Screeing of antimicrobial activity of the extracts from the selected marine sponges in *aurora globostellata* (carter) and *spirastrella inconstans* var. *moeadrina* dandy from tuticorin region

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**Introduction**

Marine invertebrates are a rich source of biologically active secondary metabolites. The biosynthesis of secondary metabolites by these invertebrates has been speculated as a result of their physical and biochemical adaptation to their environment. In the last two decades, many new compounds were isolated from these organisms and have been promoted as candidates for the development of new drugs, especially as anti-cancer drugs. There is therefore, a need to continue research for discovery of novel secondary metabolites from marine invertebrates. The largest groups of marine invertebrates as a source of secondary metabolites are the sponges. The biosynthesis of secondary metabolites by these invertebrates has been speculated as a result of their physical and biochemical adaptation to their environment. In the last two decades, many new compounds were isolated from these organisms and have been promoted as candidates for the development of new drugs, especially as anti-cancer drugs. There is therefore, a need to continue research for discovery of novel secondary metabolites from marine invertebrates. The largest groups of marine invertebrates as a source of secondary metabolites are the sponges. The structurally diverse varieties of metabolites have high therapeutic potential to treat human diseases and have made them worthy of research for marine natural product chemists (Ireland et al., 1993).

Marine sponges are shown to exhibit antibacterial, insecticidal, antiviral and antiparasomidal activities (Compagone RS, et al., 1998). Antifungal activity of *Haliclona spp.* against *Aspergillus* strains has also been reported (Faulkner DJ, 2001). The ocean covers about 70% of the earth surface providing a diverse living environment for invertebrates (Lalli and Parsons, 1993). Therefore, marine natural products will play a major role in drug discovery in the future. The work on marine natural products started 54 years ago when Bergman discovered the novel bioactive arabinono-nucleoside from the marine sponge *Cryptotethya crypta* (Bergman and Feeney, 1951).

In order to survive in a highly competitive environment, marine invertebrates produce a tremendous diversity of extreme toxic compounds. This has stimulated research groups to screen marine samples in various cytotoxicity assays. Marine natural products evaluations were mostly focused on anti-cancer and anti-inflammatory activity. Some of the compounds from marine invertebrates initially discovered were either too toxic or not effective in treating diseases for pharmaceutical purposes, but were found to be useful as biological tools or as cosmetic ingredients or as agrochemicals (Fenical, 1997).

The extract from this gorgonian shows anti-inflammatory activity, which nowadays is used as an ingredient in cosmetic skin care products (Proksch, et al., 2002). Biological tools or biochemical properties have contributed to the understanding of human diseases. Compounds (in case of pharmacological probes) that have high potential to reveal the biochemistry of diseases could be used as biological tools. This is exemplified by ziconotide, a peptide produced by *Conus* mollusk, which potentially blocks the calcium channel. This compound inhibits neurotransmitter release from incoming sensory fibers and spinal cord neurons further transmitting the signal to the brain (Oliiera, 2002). There are many classes of alkaloids which were isolated from marine sponges. However, one interesting group is the bromopyrrole-imidazole alkaloids due to its biological activities and structural diversity. About 90 compounds of this class of alkaloids were characterized (Hoffmann and Lindel, 2003). A variety of antimicrobial substances have been isolated from various species of marine sponges (Zaro BA, 1982).
report, we describe the biological effect of ethyl acetate extracts of two marine sponges collected from the coastline of Tuticorin region for their antimicrobial activities against six human pathogenic bacteria and five human pathogenic fungi in order to find new antibacterial and antifungal metabolites.

**Material and Method**

**Sponge collection**

The sponge samples were collected by scuba during scientific expedition in a rocky slope at water deeper than 20 m depth from the coastal water of gulf of mannar, Tuticorin region (March 2010). The sponge specimens were cleaned and stored deep freezer at -20°C until used in extraction.

**Preparation of extracts**

Each sponge sample (500 g wet weight) was cut into small pieces mixed with a blender and macerated at 4°C during 48 h. The macerate was lyophilised during 3 days using a laboratory freeze dryer (Christ). The lyophilised material was subjected to an extraction of biologically active components which were carried out with different solvents in the order of increase polarity: hexane, ethyl acetate and methanol by soaking at ambient temperature. The residues (crude extracts) thus obtained were finally dried under rotary vacuum evaporator and screened against six human pathogen bacteria and four human pathogen fungi using the agar disk diffusion method. (Selvin J and Lipton AP, 2004).

**Screening for antibacterial activity of sponge extracts**

For the antimicrobial screening 6 species of bacterial isolates and five species of fungal isolates were selected. The bacterial and fungal strains were obtained from National Collection of Industrial Microorganisms (NCIM), Pune, India. *Vibrio cholerae*, *Escherichia coli*, *Salmonella typhi*, *Pseudomonas aeruginosa*, *Bacillus subtilis*, *Staphylococcus aureus* (NCIM 2079), (Gram positive bacteria), *Aspergillus niger*, *T. rubrum*, *Fusarium species*, *Klebsiella pneumonia* (Carter) except its weak activity against *C. albicans* (11.33±0.66) and *Aspergillus flavus* (14.33±0.33) (Table 2). *A. globostellata* were highly sensitive to all the microbes tested. The two sponges belonged to the species *S. inconstans* var. *moenandrina* were good antimicrobial agents. *Staphylococcus aureus* (15.33±0.66 mm) when compared to the inhibitory role of all the other extracts.

**Conclusion**

Spontaneous sponges collected from Tuticorin coast have been shown to possess a specific antibiotic activity from some fractions. The most interesting species are *Aurora globostellata* (Carter) and *Spirastrella inconstans* Var. *moenandrina* Dendy. These observations corroborate the importance of both genera *Aurora* and *Spirastrella* as a potential source for potential antibacterial (Bakkestuen AK, et al., 2005) antiviral (Da Silva AC, et al., 2006) and antitumoral (Ferretti C, et al., 2007) substances. Furthermore, the encouraging biological activities seen in this study show that the Tunisian coastline is a potential source...
of sponge species worthy of further investigation.

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References


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Table 1. Antibacterial activity of ethyl acetate (EtoAc) extract of two species of sponges collected from Gulf of Mannar Tuticorin region

<table>
<thead>
<tr>
<th>Sponges</th>
<th>Escherichia coli</th>
<th>Salmonella typhi</th>
<th>Pseudomonas aeruginosa</th>
<th>Klebsiella pneumonia</th>
<th>Staphylococcus aureus</th>
<th>Bacillus subtilis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aurora globostellata</td>
<td>15.33±0.33</td>
<td>13.33±0.66</td>
<td>11.66±0.33</td>
<td>11.66±0.33</td>
<td>13.33±0.66</td>
<td>10.66±0.66</td>
</tr>
<tr>
<td>Spirastrella inconstans var. moeandrina</td>
<td>15.33±0.66</td>
<td>14.00±0.57</td>
<td>12.33±1.20</td>
<td>12.33±0.33</td>
<td>14.00±0.57</td>
<td>11.66±0.33</td>
</tr>
</tbody>
</table>

Table 2. Antifungal activity of ethyl acetate (EtoAc) extracts of two species of sponges collected from gulf of Mannar Tuticorin region

<table>
<thead>
<tr>
<th>Sponges</th>
<th>Saccharomyces cerevisiae</th>
<th>T.rubrum</th>
<th>Fusarium species</th>
<th>Candida albicans</th>
<th>Aspergillus flavus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aurora globostellata</td>
<td>9.00±0.57</td>
<td>12.33±0.33</td>
<td>8.33±0.88</td>
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</tr>
<tr>
<td>Spirastrella inconstans var. moeandrina</td>
<td>10.33±0.33</td>
<td>11.00±0.57</td>
<td>8.66±0.66</td>
<td>11.33±0.66</td>
<td>11.66±0.33</td>
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