Evaluation of Antibacterial Activity of Callicarpa macrophylla Vahl. Stem Extracts

**Corresponding Author:**
Mr. Rajeev K Singla,
Principal Investigator, Division of Biotechnology, Netaji Subhas Institute of Technology, University of Delhi, Azad Hind Fauz - India

**Submitting Author:**
Mr. Rajeev K Singla,
SERB-Young Scientist/PI, Division of Biotechnology, Netaji Subhas Institute of Technology, University of Delhi, Azad Hind Fauz Marg, Sector-3, Dwarka-110078 - India

**Other Authors:**
Mr. Virendra Yadav,
Research Scholr, College of Pharmacy, Institute of Foreign Trade & Management, Lodhipur rajput, Moradabad, Uttarprade - India
Dr. Soma Jayalakshmi,
Professor, College of Pharmacy, Institute of Foreign Trade & Management, Lodhipur rajput, Moradabad, Uttarprade - India
Dr. Arjun Patra,
Professor, College of Pharmacy, Institute of Foreign Trade & Management, Lodhipur rajput, Moradabad, Uttarprade - India

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**Competing Interests:**
Authors declare no competing interests
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Author(s): Yadav V, Jayalakshmi S, Singla RK, Patra A

Abstract

Callicarpa macrophylla Vahl.(Beautyberry species) is commonly used in Indian traditional medicine. Thus an ex vivo antibacterial activity studies on ethanolic (SEE) and aqueous (SAE) stem back extracts of C. macrophylla against some gram positive and gram negative strains was done using Kirby bauer agar disc diffusion assay techniques. SEE, showed moderate growth inhibitory activity against all the bacterial strains, but SAE was exceptionally inactive against all strains except Salmonella typhimurium. The phytoconstituents in SAE might be responsible for the inhibition of S. typhimurium growth.

Introduction

Being As a treasure house of various therapeutic phytochemicals, plants have been known reported to be an integral part of traditional medicinal system [1] in many cultures. Indigenous peoples living on their traditional territory histories largely rely on ethnomedicinal plants for healthcare and they are therefore rich in ethnopharmacological knowledge [2, 3]. The use of natural products with therapeutic properties is as ancient as human civilization because medicinal since plants are capable of synthesizing an overwhelming variety of low molecular weight organic compounds called secondary metabolites, usually with unique and complex structures [4-9]. With so many chemotherapeutic agents coming up especially from natural sources, there is the growing need to ascertain some of these claims[10,11].

Callicarpa macrophylla Vahl. of family Verbenaceae, is an indigenous plant of India, have with a wide spectrum of therapeutic properties. Its leaves are reported to have anti-inflammatory, analgesic and antipyretic effects[4,12], while roots have are anti-inflammatory and analgesic effects [13]. Its Sstems of C. macrophylla hasd been evaluated for its anti-fungal activity and results are very significant [14]. In the current research work, we have evaluated Thus following its potentials we hereby report the antibacterial activity studies of stem back extracts of Callicarpa macrophylla Vahl. stem extracts.

Materials & Methods

Collection & Authentication of Plant Material: A voucher specimen of the authenticated plant material has been preserved in the Department of Pharmacognosy, College of Pharmacy, IFTM, Moradabad for future references[4, 12-14].

Preparation of Extracts: The coarsely powdered stems were extracted using aqueous water and ethanol as solvents. Standard extraction procedures were adopted[5, 12-15].

Gram-positive bacteria used: Streptococcus pyogenes (NCIM 2608), Bacillus cereus (NCIM 2797), Micrococcus luteus (NCIM 2704), Staphylococcus epidermidis (NCIM 2493), Clostridium sporogenes (NCIM 2559), Streptococcus faecalis (NCIM 2404), Staphylococcus aureus (NCIM 2079), Bacillus subtilis (NCIM 2439).

Gram-negative bacteria used: Agrobacterium tumifaciens (NCIM 2942), Klebsiella pneumonia (NCIM 2957), Salmonella typhimurium (NCIM 2501), Pseudomonas aeruginosa (NCIM 2863), Serratia marcesens (NCIM 2078), Enterobacteria aerogens (NCIM 2693), Proteus vulgaris (NCIM 2813), Escherichia coli (NCIM 2831).

Kirby-Bauer Agar Disc Diffusion Assay: Nutrient agar media was taken in a pre-sterilized Petri-dish. After that the microorganisms were spreaded over the cooled nutrient agar media with the help of L- shaped glass rod. The sterilized empty disc (7 mm) was saturated with 200µl/disc and 400µl/disc of ethanolic and aqueous extracts of C. macrophylla Vahl. stem and allowed to dry and then introduced on the upper layer of the seeded agar plate. Similarly disc of ciprofloxacin (10mg/disc) was placed on the seeded agar plate and incubated at 37°C for 24 hr. The diameters of zone of inhibition (mm) were recorded and compared with standard drug ciprofloxacin[16-24].

Results & Discussion
Ethanolic (SEE) and aqueous (SAE) stem extracts of *Callicarpa macrophylla* Vahl. stems were prepared and evaluated in-vitro for their antibacterial activity against various some gram positive and gram negative bacterial strains. Results of antibacterial activity of SEE & SAE against the test bacteria are shown in Table 1 & Table 2.

See Illustration 1 and 2

Results shown that ethanolic extract (SEE) is active against both gram positive and gram negative bacterial strains even at a concentration of 200 µg/disc when compared with the standard drug ciprofloxacin. Maximum zone of inhibition of 17mm was obtained when SEE reacted with *SEE against Bacillus subtilis*. Surprisingly, aqueous extract (SAE) was inactive against all the bacterial strains tested gram negative *Salmonella typhimurium*, causative organism for gastroenteritis in humans and other mammals with symptoms resembling typhoid fever. It can conclude here that the aqueous extract must be containing some unique anti-salmonella compounds, which may be having a unique action against this bacterium, and the ethanolic extract of *C. macrophylla* may have a general broad spectrum.

### Acknowledgement

Authors would like to express our gratitude towards the management committee of IFTM university for providing laboratory facility for conducting this research project. Author Rajeev K Singla is grateful to Department of Science & Technology, Ministry of Science & Technology, Government of India for providing Young Scientist Fellowship (SR/FT/LS-149/2011).

### References


Illustrations

Illustration 1

Table 1: Zone of inhibition in mm of ethanolic, aqueous extract of C. macrophylla Vahl. stems in gram-positive bacterial strains.

<table>
<thead>
<tr>
<th>Gram-positive Bacteria</th>
<th>Zone of Inhibition (mm)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SEE 200 µg/disc</td>
<td>400 µg/disc</td>
</tr>
<tr>
<td>S. pyogens</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>B. cereus</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>M. luteus</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>S. epidermidis</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>C. sporogens</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>S. faecalis</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td>S. aureus</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>B. subtilis</td>
<td>10</td>
<td>17</td>
</tr>
</tbody>
</table>
**Illustration 2**

Table 2: Zone of inhibition in mm of ethanolic, aqueous extract of C. macrophylla Vahl. stems in gram-negative bacterial strains.

<table>
<thead>
<tr>
<th>Gram-negative Bacteria</th>
<th>Zone of Inhibition(mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SEE 200 µg/disc</td>
</tr>
<tr>
<td>A. tumifaciens</td>
<td>12</td>
</tr>
<tr>
<td>K. pneumonia</td>
<td>10</td>
</tr>
<tr>
<td>S. typhimurium</td>
<td>10</td>
</tr>
<tr>
<td>P. aeruginosa</td>
<td>12</td>
</tr>
<tr>
<td>S. marcesens</td>
<td>11</td>
</tr>
<tr>
<td>E. aerogens</td>
<td>11</td>
</tr>
<tr>
<td>P. vulgaris</td>
<td>11</td>
</tr>
<tr>
<td>E. coli</td>
<td>10</td>
</tr>
</tbody>
</table>
Reviews

Review 1

Review Title: Review on: Evaluation of Antibacterial Activity of Callicarpa macrophylla Vahl. Stem Extracts

Posted by Dr. Sreedhar Tirunagari on 24 Jan 2013 09:50:45 AM GMT

What are the main claims of the paper and how important are they?:
The phytoconstituents aqueous extract must be containing some unique anti-salmonella compounds, which may be having a unique action against this bacterium, and the ethanolic extract of C. macrophylla. may have a general broad spectrum. Further studies to be conducted with other phytoconstituents in Knowing this activity

NA

Yes

Further studies needed to be conducted with other phytoconstituents in Knowing this activity

If a protocol is provided, for example for a randomized controlled trial, are there any important deviations from it? If so, have the authors explained adequately why the deviations occurred?
NA

Yes

No

No

Rating: 7

Comment:
NA

Competing interests: No

Invited by the author to make a review on this article? : No

Have you previously published on this or a similar topic?: No

Experience and credentials in the specific area of science:
I am Post graduate in Ayurvedic Medicine with experience in Clinical research

Review 2

Review Title: Ok As Submitted

Posted by Dr. Terrumun A Tor-Anyiin on 29 Aug 2012 01:11:45 PM GMT

What are the main claims of the paper and how important are they?:
Anti bacteria activity of an ethnomedicinal plant was studied ex-vitro. This document the important of medicinal plants as a potential source of therapeutic agents.

No, however among the contemporary studies.

Yes

Yes, however identification of secondary metabolites responsible for the claims could give it a stronger standing.

If a protocol is provided, for example for a randomized controlled trial, are there any important deviations from it? If so, have the authors explained adequately why the deviations occurred?

No

Yes, but questions raised to be addressed to give it a better reproducibility.

Yes, as suggested earlier. It would give a better overview of the plant. If initially done, it only require incorporation into the paper. If not, it may take about two weeks to do.

Yes, as suggested earlier. It would give a better overview of the plant. If initially done, it only require incorporation into the paper. If not, it may take about two weeks to do.

Rating: 5

Comment:
Tables 1 and 2 not available to me.

Competing interests: No

Invited by the author to make a review on this article? : Yes

Have you previously published on this or a similar topic?: Yes

References:

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macrophylla Vahl. Stem Extracts ' by }.WebmedCentral 1970;3(8):WMCRW002211
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