

Table 1. Phytochemical analysis of plant *Antigonon leptopus* fresh extract for first 24hrs.

S.No	Phytochemical Component	Ethanol Extract	Methanol Extract	Aqueous Extract
1.	Flavonoids	-	-	-
2.	Saponin	++	+	+
3.	Tannins	-	++	-

4.	Terpenoids	++	+	+
5.	Sterol	+	-	++
6.	Alkaloids	-	-	-
7.	Glycosides	-	-	++

Table 2. Antibacterial Activity of *Antigonon leptopus* leaf extract (Ethanol, Methanol, Aqueous).

S.No	Plant Name	Solvent extract	Sample concentration	Zone of inhibition against <i>E. coli</i>
1	<i>Antigonon leptopus</i>	Ethanol	20µl	11mm
			40µl	13mm
			60µl	14mm
			Negative Control (60µl)	-
			Positive control	26mm
		Methanol	20µl	-
			40µl	11mm
			60µl	12mm
			-ve	-
			+ve	24mm
2	<i>Antigonon leptopus</i>	Distilled Water	20µl	-
			40µl	-
			60µl	-
			-ve	-
			+ve	24mm

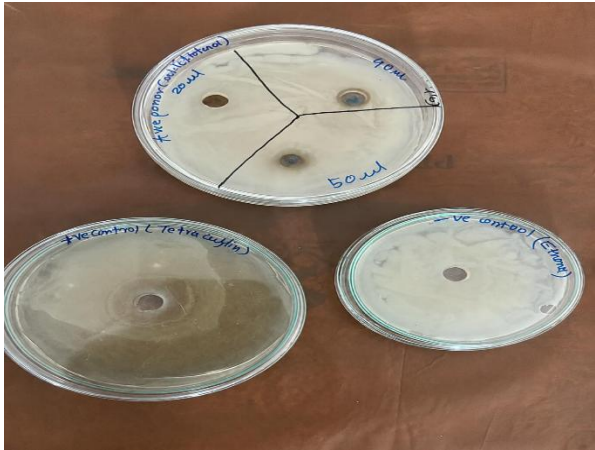


Figure 2. Antibacterial activity of ethanolic leaf extract against *E. coli*.

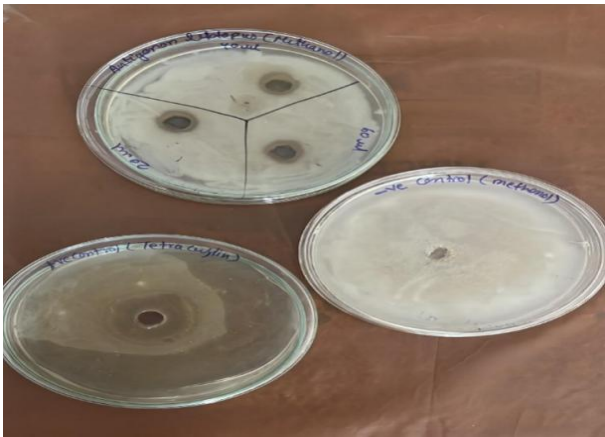


Figure 3. Antibacterial activity of methanolic leaf extract against *E. coli*.



Figure 4. Antibacterial activity of aqueous leaf extract against *E. coli*.

Anti-bacterial activity of leaf methanolic extract (20µl/ml, 40µl/ml, 60µl/ml) and control tetracyclin was evaluated. Maximum zone of inhibition showed at 60µl/ml comparing to other concentration and no zone showed at 20µl/ml. Leaf methanolic extract has showed maximum antibacterial activity by *E. coli* (60µl/ml) concentration (Figure 3). Anti-bacterial activity of leaf aqueous extract (20µl/ml, 40µl/ml, 60µl/ml) and control tetracyclin was evaluated. No zone of inhibition is showed in any of the concentrations. Leaf aqueous extract has showed no antibacterial activity by *E. coli* in any concentration (Figure 4).

CONCLUSION

The study on the determination of antibacterial potential and phytochemicals screening of *Antigonon leptopus* clearly demonstrate that the plant is a valuable source of biological active compound. The phytochemical analysis confirmed the abundant presence of flavonoids, tannins, saponins, terpenoids and alkaloids all of which are well known for their protective and therapeutic activities. These secondary metabolites contribute significantly to the plants' pharmacological properties and to the biochemical basis of their traditional medicinal uses. In this study we prepare three types of extracts - Ethanolic extract, Methanolic extract, Aqueous Extract for phytochemical screening and antibacterial testing. The present study demonstrates that *Antigonon leptopus* leaves contains several important phytochemicals, including saponins, terpenoids, tannins, alkaloids, flavonoids, sterols and glycosides. Phytochemical analysis showed that the ethanolic extract was rich in saponin and terpenoids, the methanolic extract contained a higher number of tannins, and the aqueous extract was rich in sterols and glycosides. Antibacterial evaluation revealed that the ethanolic extract exhibits the highest antibacterial activity, producing a zone of inhibition of 14mm at 60µl concentration, followed by the methanolic extract with a zone of inhibition of 12mm at same concentration. No antibacterial activity was observed in the

aqueous extract. Therefore, it can be concluded that the ethanolic extract of *Antigonon leptopus* leaves possess the most promising antibacterial potential and may serve as a potential source of natural antimicrobial compounds for further pharmaceutical purposes.

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CONFLICT OF INTERESTS

The authors declare no conflict of interest

ETHICS APPROVAL

Not applicable

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AI TOOL DECLARATION

The authors declare that no AI and related tools are used to write the scientific content of this manuscript.

DATA AVAILABILITY

Data will be available on request

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