



Antibacterial activity of two selected seaweeds (*Sargassum ilicifolium* and *Caulerpa racemosa*) against foodborne pathogenic bacteria

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Abstract

Emergence of antibiotic resistance in bacterial pathogen is one of the biggest global threats to public health in the 21st century. Thus, seeking natural ingredients having the antibacterial activity to treat bacterial infections created a higher interest. The purpose of this study was to determine the antibacterial activity of *Sargassum ilicifolium* and *Caulerpa racemosa* collected from Ahangama, the Southern coast of Sri Lanka, against foodborne pathogens of Gram-positive and Gram-negative bacteria. 95% Ethanol extraction of both seaweeds was tested against foodborne pathogenic bacteria by using the disc diffusion method. A concentration of 25 mg/mL, 50 mg/mL, and 100 mg/mL were prepared by dissolving the extracted powder in 2% Ethanol. Tetracycline (1 mg/mL) was used as the positive control while 2% Ethanol was used as the negative control. The tested foodborne pathogenic bacterial species were *Bacillus cereus* (ATCC 14579), *Proteus vulgaris* (ATCC 13315), and *Staphylococcus aureus* (ATCC 25923). The obtained minimum inhibition zones in each treatment were statistically analyzed using one-way ANOVA. All tested bacterial species have resulted significant ($p < 0.05$) antibacterial effects compared to the negative control under different concentrations of two seaweeds. Both extracts displayed concentration-dependent activity, while *S. ilicifolium* exhibit stronger inhibition compared to *C. racemosa*. The findings have revealed that significant antibacterial efficacy with *S. ilicifolium* exhibiting higher inhibition zones against *Bacillus cereus* (8.75 ± 0.28 mm) and *Staphylococcus aureus*, (8.36 ± 0.22 mm) particularly at concentrations of 100 mg/mL. Similarly, *C. racemosa* showed potent antibacterial activity, especially at 100 mg/mL concentration for *Bacillus cereus* (8.04 ± 0.08 mm). Also, *Proteus vulgaris* has resulted in the inhibition zones of 7.98 ± 0.14 mm and 7.56 ± 0.26 mm, respectively for 100 mg/mL of *S. ilicifolium* extraction and *C. racemosa* extractions. Fourier Transform Infrared Spectrometer (FTIR) analysis have indicated that the presence of phenolic compound is the major functional group in both seaweeds, which might contribute to the antibacterial activities of both seaweed species against the respective foodborne bacterial pathogens. Thus, 100 mg/L of ethanolic extracts of *S. ilicifolium* and *C. racemosa* can be used as effective antibacterial agents, especially against Gram-positive foodborne pathogenic bacteria. Also, both seaweed extracts were found to be more effective against Gram-positive bacteria than Gram-negative bacteria.

Keywords

Caulerpa racemosa, Sargassum ilicifolium, foodborne pathogenic bacteria, minimum inhibition zone, FTIR