



ORIGINAL ARTICLE

Screening of Antimicrobial Properties of *Vitex negundo* (Nirgundi)

Lalit Gupta¹ and Shaili Yadav²

¹Dept. of Zoology, Janta college, Bakewar (Etawah)

²Dept. of Biotechnology, Janta college, Bakewar (Etawah)

Email: drlalit@rediffmail.com

ABSTRACT

Medicinal plants have been a vital source of therapeutic agents since ancient times. The present study investigates the antimicrobial activity of *Vitex negundo*, a traditionally important medicinal plant. Extracts of the plant were tested against selected bacterial strains using standard microbiological techniques. The results demonstrated significant antimicrobial activity, indicating the potential of *Vitex negundo* as a natural antimicrobial agent. This study supports the use of plant-based compounds as alternatives to synthetic drugs.

Keywords: *Vitex negundo*, antimicrobial activity, medicinal plants, phytochemicals, bacterial inhibition

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INTRODUCTION

Long before mankind discovered the existence of microbes, the idea that certain plants had healing potential, indeed, that they contained what we would currently characterize as antimicrobial principles, was well accepted. Since time immemorial, plants are used as a source of medicines; Traditional medicine is the most ancient art of medical practice (Soforowa, 1986). The Charak Samhita, an ageold written document on the herbal therapy, reports on the production of 340 herbal drugs and their indigenous uses. (Shastri *et al.*, 1965) Dioscorides (40-90 A.D.) De material medica-encyclopedia of medicinal plants that was major gospel of plant medicines form hundreds of years. Since antiquity, man has used plants to treat common infectious diseases and some of these traditional medicines are still included as part of the habitual treatment of various maladies. For example, the use of bearberry (*Arctostaphylos uva-ursi*) and cranberry juice (*Vaccinium macrocarpon*) to treat urinary tract infections is reported in different manuals of phytotherapy, while species such as lemon balm (*Melissa officinalis*), garlic (*Allium sativum*) and tee tree (*Melaleuca alternifolia*) are described as broad-spectrum antimicrobial agents (Heinrich *et al.*, 2004). That being said, it has generally been the essential oils of these plants rather than their extracts that have had the greatest use in the treatment of infectious pathologies in the respiratory system, urinary tract, gastrointestinal and biliary systems, as well as on the skin. In the case of *Melaleuca alternifolia*, for example, the use of the essential oil (tee tree oil) is a common therapeutic tool to treat acne and other infectious troubles of the skin.

This study focuses on evaluating the antimicrobial potential of *Vitex negundo* extracts against selected microorganism.

REVIEW OF LITERATURE

Since ancient times, plants have been widely used in traditional medicine systems due to their therapeutic properties. Historical texts such as Charak Samhita describe the use of herbal remedies for treating various diseases (Heinrich 2004). Many plants contain bioactive compounds with antimicrobial properties that help combat infectious diseases (Singh *et al.*, 2007).

With the increasing problem of antibiotic resistance, there is a growing need to explore alternative sources of antimicrobial agents. *Vitex negundo* (commonly known as Nirgundi) is a well-known medicinal plant used in Ayurveda for its anti-inflammatory, analgesic, and antimicrobial properties (Sharma *et al.*, 2023).

The herb *nirgundi* is abundant and has pharmacological effects against a variety of ailments in conventional medicine (Gawali *et al.*, 2023). Numerous secondary metabolites, including alkaloids, phenols, flavonoids, glycosidic iridoids, tannins, and terpenes, are present in all parts of the plant, but especially in the leaves. The plant is said to have a variety of therapeutic uses due to its abundance of phytochemicals, including antibacterial, anti-inflammatory, astringent, bronchodilator, CNS depressant, emmenagogue detoxifying, diuretic, anticancer, and hepatoprotective properties. In addition, it has larvicidal, insecticidal, and repellent uses (Sharma *et al.*, 2023).

MATERIALS AND METHODS

1. Plant Material Collection: Fresh leaves of *Vitex negundo* were collected from a local area and properly identified.

2. Preparation of Extract: Leaves were washed, dried, and powdered.

Extracts were prepared using suitable solvents e.g., Acetone/methanol/water.

The extract was filtered and stored for further use.

3. Test Microorganisms: Selected bacterial strain e.g., *E. coli* was used for testing.

4. Antimicrobial Assay: Agar well diffusion method was used.

Extract (1mg/ml standard) was introduced into wells on agar plates in 0.2, 0.4, 0.6, 0.8 and 1 ml concentration respectively.

Plates were incubated at temperature of 37°C for 24 hours in BOD. Zone of inhibition was measured in different concentrations of extract against *E. coli*. The comparison was made between leaf extracts in solvents and antibiotic ampicillin solution.

RESULTS AND DISCUSSION

The leaves of *Vitex negundo*, showed no inhibitory effect on bacterial strain when extracted with distilled water. But methanol and acetone extracts showed valuable inhibition against bacterial strain *E. coli*.

The maximum zone of inhibition was observed in case of methanol and ethanol extract at 0.8 ml and 1.0 ml conc. respectively having zone of diameter 0.9 cm and 1 cm for methanol, whereas acetone showed 0.5 and 0.6 cm diameter against *E. coli*. Control showed maximum zone of inhibition with 1.3 cm diameter at 1.0 ml of antibiotic dilution against *E. coli* (Table1) (Fig. 3-6).

In *Vitex negundo* both methanol and acetone extracts are effective against *E. coli* strain. Therefore, we can conclude that methanol extract is the most effective against *E. coli* and methanol is best solvent. The order of effectiveness of solvent phase for extraction of effective antimicrobial on the basis of zone of inhibition is;

E. coli- Methanol>Acetone> Distilled water

Table1: Antimicrobial activity of *Vitex nergundo* extracts against the *E. coli*

Solvent Phase	0.2	0.4	0.6	0.8	1.0
Control	NA	0.8	0.9	1	1.3
D/W	-	-	-	-	-
Methanol	0.5	0.8	0.8	0.9	1
Acetone	0.3	0.4	0.5	0.5	0.6



Fig. 1: Leaf extracts in acetone, methanol and DW



Fig. 2: Solvent preparation

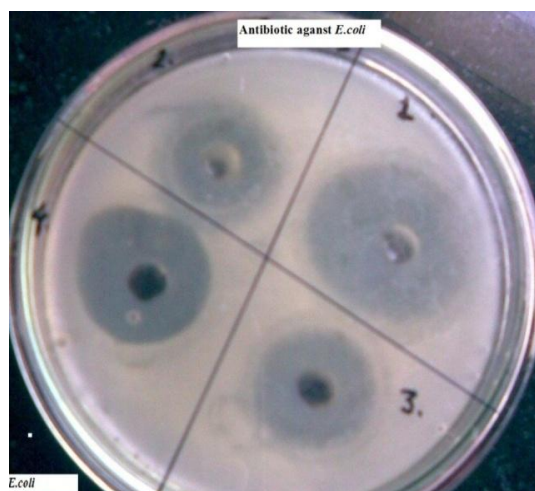


Fig. 3: Zone of resistance of antibiotic against *E. coli*

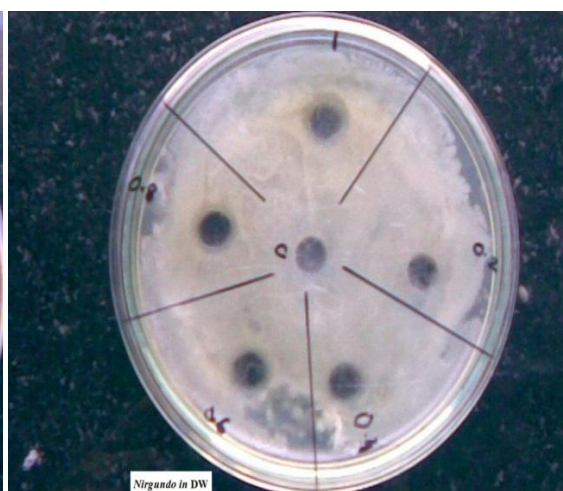


Fig. 4: Antimicrobial activity of leaf extract in DW

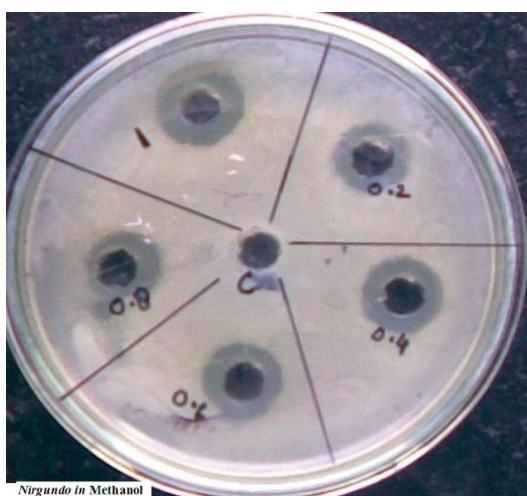


Fig. 5: Antimicrobial activity of leaf extract in methanol

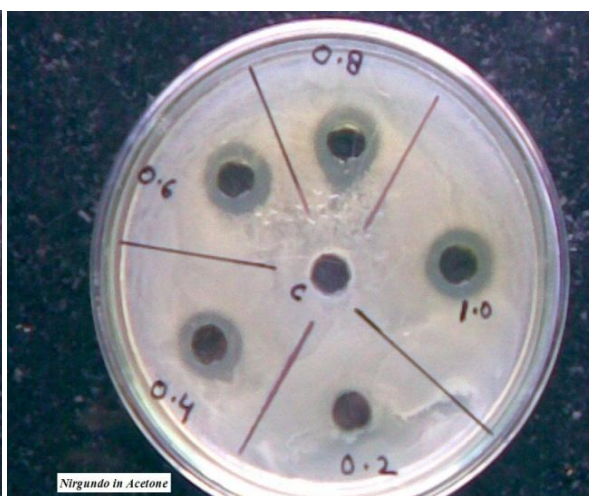


Fig. 6: Antimicrobial activity of leaf extract in acetone

CONCLUSION

The antimicrobial activity observed in *Vitex negundo* may be due to the presence of bioactive compounds such as: flavonoids, alkaloids, tannins, essential oils. These compounds interfere with microbial cell walls, enzymes, or metabolic pathways, leading to inhibition of growth.

The results support traditional uses of the plant and suggest its potential in developing plant-based antimicrobial drugs. Further studies are required to isolate active compounds and evaluate their clinical applications.

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