

# *Pharmacophore*

(An International Research Journal)

Available online at <http://www.pharmacophorejournal.com/>

## Original Research Article

### ANTIMICROBIAL STUDIES OF PERGULARIA DAEMIA AGAINST HUMAN PATHOGENIC ORGANISMS

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#### ABSTRACT

*Pergularia daemia* is a perennial herb that grows along the roadsides of tropical and subtropical regions. The aim of the present study was to investigate the antimicrobial activity of ethanolic, methanolic and acetone extracts of *Pergularia daemia* leaves and roots against some pathogenic microorganisms such as *Enterococcus faecalis*, *Bacillus anthracis* and *Aspergillus fumigates*. In ayurveda the aerial parts of the plant are reported to have antifertility, antidiabetic, hepatoprotective activity, cardiovascular effect, antibacterial activity, antiseptic, antivenin, emmanagogue, emetic, expectorant etc. In this study it was found that methanolic extract of the leaves of *Pergularia daemia* showed maximum antimicrobial activity with increased zone of inhibition against *Enterococcus faecalis* than that of tetracycline and less activity against *Bacillus anthracis* and no antifungal activity against *Aspergillus fumigates* and the roots showed less inhibitory activity against *Enterococcus faecalis* and *Bacillus anthracis* and no antifungal activity was observed.

**Keywords:** Antimicrobial , *Enterococcus faecalis*, *Bacillus anthracis*

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#### INTRODUCTION

Medicinal plants are also been relied upon by over 80 % of the world population for their basic health care needs. Thus the usage of medicinal plants gradually abandoned the empiric framework and became founded on explicatory facts<sup>1</sup>. In the past traditional medicinal knowledge prevalent in the form of holy books, incantations, folklores, material medica and other historical literature defined the preliminary guidelines for the authorization of plant derived natural medicine. As natural medicines have been used to enhance human and veterinary health, the success of modern science also largely depends on drugs obtained from natural resources. The market of herbal drugs has grown at an impressive rate due to a global resumption in traditional and alternative healthcare systems and therefore medicinal plants have great economic importance<sup>2</sup>. The presence of the phytochemical constituents in the medicinal plants is responsible for curing several human diseases<sup>3</sup>. The herbal medicines are the unpurified plant extracts containing several constituents which work synergistically together for the treatment of disease<sup>4</sup>. There is a huge increase in plant research all over the world and it has also given the potential for using various medicinal plants in the treatment<sup>5</sup>.

In this study, *Pergularia daemia* was used which belongs to a milky weed family of Asclepiadaceae. The family Asclepiadaceae includes more than 2000 species which are classified under 280 genera<sup>6</sup>. They were distributed worldwide in tropical and subtropical regions and it is grown along the roadsides of India and also present in the tropical and subtropical regions of Asia and Africa. The name *pergularia* in English is called *veliparuthi* in Tamil; *uttaravaruni* in Sanskrit, *uttaranjutka* in Hindi, *dustaputeega* in Telugu is a perennial twinning herb. The most commonly found phytochemicals in the leaves are flavonoids, alkaloids, terpenoids, tannins, steroids and carbohydrates. Though many antimicrobial agents are available in the market, the microbes are getting resistant to the antimicrobial agents and so in this study the leaf and root extracts of *Pergularia daemia* are analyzed for the presence of antimicrobial activity.

## **MATERIALS AND METHODS:**

### **Collection of plant sample**

The plant *Pergularia daemia* was collected from the local areas of krishnagiri district during the month of December 2015 and January 2016 and only the leaves and roots were collected and kept in sterile bags then taken to the laboratory for further process.

### **Processing of the plant sample**

The leaves and roots were washed with water thoroughly to remove all the soil particles and the roots were chopped into small pieces and then both the leaves and roots were shade dried in room temperature for about 7-10 days. Then the dried leaves and roots were grinded to coarse powder using an electrical blender and then sieved through a mesh to get a fine powder and then the powdered sample were stored in a sterile airtight containers .

### **Solvent extraction**

The dried powdered sample of the leaves and roots was taken and weighed 30 g , dissolved in 150 ml of solvents such as ethanol, methanol and acetone separately in a soxhlet apparatus by continuous heat exposure for 48 hours till the solution becomes clear and then the extracts were collected in separate tubes and then the extracts were concentrated in rotary vacuum evaporator at different temperature for varying solvents and then the concentrated extracts were reconstituted with 10 to 15 ml of DMSO (Dimethyl sulfoxide) and the remaining extracts were stored in refrigerator for future use.

### **Antimicrobial activity**

The antimicrobial activity of the solvent extracts of *Pergularia daemia* against the bacteria such as *Enterococcus faecalis*, *Bacillus anthracis* and fungi *Aspergillus fumigatus* using the well diffusion method.

The Muller Hinton agar media was prepared by dissolving 5.7 g of Muller Hinton agar in 150 ml of distilled water and autoclaved at 121°C for 15-20 minutes and the potato dextrose agar (PDA) was prepared by dissolving 3.6 g of PDA agar in 150 ml of distilled water and autoclaved at 121°C for 15-20 minutes.

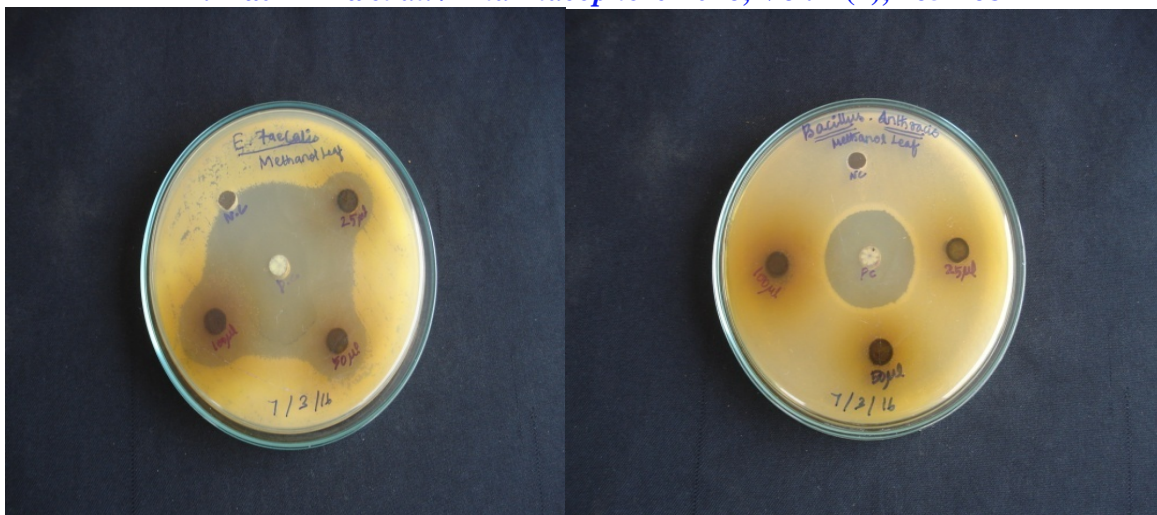
Then the media was poured in the plates in the laminar air flow chamber (LAF) and allowed to solidify and after solidification the test organisms were swabbed using sterile cotton swabs and about 6mm wells were bored using cork borer and different concentrations of extracts such as 25 µl, 50 µl and 100 µl were added to the wells and the plates were kept for incubation at 37°C for 24 hours.

## **RESULTS AND DISCUSSION:**

The antimicrobial activity of ethanolic, methanolic and acetone extracts of *Pergularia daemia* at different concentrations such as 25 µl, 50 µl, and 100 µl showed wide spectrum of activity against test organisms namely bacteria such as *Enterococcus faecalis*, *Bacillus anthracis* and fungi *Aspergillus fumigatus*.

The antimicrobial activity of methanolic extract of the leaves of *Pergularia daemia* against *Enterococcus faecalis* showed increased zone of inhibition of 13 mm at a concentration of 100 µl than that of the positive control (tetracycline) which produced only 12 mm of zone of inhibition whereas it produced less inhibitory activity against *Bacillus anthracis* by producing zone of inhibition of only 7.5 mm even though at a higher concentration of 100µl and no activity and zone of inhibition was observed against *Aspergillus fumigatus* which is depicted in the figure 1as follows,

The acetone leaf extracts against *Bacillus anthracis* produced less zone of inhibition of 7 mm than that of standard which produced zone of inhibition of 15 mm as depicted in figure 3.



**Fig -1: Antimicrobial activity of methanolic leaf extracts against Enterococcus faecalis and Bacillus anthracis**



**Fig-2: Antimicrobial activity of methanolic root extracts against Enterococcus faecalis and Bacillus anthracis**



**Fig 3 Antimicrobial activity of acetone leaf extracts against Bacillus anthracis**

The present study revealed maximum antimicrobial activity in methanolic extract of the leaves of Pergularia daemia against Enterococcus faecalis. The extract showed increased zone of inhibition 13 mm at higher concentration (100 µl) than that of tetracycline and less inhibitory activity was observed against Bacillus anthracis even at higher concentration (100µl) and no activity was observed against Aspergillus fumigatus and acetone leaf extracts also showed milder inhibitory activity against Bacillus anthracis whereas the previous studies was not performed with the same organisms but the previous studies reported the antimicrobial activity of hydro alcoholic extracts of Pergularia daemia against E.coli, Pseudomonas

aeruginosa, *Vibrio harveyi*, *Bacillus subtilis*<sup>7</sup> and antimicrobial activity of various extracts of leaves of *Pergularia daemia* against *Shigella flexinari*, *E.coli*, *Salmonella typhi*, *Staphylococcus aureus*<sup>8</sup> and antimicrobial activity of methanolic extract of leaves of *Pergularia daemia* against *E.coli*, *Bacillus subtilis*, *Bacillus cereus*, *Pseudomonas*, *Staphylococcus*, *Candida glabrata*, *Candida albicans*, *Aspergillus sp.*, *Bacillus cereus* and the current study also revealed the antimicrobial activity of methanolic extract of roots of *Pergularia daemia* against *Enterococcus faecalis* which showed less zone of inhibition of 7 mm even at higher concentration than the tetracycline and less inhibitory activity against *Bacillus anthracis* even at higher concentration (100 µl) and no activity was observed against *Aspergillus fumigatus* and no previous studies were reported on antimicrobial activity of roots.

## Conclusion

From the present study and with previous literature survey we can come to conclusion that the *Pergularia daemia* leaves are rich in phytochemicals which has antimicrobial activity. We also made an attempt with root extract but it showed less effect on pathogenic organisms and further studies can be made with other microorganisms using root extract and leaf extract.

## ACKNOWLEDGEMENTS

The authors are thankful to the Management of Arignar Anna College ( Arts & Science ), Krishnagiri and to Dr. M. Subbiah, M.A. (Eng), M.A. (JMC), M.A. (Political Sci), B. L., M. Phil., Ph.D, Principal, Arignar Anna College, Krishnagiri, for the constant help and support in conducting this work to full satisfaction.

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**Cite This Article:** M.Iffath Hina , Dr. J.Caroline Rose (2016), "Antimicrobial studies of *Pergularia daemia* against human pathogenic organisms", *Pharmacophore*, Vol. 7 (4), 265-268.

