

PHYSICIAN DIAGNOSIS AND REPORTING OF CIGUATERA FISH POISONING IN AN ENDEMIC AREA.

Donald B McKee MD¹, Lora E Fleming MD PhD¹, Robert Tamer MPH MPA¹, Richard Weisman PharmD², Donna Blythe MD¹

¹NIEHS Marine & Freshwater Biomedical Sciences Center, c/o RSMAS University of Miami, 4600 Rickenbacker Causeway, Miami, FL, 33149, USA; ²Florida Poison Information Center- Miami, Dept of Pediatrics, University of Miami School of Medicine, Miami, FL, 33136, USA

ABSTRACT

Ciguatera fish poisoning is the most common marine seafood toxin disease worldwide. It is associated with the consumption of large reef fish contaminated with extremely potent natural marine toxins elaborated by micro-algae known as dinoflagellates. Although a reportable disease with a proven acute therapy, Ciguatera is largely under-diagnosed and under-reported in the United States and elsewhere. This study presented a classic case of Ciguatera to family medicine physicians in the endemic area of Dade County, Florida (USA) to evaluate their knowledge of diagnosis, treatment and reporting of Ciguatera.

Of the 78 eligible participants, 36 (46%) participated. The majority of the participants were male, born in the US, and attended medical school in the US. Although 25(68%) of the participants diagnosed Ciguatera, only 6 (17%) correctly recommended intravenous mannitol therapy as the acute treatment of choice. Almost all the participants (97%) had heard of Ciguatera, but only (64%) had ever diagnosed a case with an average of 0.14 ± 0.42 cases in the past year. Furthermore, only 17 (47%) of the participants knew that Ciguatera was a reportable disease. Foreign-born physicians were significantly more likely to know that Ciguatera was a reportable disease ($p=0.02$); foreign-trained physicians were also more likely to know, although not significantly ($p=0.08$).

This study illustrates that even in an endemic area, Ciguatera is an under-diagnosed, inadequately treated and under-reported disease, especially among US born and US trained physicians.

INTRODUCTION

Ciguatera fish poisoning is the most common marine seafood toxin disease worldwide (1-6). It is associated with the consumption of large reef fish contaminated with extremely potent natural marine toxins elaborated by the dinoflagellate, *Gambierdiscus toxicus*. This dinoflagellate produces a variety of potent neurotoxins, including ciguatoxin and maitotoxin, which are heat and acid stable. Very small amounts of these toxins (probably picogram doses) cause an acute gastrointestinal and neurologic illness with subsequent development of a debilitating chronic neurologic disease

lasting weeks to months (1,3,4-6).

Ciguatera has been reported since the 1500s, first by European explorers as they ventured into the tropical and subtropical regions of the world. Until recently, Ciguatera was primarily an endemic disease of island peoples in the tropics. However, with increasing international tourism, seafood trade and consumption, Ciguatera has been reported in non-endemic areas, including North America and Europe (7). Of note, at this time there are no official monitoring programs for Ciguatera in the US seafood industry, although new Food Safety Legislation may make it mandatory in the future.

Although a reportable disease, Ciguatera is highly under-reported in the United States and elsewhere (2, 4-6, 8,9). The US Centers for Disease Control and Prevention (CDC) estimated that Ciguatera is only reported 2-10% of the time (2,3). Part of this under-reporting is due to under-diagnosis by physicians and other healthcare workers, even in endemic areas. Under-diagnosis is an important problem not only because it contributes significantly to subsequent under-reporting, but also because persons with undiagnosed Ciguatera will receive inadequate acute treatment. If Ciguatera is not correctly diagnosed within the first days from exposure, then the appropriate acute therapy, intravenous mannitol, will not be given during its most efficacious period; persons who do not receive intravenous mannitol within the first 2-3 days from exposure are much more likely to experience subsequent chronic Ciguatera, a debilitating neurologic disease, for which there is no definitive treatment (4-6, 10-13).

The objective of this study was to explore the extent of knowledge of Ciguatera, its treatment and reporting requirements among family medicine physicians in the endemic area of Miami-Dade County, Florida with expected incidence rate of 5/10,000/yr (14).

Methodology

This study was a cross sectional study of the knowledge and behavior of Ciguatera among family physicians in an endemic area. Approval for this study was obtained from the University of Miami Human Subjects Committee. All family medicine physicians listed in the annual Registry of the American Academy of Family Physicians (AAFP) in Miami-

Dade County (Florida) were contacted by phone at their workplace by the first author, as a 2nd year medical student. Once verbal consent to participate in a study was obtained, the family physician subject was presented with the following classic case of Ciguatera and asked a series of brief questions concerning diagnosis, treatment, reporting issues, and demographics.

"We have a 50 year old man who presented with nausea, vomiting, and diarrhea, followed within 24 hours by itchy skin without a rash and a burning sensation when touching cold objects. He and his wife returned from the Bahamas 2 days ago where they had caught and eaten a large grouper (which was delicious) within hours prior to the onset of symptoms. His wife is complaining of similar symptoms."

All physician subjects approached were ultimately offered a Ciguatera Information Packet through the mail regardless of participation.

The data were entered into EpiInfo 6 software and analyzed by SAS version 7 statistical software. After reviewing frequencies and means, the data were evaluated by ttests and Fishers exact test for possible associations.

Results

From the annual Registry of the American Academy of Family Physicians (AAFP) in Miami-Dade County, 78 eligible participants were identified. Of those eligible, 36 (46%) agreed to participate, 2 refused, and 40 (51%) were lost to follow up. Those lost to follow up did not respond after at least 3 phone calls/eligible participant.

Of the 36 (46%) participants, the majority were male (27 (75%)). Their mean age was 51.3±10.9 years and the mean years in practice were 20.6±11.7. The majority were both born in the US (19 (53%)) and attended US medical schools (23 (64%)).

Although 35 (97%) reportedly had heard of Ciguatera, only 23 (64%) had ever diagnosed a case, with a mean of 0.14±0.42 cases/year of practice. The majority, 25 (68%), were able to make a correct diagnosis of Ciguatera in response to the classic case presentation; there was no significant difference by age, gender, years of practice, birthplace, or medical school location with respect to making this diagnosis. However, only 6 (17%) of the physician subjects recommended the correct treatment of IV mannitol; again, there was no significant difference by age, gender, years of practice, birthplace, or medical school location with respect to this prescribing treatment.

Furthermore, only 17 (47%) knew that Ciguatera was a reportable disease to the public health authorities. Foreign born physicians ($p=0.02$) and foreign trained physicians

($p=0.08$) were significantly more likely to know that Ciguatera was an officially reportable disease; there were no significant differences in knowledge by age, gender, or years of practice. The majority of the foreign-born and foreign-trained physicians were from the Caribbean, a highly endemic Ciguatera area.

Conclusions

This study is a small cross sectional study of primary care physicians in an endemic Ciguatera area. The study is limited not only by the small numbers of participants but also by the relatively low participation rate. Nevertheless, this is the only study of its kind in the marine toxin disease literature.

In conclusion, family medicine physicians in an endemic area, have relatively little experience recognizing and diagnosing Ciguatera when presented a classic case to evaluate. Furthermore, these physicians do not know the correct treatment, intravenous mannitol. Therefore, even if they were able to diagnosis a classic acute case, they would not be able to prevent the subsequent occurrence of chronic Ciguatera. The majority (53%) of these family medicine physicians did not know that Ciguatera is a reportable disease to health authorities. Therefore, there is no possibility of primary prevention by removing contaminated fish from the home, eating establishments and fish stores before it is shared with others, leading to the possibility of additional cases of Ciguatera. Furthermore, this finding helps to explain the significant public health under-reporting of this marine toxin associated disease, even in an endemic area.

In order to ensure timely diagnosis, treatment and reporting of Ciguatera, physician education is essential (2, 4-6). Given its acute presentation, education should be targeted not only at primary care providers, but also at emergency rooms. Official reporting to health authorities must be made as simple and efficient as possible given the time constraints on busy healthcare providers.

In Florida, for example, the Florida Poison Information Centers in collaboration with the Florida Department of Health and the National Institute of Environmental Health Sciences (NIEHS) Marine Center at the University of Miami have established a toll free, 24 hour/day, 365 days/year Marine Hotline (888-232-8635) in English, Spanish and Haitian Creole (with access to other languages if necessary). Not only does this Marine Hotline provide diagnosis and treatment information concerning all the marine toxin related diseases for all callers including healthcare providers, official reporting of Ciguatera and other marine toxin disease cases are made to the Florida Dept of Health by the Florida Poison Information Center- Miami on behalf of the healthcare provider.

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