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Advances in Clinical Toxicology

Unexpected Harmful Algal Bloom in Southern Chile, more than a Public Health Issue that Might Not Go Awa

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Case Report

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Introduction

Harmful micro algal blooms (HABs) are a natural component of seasonal cycle of photosynthetic organisms in marine ecosystems. HABs are considered natural occurring phenomena that can be influenced by anthropogenic activities in coastal areas. Also, global warming, particularly changes in the oceans could increase HAB occurrences, thus enhancing the likelihood of seafood (e.g. shellfish) consumption poisonings [1]. Photosynthetic organisms (e.g. plank tonic microalgae and cyanobacteria) partially sustain aquatic ecosystems through carbon fixation and oxygen production. HABs are often associated with a variety of species (e.g. Pseudo-nitzschia spp, Dinophysis spp, Alexandrium spp.). Most of these species produce potent and persistent toxins that result harmful or even lethal to humans and animals (e.g. fish, seabirds, reptiles and marine mammals) [2]. Furthermore, HABs have also been associated with population socio-economic impact and costs, especially when small coastal economies are only based on fishery activities (e.g. closure of shellfisheries [3]. Poisoning processes mostly involve bio-concentration of toxins by filter feeding fauna (e.g. bivalve mollusks), which are not affected by these compounds. Also, some other vectors incorporate toxins through the food web (e.g. planktivorous fish). Marine toxins are relatively stable to temperature, thus seafood cooking and processing do not eliminate the risk of poisoning. Furthermore, toxins can remain in seafood tissues even after HABs have decline [4]. Generally, toxicity is triggered by ingestion of contaminated seafood products, skin contact with toxin-contaminated water or inhalation of aerosolized toxins [5]. Among the most common marine toxins are: amnesic shellfish poisoning (ASP), diarrhetic shellfish poisoning (DSP), and paralytic shellfish poisoning (PSP). Acute poisoning symptomatology involves neurological, gastrointestinal, respiratory, dermatological, and cardiac disturbances [6]. These disturbances can initiate from minutes up to hours after being exposed to toxins, and they may last for weeks depending upon efficacy of medical treatment and type of toxin. Shellfish toxin poisonings are treated based upon patient symptoms and there are neither antidotes nor antagonists to specifically treat this clinical condition [7]. Anticipation and mitigation of HABs is not an easy task, since complex interactions among physical, chemical, and biological processes operating at different spatio-temporal levels in the marine environment take place. At this level, periodic monitoring strategies are needed in order to prevent not only public health issues, but also shellfish-based industry economic disturbances [8].

Case Report

Since the beginning of March 2016, Chilean public health authorities communicated an important message to the entire country. HABs had been detected in southern Chile territory (i.e. Aysén and Los Ríos regions), therefore fishery activities of any kind were completely prohibited as well as commercializing seafood coming from these two geographic affected regions. According to The Chilean Agency for Food Quality and Safety's last bulletin, a first HAB of Chattonella and Leptocilindus spp killed a large number of farm fish by water oxygen depletion (asphyxia). Simultaneously, a second HAB (i.e. Alexandrium catenella) had been responsible for stopping fishery-related activities in Chilean southern coastal regions as a preventive measure for protecting people from shellfish poisoning. Local recognized academicians, scientists, and researchers coincided in pointing out global warming as the main factor of HABs occurrence, along with the ocean current "El Niño". On the past two weeks, the HAB extension had already covered more than 200 Km (124 miles) of the Chilean coast. International reports showed that similar HABs have also occurred in

other geographical areas of the world (e.g. Hong Kong, Canada, Vietnam) [9]. As to date, very few suspicious cases of toxin-related poisonings have been reported (e.g. digestive complications), which were medically resolved with no patient fatalities or sequelae.

Discussion

HABs are natural phenomena that increase their occurrence due to physical and chemical changes of atmospheric and water conditions. Minimum levels of marine toxins in sea water represent a life-threatening situation to humans who might be exposed through ingestion of contaminated seafood. Thus, the Chilean Ministry of Health through its regional agencies along with The National Service of Fishery and Aquiculture, and The Chilean Agency for Food Quality and Safety have taken actions to control risks associated with the presence of HABs in Chilean costs. Among the undertaken preventive and corrective measures are:

1. Execution of a control plan in order to absolutely avoid fishery activities (e.g. shellfish extraction, transportation, processing, and exportation) in and from the affected geographical areas.
2. Publication of an official bulletin to keep general public, stakeholders, healthcare professionals, and consumers informed about the latest events occurred in regards with HABs.
3. Publication and distribution of safety guidelines and self-care recommendations to people who live in the affected geographical areas.
4. Broadcasting alert messages on local TV and radio stations to warn people about the risks associated with ingestion of contaminated seafood.
5. Establishment of expert panels composed of marine biologists, biologists, risk assessors, clinical physicians, public health professionals, economists and government representatives to study HAB phenomena and mitigate their consequences.

So far, public health issues linked to HABs appear to be under control, however socio-economic complications have arisen on the last weeks, especially those related to temporary closures of middle-to-low scale fishery companies. Furthermore, most affected people are those who own small fishery businesses.

Conclusion

HABs generate not only serious public health risks, but also several socio-economic issues on people who do fishery-related activities for a living in the geographical affected regions. Accordingly, Chilean public health authorities should keep implementing rigorous and effective monitoring programs that assure seafood safety at all times in regards with marine toxins, and also should be able to anticipate and mitigate future local events related to HABs.

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