



Short Communication

Pink spot: A serious threat to scleractinian corals (*Porites* spp.) in Andaman archipelago

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Throughout their existence, coral reefs around the world have encountered a range of challenges, both natural and human-made. Despite these hurdles, they have displayed remarkable resilience and managed to withstand the cycle of life and death. One major threat to these reefs is the pink spot disease, which causes significant harm to the diversity of reef ecosystems on a global scale. Recently, the Andaman Islands experienced the destructive consequences of this disease on three types of stony corals belonging to the Poritidae family - *Porites lutea*, *P. lobata*, and *P. solida*. The affected colonies suffered a decline in live reef cover ranging from 15 to 39 %.

[Keywords: Andaman Islands, Coral cover, Poritidae, Reef Biodiversity, Threat]

Introduction

Coral reefs, renowned for their incredible biodiversity and ecological significance, are incredibly delicate ecosystems that face numerous threats¹. These threats, both natural and human-induced, place coral reefs in a precarious position. Climate change-related events, such as rising sea temperatures leading to coral bleaching and ocean acidification hinder coral's ability to form skeleton and pose significant survival-related challenges. Moreover, pollution from coastal areas, overfishing, destructive fishing practices, coastal development, and the introduction of invasive species further exacerbate the vulnerability of these fragile ecosystems²⁻⁶. The decline of coral reefs is greatly influenced by the emergence of destructive diseases. These diseases can be caused by various factors, including living organisms and environmental factors. The interplay between coral health and the adverse surrounding environment makes them susceptible to different stressors, which can lead to the development and spread of diseases⁶⁻⁷. The pink spot observed on *Porites* colonies is well recognized worldwide. It is

sometimes considered a disease, while in other cases, it is seen as a mechanical aberration⁸⁻⁹. The spread of the pink spot in *Porites* is believed to be facilitated by the activity of trematode larvae¹⁰⁻¹¹. This results in the destruction of normal coral tissue and its separation from the coral skeleton. Reef ecosystems across the world are facing growing threats of both natural and human origins, particularly the Indo-Pacific reefs, which are projected to experience a loss of nearly 2 % per year¹². The pink spot disease caused by trematodes was initially recorded on *Porites compressa*⁸. Additionally, the prevalence of pink spots has been documented in Indo-Pacific massive *Porites* species, but these were not caused by trematodes¹¹⁻¹². Andaman and Nicobar Islands share the Indo-Pacific province, a noteworthy reef ecosystem across the globe¹³. The present study was made as a pilot study to acknowledge the injurious impact of the pink spot on the poritidae corals in the Andaman Islands.

Materials and Methods

In 2017, studies were conducted at Table Excelsior Island Wildlife Sanctuary, located at latitude 13°24'38.63" N and longitude 93°05'17.60" E; which is part of the Andaman group of islands. The initial phase of the study involved a Manta tow survey to gain a comprehensive understanding of the reef areas affected by pink spot disease. Subsequently, quadrat sampling measuring 1 × 1 sq. m and 20 × 20 sq. cm was employed to investigate the extent of pink spot spread on live corals followed by dead reef cover due to pink spot. This sampling method followed the approach outlined by English *et al.*¹⁴ and Jokiel *et al.*¹⁵, and covered a total area of 10,000 sq. m. A total of 100 quadrat samples were collected during the study.

Results and Discussion

In May 2017, pink spots began to appear on the *Porites lutea* Milne Edwards & Haime, 1851, *Porites lobata* Dana, 1846, and *Porites solida* (Forskål, 1775). These pink spots covered anywhere from 8 to 33 % of the total surface area of the *Porites* colonies, which consisted of 82 colonies (Fig. 1a – c), at a depth of 3 – 6 m. The initial infection presented as pink swollen nodules or structures measuring 1 – 4 mm in diameter along the outer surface area of

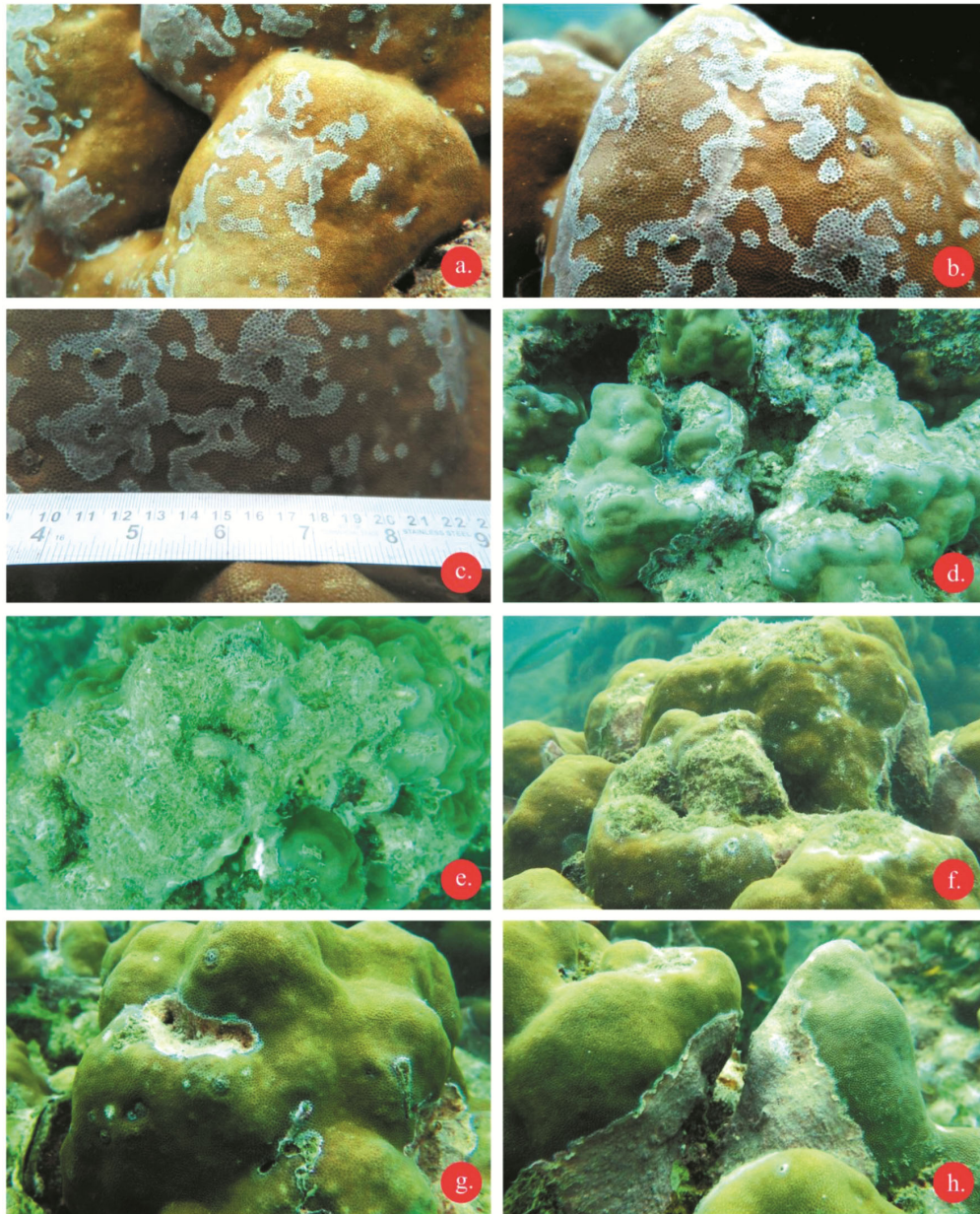


Fig. 1 — a – c) Manifestation of pink spot on *Porites* sp.; and d – h) Patch of dead reef covers on *Porites* sp.

the poritid corals, and later on, it expanded. The continuous swollen arrangement created a valley-like appearance in the infected areas. By October 2017, all the pink spotted areas had transformed into dead reef patches within the *Porites* colonies, resulting in a significant destruction of about 15 – 39 % of the live reef cover of all 82 infected colonies (Fig. 1d – h).

Though pink spots may be seen due to the impact of trematode larval activity or mechanical abnormality, the present study indicated the damage due to the spread of digenetic trematode larvae. In 1998, Aeby found that the

pink spot disease among the poritid coral *i.e.* *Porites compressa* is caused by *Podocotyloides stenometra* Pritchard, 1966, a digenetic trematode, which is presently known as *Polypipapiliotrema stenometra* Pritchard, 1966^(ref. 16). Kubomura *et al.*¹⁷ investigated the possible causes of pink and purple pigmentation response among the *Porites* corals from Okinawajima Island, whereas the present study indicated a detrimental impact of the pink spot disease on the porites corals in Andaman region. Coral diseases in the Indian coastal region are severely under-documented, and there is a

limited understanding of the specific diseases that impact coral reefs in this area. It is crucial to monitor and document coral diseases in order to identify patterns, comprehend the causes, and implement targeted measures to mitigate their impacts⁶. A total of 14 coral diseases are reported from Indian waters, including 11 from the Gulf of Mannar, 10 from the Lakshadweep Archipelago and Andaman and Nicobar Islands each and four from the Gulf of Kachchh⁴. Pink Line Syndrome (PLS) on *Porites lutea* corals of Kavaratti Island of Lakshadweep Archipelago reported the impact on 10 % colonies due to cyanobacterium *Phormidium valderianum*¹⁸. Pink spot disease on coral in the Gulf of Mannar and Palk Bay was documented by Thinesh *et al.*¹⁹⁻²⁰. Chakkaravarthy & Raghunathan²¹ conducted research on microbial diseases in corals and also noted the presence of pink spot disease in the Andaman Islands. This was further supported by Yogesh Kumar *et al.*²². Sreeraj *et al.*²³ mentioned the occurrence of *P. stenometra* for pink spot disease from Swarajdweep among the poritid coral population where manifestation was recorded with 3.67 %. Further, Thangaradjou *et al.*²⁴ reported the prevalence of pink spot disease in the Gulf of Mannar and Lakshadweep region.

The rapid emergence of pink spots has led to significant damage to the reef-building massive corals within a remarkably short span of six months. Although it is not commonly observed in other genera, this phenomenon is gradually eroding the cover of *Porites* corals. These massive *Porites* colonies play a crucial role in providing physical protection to preserve the island ecosystem and its realized niches. Given that the growth rate of massive corals is relatively slow compared to other reef-building corals, it is imperative to investigate and implement effective management protocols to protect the scleractinian corals from the pink spot, ensuring the sustainable conservation of the pristine reef ecosystems.

Conclusion

The pink spot is considered one of the notable diseases among the corals of the world which causes substantial damage to the reef habitat on a regional scale. The emergence of the disease caused by trematode larvae affecting three species of Poritidae corals is a matter of great concern. Trematodes, which are parasitic flatworms capable of infecting various marine organisms, can have detrimental effects when present in corals. Hence, it is crucial to comprehend

the specific mechanisms of disease transmission, the life cycle of the trematode larvae, and the contributing factors to effectively manage and conserve affected areas. Furthermore, it is essential to identify potential stressors and environmental factors that may worsen the spread of the disease. Research studies, including the current study, might play a vital role in documenting and understanding coral diseases, thereby contributing to the broader knowledge base and framing conservation strategies. Conservation efforts may involve monitoring the health of corals, implementing measures to reduce stressors, and engaging in initiatives that enhance the overall resilience of coral reef ecosystems.

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Conflict of Interest

There is no competing or conflict of interest for this said research paper.

Author Contributions

TM: Field survey, methodologies, data accumulation and interpretation, writing and review of the manuscript; and CR: Writing and reviewing of the the manuscript.

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