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Antibacterial activity of important medicinal plant Justicia adhatoda

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ABSTRACT:

Justicia adhatoda L., an Indian medicinal herb, has long been used in Unani and Ayurvedic medicine treatments for respiratory ailments. It is widespread in the Indian subcontinent. There are numerous well-known pharmacological effects of plant leaves, including their antifungal and antibacterial properties. Studies have highlighted the antibacterial qualities of vasicine and vasicinone, two of its primary bioactive ingredients. Nevertheless, not much has been done to shift the focus of microbiology activities. In the current investigation, the plant's potential as a potent and antibacterial agent was therefore examined.

We are interested in learning if the plant extract J. adhatoda L. has any antimycobacterial properties against *Salmonella typhi, E. coli, B. subtilis, and S. aureus*. Every study result in SCDA media has shown antibacterial activity against difficult pathogens. According to the test results, *B. subtilis* outperformed the other microorganisms under study in terms of inhibitory zone (15 mm) at 1000 mg concentration. The chemical-containing extract sample had more potent antibacterial action. The molecule included in the extract sample has been discovered to have important medicinal applications, especially with regard to its antifungal and antibacterial qualities, as a result of the experiment's results.

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Keyword: Antibacterial, *Salmonella typhi, E. coli, B. subtilis, and S. aureus.*

1. Introduction:

The leaves of a shrub known as Justicia adhatoda are 8–9 cm long and 4 centimeters wide, with 10–20 lance-shaped leaves. They are borne on short petioles, have smooth margins, and are orientated oppositely. They have a bitter taste. When a leaf is examined under a microscope after being cleaned with chloral hydrate, the oval stomata are visible. Two crescent-shaped cells that are perpendicular to the ostiole surround them. Simple one- to three-celled warty hairs and tiny glandular hairs are present in the epidermis. On the underside of the blade, directly beneath the epidermis, are cystoliths [1]. Antibacterial, antifungal, anti-inflammatory, anti-ulcer, anti-oxidative, anti-tubercular, anti-tussive, larvicidal, anti-Alzheimer, and hepatoprotective qualities are among the many studies that have demonstrated the effectiveness of J. adhatoda [2]. Effective inhibitors include isotine and vasicoline from Pemirolast and Justicia adhatoda. All three of these chemicals are currently marketed as medications, therefore conducting a preliminary clinical trial to tackle the epidemic is likely to be beneficial. We suggested different drugs for different goals and stages of viral infection [3]. J. adhatoda has been traditionally used for a variety of ailments, including oral issues, tumors, painful eyes, bronchitis, leprosy, leucoderma, thirst, fever, memory loss, heart problems, jaundice, and venereal illnesses [4]. J. adhatoda is a well-known plant remedy in herbal and homeopathic therapy [5]. It has certain medicinal properties and is used by doctors of Ayurveda. It has been used to treat many different diseases and ailments, especially those of the respiratory system. Because of this, it is a significant herb in the Ayurvedic system and is used to treat asthma, bronchitis, and common cold symptoms [6].

2. Material and Method:

2.1 Plant Collection and Identification:

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All of the collected and preserved plant pieces are contained in a dried plastic bag. After all of the cleaning and washing was done, the plant pieces were assembled in another beaker.

2.2 Media Preparation:

2.2.1 SCDA:

40.0 grams should dissolve in 1000 milliliters of distilled or filtered water. Apply heat if necessary to completely dissolve the medium. When needed, transfer into tubes or flasks after thoroughly stirring. Sterilize by autoclaving at 121°C for 15 minutes with 15 pounds of pressure. final pH of 7.33.

When inoculating no more than 100 cfu for the shortest time possible (at 30-35°C for 18–24 hours for bacteria and 5 days for fungi), clearly discernible growth of microorganisms comparable to that previously obtained with previously tested and authorised lot of medium occurs. According to IP guidance, growth promotion is done.

2.3 Culture Enumeration:

Readymade culture of ***S. bongori B. subtilis*** and ***A. niger*** is used or culture enumeration activity.

2.4 Zone of Inhibition method:

Move the SCDA agar medium plates to the biosafety cabinet. After removing the B. subtilis culture tubes, carry out the spare plate process. Utilize two SCDA plates for testing, and on each plate, use a cork borer to form a single cup with an 8.0 mm diameter. Fill a petri dish with 100 microliter of each sample solution for the extracts. Keep the plates in this position for one hour to allow for diffusion of the solution. Gently place the plates in an incubator heated to 30-35 °C so that no dilution seeps into the cups. Incubate the Petri dishes at 30-35°C for a whole day. Same procedure follow to all organism.

3. Results and Discussion:

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***E coli*:**

To determine its antibacterial efficacy, the zone of inhibition method's area diameter of sample extracts on 250 mg, 500 mg, and 1000 mg concentration solutions was examined. The extract sample proved effective against *E.Coli.* It was found that a sample's average zone inhibition measured in millimeters in solutions of 250 mg, 500 mg, and 1000 mg concentrations was 04 mm, 02 mm, and 05 mm, respectively**.**

This study is similar to, methanolic extract of J. adhatoda showed positive antibacterial activity against *P. aeruginosa, S. aureus, and B. subtilis* but failed to inhibit E. coli [7].

Salmonella typhi:

To determine its antibacterial efficacy, the zone of inhibition method's area diameter of sample extracts on 250 mg, 500 mg, and 1000 mg concentration solutions was examined. The extract sample proved effective against *Salmonella typhi.* It was found that a sample's average zone inhibition measured in millimeters in solutions of 250 mg, 500 mg, and 1000 mg concentrations was 02 mm, 07 mm, and 03 mm, respectively**.**

This study is similar to, methanolic extract of J. adhatoda showed positive antibacterial activity against *P. aeruginosa, S. aureus, and B. subtilis* but failed to inhibit E. coli [7].

Streptococcus aureus:

To determine its antibacterial efficacy, the zone of inhibition method's area diameter of sample extracts on 250 mg, 500 mg, and 1000 mg concentration solutions was examined. The extract sample proved effective against ***Streptococcus aureus***. It was found that a sample's average zone inhibition measured in millimeters in solutions of 250 mg, 500 mg, and 1000 mg concentrations was 03 mm, 01 mm, and 09 mm, respectively**.**

This study is similar to, methanolic extract of J. adhatoda showed positive antibacterial activity against *P. aeruginosa, S. aureus, and B. subtilis* but failed to inhibit E. coli [7].

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***B. subtilis*:**

To determine its antibacterial efficacy, the zone of inhibition method's area diameter of sample extracts on 250 mg, 500 mg, and 1000 mg concentration solutions was examined. The extract sample proved effective against B. subtilis. It was found that a sample's average zone inhibition measured in millimeters in solutions of 250 mg, 500 mg, and 1000 mg concentrations was 10 mm, 6 mm, and 15 mm, respectively.

This study is similar to, methanolic extract of J. adhatoda showed positive antibacterial activity against *P. aeruginosa, S. aureus, and B. subtilis* but failed to inhibit E. coli [7].

Table No.01: The antibacterial action of *Justicia adhatoda*

Sample	**Zone of inhibition (in mm) Gram + Ve**			
Concentratuion	***E.coli***	***Salmonella typhi***	***Streptococcus aureus***	***B.subtilis***
250 mg	4	2	3	10
500 mg	2	7	1	6
1000 mg	5	3	9	15

Graph No.01: The antibacterial action of *Justicia Adhatoda*

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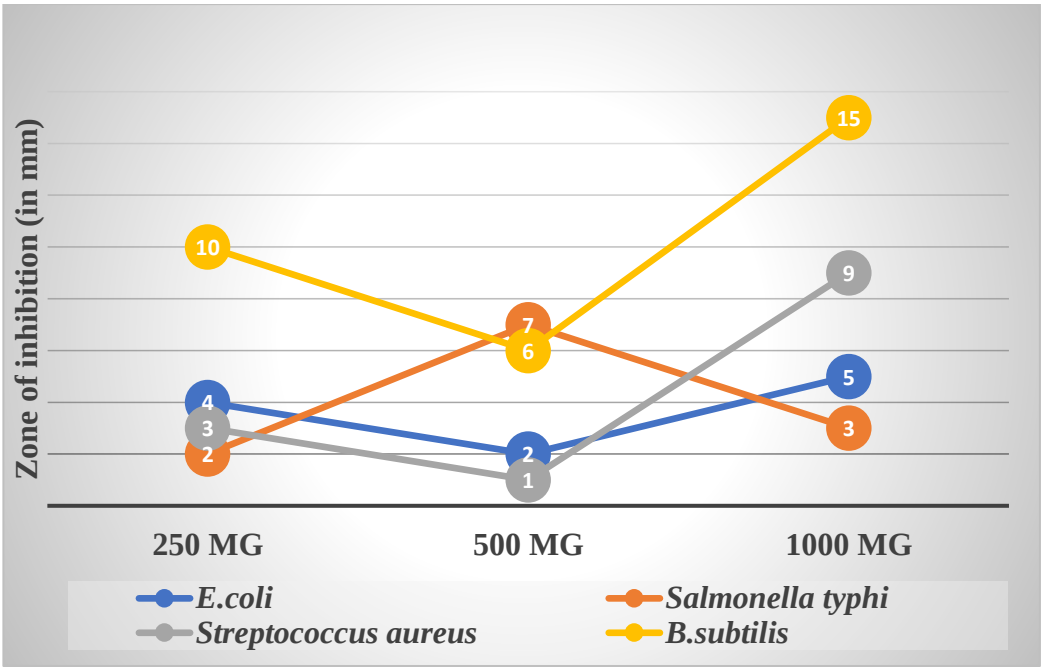

4. Conclusion:

Several important bioactive compounds, including oils and quinazoline alkaloids, have been identified in different sections of J. adhatoda. Therefore, J. adhatoda extract might be the greatest option for developing novel natural medications. Effective therapeutic efficacy is exhibited by major phytoconstituents active components, including vasicine and vasicinone, which are found in both alcoholic and aqueous extracts of vasaka.

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