

Antibacterial Activity of Selected Brown and Green Seaweeds Against Biofilm-Associated Gram-Positive and Gram-Negative Bacteria

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ABSTRACT

The goal of the current experiment was to learn more about the antibacterial properties of specific brown and green seaweeds that found in Karachi's coastal region. The three species of seaweed under investigation—*Fucus* sp., *Iyengaria* sp., and *Codium* sp.—were procured from Buleji. *Escherichia coli* sp. and Gram-negative pathogens *Staphylococcus aureus* and *Staphylococcus epidermidis* were tested for antibacterial activity against the chosen species. Biofilms and accumulated microorganisms were discovered in the rocks of Manora Island, Hawks Bay, and Buleji. It is important to highlight that both gram-positive and gram-negative bacteria cause infectious illnesses in people. Chloroform, ethanol, and methanol were used in sequence to create seaweed extracts. The goal of the current work was to learn more about the antibacterial properties of specific brown and green seaweeds that may be found in coastal areas. The inhibitory zone measuring approach, followed by disc diffusion, was used in this investigation. The ethanolic extracts of *Fucus* sp. shown the greatest potential for combating *S. aureus* and *E. coli* with (20±2 mm 21±1.3 mm,). However, with (18±1.5 mm), methanol shown less potential than ethanol. While the efficacy of chloroform, which is 18±1.3 mm, is only mild compared to the other two solvents.

Seaweed, microbial activity, and *Fucus* sp.

INTRODUCTION

Uses of seaweeds nowadays enhancing different categories, For instance some types of seaweed are edible, some uses in pharmaceuticals and all have economic value to people. A wide range of morphological forms, from spatially dispersed thallus to thallus aggregated into thick lawns, are displayed by several intertidal seaweeds. S

seaweed aggregation into grass decreases production per g of organic material but enhances desiccation resistance. Recent research has demonstrated that seaweed has significant levels of polysaccharides that are anti-inflammatory, anticoagulant, anti-antioxidant, antiangiogenic, and anticancer (Yan et al., 2019).

Seaweed is regarded as one of the most known sources of bioactive substances. Many seaweeds emit various bioactive substances that are harmful to the development of both Gram-positive and -negative bacteria. Different metabolites that function as antimicrobial substances are produced by seaweeds (Chiheb et al., 2009).

The ability of chemicals derived from seaweed as antimicrobial agents to stop infectious illnesses and microbial pollution has improved (Prabha et al., 2013). Seven green seaweeds exposed to the presence of high-quality secondary metabolites were subjected to phytochemical analyses in aqueous, chloroform, ethanol, petroleum ether, and hexane extracts. These analyses were extensively addressed (Babu et al., 2014).

OBJECTIVES

This study's goal is to track the microbial activity of certain brown and green seaweeds from Karachi (Buleji) shore, Pakistan.

MATERIALS AND METHODS

Sampling of seaweed: *Fucus* sp., *Iyengaria* sp. and *Codium* sp. were collected from the intertidal zone of Buleji.

Preparation of seaweed extracts: *Fucus* sp., *Iyengaria* sp., and *Codium* sp., which were collected, were cleaned; epiphytes and other related material were taken out. The following techniques are used to prepare extracts: (Rizwan et al., 2020)

assembling test microbial cultures

The biofilm was taken from Buleji, Hawks Bay in Manora Channel on the coast of Karachi under aseptic conditions.

Antimicrobial activity screening: Method using agar disc diffusion Bacterial species' inoculum was placed on agar plates. The growth mass of the studied microorganism was increased or suppressed using an antibiotic agent, and the widths of the inhibitory growth zones were measured in millimetres. Using antimicrobial testing procedures (Rizwan et al., 2020)

CONCLUSION

According to this study, both green and brown seaweeds may be able to withstand the effects of antibiotics. However, among all the chosen seaweed extracts, the extract from *Fucus* sp. with methanol solvent has the ability to more effectively thwart the growth of bacteria such *E. coli*, *S. aureus*, and *S. epidermidis*.

ACKNOWLEDGMENT

Firstly, I want to thank Jinnah University for Women for providing us with such wonderful opportunity to do this research and my supervisor, Dr. Saba Rizwan, for all the work she put into it.

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