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Foodborne botulism in southeast Turkey in over a five-year period

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ABSTRACT

Aim: The purpose of this study was to evaluate food-borne botulism cases (especially purslane) observed in Adıyaman, a southeastern province of Turkey.

Material and Methods: This retrospective study covers food-borne botulism cases, especially due to purslane, which were detected in 9 out of 796 people admitted to the emergency department due to food poisoning in Adıyaman between 2015-2020. The demographic characteristics of the cases, nutritional sources, and prognosis of the disease, its clinical signs and symptoms, duration of hospital stay, and treatment and death rates were analyzed.

Results: A total of 9 patients from the same family (5 females and 4 males) were included in the study. The time elapsed since the onset of the disease was between 8-12 hours. The outbreaks occurred due to purslane prepared in the autumn season and consumed in the spring season. At the end of follow-up and treatment, all the patients were discharged with full recovery.

Conclusion: When looking at the data of our hospital, patients were frequently diagnosed with food poisoning, but the cause was not specified. The main source of toxin seen in food poisoning in our city was due to canned purslane, which was stored in unsuitable conditions at home. Therefore, emergency physicians need to know how to diagnose and treat this rare but potentially fatal condition, as they may be the first to treat a patient with any type of botulinum intoxication.

Key words: Food poisoning; purslane; botulism

INTRODUCTION

Botulinum Neurotoxin (BoNT) is the strongest natural toxin. It is the food-borne type with the highest incidence among the causes of botulism. Botulism is a neuroparalytic syndrome caused by the action of a potent toxin produced by Clostridium botulinum (C. botulinum). Depending on the toxic dose, the incubation period of the bacteria is 12-72 hours1,2. Botulism is classically characterized by acute, febrile, and symmetrical flaccid paralysis. This severe intoxication is an emergency that requires diagnosis and resources to be identified early. Of the seven botulinum toxin types, the types that cause the most common disease in humans are often associated with type A, B, E, and rarely F3. BoNT is not resistant to heat and irreversibly inhibits the release of acetylcholine at the peripheral and cranial nerve endings following ingestion with food. Clinical findings include nausea/vomiting, abdominal pain, cranial nerve palsy (diplopia, dysarthria, dysphagia, ptosis and mydriasis), symmetrical pattern paralysis, respiratory failure, blurred vision, dry mouth, constipation, urinary retention, and decreased deep tendon reflexes4. As a result, voluntary motor and autonomic muscle blockade occurs.

The blockage is in the descending form from the cranial nerves to the extremities and consequently, inhibits respiration by the blockage of the respiratory muscles5,6. When food botulism is suspected, clinicians should report the suspected case to the Ministry of Health. Many people can become sick by consuming contaminated food. While botulism is rare, it can kill quickly. Therefore, foodborne botulism is a medical and public health emergency that places emphasis on rapid and effective communication between clinicians and public health professionals1,2. Although there are isolated case reports from our country, it has been reported that in a study containing the largest number of cases that botulism cases results from the consumption of improperly prepared cheese7. On the other hand, data on botulismus due to purslane consumption can be found in the form of case reports8-10.

In this study, the data of 796 food poisoning patients between 2015-2020 were reviewed. The clinical and epidemiological data of 9 patients from the same family diagnosed with botulism were discussed in the light of the literature.

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MATERIAL and METHODS

Ethics committee approval (2020/9-19) was obtained from Adıyaman University Non-Interventional Clinical Research Ethics Committee for this study. A total of 796 patients were analyzed retrospectively in 1 January 2015 between 31 December 2020. This study includes foodborne botulism cases detected and subsequently hospitalized in Adıyaman province. The search was carried out by examining the data records of our hospital and using the keywords "botulism, foodborne botulism, food poisoning undefined" (A05 and sub-divisions with ICD codes). The files of all patients identified through a database search by a researcher (Y.A) were scanned. As a result, 9 patients diagnosed with food botulism due to purslane consumption were included in the study. The remaining patients were excluded from the study because they were not hospitalized, treated in the emergency department, and/or file information was missing. The demographic characteristics of the patients, responsible dietary sources, clinical symptoms and findings, the prognosis of disease, duration of hospital stay, follow-up rate in the intensive care unit, secondary bacterial infection developed in hospitalized patients, and the treatment/treatment results applied to the patients were reviewed.

Statistical analysis

After the data were coded by the researchers, the IBM Statistical Package for the Social Sciences 25.0 was used for the statistical analyses of the data. The statistical analyses included descriptive statistics. First of all, the normality of the distribution of the data was tested using Kolmogorov-Smirnov test. The results were interpreted in a 95% confidence interval, and the level of statistical significance was accepted as $p<0.05$.

RESULTS

In this study, based on the consumption of purslane, information was obtained on a total of 9 botulism cases, 5 of which were female (55.6%) and 4 were male (44.4%), from the same family. The age interval of patients ranged from 2 to 42, with an average age of 16.9. Electromyograms were not performed for any of these patients whose information was available; however, the histories of the patients initially supported the clinical diagnosis. In the laboratory, type A BoNT assessment was not performed in the residual food of the patients. The time elapsed since the onset of the disease (incubation period) varied between 8-12 hours. When the symptoms of the cases were evaluated, 89% had dry mouth and fatigue, 33% had visual impairment, 56% had double vision, and 78% had difficulty speaking and swallowing (Table 1).

Table 1. Demographic data of botulism cases (n=9)

Patient number	Age/ Gender	Duration	Symptoms	Antitoxin serum	Result
1	42/M	8 hours	Weakness, nausea, vomiting Shortness of breath Visual impairment and double vision Speech and swallowing disorder Difficulty in walking Respiratory distress	Administration after 72 hours	Clinical recovery after 9 days in the hospital ICU after antiserum treatment
2	38/F	10 hours	Weakness, nausea, vomiting Shortness of breath Difficulty in chewing Speech and swallowing disorder Difficulty in walking Respiratory distress	Administration after 120 hours	Clinical recovery after 9 days in the hospital ICU after antiserum treatment
3	7/M	12 hours	Weakness, nausea, vomiting Shortness of breath Speech and swallowing disorder Visual impairment and double vision Ptosis Difficulty in chewing Difficulty in walking		Clinical recovery after 8 days of hospitalization in the pediatric ward
4	2/F	12 hours	Weakness, nausea, vomiting		Clinical recovery after 8 days of hospitalization in the pediatric ward
5	10/M	9 hours	Weakness, nausea, vomiting Visual impairment and double vision Difficulty in chewing Difficulty in walking Abdominal pain Blurred vision Respiratory distress	Administration after 72 hours	Clinical recovery after antiserum treatment after a period of 14 days, 10 days in the hospital ICU and 4 days in the ward

6	13/F	9 hours	Weakness, nausea, vomiting Respiratory distress Double vision Difficulty in chewing Difficulty in walking Abdominal pain Blurred vision	Administration after 72 hours	Clinical recovery after antiserum treatment after a period of 14 days, 10 days in the hospital ICU and 4 days in the ward
7	8/F	12 hours	Weakness Nausea, vomiting Shortness of breath Visual impairment and double vision Difficulty in chewing Difficulty in walking		Clinical recovery after 8 days of hospitalization in the pediatric ward
8	15/M	10 hours	Weakness, nausea, vomiting Shortness of breath Difficulty in chewing Difficulty in walking	Administration after 72 hours	Clinical recovery after 8 days of hospitalization in the pediatric ward
9	17/M	8 hours	Nausea Weakness Abdominal pain		Short-term emergency follow-up, then discharged with recovery

Since the general symptoms of the patients were similar and there was no severe respiratory distress, the patients were not classified into groups. All patients, except 787 outpatients with a diagnosis of food poisoning, were followed up in the hospital. In 4 of the 9 patients followed in the hospital, botulinum toxin A or toxin B gave positive results in serum, urine, and stool materials examined using mouse neutralization method. Mechanical ventilation was required for 2 of these patients who were given supportive care and were followed up in the pediatric intensive care unit. The other 7 patients were followed up by hospitalization. One of these patients was on mechanical ventilation for 7 days and the other one day. Trivalent botulism antitoxin serum was given to 4 patients with more severe clinical findings for treatment. Hypersensitivity reaction developed in only one patient. The average length of stay in the hospital was 8.77 days. Although 4 of the patients presented with severe respiratory distress, no mortality occurred. The follow-up period of two patients in the intensive care unit was 10 days. Secondary bacterial infections (such as ventilator-associated pneumonia) did not develop in any of the hospitalized patients. At the end of follow-up and treatment, all patients recovered and were discharged.

Table 2. Reported cases of botulism due to consumption of canned purslane in Turkey

Case	Location	Duration (hour)	Symptoms	Case number/Ex	Period of hospital stay (day)	Result
Sırmatel et al [8]	Adıyaman	48-72	Weakness Nausea, vomiting Double vision Difficulty in chewing Difficulty in swallowing Speech impairment Difficulty in walking Fuzziness of consciousness	10/3	1-3	7 clinical recovery and 3 ex after antiserum treatment (no antiserum treatment)
Altun et al [9]	İstanbul	36	Weakness Nausea, vomiting Double vision Difficulty in chewing Difficulty in swallowing Difficulty in walking Fuzziness of consciousness	7/0	54	7 clinical recovery after antiserum therapy
Yayla et al [10]	İstanbul	24-96	Weakness Nausea, vomiting Double vision Difficulty in chewing Difficulty in swallowing Difficulty in walking Fuzziness of consciousness	6/0	60	6 clinical recovery after antiserum therapy

Six months after the discharge date, these patients were diagnosed by a neurologist (Y.A) where they lived and any complaints were questioned and examined. Follow-up of the patients was completed in 6 months and it was observed that complaints did not persist in all patients and almost all of them were recovered.

DISCUSSION

Botulismus is an infectious disease that develops as a result of the toxins of C. botulinum blocking the acetylcholine release in the peripheral autonomic and motor nerve endings. It can be confused with other neuroparalytic diseases with the clinical picture it causes[1]. Definitive diagnosis is made by determining the toxin or agent in the patient or food. However, these examinations are possible in only few settings. As represented by the sources available, this epidemic is caused by botulismus in most cases in our city. It is not possible to prove botulismus within the laboratory in our country. However, it is possible to utilize non-specific methods such as anaerobic culture and acute inflammatory polyneuropathy patient serum, which causes paralysis in mice[11,12]. For this reason, diagnosis is made by history and clinical findings in many health institutions in our country. Although there are isolated case reports in our country, it has been reported that the source of infectious food is improperly prepared cheese[7]. Botulismus cases related to purslane consumption are in the form of case reports[8-10]. In addition, in another botulism case related to canned consumption, a family of 5 people in Adana was poisoned by canned purslane; however, there no mortality was documented[13]. In a retrospective study conducted between 1983-2017, which reported a revision of food-borne botulism in Turkey, only 16 of the 95 patients developed botulism due to canned purslane[14]. When the results of our study are evaluated together with the reports from the study of Sırmatel et al.[8], food intoxication due to purslane consumption was shown to be most frequently encountered in Adıyaman.

In cases of foodborne botulismus, the incubation period was reported as 6 hours (shortest) and 10 days (longest), with an average of 12-72 hours[11,12]. The prognosis was negatively affected by the short incubation period[15,16]. It has been observed that the incubation times of our cases were quite different and varied between 8-12 hours. However, the late recovery in 2 cases with an incubation period of 9 hours compared to other family members can be explained by the shorter incubation period and the younger age of the patient. However, the variable incubation times despite consuming common food can be explained by the differences in the amount of purslane taken, the amount of toxin consumed, and varying personal sensitivity.

It is of great importance to perform a rapid clinical diagnosis in cases of botulism. In food botulism, the diagnosis may be delayed in cases where a single case and a previously unknown food source is the cause. In one third of the cases, a contaminated food source has not been able to be detected[17]. The food source was determined in our patients and purslane was identified. Homemade canning is very common in our country, and botulismus intoxications can occur if adequate hygienic conditions are not fulfilled[7,8]. Sometimes identification of cases can be delayed and death may occur. In particular, washing foods that come into contact with the soil and high salt content reduces botulismus events[18]. In our cases, we believe that purslane was not adequately washed, hygienic conditions were not met, and that pickled was made raw.

Disease-related morbidity and mortality rates increase due to the delay in diagnosis and treatment[5,19]. Early initiation of antitoxin therapy may stop clinical deterioration and shorten the duration of stroke and attachment to a mechanical ventilator[20,21]. Disease mortality due to botulism varies between 30-65%[1]. Even in the best intensive care conditions, the mortality rate has been reported to be 7.5 percent[22]. The majority of patients who survive have complete recovery. Occasionally, mild complaints may persist even after a long period of 2 years[23]. In this study, there was no delay in diagnosis and treatment for intoxication due to purslane. In addition, disease-related mortality was not detected in this study. Sırmatel et al.[8] reported that 3 of 10 cases died despite antiserum treatment in their studies on food intoxication due to purslane. Altun et al.[9] reported in their studies of purslane related food intoxication that all 7 cases recovered after antiserum treatment. Yayla et al.[10] reported that all 6 cases recovered with antiserum treatment in their study of botulism related to purslane (Table 2). In our study, 4 out of 8 cases that underwent trivalent botulinum antitoxin serum treatment showed no clinical deterioration; all patients recovered. In addition, no mortality was observed in our cases, contrary to the literature. All of our patients had nausea, vomiting, dizziness, weakness, and abdominal pain. Seven patients had speech and swallowing disorders, one patient had ptosis, 3 patients had visual impairment, 5 patients had diplopia, and one patient had speech impairment. In addition, our patients had varying degrees of muscle weakness. The essence of botulismus treatment is close monitoring and respiration support[24]. Because only 2 of our patients needed respiratory support, they were followed up and treated in the intensive care unit. Antitoxin administration in the early period is also a treatment option that should be considered[25]. Antiserum treatment was given to 4 patients in the early period. Two of our patients were connected to a mechanical ventilator and our other patients did not receive respiratory support. It was thought that the reason for the milder clinical findings in 4 cases, including the mother, father, and two children aged 2 and 17, may be related to a limted consumption canned food and lower toxin exposure.

Although the failure rate is high in some studies, toxin research can be performed with microbiological methods to confirm the diagnosis of botulismus[9]. Toxin research was also conducted in our patients and the result was positive in only 4 patients. It is extremely easy to diagnose when there are signs and symptoms that start at the same time in people who eat from the same can. The most important feature here is the recall of the disease and anamnesis. As a result, because all patients were from the same family and had a history of consuming purslane together, patients with

negative test results were diagnosed with purslane-related food intoxication like the other four family members. Since electrophysiological examination was not performed in our patients, a differential diagnosis with Lambert-Eaton syndrome was not performed.

CONCLUSIONS

In countries where consumption of traditional foods is common, the public should be made aware of homemade and traditional foods that are not prepared under appropriate conditions. The public should be warned not to consume spoiled canned food or other food products. Clinicians should be highly suspicious of botulism when evaluating patients with clinically compatible signs and symptoms. Creating awareness in the society in the form of thorough washing of food, balanced salt ratio, and ensuring hygienic conditions in homemade canning will prevent botulismus cases. A single case of foodborne botulism constitutes a public health emergency. It requires immediate action to identify the source and prevent further consumption of toxin-containing food. Our message is “don't risk your life while consuming canned food”.

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