

Short Communication (NS-5)**ANTIBACTERIAL ACTIVITIES OF BROWN SEAWEED
Sargassum boveanum (J. AG.) AGAINST
DIARRHEA ALONG THE COAST
OF KARACHI, PAKISTAN**Abdul Rahim Khan¹ and Rashida Qari*²

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: ABSTRACT

Prominent pathogenic enteric are *Salmonella*, *Shigella* and *Escherichia*. The strains of *E. coli* are the main organisms for causing diarrhea. The antibacterial characteristics of methanol, acetone, diethyl ether and ethanol extracts of brown seaweed *Sargassum boveanum* from the three shores (Buleji, Paradise Point and Manora) of Karachi coast were tested in vitro for their antidiarrheal activities against diarrhea causing *E. coli* in children between the ages 2 weeks to 10 years old by disc diffusion method. The diarrhea samples were taken from civil hospital of Karachi, Pakistan. Acetone was the best extraction against the *E. coli* used in this experiment. While some ethanol extraction also showed the positive results. There was no significant result observed between the diethyl ether and methanol extracts of each sample of *Sargassum boveanum*. In majority of samples *E. coli* diarrhea causing organism was found while in some cases *Vibrio cholera* also detected.

Key Words : Seaweeds, Diarrhea, Karachi coast, Pathogens, Antibacterial activity**INTRODUCTION**

Seaweeds medicinal application is almost as old as their food uses in many countries like China, Japan and Europe¹. Seaweeds species of *Laminaria*, *Sargassum*, *Gelidium* and *Chondrus* still used for the treatment of glandular troubles, goiter, stomach disorders and heat induced disorders. Irish moss (*Chondrus crispus*) has had a long medical history in Europe in the treatment of diarrhea, urinary disorder and chronic pectoral infection.

Enteric pathogens are the most frequent cause of diarrheal illnesses that account for an annual mortality rate of five million people worldwide, the second most common cause of death after cardiovascular disorders. Prominent pathogenic

enteric include *Salmonella*, *Shigella* and strains of *E. coli* are responsible for diarrhea. Many biological active components have been isolated from marine algae and some of them are under investigation and are being used to developed new pharmaceuticals². Previously many worker have studied bioactive and antibacterial substances from Indian marine algae against human pathogens³. Recently studied the antibacterial activity of marine macro algae from the Aegean Sea (Turkey)¹.

AIMS AND OBJECTIVES

In Pakistan, seaweed are not utilized as an antibacterial activity against different severe infectious diseases although, in Pakistan large number of seaweed are found and many of which occur in great abundance⁴. Therefore a study is initiated

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ed to assess the seaweed potential as a source of antibacterial substances. This study will provide information about antibacterial activity of brown seaweed species (*Sargassum boveanum*) extract against one important disease called diarrhea.

MATERIAL AND METHODS

Seaweed were collected at low tide from different sites of Karachi (Buleji, Manora channel and Paradise point). Sample rinsed and cleaned with sterile water to remove all epiphytes and debris and kept to dry. Each sample (10 g) were extracted in 25 ml of four solvents methanol, ethanol, diethyl ether and acetone.

Test organisms

The diarrhea causing organism (*E.coli*) were obtained from the culture samples of different ages of children that were patients of civil hospital Karachi and maintained on BHI agar medium at 40°C until testing.

Antibacterial activity

Antibacterial activity was evaluated using agar diffusion technique in Petri plates⁶. 15 µl of each extract was loaded on a sterile filter paper disc 6

mm in diameter. Indicator organisms were spread on Mac Conkey agar with sterile effusion and the disc were placed on agar plates. After incubation for 24 hours at 30°C, clear zones around disc were observed that evidence of antidiarrheal activity. Diameter of zone measured in millimeters. Disc loaded with extracting agents were tested as controls.

RESULTS AND DISCUSSION

Antibacterial activities of seaweed *Sargassum boveanum* (j. ag.) sample tested against diarrhea causing organisms (*E.coli*) in children of different ages. The results of in vitro testing are summarized in **Fig. 1** to **Fig. 3**. In this investigation antibacterial activities of *S. boveanum* that was collected from Buleji coast was tested in five children with different ages such as one month, seven week, one year, two years and ten years that were affected by diarrhea **Fig. 1**. The Antibacterial activities of *S. boveanum* collected from Paradise Point coast was tested in two children with five years and ten years that were affected by diarrhea. **Fig. 2** and *S. boveanum* collected from Manora

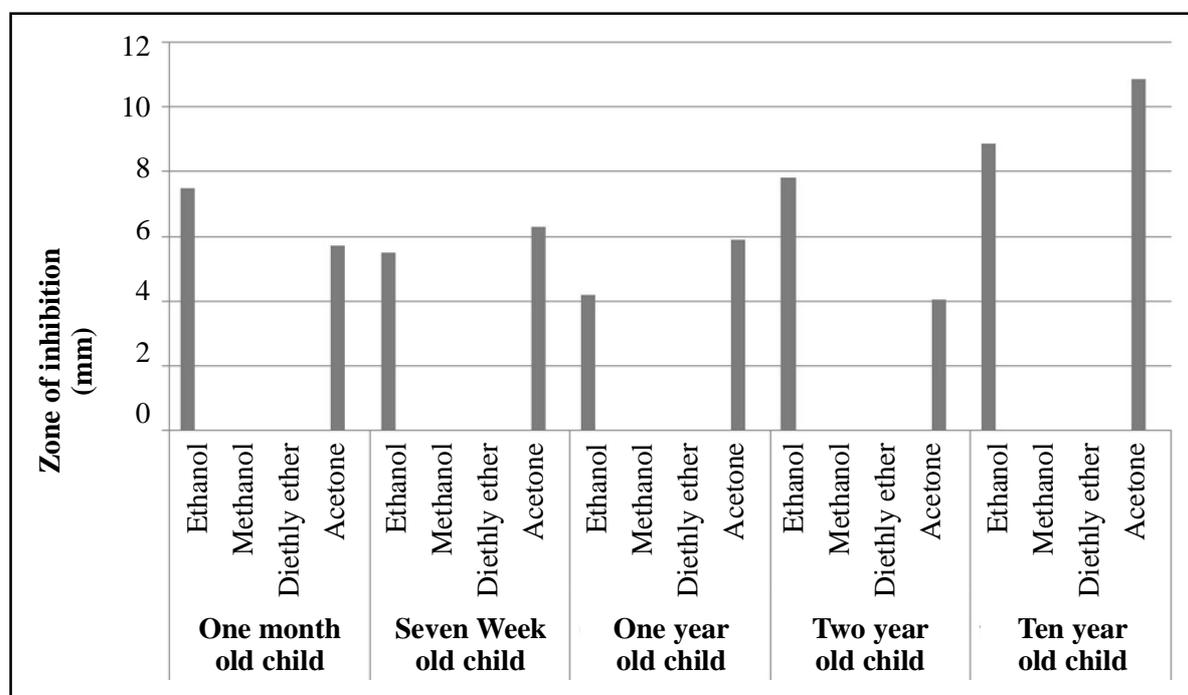


Fig. 1 : Antibacterial activities of *S. boveanum* collected form Buleji against diarrhea causing organism (*E. coli*)

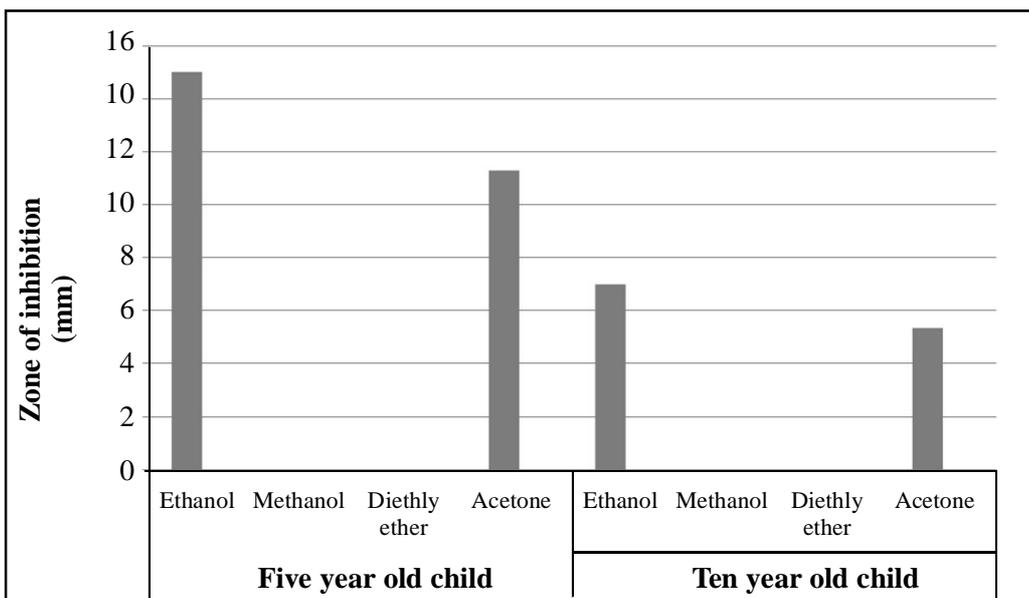


Fig. 2 : Antibacterial activities of *S. boveanum* collected from Paradise point against diarrhea causing organism (*E.coli*)

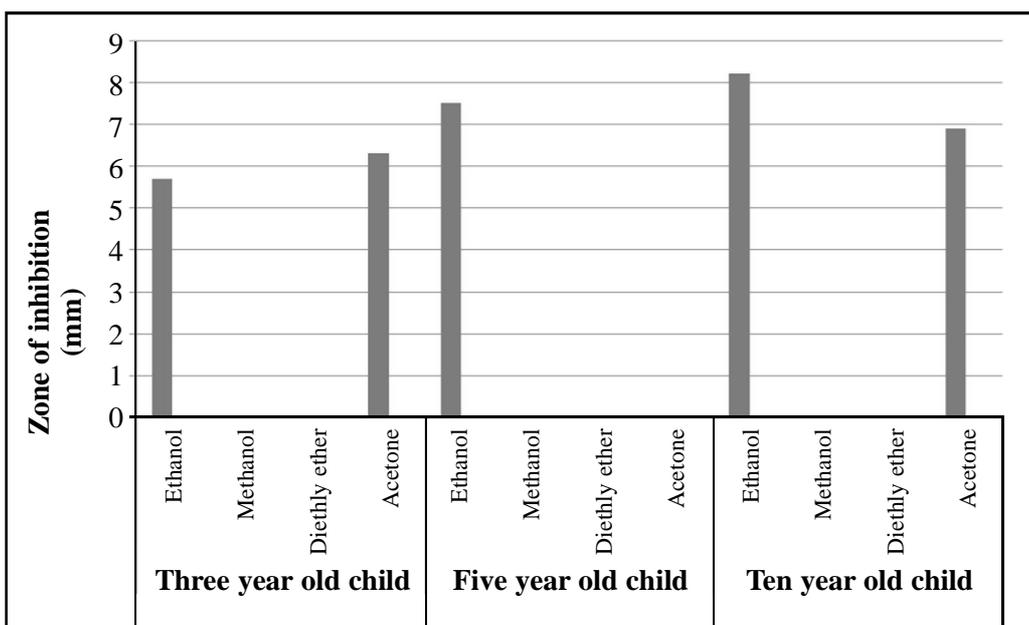


Fig. 3 : Antibacterial activities of *S. boveanum* collected from Mannora channel against diarrhea causing organism (*E.coli*)

channel was tested in three children with three, five and ten years **Fig. 3**.

There are four different solvents were used to extract the *S. boveanum* shade-dried material and the acetone and ethanol were found to be most suitable of the solvents. The acetone and ethanol extracts were active against all diarrhea causing *E.coli* strains tested and showed a greater zone of

inhibition than the extracts obtained with the other solvents viz., methanol and diethyl ether. The methanol and diethyl ether extract of *S. boveanum* of each site did not show any antibacterial activity.

Among the children that were the patients of civil hospital ten years old child culture sample shows the most susceptible results to the ethanol

as well as acetone extract of *S. boveanum* collected from Buleji coast as compared to other children of different ages **Fig. 1**. Whereas five year old child culture sample shows the effective results to the both ethanol and acetone extract of seaweeds collected from the Paradise point coast as compare to the ten years old child culture sample **Fig. 2**. In the extract of seaweeds collected from the Manora channel ten years old child culture sample showed the excellent results to the ethanol and acetone like the seaweeds extract collected from Buleji coast **Fig. 3** as compared to other children of different ages sample. It is also noted five year old age child culture sample showed positive results only with ethanol extract **Fig. 3**.

Having shown that acetone and ethanol was suitable solvent for extracting the antibiotic principle from *S. boveanum* were tested against diarrhea causing organisms (*E.coli*) in Karachi, Pakistan as shown in **Fig. 1** to **Fig. 3**. This results could be related to the presence of bio active metabolites present in the species of seaweed *S. boveanum*. It is clear that using organic solvents provides a higher efficiency in extracting compound to water based methods². The effectiveness of extraction methods highlighted that methanol extraction yield higher antibacterial activity⁷⁻⁸ whereas chloroform is better than methanol and benzene⁶. Seaweed extract prepared in acetone, ethyl alcohol and diethyl ether showed higher antibacterial activity than similar samples extracted with chloroform⁹. Ethanol extracts of marine algae and showed the highest activity with brown seaweeds¹⁰. It is concluded that crude extracts with acetone and ethanol showed good activity against diarrhea causing *E.coli* in children while extracts of methanol and diethyl ether showed no activity against organism in the present investigation. It indicates that the strength of the active principle depends on the use of a suitable solvent.

CONCLUSION

The results concluded that the crude extracts of seaweeds with acetone and ethanol had antibac-

terial activity on diarrhea causing *E.coli* based on the clear inhibition zone exhibited. While extracts of methanol and diethyl ether showed no activity against organism in the present investigation. It means the acetone and ethanol extracts from the *S. boveanum* may be useful in the development of therapeutic agents for *E.coli*. It indicates that the strength of the active principle depends on the use of a suitable solvent.

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