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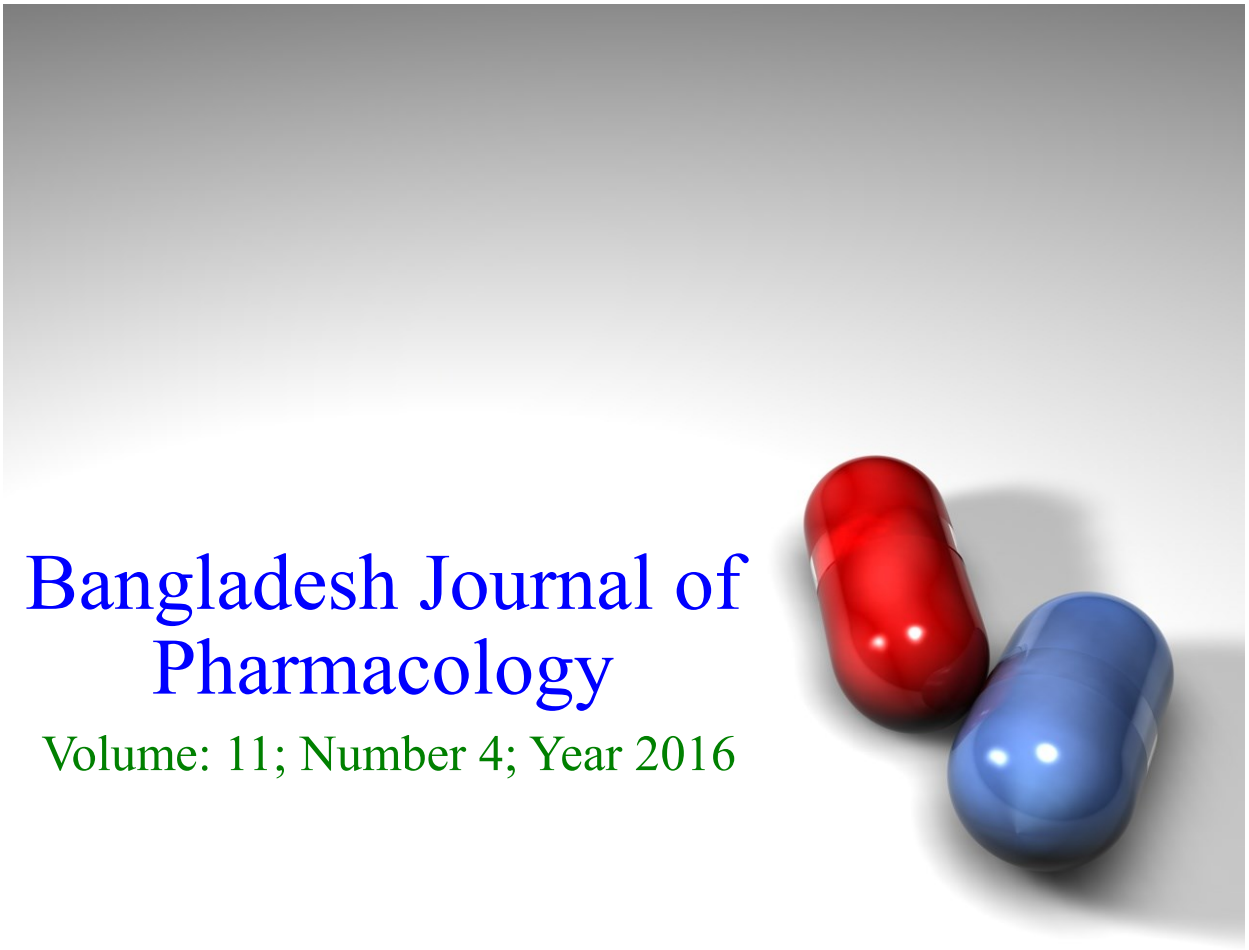

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Letter to the Editor

In vitro antibacterial and antioxidant potentials of selected seaweeds of Andaman and Nicobar Islands, India

Sir,

Seaweeds are primitive non-flowering plants without true root, stem and leaves. Seaweeds have been used as food stuff in Asian countries from centuries as it contains carotenoids, dietary fibers, proteins, vitamins and minerals. Red and brown algae are mainly used as human food sources (Chander et al., 2014). Seaweeds have some valuable medicinal components such as anticoagulants, anti-angiogenic and anti-adhesive activities (Cumashi et al., 2007). Seaweeds have recently been received significant attention for their potential as natural antioxidants, antibacterial and cytotoxic properties (Patra et al., 2016, Rani et al., 2013). The prevention and treatment of infectious diseases by marine seaweeds appears to be a possible alternative resource.

Andaman Islands marine ecosystem is unique, isolated and understudied compared to other marine ecosystems, may have potential of rich source of antimicrobial compounds. Therefore, it was worthwhile to investigate the antibacterial and antioxidant properties of seaweeds against human pathogenic bacteria that often cause of infectious diseases in human beings.

The seaweeds were separately dried under shade, pulverized by a mechanical grinder. Hundred grams of coarsely powdered dry leaves were extracted by cold percolation method, by using 1000 mL 95% methanol as a solvent and keeping it for 72 hours at room temperature. The whole seaweed extract was collected in a conical flask, filtered, and the solvent was evaporated to dryness under reduced pressure in an evaporator at 40-45°C. Resulted residues were stored at 4°C for further use (Chander et al., 2014).

The seaweed extracts were screened for their ability to scavenging 2,2-diphenyl-1-picrylhydrazyl stable radicals (DPPH) by using the method described previously (Singh et al., 2015). The seaweed extracts were screened for antibacterial activity using the agar well diffusion method (Chander et al., 2016).

The effect of antioxidant on DPPH radical scavenging was thought to be due to their hydrogen donating ability or radical scavenging activity. The free radical scavenging activity depends upon the chemical composition of extracts (Nilgun et al., 2007). The DPPH radical scavenging results showed that *S. swartzi* exhibited highest activity having IC_{50} value 73.2 ± 0.6 µg/mL followed by *T. ornate* and *H. opuntia* (Table I).

The antimicrobial activities of the investigated extracts against human pathogens used by agar well diffusion method were shown in Table II. Results obtained in the current study relieved that selected seaweed extracts were found to possess potential antimicrobial activity against tested organisms. The *G. corticata* extract showed activity against seven pathogens tested followed by *S. natans and P. tetrastromatica* while the highest activity (22.7 ± 1.5) was shown by *G. corticata* against *S. aureus*.

In the present study, seaweeds were found to possess antibacterial and antioxidant properties against human pathogens. The species *G. corticata*, *S. natans* and *P. tetrastromatica* were found to be very effective. These organisms need to investigate in detail, in order to isolate biologically active molecules and thus paving

Table I

Details of seaweeds and their antioxidant properties

Name of the seaweed	Family	Place of collection	(GPS Location)	Antioxidant IC_{50} (µg/mL)
Gracilaria corticata	Gracilariaceae	Wandoor	N 11°36'0.83" E 92°36'45.39"	276.8 ± 6.3
Halimeda opuntia	Halimedaceae	Wandoor	N 11°36'8.04" E 92°36'41.76"	99.8 ± 0.4
Padina tetrastromatica	Dictyotaceae	Little Andaman	N 10°34'8.45" E 92°33'43.29"	349.8 ± 5.8
Sargassum natans	Sargassaceae	Pongibalu	N 11°37'15.20" E 92°36'45.79"	357.3 ± 7.8
Sargassum swartzii	Sargassaceae	Little Andaman	N 10°39'8.25" E 92°34'9.78"	73.2 ± 0.6
Turbinaria ornate	Sargassaceae	Pongibalu	N 11°37'7.20" E 92°37'15.92"	99.7 ± 2.0

Table II

Antibacterial activity of methanol crude extracts of seaweeds

Microorganisms	*G. corticata*	*H. opuntia*	*P. tetrastromatica*	*S. natans*	*S. swartzi*	*T. ornate*
S. aureus	22.7 ± 1.5	-	12.7 ± 0.6	-	-	-
B. cereus	18.3 ± 0.6	10.7 ± 0.6	13.3 ± 1.5	21.3 ± 0.6	-	10.7 ± 0.6
P. aeruginosa	-	-	-	13.3 ± 1.5	-	-
K. pneumonia	14.0 ± 1.0	10.7 ± 0.6	-	-	13.7 ± 1.2	-
E. coli	13.7 ± 2.1	-	11.3 ± 1.5	14.7 ± 1.2	15.7 ± 1.2	-
S. flexeneri	12.3 ± 0.6	-	11.3 ± 1.5	13.3 ± 2.1	-	13.7 ± 0.6
S. typhi	10.3 ± 1.5	-	-	-	13.7 ± 1.2	-
S. epidermidis	16.7 ± 1.2	11.7 ± 0.6	-	-	-	-
P. mirabilis	-	-	-	-	-	-

the way to search for novel compounds. Furthermore, the encouraging biological activity observed in this study show that the Andaman and Nicobar Islands are potential source of variety of marine organisms worthy of further investigation.

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