WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.453
Volume 14, Issue 1, 381-385. Review Article ISSN 2277–7105

ANTI- MICROBIAL ACTIVITY OF ADHATODA VASICA (A. VASICA) LEAF EXTRACT

Kirti Burman, Ganu Gavade*, Wahed Patel and Mohinee Nagpure

Bansal College of Pharmacy, Kokta, Anand Nagar, Bhopal, MP-462021, India.

Article Received on
12 November 2024,
Revised on 02 Dec. 2024,
Accepted on 22 Dec. 2024
DOI: 10.20959/wjpr20251-35066

***Corresponding Author**
Ganu Gavade
Bansal College of Pharmacy, Kokta, Anand Nagar, Bhopal, MP-462021, India.

ABSTRACT

This Adhatoda vasica, commonly known as "Vasaka" or "Malabar nut," is a medicinal plant widely distributed in tropical and subtropical regions, particularly in India. It has been traditionally used in the treatment of respiratory ailments, asthma, bronchitis, and other inflammatory conditions. In recent years, there has been growing interest in studying its pharmacological properties, including its anti-microbial activity.

Index terms: Malabar nut, treatment of respiratory ailments, anti-microbial activity.

INTRODUCTION

Adhatoda vasica Nees, (Family Acanthacea), commonly known as vasa or vasaka, is a well-known herbal drug in Ayurvedic, Unani and Homeopathic system of medicines. Vasaka is widespread throughout India and tropical regions of Southeastern Asia. This plant is a source of vitamin C and has other phytoconstituents with their proven medicinal value.

Justicia adhatoda commonly known in English as Malabar nut, adulsa, adhatoda, vasa, vasaka, is native to Asia. Adathoda means 'untouched by goats' in Tamil. The name derives from the fact that animals like goats do not eat this plant due to its extreme bitter taste.

Chemical Composition of A. vasica Leaves: The antimicrobial effects of Adhatoda vasica are largely attributed to its chemical constituents, particularly alkaloids, flavonoids, and essential oils. The primary alkaloid, Vasicine, has been identified as one of the major bioactive compounds, along with Vasicinone and other quinazoline derivatives. These

compounds are believed to contribute to its therapeutic potential by exhibiting anti-inflammatory, anti-bacterial, anti-fungal, and anti-viral properties.

Anti-microbial activity: Activity Reported studies have revealed the anti-microbial activity of the alcoholic and water extracts of leaves and roots of J. adhatoda plant when tested against Staphylococcus aureus and E. coli. Toxicity studies: Chronic oral toxicity studies with vasicine HCl in arts and monkeys for six months administered orally at 2.5-20 mg/kg did not produced any toxic effects (Pahwa et al., 1987).

Anti-Bacterial activity: Several studies have investigated the antibacterial activity of Adhatoda vasica leaf extracts against various pathogenic bacteria. The ethanol, methanol, and aqueous extracts of A. vasica leaves have shown significant inhibitory effects against a range of bacterial strains, including Escherichia coli, Staphylococcus aureus, Bacillus subtilis, Pseudomonas aeruginosa, and Salmonella typhi.

Anti-Fungal activity: In addition to its antibacterial properties, A. vasica leaf extracts have shown anti-fungal activity. Studies have found the plant to be effective against fungi such as Candida albicans, Aspergillus niger, and Trichophyton mentagrophytes. These results suggest that A. vasica could be a potential candidate for developing treatments for fungal infections.

Anti-Viral activity: Though less widely studied, some research indicates that A. vasica may also exhibit antiviral properties. Preliminary studies have shown that certain compounds in the leaf extracts of A. vasica can inhibit the replication of viruses such as the Herpes simplex virus (HSV) and the Influenza virus. However, more in-depth research is needed to fully understand its antiviral potential.

Mechanism of action: The antimicrobial mechanisms of Adhatoda vasica are still being explored, but several studies have suggested that its bioactive compounds may act by disrupting bacterial cell walls, inhibiting protein synthesis, or interfering with the replication of microorganisms. The alkaloid Vasicine has been shown to exhibit antimicrobial activity by binding to microbial DNA and preventing its replication, thus hindering microbial growth.

Synergistic effects: Several studies have also examined the potential synergistic effects of A. vasica leaf extracts when used in combination with other plant extracts or antibiotics. The combination of A. vasica with other herbal remedies has been found to enhance its

antimicrobial activity, suggesting its potential in the development of polyherbal formulations to combat microbial resistance.

Plan of work for Phytochemical and Antimicrobial activity of leaves extract: The leaves of Adhatoda Vasica were collected from home garden, Bilhari, Jabalpur (MP). Collected leaves were specifically separate out from other plant parts. Collected sample were washed with water to remove unwanted particles and dust. Leaves of A. vasica were dehydrated and the size of the plant materials was reduced to moderate coarse powder. The dried plant materials were subjected to loss on drying test. The initial weight of leaves material was recorded. After drying, the leaves were weighed. This procedure was repeated until a constant weight was obtained. The powdered samples were sieved using sieving machine with mesh size 75 µ to achieve sample powder in even size. Small sized particle can release more extract so the 75 µ mesh sieved powder was preferred for the extraction process.

Extraction: The uniformly powdered samples were subjected to double extraction using Soxhlet extraction and column chromatographic extraction process to increase the quantity as well as to attain purity of extracted components from the plant materials of A. vasica. For the extraction process, solvents were selected based on their polarity (acetone, and methanol). In this method, 4 g of powdered substance was taken and 600 ml of solvent was used. The extraction process was carried out at the boiling point the solvent used for about 6–8 h and 6 cycles as preliminary extraction. All the chemical and solvents used were of analytical grade and were used as received without any further purification.

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