

## CASE REPORT

# Hallucinatory Fish Poisoning (Ichthyoallyeinotoxism): Two Case Reports From the Western Mediterranean and Literature Review

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**Ichthyoallyeinotoxism is a rare kind of food poisoning contracted following the ingestion of fish. The responsible toxins are unknown, and the clinical feature is characterized by the development of CNS disturbances, especially hallucinations and nightmares. As the implicated fish species may be also related to ciguatera poisoning, there may be possible confusion between the two fish-borne intoxications. In order to clarify this, the literature pertaining to “dreamfish” was reviewed and two cases are presented. A 40-year-old man experienced mild digestive troubles and terrifying visual and auditory hallucinations after eating a specimen of *Sarpa salpa* in a restaurant. As he had severe behaviour troubles, he was managed in the hospital and recovered 36 h after the meal. He was unable to recall the hallucinatory period. Another man, 90-years-old and previously healthy, had auditory hallucinations 2 h after eating a specimen of *Sarpa salpa*. The two following nights, he had numerous nightmares and recovered spontaneously after a period of 3 days.**

**Keywords** Ichthyoallyeinotoxism; Ichthyosarcotoxism; Hallucinatory Fish Poisoning; Dreamfish

## INTRODUCTION

Ichthyosarcotoxism is a type of food poisoning caused via the ingestion of fish. The most common and widely investigated form of ichthyosarcotoxism is ciguatera poisoning that affects the peripheral nervous system. It is due to contamination of fish flesh by various toxins produced by the benthic dinoflagellate *Gambierdiscus toxicus*. A less common form is ichthyoallyeinotoxism, characterized by development of central nervous system disturbances, especially hallucinations and nightmares. Ichthyoallyeinotoxism has been reported in many locations around the world (1,2). The purpose of this article is to describe two new cases of ichthyoallyeinotoxism that

occurred in the Western Mediterranean after ingestion of *Sarpa salpa*, and to review the literature concerning this rare poisoning.

## CASE 1

### April 1994

A previously healthy 40-year-old executive began feeling weak and tired within 2 h after eating freshly caught baked sea bream (*Sarpa salpa*) for dinner while on vacation in Cannes on the French Riviera. Nausea and vomiting developed quickly during the night. The next day symptoms persisted and were accompanied by marked muscle weakness. He decided to shorten his vacation and drive home. At that point, he began to experience blurring of vision and hallucinations involving aggressive and screaming animals. Agitation and disorientation led him to seek medical assistance (he was not able to drive anymore as he was seeing giant arthropods around his car). Physical examination upon arrival at the hospital emergency room demonstrated no notable abnormalities: no fever, no sign of focalization or sensory-motor deficit, and normal hemodynamic status except for sinus tachycardia linked directly to the mental disturbances. During hospitalization, the patient recovered rapidly with complete resolution of symptoms within 36 h post ingestion. He was unable to recall the hallucinatory period.

## CASE 2

### March 2002

A previously healthy 90-year-old retiree began experiencing auditory hallucinations 2 h after ingesting a sea bream (*Sarpa salpa*) that he had purchased from a professional fisherman in Saint Tropez on the French Riviera. He was used to eating this kind of fish, and had cleaned the fish after he had purchased it. Hallucinations were of a particularly terrifying nature (human screams and bird squealing), and he had numerous nightmares for the next two nights. Fearing that these symptoms might

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TABLE 1  
Fish species described as hallucinogenic in the Literature

Fish Families	Species	Geographical distribution	Common names	Feeding behaviour	Described as hallucinogenic in
Acanthuridae	<i>Acanthurus triostegus</i>	Indo-Pacific Ocean	Convict surgeonfish, Tang (USA), Manini (Hawaii)	Herbivorous	Hawaii (8)
Kyphosidae	<i>Kyphosus cinerascens</i>	3 species in Indo-Pacific Ocean	Sea chub (USA), Nenu, Manaloha (Hawaii), Dreamfish (Norfolk)	Herbivorous	<i>K. cinerascens</i> and <i>K. vaigiensis</i> in Hawaii (8); <i>K. fuscus</i> in Norfolk Island (9)
	<i>Kyphosus vaigiensis</i>				
Mugilidae	<i>Kyphosus fuscus</i>	Cosmopolitan Indo-Pacific Ocean	Common mullet (USA), Ama (Hawaii), Haarder, flathead mullet (South Africa)	Omnivorous	Hawaii (3)
	<i>Mugil cephalus</i>				
Mullidae	<i>Neomyxus chaptalli</i>	Both species in Indo-Pacific Ocean	Surmullet, goatfish (USA), Weke'a'a, Weke-ula (Hawaii for <i>M. samoensis</i> ), Weke pueo (Hawaii for <i>U. arge</i> ), Jome (Marshall Islands), Tebaweina (Gilbert Islands), Afolu i'a sina (Samoa)	Omnivorous	Both species in Hawaii (3,14,18).
	<i>Mulloidichthys samoensis</i>				
	<i>Upeneus arge</i>				
Pomacentridae	<i>Abudefduf septemfasciatus</i>	Indo-Pacific Ocean	Damselfish (USA), Maomao (Hawaii), Ulavapua, Alala saga, Mutu (Samoa), Bakej (Marshall Islands), Tebukibuki (Gilbert Islands), Palata (Philippines), Sergeant-Major (French Polynesia)	Herbivorous	Gilbert Islands (10)
Serranidae	<i>Epinephelus corallicola</i>	Tropical Indo-Pacific Ocean	Coral Grouper (USA), Gatala (Samoa), Rero (Polynesia), Baraka, Kugtung (Philippines), Coral Rockcod (Australia), Vieille (Seychelles, Mauritius, French)	Carnivorous	Gilbert Islands (10)
Siganidae	<i>Siganus argenteus</i>	5 species in Indo-Pacific Ocean, <i>S. luridus</i> and <i>S. rivulatus</i> settled in Mediterranean and Red sea	Rabbitfish (English), Poisson Lapin, Cordonnier (Mauritius, Réunion, French), Aras (Israel)	Herbivorous	<i>S. argenteus</i> and <i>S. corallinus</i> in Mauritius (19). <i>S. luridus</i> in Israel (7, 16). <i>S. rivulatus</i> in Mauritius (19) and suspected in Israel (5). <i>Siganus spinus</i> in Réunion island (12)
	<i>Siganus corallinus</i>				
	<i>Siganus luridus</i>				
	<i>Siganus rivulatus</i>				
	<i>Siganus spinus</i>				
Sparidae	<i>Sarpa salpa</i>	Mediterranean sea	Saupe (English & French), Salema (Spain & Israel)	Herbivorous	Tunisia (4), France (11) and Israel (5,6).

signal the beginning of a major mental illness, he did not tell his friends or attending physician. The manifestations abated three days after he had eaten the fish. Later, he recalled a warning that he had heard at the fish market concerning the hallucinogenic potential of sea bream and decided to contact the Poison Control Center in Marseille.

## DISCUSSION

Clinical symptoms of ichthyallyeinotoxism occur within a few minutes to 2 h after ingestion of toxic fish. The first symptoms resemble inebriety with loss of balance and coordination and generalized malaise (1–3). Sore throat and heartburn have also been reported in the initial phase. Within a few hours, specific signs of poisoning occur including delirium, visual and/or auditory hallucinations (often involving animals), depression, feelings of impending death with reactive tachycardia and hyperventilation, and disturbed behavior. If they are able to sleep, patients classically report terrifying nightmares (3). Gastrointestinal symptoms including nausea, abdominal pain, and diarrhea have been described in a few cases, but are usually low-grade (3). No specific treatment or antidote treatment is available. Appropriate management of transient behavioral disturbances (e.g., using benzodiazepine or neuroleptics), is important to prevent self-inflicted or other injury. Symptomatic treatment for gastrointestinal manifestation can enhance patient comfort. Symptoms generally abate within 24 to 36 h, but weakness may persist for several days (1–3).

Ichthyallyeinotoxism is widespread in tropical and temperate areas of the Indian and Pacific Oceans as well as in the Mediterranean Sea. Toxic fish species belong to the 8 families detailed in Table 1. Most are herbivores or scavengers living in coastal areas. It should be noted that toxicity in all species varies according to fishing location, season, and way of preparing the fish (3). In the Mediterranean, most poisonings involving *Sarpa salpa* (eaten in Tunisia, France and Israel but considered as inedible in Italy and Spain), have been reported in spring and summer (4–7). A classically reported exacerbating factor is consumption of fish cooked without removing the head, and/or not immediately gutted after being caught (8). Although the toxic agents are still unknown, some authors have implicated toxic macroalgae (caulerpaceae family) that are ingested and contaminate the flesh of fish (3,4). These toxins are probably heat stable since case reports have been described after ingestion of fried, boiled, steamed or raw fish (3,7). Most cases have been described anecdotally as unexpected, sporadic accidental food poisonings, usually occurring in endemic areas after consumption of fish considered as safe. However some cases of intentional consumption of “dreamfish” have been reported (8–10). Consumption of *Sarpa salpa* was reported for recreational purposes in the Mediterranean during the Roman Empire (11), and for ceremonial purposes particularly in Polynesian populations (8–10). The traditional names given to hallucinogenic species reflect their potentially toxic effect. *Sarpa salpa* is

called “the fish that makes dreams” in Arab; *Siganus spinus* is called “the fish that inebriates” in Mascareignes (southwest coast of Reunion Island) (12,13); and *Mulloidichthys samoensis* is called “the chief of ghosts” in the Hawaiian Islands of Molokai, Kauai, and Oahu (8, 14,15).

It should be emphasized that tropical fish species that cause ichthyallyeinotoxism are also implicated in cases of ciguatera poisoning. In this regard, there has been some confusion concerning these two forms of ichthyosarcotoxism. Some cases of ichthyallyeinotoxism reported in the western (11) and eastern Mediterranean (5–7,16) after ingestion of *Sarpa salpa* or *Siganus luridus*, have been described as ciguatera despite typical clinical signs of ichthyallyeinotoxism, (i.e., hallucinations and nightmares lasting for a few hours). In this regard, it should be noted that the presence of *Gambierdiscus toxicus*, the dinoflagellate solely responsible for ciguatera, has not been formally documented in the Mediterranean. It should be emphasized that there are differences in clinical expression: ichthyallyeinotoxism is characterized by central nervous system involvement, whereas ciguatera features peripheral nervous system involvement. The two diseases are also different with regard to potential severity and duration. Most patients with ichthyallyeinotoxism recover within 36 h (1–3), while many patients with ciguatera die or present prolonged symptomatology for several months (17).

## CONCLUSION

Ichthyallyeinotoxism is a rare, poorly understood fishborne intoxication. Its incidence is probably underestimated for several reasons. The first is that symptoms often occur at night and are short-lived. As a result, patients do not always seek medical advice, as was the case for our second patient. Another reason is that the disease occurs in remote geographical areas (islands and isolated archipelagoes), where there are few medical facilities able to document cases. Finally, voluntary ingestion by its very nature seldom leads to medical intervention. Great care is necessary to avoid confusing ichthyallyeinotoxism and ciguatera that involve the same species in overlapping endemic areas.

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