SHORT COMMUNICATION

Isolation and screening of bioactive principle from *Chaetomorpha antennina* against certain bacterial strains

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Abstract Microbial pathogens develop resistance to a particular antibiotic after repeated administration during the treatment of infectious diseases. Moreover, multiple drug resistance is a very common problem especially in hospital acquired infections. Therefore, it is necessary to find out alternative antibacterial drugs and the present trend is focused on seaweeds. This preliminary research work was carried out to find out the antibacterial activity of petroleum ether extract of *Chaetomorpha antennina*. The extracts were tested against *Staphylococcus aureus* MTCC 121, *Bacillus cereus* MTCC 492, *Bacillus subtilis* MTCC 441, *Klebsiella pneumoniae* MTCC 530, *Escherichia coli* MTCC 443 and *Pseudomonas aeruginosa* MTCC 779 by agar well diffusion technique. It was observed that petroleum ether extract showed prominent zone of inhibition against *Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* even at 50 \( \mu \)g/ml concentration. The maximum spectrum of activity was observed against *Staphylococcus aureus* ranged from 7.3 ± 0.8 to 18 ± 2.4 mm at the concentration 50 to 500 \( \mu \)g/ml, respectively. Hence the most susceptible bacterium was *Staphylococcus aureus* among the tested organisms. However, *Escherichia coli* and *Pseudomonas aeruginosa* are also susceptible. But the *Bacillus cereus* and *Klebsiella pneumoniae* are resistant against the tested extract.

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1. Introduction

Seaweed is the most accessible marine resource of the coastal zone that occupies potential importance source of biochemical compound. Pharmaceutical importance of seaweed is well known all over the world and extensive efforts were given to bring out substances from algae. There are a number of reports regarding the medicinal importance of sea weeds belonging to Phaeophyceae, Rhodophyceae and Chlorophyceae from all over the world (Kolanjinathan et al., 2009; Padmini Sreenivasa Rao, 1998; Inci Tuney et al., 2006; Nair et al., 2005; Rajasulochana et al., 2009). Many studies were reported earlier on the antimicrobial study of marine algae (Battu et al., 2011; Elena et al., 2001; Okai et al., 1997; Premila et al., 1996; Rao and Paerkh, 1981). The present study was undertaken to investigate the antibacterial activities of petroleum ether extract of *Chaetomorpha antennina* against certain human pathogenic bacteria.

2. Materials and methods

2.1. Collection, identification and extraction

*C. antennina* was collected from Kovalam sea shore near Chennai, India. The collected alga was identified by...
The following strains were collected from Microbial type culture and collection (MTCC), Chandigarh, India. *Staphylococcus aureus* MTCC 121, *Bacillus cereus* MTCC 492, *Bacillus subtilis* MTCC 441, *Klebsiella pneumoniae* MTCC 530, *Escherichia coli* MTCC 443 and *Pseudomonas aeruginosa* (MTCC 779).

2.3. Antibacterial screening

The lyophilized culture was sub cultured and the concentration of working stock culture was assessed as 10⁻⁶ CFU/ml. Specified quantity of Muller Hinton agar was prepared and plated in aseptic condition. The agar well diffusion technique was followed for antibacterial susceptibility test for crude extracts and petroleum ether (solvent control) whereas agar disc diffusion method was followed for antibacterial susceptibility test for standard streptomycin disc. The extracts were dissolved in DMSO to get the known concentrations of 50 µg/ml, 100 µg/ml, 200 µg/ml, 300 µg/ml, 400 µg/ml and 500 µg/ml. The activity was compared with streptomycin sulphate disc (10 mcg/disc). After 24 h of incubation at 37 °C the zone of inhibition was measured and tabulated.

3. Results and discussion

Antimicrobial drug resistance is the foremost problem all over the world with present antibiotic therapy in treating infectious diseases (Manikandan et al., 2011). Recently considerable research activity has been focused on seaweeds for isolating and developing newer antimicrobial agents. During the past four decades many novel bioactive compounds have been isolated from marine organisms (El Gamal, 2010; Faulkner, 2002). Since seaweeds show promising antimicrobial action, the present investigation is aimed to carry out antibacterial activities from *C. antennina*. The phytochemical analysis of petroleum ether extract of *C. antennina* showed the presence of the various phyto constituents such as carbohydrates, proteins and amino acids. In order to ascertain the minimum concentration of the extract showing antibacterial activity in this work various concentrations 50 µg/ml, 100 µg/ml, 200 µg/ml, 300 µg/ml, 400 µg/ml and 500 µg/ml were prepared.

The results are summarized in Table 1 demonstrating that the extracts were showed maximum activity against *S. aureus*, *E. coli* followed by *P. aeruginosa* even at the concentration of 50 µg/ml when compared with the rest. The observed zone of inhibition is 7.3 ± 0.8 mm against *S. aureus*, 8 ± 0.6 mm against *E. coli* and 7.3 ± 1 mm for *P. aeruginosa*. But the zone of inhibition is ranged between 19 ± 1.4 to 25.5 ± 0.5 mm for Streptomycin sulphate (10 mcg/disc). Moreover, in our study the petroleum ether does not exhibit antimicrobial action against the tested organisms, which is not mentioned in Table 1. In 2011, Prasanna Latha and Hemalatha reported that 50 µg/ml of chloroform extract of *C. antennina* showed the zone of inhibition ranged between 9 to 11 mm against the tested organisms. Patra et al. (2009) reported that both chloroform and ethyl acetate extracts of *Chaetomorpha linum* showed moderate effect against *E. coli* whereas methanol and ethanol extracts showed no activity against *E. coli*. But chloroform extract of *C. linum* (Patra et al., 2009) showed better activity against *B. subtilis*. In our study, the extracts also showed very little activity against *B. subtilis* and no activity was observed against *K. pneumoniae* and *Bacillus cereus*. Man-
ikandan et al. (2011) reported that the methanol extract of *C. antennina* showed moderate activity against *K. pneumoniae, P. aeruginosa* and *S. aureus*. The result of our study showed that the petroleum extract of *C. antennina* was active against some gram positive and gram negative bacteria.

**4. Conclusion**

In this preliminary research work, we are able to demonstrate the antibacterial effect of *C. antennina* against certain bacterial strains. Further detailed study is required for isolating and establishing the antibacterial substances from *C. antennina*.

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**References**


