

# Ciguatera

Subjects: Others

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Ciguatera is a food poisoning caused by ingestion of fish contaminated with dinoflagellate toxins that live in detritus and in macroalgae associated with reef systems.

Keywords: dinoflagellate toxins ; food poisoning ; fish contaminated

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## 1. Introduction

Ciguatera fish poisoning (CFP) is an intoxication due to eating contaminated fish with ciguatoxins. Ciguatoxins are lipid-soluble polyether compounds consisting of 13 to 14 heterocyclic rings whose synthesis is associated with various species of dinoflagellates <sup>[1]</sup>. The ladder-like polyethers are produced by polyketide synthases (PKS), and the synthesis of the ladder-like polyethers by PKS starts with acetyl CoA, which is incorporated into long polyethers through a series of sequential condensations with malonyl CoA that are performed by KS domains of the PKS <sup>[2]</sup>. The main genera associated with the synthesis of ciguatoxins is *Gambierdiscus* <sup>[3]</sup>. Ciguatoxins were first isolated in 1967, describing an empirical formula of C<sub>35</sub>H<sub>65</sub>NO<sub>8</sub> by means of Ultra-Micro methods <sup>[4][5]</sup>. The structure that is frequently described in the Caribbean Sea is the Caribbean ciguatoxin (CTX-1) <sup>[6]</sup>.

On the other hand, CFPs have a great impact on the tourist and gastronomic sector of the Colombian Atlantic and Pacific coast, describing it in the Colombian Caribbean as the main cause of the ciguatera consumption of barracuda meat (*Sphyaena barracuda*) and moray eel (*Gymnothorax moringa*) <sup>[7]</sup>.

Regarding the first reported case of CFP in Colombia, caused by ingesting the meat of a *Seriola zonata* (Mitchill, 1815), highlights the probability of existence of dinoflagellates that synthesize ciguatoxins in the vicinity of the Departments of Bolívar and Sucre in the Colombian Caribbean, although the species of dinoflagellate that caused the intoxication was not identified <sup>[8][9]</sup>.

There is little information on CFP in Colombia and the registration of its dynamics is difficult, given that Colombia is not required to register for the National Public Health Surveillance System—SIVIGILA.

## 2. Treatment

Treatment consists of adrenaline in cases of anaphylactic shock, corticosteroids and antihistamines <sup>[10]</sup>.

Additionally, intravenous mannitol remains the primary treatment consideration for CFP. Mannitol therapy has been recommended for the goal of reducing symptoms (especially neurologic) during the acute stage of the illness; it can be used in patients with significant morbidity due to poisoning by ciguatoxins and it is recommended to administer 1.0 g/kg body weight over a 30–45 min period <sup>[1][11][12]</sup>.

Food poisoning of bacterial, viral or parasitic etiology can be triggered by consumption of contaminated fish during the process of handling these foods, often associated with dysentery and fever, and are not related to neurological symptoms. except for botulism caused by intake of *Clostridium botulinum* toxins <sup>[1]</sup>.

The clinical management of ciguatera poisoning is symptomatic and supportive; it should be noted that the topic should be known and that it exists so as not to underreport such poisoning. In the following section, a division between acute management and chronic management will be performed <sup>[1]</sup>.

### 2.1. Acute Management

Patients with symptoms such as a skin rash, pruritus and acute gastroenteritis: Medical management is with isotonic intravenous fluids, such as 0.9% saline or Ringer's lactate, depending on the state of dehydration of the patient; in addition, an antiemetic and an antihistamine can be used <sup>[13]</sup>.

There are case reports in which patients have severe poisoning, defined as alterations in the state of consciousness, presence of cardiac arrhythmias and/or hypotension; in these cases one must start by ensuring the airway is open if necessary, starting mannitol early at a dose of 1gr/kg of weight to pass in 30 min to 1 h and the dose can be repeated. As such, its mechanism of action is not known exactly but it has been speculated that due to its osmotic diuretic effect, it sweeps the ciguatoxins and decreases the axonal edema that causes competitive inhibition with the sodium channels. To begin the said diuretic, one should not wait more than 72 h <sup>[13]</sup>.

In cases of hypotension, supportive medical management with dopamine and anti-shock therapy with volume expanders can be initiated; in case of bradycardia, atropine at a dose of 0.5–2 mg intravenously is useful <sup>[14]</sup>.

## 2.2. Chronic Management

As for chronic management, it should be noted that all treatments are aimed at neuropathic therapies, since the predominant symptoms are from the peripheral nervous system; for example, paresthesia, dysesthesia and vertigo; multiple drugs have been studied for these symptoms, and currently they are used with little clinical evidence (e.g., pregabalin, gabapentin, calcium channel inhibitors, such as nifedipine, and amitriptyline as a sodium channel membrane stabilizer). It must be said that the management of chronic symptoms could be long term and, in some circumstances, it becomes a challenge for the clinician <sup>[15]</sup>.

## 3. Conclusions

Ciguatera poisoning is a disease with great impact on public health, especially in the Colombian coast. The most frequently given advice is not to consume fish weighing more than 2 kg, avoid eating fish such as barracuda and not eating fish parts such as the viscera, brain and gonads, which is where ciguatoxins is mostly accumulated. An invitation is sent to the territorial entities to carry out control measures for the consumption of certain fish; in addition, because this is a medical and environmental alert, the symptoms must be known and an adequate diagnosis of this poisoning must be given, so that CFP does not drastically disrupt our daily life.

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