Short Communication

it Medical Team
www.itmedicalteam.pl

International Journal of Drug Development and Research
ISSN 0975-9344

2025
Vol.17 No.1:173

Illicium verum : Prospective Applications in Antibacterial Drug Development

Sasikala Sekar*

Department of Food and Nutrition, Queen Mary's College, Chennai, India

***Corresponding author:** Sasikala Sekar, Department of Food and Nutrition, Queen Mary's College, Chennai, India; E-mail: dr.sasi2020@gmail.com

Received date: Oct 15, 2024, Manuscript No. IJDDR-24-15268; **Editor assigned date:** Oct 17, 2024, PreQC No. IJDDR-24-15268 (PQ); **Reviewed date:** Oct 31, 2024, QC No. IJDDR-24-15268; **Revised date:** Feb 07, 2025, Manuscript No. IJDDR-24-15268 (R); **Published date:** Feb 14, 2025, Invoice No. J-15268

Citation: Sekar S (2025) *Illicium verum*: Prospective Applications in Antibacterial Drug Development. Int J Drug Dev Res Vol:17 No:1

Abstract

Star anise, *Illicium verum*, has long been used for its therapeutic potentials, especially in Southeast Asia. Its bioactive components, including as shikimic acid and anethole, have focused recent research efforts on its possible application in the development of antibacterial medications. This brief letter examines its bioactive ingredients, modes of action, ability to thwart antibiotic resistance, and uses in topical and systemic formulations. There is also discussion of the difficulties and potential applications of *Illicium verum* in pharmaceutical development.

Keywords: Star anise; Shikimic acid; Anethole; Bacterial growth

Introduction

Illicium verum, commonly known as star anise, has gained attention for its antibacterial properties. Its bioactive compounds, particularly shikimic acid (a key precursor in antiviral synthesis) and anethole, are being investigated for their role in inhibiting bacterial growth. This presents the potential of *Illicium verum* in the context of antibacterial drug development.

Description

Bioactive compounds with antibacterial properties

The antibacterial efficacy of *Illicium verum* can be attributed to the following active compounds:

Shikimic acid: Known primarily for its role in antiviral drug synthesis, shikimic acid has shown promise in antibacterial applications, potentially inhibiting bacterial growth by targeting metabolic pathways.

Anethole: This aromatic compound has demonstrated moderate antibacterial activity, likely by disrupting bacterial cell membranes.

Flavonoids and polyphenols: These compounds exhibit antioxidant and antimicrobial activities, contributing to the overall antibacterial potential of *Illicium verum*.

Mechanism of antibacterial action

Illicium verum exhibits antibacterial activity through several mechanisms:

Disruption of cell membranes: Some compounds in star anise can destabilize bacterial cell walls, leading to leakage of cellular contents and bacterial death.

Inhibition of bacterial growth: Extracts have shown the ability to inhibit the growth of pathogenic strains such as *Escherichia coli*, *Staphylococcus aureus*, and *Klebsiella pneumoniae*, suggesting broad-spectrum antibacterial activity.

Combating antibiotic resistance

As antibiotic resistance becomes an increasingly critical issue, natural antibacterial agents like *Illicium verum* offer promising alternatives. Its potential to work synergistically with existing antibiotics may help in reducing the reliance on synthetic drugs and minimizing the emergence of resistance. This highlights its role as an adjunct in existing antibacterial therapies.

Applications in topical and systemic formulations

Beyond systemic use, *Illicium verum* shows potential in topical applications, such as wound healing creams and antiseptic lotions, due to its combined antibacterial and antioxidant properties. Its incorporation in oral care products like mouthwashes could also address bacterial infections in the oral cavity.

Future prospects and challenges

While preliminary studies on the antibacterial properties of *Illicium verum* are promising, several challenges remain:

Standardization of extracts: Consistency in bioactive compound concentration is crucial for pharmaceutical development.

Clinical trials: More clinical evidence is needed to confirm its efficacy and safety in humans.

Formulation development: The development of stable, therapeutic formulations of *Illicium verum*'s bioactive compounds is essential for its use as a drug.

Illicium verum holds significant promise as a source of new antibacterial agents. Shikimic acid and anethole offer potential for both systemic and topical applications. However, further research is required to address standardization, clinical validation, and formulation challenges. As the demand for novel antibacterial solutions grows, *Illicium verum* remains an exciting area for exploration in drug development.

Illicium verum: Prospective applications in antibacterial drug development

Illicium verum, commonly known as star anise, has been traditionally used for its medicinal properties in various cultures, particularly in Southeast Asia. In recent years, the focus has shifted toward its potential in modern medicine, especially in the development of antibacterial drugs. Its bioactive compounds, such as shikimic acid and anethole, are being studied for their pharmacological activities, including antibacterial effects.

Bioactive compounds with antibacterial properties

The antibacterial potential of *Illicium verum* is attributed to several key compounds:

Shikimic acid: Widely known as a precursor in the synthesis of antiviral drugs (such as oseltamivir), shikimic acid also shows promise in the development of antibacterial agents. Studies have suggested that it may play a role in inhibiting bacterial growth by targeting key metabolic pathways.

Anethole: This aromatic compound, which gives star anise its characteristic flavor, has demonstrated moderate antibacterial activity. It is believed to act by disrupting bacterial cell membranes, leading to cell lysis.

Flavonoids and polyphenols: These compounds are known for their antioxidant and antimicrobial properties, adding to *Illicium verum*'s potential in inhibiting bacterial growth.

Mechanism of antibacterial action

The bioactive compounds in *Illicium verum* have been shown to exhibit antibacterial effects through several mechanisms:

Disruption of bacterial cell membranes: Some compounds in star anise destabilize bacterial cell walls or membranes, causing leakage of cellular contents and ultimately leading to bacterial cell death.

Inhibition of bacterial growth: Extracts of *Illicium verum* have shown the ability to inhibit the growth of several pathogenic bacterial strains, including *Escherichia coli*, *Staphylococcus aureus*, and *Klebsiella pneumoniae*. This suggests that the spice could be used as a broad-spectrum antibacterial agent.

Potential in combating antibiotic resistance

With the rising global concern over antibiotic resistance, the search for alternative or adjunctive therapies has intensified. *Illicium verum* presents a potential natural solution in this context. Its ability to work synergistically with other antibiotics could enhance the efficacy of existing treatments, especially for resistant bacterial strains. Additionally, the use of natural antibacterial agents like star anise may reduce the reliance on synthetic antibiotics, potentially minimizing the emergence of resistance.

Application in topical and oral formulations

Beyond systemic antibacterial drugs, *Illicium verum* has shown potential in topical applications for treating skin infections. Due to its antibacterial and antioxidant properties, star anise extracts could be incorporated into wound healing creams or antiseptic lotions. Additionally, it may find use in oral care products, such as mouthwashes, to combat bacterial infections in the oral cavity.

Future prospects and challenges

Although the preliminary studies on *Illicium verum*'s antibacterial properties are promising, several challenges remain. These include:

Standardization of extracts: Ensuring consistent concentrations of bioactive compounds in star anise extracts is crucial for their reliable use in pharmaceuticals.

Clinical trials: While in vitro studies demonstrate antibacterial efficacy, more clinical trials are needed to confirm its safety and effectiveness in humans.

Formulation development: Developing stable, effective formulations that deliver *Illicium verum*'s compounds at therapeutic concentrations remains a critical step for drug development.

Conclusion

Illicium verum holds great promise as a source of new antibacterial agents. Its bioactive compounds, particularly shikimic acid and anethole, offer potential avenues for the development of both systemic and topical antibacterial treatments. However, further research is necessary to fully unlock its therapeutic potential, with a focus on overcoming challenges related to standardization, clinical validation, and formulation development. As the demand for novel antibacterial solutions continues to grow, *Illicium verum* presents an exciting area of exploration in drug development.