

pital). Doctors claim ciguatera poisoning is not fatal and the disease is not morbid. As a result the problem of ciguatera is left in the hands of fisheries scientists.

It is difficult to advise people in Fiji how to avoid ciguatera poisoning because it is so sporadic. Some fish are more prone to cause ciguatera than others, especially at certain times of the year or in certain areas. However, Island peoples have known about ciguatera poisoning for centuries and local communities usually know which fish to avoid at which time of the year. The best way to avoid ciguatera poisoning is to seek the advice of the people living in the area. Ciguatera intoxication has increased recently due to movement of fish to larger urban centres where people are not able to use local knowledge for guidance.

There is a sudden increase in ciguatera during the months of October and November, when the balolo rises. It is not yet known whether balolo is directly responsible or if it is the associated factors that are responsible for this increase.

It is very difficult to screen for proneness ciguatera unless a reliable test is developed. At the moment the only real way of ascertaining such areas is

through cases of poisoning. Many cases are not reported to the medical authorities and mild cases are often misdiagnosed.

Ciguatera fish poisoning in Fiji is confined to carnivorous reef fish. The larger specimens are more likely to be toxic, probably through accumulation of ciguatoxin over a long period or having taken in a large amount at one time ie. at the time of the balolo spawning.

Most common species of fish implicated in ciguatera are:

Fijian name	Scientific name
Bati damu	<i>Lutjanus bohar</i>
Dokonivudi	<i>Lethrinus miniatus</i>
Ogo	<i>Sphyraena barracuda</i>
Dabea	<i>Gymnothorax undutus</i>
Donu	<i>Variola louti</i>
Regua	<i>Lutjanus rivulatus</i>
Delabulewa	<i>Epinephelus fuscoguttatus</i>
Sumusumu	<i>Arothron stellatus*</i>

(*Note from the editor: in this case, it's tetraodontid poisoning)

Ciguatera fish poisoning in the Cook Islands

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The Cook Islands are 15 islands situated about 3,000 miles north-east of New Zealand. The Polynesian inhabitants number about 18,000 and are closely related to the Tahitians.

The Cook Islands are scattered over 2 million square kilometres of the Pacific Ocean. There are two distinct groups, the northern group made up of Penrhyn, Pukapuka, Manihiki, Rakahanga, Nassau and Suvarrow, which are all atoll islands with the exception of Nassau. The southern group consists of two atolls, Palmerston and Manuae, and 7 islands, Rarotonga, Aitutaki, Atiu, Mauke, Mangaia, Mitiaro and Takutea.

The traditional basic food in the islands consists of fish and taro, although on the main island of Rarotonga these foods are mixed with additional locally grown vegetables and fruit as well as imported foods.

There are no large ocean-going fishing boats belonging to the Cook Islands that could catch fish on long lines or with nets. Only small amounts of fish are caught in the southern group, which has tiny lagoons and virtually no continental shelf,

while in the northern group, with less population, there are still plenty of ocean fish as well as reef and lagoon fish available.

Ciguatera fish poisoning is hardly any problem in the northern group of the Cook Islands. There have been only a few cases reported. However, the people are cautious and do not eat the Napoleon wrasse (**Maratea**) in Penrhyn. Two serious ciguatera poisoning cases occurred in Rarotonga from a large red snapper (**Anga-mea**) that was brought over from Penrhyn.

In the northern group very few vegetables are grown. Only on the atolls are fish still foremost in the diet. Most of the people are good fishermen and like to paddle out with small outrigger canoes. They will put 3 or 4 lines down to about 150 m or go trolling outside the reef with small aluminium boats and outboard engines. They mainly catch, tuna, bonito, barracuda, wahoo and dolphin fish. There has been no ciguatera from these fish in the Cook Islands to-date. In the northern group few people go net fishing in the reef passages or in the lagoon.

This pattern is different in the southern group of the Cook Islands. The most cases of ciguatera fish poisoning have been in Rarotonga, the main island with about 9,000 inhabitants, Atiu with about 980 inhabitants, Aitutaki with 2,500 inhabitants, and Mitiaro which has a population of 250.

In 1989, 158 cases of fish poisoning were reported in the Cook Islands: statistics only mention this common term, but nearly all of these were ciguatera intoxications. In 1990, there were 109 cases and 1991 reports show 81 cases: 35 on Rarotonga, 24 on Atiu, 15 in Aitutaki and 7 on Mitiaro. During the first 3 months of 1992, 39 cases were reported, 19 in January, 15 in February, and 5 in March. But it has been estimated that only 10-20% of fish poisoning cases are actually reported. Severe cases that need medical attention are mostly reported, while many mild cases remain unrecorded.

Fish species causing ciguatera fish poisoning

In the Cook Islands most poisoning were caused by eating: black surgeon fish (**Maito**), unicorn fish (**Ume**), snake mackerel (**Manga**) brown moray (**A'a pata**), red snapper (**Anga-mea**) and different cod species such as the peacock cod (**Roi**).

A survey by Mrs. Dawn Turner and her geography students on the island of Atiu in 1989 interviewed 953 people about ciguatera fish poisoning. The results showed that 183 people (19%) have had ciguatera poisoning symptoms in the past: 67 people in 1989, 52 in 1988 and 64 in earlier years. The main fish species causing the poisoning included surgeon fish, parrot fish, reef shark, unicorn fish, moray eel, red snapper and groupers. 64 people had severe ciguatera and 55 of these were admitted to hospital.

In the Cook Islands, most of the ciguatera intoxication cases reported that they had eaten fish caught on the reefs in the northern side of the islands, where most of the hurricane damage is to be seen, or surrounding recent ships' wreckage, or where rubbish had been dumped, e.g. in some parts of Aitutaki lagoon. Ciguatera dates back to the end of the last world war when the Americans dumped surplus supplies. Most people in the Cook Islands still avoid catching fish in these areas, especially those species that have previously caused ciguatera. On some smaller islands like Atiu and Mitiaro there is little possibility of avoiding potentially ciguateric fish because there is only a small amount of fish and there is a limited supply of other food available.

There seems to be a peak during the hotter months when cases of ciguatera increase through sudden outbreaks, although poisoning cases can be also seen at other times of the year.

Report of cases

A 50-year-old male was admitted to Rarotonga Hospital in 1985 about two hours after having eaten parts of a large red snapper (**Anga-mea**), with heavy diarrhoea, vomiting, general weakness, joint pains, reversal of temperature sensations and severe muscle pain.

Under the treatment of intravenous fluids, antiemetics, antihistamines, calcium, and a very light diet consisting of toast, rice and water, he slowly improved and was discharged after three weeks, but joint pain in both knees and elbows as well as tingling skin sensations lasted for more than a year.

All his pigs died after eating the inner organs of that fish when he cleaned it and his cat was paralysed for about a week but survived. All his chickens had to be killed as they were running around with their guts hanging out at their back and of his neighbour's two dogs died shortly after eating discarded parts out of the rubbish drum.

In 1984, 15 people suffered from ciguatera fish poisoning after having eaten a large snake mackerel (**Aamanga**) at the same function. They all suffered from nausea or even vomiting and diarrhea with some also having abdominal distension with symptoms of a paralytic ileus.

General weakness, headaches, prickling skin sensations and severe arthralgia in the main joints were common in most cases. With symptomatic treatment, all patients were able to be discharged from hospital after 5 days. In one case, heavy watery eye irritation occurred, which rapidly improved under intravenous hydrocortisone application. Several rats, dogs and cats died after having eaten some parts of the same fish that had been dumped.

Clinical symptoms seen with ciguatera fish poisoning

The first symptoms occur mostly within one hour. Paraesthesia and prickling round the lips and inside the mouth and throat were specified, followed by headaches, diarrhea, nausea or vomiting and often accompanied by abdominal cramps. Soon after, typical sensitivity disturbances appear with cold water feeling hot and hot water cold. General weakness with muscle pain and numbness occurred, especially in the legs. With severe intoxication arthralgia was localised mainly in the large joints like the knee and elbow. Only in a few cases were hypotension and bradycardia seen.

Treatment

Until 1988 severe cases were treated symptomatically with intravenous (i.v.) fluids, mostly saline infusions, i.v. antiemetics, i.v. antihistamines, i.v. calcium, i.v. B6 and B12 vitamins, pain relief and a very light diet beginning after 24 hours of only i.v. fluid applications. Hospitalisation usually lasted about one week, but symptoms like general weakness and sensitive skin disturbances were specified for many months after. The longest ongoing symptom seemed to be the arthralgia that in some cases lasted up to three to four years. Repeated cases usually showed more severe symptoms.

Since 1988, when the successful treatment of ciguatera fish poisoning with intravenous Mannitol was reported by Palafox et al., this treatment has been used in the Cook Islands and in nearly all cases all symptoms disappeared within 24 to 48 hours. The earlier the treatment can be given after intoxication (especially when the patient has not had ciguatera poisoning before) the more effective the treatment is.

Precautions to avoid ciguatera fish poisoning

Especially in the outer islands of the Cook Islands, the saying is that fish which no flies land on must be toxic. There are no specific tests for ciguatera available in the Cook Islands. The other precautions known are feeding parts of the fish to cats, dogs or chickens, and then observing them for clinical symptoms of intoxication for two to three hours. Some brave men sometimes taste the fish themselves

first to protect their family from intoxication, to see whether anaesthesia with prickling around the lips and mouth occurs as the very earliest symptom.

The Health staff on all of the Cook Islands are aware of the dangers of ciguatera. Improvement of case reports is encouraged and people are warned not to fish in places where ciguatera intoxications have occurred previously.

On the other hand, the introduction of i.v. mannitol has certainly seen a great improvement in the management as well as in shortening of time required for the treatment of this disease.

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Improved ciguatoxin test kit being developed

Source: *Hawaii Fishing News*,
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The ciguatera-toxin test kit to be made commercially available this year will be different from the test kit with which Hawaii fishermen have become familiar.

Although the commercial kit is still in the design and development phase, it already appears that it will include a plastic stick with a membrane rather than the wooden stick coated with white correction fluid that is now being used.

Robert Goldsmith, president of Hawaii Chemtect International (HCI), which owns the ciguatera test-kit patent, said he expected the kit to be available in the first quarter of 1992 and to retail in the 70-cent range, depending on the market.

Goldsmith also said that the kit will be better than the presently used kit because it does not register false positives, that is it does not read positive for fish that are not infected with ciguatera.

The present test has registered false positives, but several sources suggest that this could be due to oversensitivity of the test and a need to recalibrate it.

The improved kit is being developed and researched at the University of Arizona, Nutrition and Food Service Department, with funds from HCI. Dr Douglas Parks is the primary investigator and is being assisted by research assistant Sam Rua. In a phone interview, Rua clarified some technical aspects of the test kit improvement.