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Research Article

Antimicrobial and Antioxidant Free Radial Scavenging Activity of Bark and Stem of *Bacopa Monnieri*

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Abstract

This study was carried out with an objective to investigate the antimicrobial and antioxidant free radical scavenging activity of bark and stem of Hiptage benghalensis. The aim of the study is to assess the antimicrobial activity and to determine the zone of inhibition of extracts on gram positive and gram-negative bacterial strains. In the present study, the antimicrobial activity of ethanol extract of bark of Hiptage benghalensis was evaluated for potential antimicrobial activity against gram positive and gram-negative bacterial strains. The extract (50, 100, µg/ml) of Hiptage benghalensis were tested against the gram positive and gram- negative bacteria. Zone of inhibition of extracts were compared with that of different standards erythromycin, for gram positive bacteria and cephalosporins like cefadex for gram negative bacteria. The results showed that the remarkable inhibition of the bacterial growth was tested against the tested organisms. The phytochemical analysis of the plant were carried out. The aim of the study of antioxidant activity is to assess the free radical scavenging activity of hiptage benghalensis by phosphomolybdenum method.

Keywords: Hiptage benghalensis, phosphomolybdenum, cephalosporins, cefadex

Article Info

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Contents

1. Introduction

Bacopa monnieri, also called brahmi, is a staple plant in traditional Ayurvedic medicine. It grows in wet, tropical environments, and its ability to thrive underwater makes it popular for aquarium use. Bacopa monnieri has been used by Ayurvedic medical practitioners for centuries for a variety of purposes, including improving memory, reducing anxiety, and treating epilepsy. In fact, research shows that it may boost brain function and alleviate anxiety and stress, among other benefits. A class of powerful

compounds called bacosides in Bacopa monnieri is believed to be responsible for these benefits.

Fig.1. Bacopa monnieri

Bacopa monnieri is a non-aromatic herb. The leaves of this plant are succulent, oblong, and 4–6 mm (0.16–0.24 in) thick. Leaves are oblanceolate and are arranged oppositely on the stem. The flowers are small, actinomorphic and white, with four to five petals. Its ability to grow in water makes it a popular aquarium plant. It can even grow in slightly brackish conditions. Propagation is often achieved through cuttings.

Uses: Bacopa monnieri is used in Ayurvedic traditional medicine to improve memory and to treat various ailments. Preliminary clinical research found that Bacopa minnieri may improve cognition.

Adverse effects: The most commonly reported adverse effects of Bacopa monnieri in humans are nausea, increased intestinal motility, and gastrointestinal upset.

Phytochemicals:

The best characterized phytochemicals in Bacopa monnieri are dammarane-type triterpenoid saponins known as bacosides, with jujubogenin or pseudo-jujubogenin moieties as aglycone units. Bacosides comprise a family of 12 known analogs. Other saponins called bacopasides I–XII were identified.[12] The alkaloids brahmine, nicotine, and herpestine have been catalogued, along with D-mannitol, apigenin, hersaponin, monnierasides I–III, cucurbitacin and plantainoside B.

2. Methodology

Preparation of plant extract:

- The bark and stem of Hiptage benghalensis were collected than dried and powdered it. 25g of the bark and stem powder was loaded in the thimble of Soxhletapparatus.
- It was fitted with appropriate size round bottomed flask with 250ml absolute ethanol, and the upper part was fit ted with condenser with continuous water flow.
- Constant heat was provided by mantox heater for recycling of the solvent. After complete extraction , the extract in RBF was transferred into clean and pre- weighed universal tubes.
- Universal tubes containing extract was weighed and noted down final weight of extract.

Fig.2. Soxhlet apparatus

Growth of microorganisms:

Media preparation:

- Pour 250ml of distilled water and add required quantity of agar, peptone, beef extract, and sodium chloride.
- Mix the content and heat it with continuous agitation to dissolve the contents.
- Autoclave it at 121ºC for 15 mins.
- Allow the content to cool and then inoculate the specimen to be culture.

Isolation of soil bacteria:

- The sterile dilutions blanks were marked in the following order: the 10ml dilution blank is 10-1 and for the 8 test tubes were marked accordingly in 10-2 to 10-9.
- 1gm of soil sample was weighed and is added into the 10-2 dilution blank and shaken vigorously for atleast one minute.
- 1ml solution from the 10-2 dilution blank is transferred to the 10-3 tube aseptically. The solution is then mixed thoroughly.
- By using a fresh, sterile pipette for the following succeeding step, 1ml from the 10-3 dilution to the 10-4 dilution blank and same step is repeated for the followingblank.
- 1ml solution from the 10-3 is transferred into the nutrient agar media that contained sodium (Na) and nutrient agar media that contained sodium (Na+). Then it is drawn into spiral manner across the medium by using the glass rod.
- The above procedure was repeated subsequently for the dilution blanks with dilution factors of 10-4, 10-5 ,10-6, 10-7, 10-8, 10-9.
- The petri dishes is inverted and placed in the incubator or at room temperature.

Antimicrobial activity:

Determination of zone of inhibition:

- The microorganisms in the agar plates with inoculated media. 6mm diameter sterile discs are placed with the help of disc dispenser.
- The two concentrations (50, 100µmol/l) of ethanolic extract solutions of bark and stem of Hiptage Benghalensis were poured on the disc with the help of sterilized micro pipette.
- The disc are left for sometimes till the extract solutions diffused in them. Effects were compared with that of standard solutions (antibiotic -loaded disc).
- Finally the plates were incubated with lids closed at 37ºc for 24 hours.

Determination of antioxidant activity:

Phosphomolybdenum method:

- The free radical scavenging activity was measured by phosphomolybdenum assay method.
- Ascorbic acid is used as a reference standard. The prepared samples of different concentrations(0.2, 0.4, 0.6, 0.8, 1 µg/ml) in DMSO.
- The concentrations incubated in boiling water bath at 95ºC for 90 minutes.
- After 90 minutes absorbance was measured at 695nm. Lower absorbance of reaction mixture indicates the higher free radical scavenging activity which shows the reduction potential of phosphomolybdenum blue complex and was reported in percentage.

3. Results and Discussion

Table.1.Preliminary phytochemical screening results

Chemical tests	Results
alkaloids	Negative
carbohydrates	Positive
tannins	Positive
glycosides	Positive
saponins	Positive
flavonoids	Positive
phenols	Positive

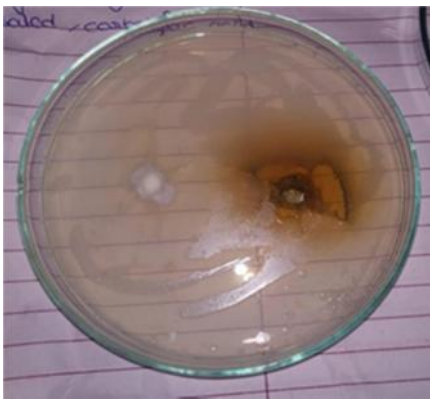

Fig.3. Gram positive Bacteria

Fig.4. Gram negative bacteria

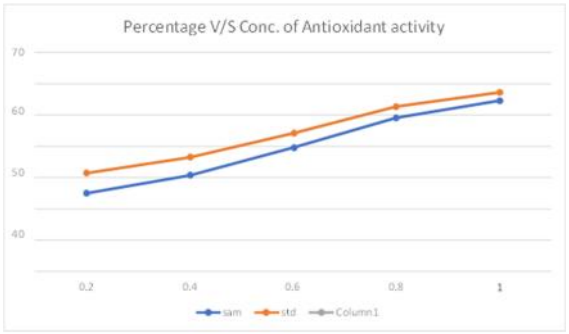

Table no.4 Results of Antioxidant activity

Discussion

The present study was to carry out an antimicrobial and antioxidant free radical scavenging activity of Hiptage benghalensis. The antimicrobial activity was performed by using disc diffusion method and the results was shown that the concentration of 50µmol/ml zone of inhibition is high when compared to concentration of100µmol/ml. Antioxidant free radical scavenging activity was performed by using phosphomolybdenum method and the results was showed strong antioxidant activity by inhibiting hydrogen peroxide when compared with standard ascorbic acid and was reported in percentage.

4. Conclusion

Antimicrobial activity:

Hiptage benghalensis extract exhibited antimicrobial activity by disc diffusion method against gram positive and gram-negative microorganism. The two concentrations of plant extract was prepared and determined the zone of inhibition. The 50µmol/ml shows the zone of inhibition 1.7 and 100µmol/ml shows the zone of inhibition 1.5. From the above study results it was concluded that the ethanolic extract of Hiptage benghalensis concentration of 50µmol/ml has zone of inhibition is more when compared to concentration 100µmol/ml by using antibiotics (erythromycin, cephadex).Phytochemical screening was conducted and it shows positive reults for Carbohydrates, phenols, tannins, glycosides, flavonoids in stem and bark extract of Hiptage benghalensis.

Antioxidant activity:

Ethanolic extract of Hiptage benghalensis shows strong antioxidant activity by inhibiting hydrogen peroxide when compared with ascorbic acid using as standard. In addition of ethanolic extract of Hiptage benghalensis found to contain a noticeable amount of total phenols, which play major role in controlling antioxidant. The results of this study show that the ethanolic extract of Hiptage benghalensis can be used as easy source of antioxidant.

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