

SHORT PAPER

Food-borne botulism in Apulia region, Italy: an expert witness testimony

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Key words: Food-borne botulism, Botulism differential diagnosis, Surveillance, Italy

Parole chiave: Botulismo alimentare, Diagnosi differenziale del botulismo, Sorveglianza, Italia

Abstract

We report the epidemiology of food-borne botulism in Puglia, Italy, between 1977-2017, using surveillance data and Experts' personal observations. As the disease is rare, the diagnosis is often missed or delayed, and cases are initially misdiagnosed. This was the case of a family outbreak of botulism in the 1970s.

Food-borne botulism is a life-threatening disease caused by the ingestion of highly potent neurotoxins formed during the growth of the anaerobic spore-forming bacterium *Clostridium botulinum* in contaminated foods (1). Symptoms-generalized persistent peripheral neuroparalysis that include both the skeletal and autonomic nervous systems - appear 12-36 hours after consumption of the toxin-containing food, requiring the early administration of antitoxin and an intensive respiratory care. Even where these are timely available, the disease can be fatal in 5 to 10% of cases (2).

According to the European Centre for Disease Prevention and Control (ECDC) epidemiological reports, over the past 10 years, the notification rates of botulism in the European Union (EU) were generally

low (0.02 cases per 100,000 population) (3,4). In 2016, 128 confirmed cases were reported by a total of 14 EU/EEA countries. Italy notified the highest number of cases (N=37), followed by Poland (N=18) and France (N=18). Sixteen countries notified zero cases (3).

In Italy, botulism is a mandatorily notifiable disease since 1975, and it is monitored through a case-based passive surveillance system requiring immediate reporting within 12 hours from the initial clinical suspicion, since 1990 (5). Detailed information on epidemiological features of cases and outbreaks occurred from 1986 to 2015 were recently provided by Anniballi et al. Of 1,257 suspected cases of botulism notified, 466 were laboratory-confirmed; of these, 421 were food-borne.

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A peak in incidence was observed in 1996 as a consequence of four outbreaks due to commercial “mascarpone” cheese and olives, and in 2013 as a consequence of a suspected outbreak due to commercial “pesto” sauce. Most cases originated in southern regions of Italy, and in particular in Campania (17.5%) and Apulia (14.0%), where many people still maintain the tradition of preparing home-preserved foods, due to the wide availability of low cost, raw food materials (5).

In Apulia, from 1977 to 1995, a total of 63 suspected cases of food-borne botulism, 11 sporadic cases and 18 clusters (2.9 cases per outbreak), were epidemiologically investigated by the *Istituto di Igiene* of the University of Bari (*Courtesy Professor Salvatore Barbuti's personal observations*). Botulinum neurotoxins and/or neurotoxin-producing Clostridia were recovered by mouse bioassay and by culture, respectively, from food items involved in 33/63 cases (5 sporadic cases and 9 clusters involving 28 persons). Of these 33 laboratory-confirmed cases, all sporadic cases and 8/9 clusters (24 patients) were associated with homemade canned food, while the remaining one cluster (4 persons) was the responsibility of commercial food. Vegetables preserved in oil were connected to 4 single cases and 7 clusters (20 persons), with peppers (one single case and 3 clusters involving 7 patients) and mushrooms (one single case and 2 clusters involving 7 patients) as the most frequent products involved. Tuna in oil was connected to one single case and 2 clusters involving 8 persons. The most common food that gave negative results or not analyzed in the laboratory but epidemiologically linked to the suspected cases was a variety of vegetables (6 sporadic cases and 6 clusters involving 13 people); of these, peppers in oil were connected to 2 sporadic cases and 3 clusters (6 cases) and eggplants to 2 single cases. Canned meat was linked to 1 cluster (5 cases) (Table 1).

From 1996 onwards, laboratory diagnostics of botulism have been performed by the Institute for Veterinarian Diseases Prevention of Apulia and Basilicata Regions (*Istituto Zooprofilattico Sperimentale della Puglia e della Basilicata*) and by the National Reference Centre for Botulism at the National Institute of Health (*Istituto Superiore di Sanità*) (6). According to the National Notifiable Diseases Surveillance System data (7), from 1996 to 2009, 77 laboratory-confirmed cases of botulism were notified in Apulia (average annual incidence rate of 0.14 per 100,000 population); detailed data on food items involved in these cases were not routinely available. From 2010 to 2017, 34 cases were reported (average annual incidence rate of 0.12 per 100,000 population); food items implicated were identified in 31 of these 34 cases: home-canned vegetables (20 patients), home-canned tuna (1 patient), commercial vegetables (4 patients), mascarpone cheese (one family cluster, 6 cases) (*Data and information provided by the Ministry of Health's Office*).

Although food-borne botulism is a rare disease in Italy, due to its severity and epidemic potential it remains a public health challenge mainly in the southern regions (8). In a recent CDC-sponsored supplement to *Clinical Infectious Diseases*, “Botulism” is defined as a “disease of contradictions”. Despite its clinical presentation is said to be distinctive, yet the diagnosis is often missed or delayed either for the rarity of the disease or because it retains elements of the past (9). Clinical suspicion of botulism must be included in the differential diagnosis of a patient with rapidly progressive descending paralysis and normal sensorium (Guillain-Barre´ syndrome, Miller-Fisher syndrome, myasthenia gravis, chemical intoxication, stroke, mushroom and staphylococcal food poisoning, poliomyelitis, diphtheria, and other conditions) (1, 10). A rapid diagnosis is essential for the correct treatment of patients

Table 1 - Suspected and laboratory-confirmed cases of food-borne botulism in Apulia region, Italy, 1977-1995

Year	Sporadic/ Cluster of cases	N. of deaths	Lab diagnostics		Food item	Food processing
			Mouse bioassay	Culture		
			Type of toxins			
1977	2	1	Not analyzed		Peppers in oil	Home-canned
1978	4	0	B	B	Green beans in oil	Home-canned
1980	2	1	B	B	Peppers in oil	Home-canned
1980	1	0	B	B	Peas	Home-canned
1980	1	0	B	B	Peppers in oil	Home-canned
1982	3	0	B	Negative	Peppers in oil	Home-canned
1983	2	0	B	B	Mixed vegetables	Home-canned
1984	4	0	Negative	B	Tuna in oil	Home-canned
1984	2	0	Not analyzed		Peppers in oil	Home-canned
1985	4	0	B	B	Tuna in oil	Home-canned
1988	2	0	Negative	Negative	Mushrooms and tuna in oil	Home-canned
1988	2	0	Toxin not typed	Toxin not typed	Peppers in oil	Home-canned
1990	4	0	Toxin not typed	Toxin not typed	Mushrooms in oil	Processed
1991	5	0	Not analyzed		Canned meat	Processed
1991	1	0	Not analyzed		Spinach	Home-canned
1991	2	0	Negative	Negative	Tuna in oil	Processed
1992	1	0	Not analyzed		“Pesto” sauce	Home-canned
1992	2	0	Not analyzed		Green beans	Home-canned
1992	1	0	Negative	Negative	Eggplants in oil	Home-canned
1994	2	0	Negative	Negative	Chili peppers in oil	Home-canned
1994	1	0	Toxin not typed	Toxin not typed	Mushrooms in oil	Home-canned
1994	3	0	Negative	Negative	Mixed vegetables	Home-canned
1994	4	0	Negative	Negative	Tuna in oil	Home-canned
1995	1	0	Negative	Negative	Peppers in oil	Home-canned
1995	1	0	Toxin not typed	Toxin not typed	Eggplants in oil	Home-canned
1995	1	0	Negative	Negative	Eggplants and peppers	Home-canned
1995	1	0	Toxin not typed	Toxin not typed	Tuna in oil	Home-canned
1995	3	0	Toxin not typed	Toxin not typed	Mushrooms in oil	Home-canned
1995	1	0	Negative	Negative	Zucchini in oil	Home-canned

(timely institution of intensive care support and early administration of botulinum antitoxin) and to prevent outbreaks.

Lessons learned from past public health experiences can contribute to increase medical awareness of the disease.

Here we report, using the lens of humanity, an expert witness testimony on

a family outbreak of food-borne botulism occurred in Apulia in the 1970s and initially misdiagnosed.

During his 51 years of university career, Professor Salvatore Barbuti, head of the Istituto di Igiene of the University of Bari, has experienced people's pain and witnessed

episodes occurred in Apulia. But the one that he still clearly recalls with a lot of emotion is an episode of botulism occurred in a family living in Martina Franca, a small town near the city of Taranto, between the end of December 1969 and the beginning of January 1970.

On December 25, 1969, Christmas day, an 84-year-old woman died of a stroke and the funeral took place the next day in the afternoon. Afterwards, a dozen relatives gathered for a ceremonial supper and consumed broth, boiled chicken, homemade pickled peppers and tomato salad with capers. Not all in the same amount.

The following days, all those who took part at that dinner presented typical symptoms of food-poisoning, in particular, the clinical conditions of the 56-year-old daughter of the deceased and her 20-year-old daughter quickly deteriorated. Both patients were hospitalized at the Martina Franca Civil Hospital and laboratory tests were performed. An oral swab was collected from the back of the throat which showed a thick, white patch: microscopic observation revealed a carpet of *Corynebacteria* almost in pure culture. The initial suspected diagnosis was diphtheria.

As the conditions worsened, both women were admitted to the University Medical Hospital of Bari, where physicians noted paralytic symptoms of oculomotor, mastication and breathing muscles, which justified, as differential diagnosis, a suspected botulism related to the consumption of vacuum-sealed peppers. Both women died few days after, the elder on December 30, the girl on New Year's day. The autopsy of the girl was performed on January 3rd (the body of her mother had already been buried in the cemetery of Martina Franca), but no additional macroscopic findings resulted useful for diagnosis. The panel of experts designed by the Court, which Professor Barbuti was part of, collected organ and tissue samples for toxicological,

bacteriological, virological and histological examinations. Later, on January 14, the autopsy of the elder woman was performed, with similar procedures. Apart from the confirmation of *Corynebacteria* present in the oral cavity, all the tests resulted negative.

Unfortunately, it was impossible to examine the leftovers peppers consumed during the dinner, since they had been trashed after the episode.

To partially justify the initial diagnosis of diphtheria, it should be noted that in the 1960s-70s botulism was not well-known and intoxication episodes were reported in the literature with the most disparate clinical diagnoses, while diphtheria was not yet uncommon as at present.

Luckily, the other participants to dinner showed less severe symptoms, which progressively regressed, with the exception of a 15-year-old girl whose conditions worsened soon. She was admitted to the Intensive Care unit of the Bari Hospital, under the oxygen curtain, where she remained for several months. Professor Barbuti didn't get to know anything about her fate.

Nine years later, in March 1979, Professor Barbuti was appointed as member of the examination board for the Diploma of Laboratory Technician at the Martina Franca Civil Hospital. Among the candidates, there was a young woman to whom he asked botulism intoxication as a question of examination. With a strange (and amused) smile, she began to speak with a little bit of a raspy voice. Curious about her behaviour, the Professor interrupted her and amusingly asked the reason for that hilarity. She immediately answered <Professor, perhaps you don't remember me. I am the 15-year-old girl who was hospitalised during the Martina Franca episode of botulism nine years ago. As you can see I have survived and I am healthy>.

He didn't think many people could ever experience the joy which in that moment

made him forget everything and everyone. He couldn't believe what he was seeing. Moved, he hugged the girl.

Still today, this extraordinary and perhaps unique coincidence remains one of the best and qualifying memories of Professor Barbuti's entire professional career.

Acknowledgements

The authors would like to thank Professor Salvatore Barbuti who provided his expert witness testimony for this report.

Riassunto

Epidemiologia del botulismo alimentare in Puglia: la testimonianza di Esperti

Riportiamo l'epidemiologia del botulismo alimentare in Puglia tra il 1977-2017, attraverso i dati di sorveglianza e gli archivi personali di Esperti. Poiché la malattia è rara, la diagnosi è spesso ritardata e i casi sono inizialmente mis-diagnosticati. È quel che accadde in un focolaio familiare di botulismo negli anni '70.

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