

Epidemiologic Profile of Accidents Involving *Thalassophryne nattereri* in Alagoas

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Abstract

Accidents caused by aquatic venomous animal's present lower occurrence than those involving terrestrial ones due to their habitat and especially to underreporting. Among the animals which cause these accidents, the *Thalassophryne nattereri* fish is emphasized in the northwestern coast of Brazil, especially in the state of Alagoas. With its particular venom inoculation apparatus, two dorsal and two lateral canaliculated spines, this envenoming causes pain, fever, severe local inflammatory reaction, formation of erythema and swelling, often are evolving to necrosis. The treatment received is limited to the administration of anti-inflammatory and antibiotic medications, with the latter in order to prevent a secondary bacterial infection. Many of the injured do not seek medical attention and end up using home remedies. In this context, we carried out a survey to quantify the occurrence of this type of accidents in two fishing communities belonging to the Mundaú lagoon, located in the state of Alagoas, Brazil, by applying questionnaires and collecting data through patient records along with the Secretariat of Health of the State of Alagoas. The results obtained indicate the most common group of injured persons: men at working age who use fishing as mean of survival and have especially their feet and hands injured in this type of accident. It is possible to conclude that these accidents caused by *Thalassophryne nattereri* occur with high frequency during fishing activities in the state of Alagoas. The envenoming drives the fishermen away from their work and leads to other complications to the life and health of the injured, as well as to their economic activity. This type of study makes this sort of accident noticeable for the society, such approach has never been conducted in the state of Alagoas and we believe that it might stimulate the interest in deepen the knowledge on toxins, the development of more efficient medical treatments and accident prevention.

Keywords: *Thalassophryne nattereri*; Accidents; Envenoming

Introduction

Accidents involving venomous animals are common in Brazil, its diverse fauna contributes for such events. Regarding accidents involving aquatic animals, affect majorly fishermen, shellfishermen and bathers, since these constitute the main group exposed to this type of environment. *Thalassophryne nattereri*, popularly known as niquim, is the main fish species causing accidents, predominating in the coastal region of the North and Northeast of Brazil, with records along time in Salvador [1], Alagoas [2], Sergipe, Pará [3] and Fortaleza [4]. This fish is characterized by a body without scales with a single sideline, eyes at the top of a large head, large mouth, pelvic flippers under the gills, presence of venomous spines in their dorsal and operculum flippers and the whole body covered with a thick, sticky mucus [5,6].

Niquim has one of the most complete venom inoculation apparatus, presenting glands connected to hollow spines: two dorsal spines located in the anterior region to the dorsal fin, one after the other along the medium line, with different sizes, where the former is bigger and two operculum spines, laterally located above the pectoral flippers. These spines have a conic, pointed shape, articulated with the subjacent osseous plan and are partly hidden by a sheath that conceals the spine almost completely, allowing the venom to be injected under pressure while stepping on or pressing the fish, therefore majorly affecting the regions of the sole of the foot or palmar of the victims. The four spines bristle at once and pierce the tegument, occurring the

rupture of the glands and immediate release of the venom. The injured individuals report intensive pain at the moment of the accident, fever, acute inflammatory reaction in the region, formation of swelling and erythema, often evolving to necrosis and low-healing secondary infection, that in severe cases affect the whole limb, leading to irreversible after-effects, such as loss of function [7-10]. Currently, the treatment aims at relieving the pain, fight the venom effects and prevent secondary infections, which has not proved efficient, leading the injured to make use of empirical therapies, which can even worsen the inflammatory response.

Knowing the severity of the accident and the presence of its causative agent in the coastal area of Alagoas, as well as the effect caused in workers related to fishing and shellfishing activities (simple workers, without resources for expenses with the post-accident treatment or conditions to pass through a long period of recover without working); in addition to the bathers, who seek these regions for fun and leisure time without high costs (because of the constantly sunny weather, typical to the Brazilian Northeast), we observe the necessity to quantify the cases of envenoming by *Thalassophryne nattereri* reported in Alagoas state, Brazil.

Methodology

This paper was carried out by using the application of a printed questionnaire in part of the fishing communities in Mundaú lagoon, located in the areas of Pontal da Barra and Dique Estrada, in the city of Maceió, in order to quantify the occurrence of cases of envenoming by

Thalassophryne nattereri, as well as the measures taken by the injured. The residents that fit as bathers, shellfishermen and fishermen received a questionnaire, being totally free from participating in the study.

We conducted a visit to the Secretariat of Health of Alagoas, at the center of Epidemiological Surveillance for the collection of data regarding the cases of envenoming by *Thalassophryne nattereri* reported in the state. This study was approved by the Research Ethics Committee, under protocol number 52595115.8.0000.5013.

Results and Discussion

Questionnaires answered by the fishing communities of Mundaú lagoon

In total, 15 questionnaires were answered. Regarding the gender of the participants in the survey, men prevailed as 87% of the interviewed, between the ages of 35 and 82 years old, majorly fishermen (92%) of two fishing community (Figure 1). Out of the interviewed, 20% [3] did not report accidents; among the injured [11], most of them reported having been involved in from one to three accidents up to that moment (58%); the interviewed were not able to state exactly when the accidents happened, including descriptions such as “months” and “years” from the event. Fishing was the predominant activity at the moment of the accident (83%), but also including reports of leisure activities (17%). Half of all the injuries reported occurred in the area of Pontal da Barra, with five occurrence records in Dique Estrada (42%) and one in Barra Nova (8%) (Figure 1).

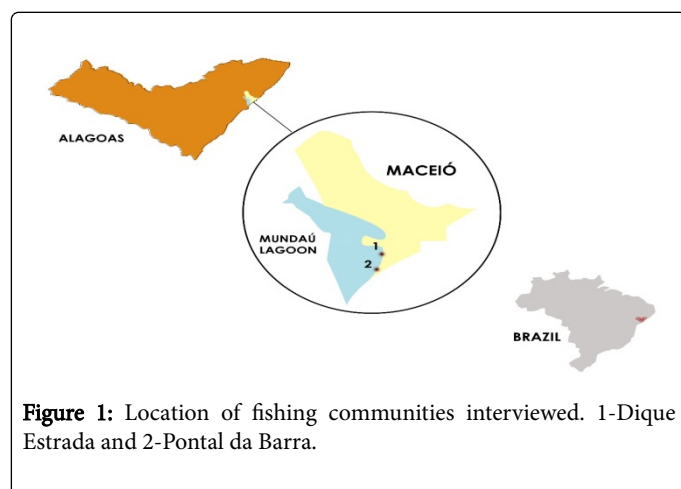


Figure 1: Location of fishing communities interviewed. 1-Dique Estrada and 2-Pontal da Barra.

In 92% of the cases [12], the wound occurred in the region of the foot, and one case reported (8%) hand lesions; no reports indicated necrosis or amputation of the limbs among the interviewed. One of the interviewed kindly granted us with a picture of the scar caused by an accident involving *Thalassophryne nattereri*. Among the injured, only one reported having sought medical attendance (8%) and received Voltaren® (Sodium diclofenac, non-steroidal anti-inflammatory).

The interviewed who stated not having sought medical services (92%) reported having taken measures to relieve the post- envenoming by *Thalassophryne nattereri* symptoms: apply water compresses on the wounded region, hot leaves and oils, massages with ointments (pomades that present revulsive reaction), ammonia ($-NH_3$, a substance normally used as cleaning product), non-described painkiller; ingestion of alcoholic beverages and lemon, in addition to the use of “lolo” (solvents such as chloroform and ether) in order to

make the effect of the pain go away. The injured also reported hitting the wounded region in order to “spread the venom” and pierce the lesion, causing bloodletting, for part of the venom to be released along with the blood. All of the injured reported intermittent pain along the 24 h after the accidents.

Data collected along with the secretariat of health of the state of Alagoas

According to the Secretariat of Health of the State of Alagoas, along the period from 2012 to 2015, 32,436 accidents were reported involving venomous animals in Alagoas; out of these, 713 were classified as “accidents by other venomous animals”, ruling out spiders, scorpions and snakes. Among these 713 accidents, 78 were attributed to the *Thalassophryne nattereri*, fish, popularly known as niquim.

Most of the accidents (75.64%) occurred in the capital of the state, and 19 (24.36%) happened in the state interior, namely, in the municipalities of Atalaia [1], Maragogi [1], Marechal Deodoro [9], Roteiro [7], and São Miguel dos Campos [1]. Regarding gender, 59 (75.64%) of the injured were male and 19 (24.36%) were female. The age range of the victims was between 0 to 72 years old; it is worth emphasizing eight accidents involving children and adolescents, including one six-month old infant. The highest amount of accidents (24.36%) occurred for the age range from 30 to 39 years old. Hands (30.77%) and feet (29.49%) were the main wounded regions. The notification forms for the accidents included reports of pain, swelling, erythema, hyperemia, and abscess, a framework characteristic to this type of envenoming. Necrosis was not reported in any of the cases.

Haddad Jr visited fishing communities in Pará and Sergipe and observed 26 accidents in the municipality of Salinópolis-PA and 17 in Aracaju-SE. All of the cases included male fishermen, from 7 to 64 years old. 80% of the interviewed reported lesions on their feet while stepping on the fish in shallow waters, while nine informed having suffered the accident while removing the fish from the nets, thus having their hands wounded. Three fishermen came to present secondary bacterial infection and tissue necrosis.

In Salvador, Pena reported 21 people who had suffered or knew some victim of envenoming by *Thalassophryne nattereri* while visiting four fishing communities. Most of the injured people (64%) include especially shellfishermen and fishermen [13]. The first 24 h were considered the worst ones. The accidents were considered by the interviewed as “one of the worst experiences of their lives”. Only one of the interviewed (6%) sought medical treatment. Preferably, home remedies were used as well as popular procedures related to the heating of the wounded region (94% of the interviewed), such as infusion of leaves or burned oil. None of the cases reported necrosis or mutilation of limbs for accidents involving *Thalassophryne nattereri*.

The first study on the occurrence of accidents involving niquim in Alagoas was carried out by Auto, in 1992, who quantified 32 cases along eight years at the ambulatory of the old Navy School of Pontal da Barra, in Maceió. Almost all of the lesions affected the feet, on the sole region, and sometimes the hands. The injured complained about pain with an irradiation to the root of the limb, followed by intensive inflammatory reaction in the affected region. One of the injured with a lesion on the sole region of the feet ended up presenting infection by *Clostridium tetani* [3].

Along 10 years (1992-2002), Facó et al. numbered 16 cases recorded at the Center for Toxicological Assistance of Ceará (CEATOX). Among

these cases, 87.5% [14] occurred in Fortaleza, and the remaining ones derived from the interior of the state. Regarding gender, male individuals were predominant in this survey (94%), especially between 21 and 60 years old (94%).

Even in the presence of a regulatory organ, sub notification still occur since many of the injured do not seek health units for knowing that the treatment offered will not be effective. Going to the fishing community, talking to the victims and writing down their comments regarding the accidents seemed to be a safer way to obtain an amount of accidents by niqum closer to the actual number. The most common clinical manifestations were pain and local swelling. We also observed transitory ischemia, paresthesia, ecchymosis, and local burning sensation. The treatment consisted of the use of dexamethasone and indomethacin, even though studies have shown that these medicines are not efficient at reducing envenoming symptoms [15]. Because of the limited knowledge on the mechanisms of action of the niqum venom on the inflammation and nociception, it is difficult to treat the symptoms of the accident leading to the use of drugs commonly applied for other therapeutic purposes, which is named repositioning of drugs. Some cases counted with the use of anesthetics (lidocaine) and warm water, intensive washing to remove fragments, surgical debridement, in addition to the use of antihistamines. The major issue is that the treatment used in health units are not only unspecific for this type of accident, but it is also unable to at least be palliative for the symptoms presented.

Conclusion

Accidents involving *Thalassophryne nattereri* are very common in the working environment and practices of shellfishing and fishing. Its envenoming is able to remove the fishermen from their work in addition to, bringing several complications to the life of the injured worker. It was possible to gather cases in the state indicating the notorious occurrence, especially among male fishermen, who during their fishing activities ended up wounded, majorly on their feet and hands. This study made emerge the issue of accidents involving niqum in Alagoas; its importance is also about contributing to make this type of accident something noticeable for the society and arouse interest of researchers to deepen the knowledge on the venom of this fish, in

addition to ways to reduce the amount of accidents through preventive education of the target public regarding the envenoming by *Thalassophryne nattereri*.

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