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Marine Pollution Bulletin

Volume 207, October 2024, 116899

Assessment of heavy metals and proximate composition in jellyfish (*Lobonemoides robustus* Stiasny, 1920) collected from Cox's Bazar coast: Human health risk assessment

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Received 22 June 2024, Revised 11 August 2024, Accepted 23 August 2024, Available online 3 September 2024, Version of Record 3 September 2024.

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https://doi.org/10.1016/j.marpolbul.2024.116899

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Highlights

- Proximate and metals were analyzed in *Lobonemoides robustus* for the first time in Bangladesh.
- The jellyfish body constitutes 95% moisture, 3% protein, and 1% ash.

- Most of the metals analyzed in *L. robustus* were below the detection limits.
- Ca, Na, Se, and Mg were found to have safe levels but had detectable levels of Pb.
- Calculated human health indexes indicated that *L. robustus* is safe for consumption.

Abstract

Jellyfish are known for experiencing periodic blooms in population, which occur when their density increases suddenly. The present study assessed the level of heavy metals and proximate composition in the jellyfish *Lobonemoides robustus* collected from Cox's Bazar coast of Bangladesh. This is the first study conducted in Bangladesh. Most of the studied metals were not possible to detect in *L. robustus* samples because concentrations were below the detection limit. Ca, Na, Se, and Mg were found to have safe levels in the *L. robustus* while the amount of Pb was recorded 0.39 ppm. The findings of Target Hazard Quotient, and Carcinogenic Risk indicate that the *L. robustus* is safe for human consumption (both for children and adults). Hence, it is suitable for consumption and can be exported. This study emphasizes the need for regular marine environment monitoring to ensure that the seafood harvested from these waters is safe for consumption.

Introduction

Jellyfish are fascinating creatures that can adapt to many diverse types of coastal and marine environments (Islam et al., 2024; Haider et al., 2022; Djeghri et al., 2019). They are well known for developing periodic population blooms, a phenomenon when populations suddenly undergo an increase in density due to a combination of biotic, environmental, and anthropogenic variables (Syazwan et al., 2020; Lucas and Dawson, 2014). Due to their significant adverse effects on both humans and the ecosystem, jellyfish bloom episodes in some main marine environments such as the Bering Sea (Brodeur et al., 2002), Mediterranean Sea (Fuentes et al., 2010), Yellow Sea (Zhang et al., 2012), Gulf of Mexico (Graham et al., 2003), Sea of Japan (Uye, 2008), Bay of Bengal (Haider et al., 2022) have alarmed scientists and prompted numerous studies over the past two decades (Brotz et al., 2012; Richardson et al., 2009; Purcell et al., 2007). Jellyfish blooms frequently pose dangerous risks to coastal tourists, power plant screen obstructions, net damage, and fish stock decline in commercial fisheries and coastal aquaculture (Graham et al., 2014; Richardson et al., 2009; Purcell et al., 2007). In some ways, these blooms can, however, occasionally be beneficial since they offer a food source and refuge for a variety of marine creatures (Graham et al., 2014), as well as enhancing carbon sequestration and transmission between columns of water (Syazwan et al., 2020; Graham et al., 2014).

Jellyfish are found in oceans all around the world and come in a wide variety of sizes, colors, shapes, and patterns (Santhanam, 2020). The Phylum Cnidaria account for over 2000 species however, only adult of the order Rhizostomeae (class Scyphozoa) are divided into four classes considered safe for human intake (Raposo et al., 2022; Kimura et al., 1983). The primary body of a Scyphozoan is made up of an umbrella, tentacles, and oral arms. The umbrella, which is the part that can be eaten, remains after the stinging tentacles, gastrovascular cavity, gonads, and other tracts are removed (Bonaccorsi et al., 2020; Raposo et al., 2018). Depending on the species, the venom found in their tentacles and oral arms may be harmful to humans (Raposo et al., 2022; Helmholz et al., 2007). They are exclusively marine species and can be found in all oceans, from the Arctic to tropical regions (Santhanam, 2020). Their venom is potent because they have a bell-shaped body and many tentacles. Jellyfish typically eat plankton and small larvae, small fish and shrimp. Some jellyfish have a cube-shaped body with four distinct sides and 24 tentacles that favor peaceful tropical and subtropical near-shore marine habitats, which are commonly visited by travelers, anglers, surfers, and divers (Santhanam, 2020). Some of them are also highly venomous, and they can cause severe injury and even death to humans (Santhanam, 2020).