



# A Food Poisoning Outbreak by *Shigella boydii* in Kerman-Iran

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## Abstract

**Background:** Food poisoning is a common infectious disease and *Shigella* is at the top of causative pathogens. All species of *Shigella* cause an acute bacterial disease involving the large and distal small intestine that presents with diarrhea, vomiting, and abdominal pain.

**Objectives:** To interpret clinical and paraclinical characteristics of patients in the food poisoning outbreak by *Shigella boydii* in Kerman-Iran.

**Methods:** On October 2015, 241 residents of the Anduhjerd town of Kerman, Iran, came to clinics and hospitals with a complaint of food poisoning. Meanwhile, 118 people referred to Afzalipour Hospital - a referral center. Among them, 21 patients were admitted due to fever, dysentery, old age, or bad general condition. We assessed and reported clinical and paraclinical characteristics of all these 21 hospitalized patients.

**Results:** The mean age of patients was 38.1 years old while 71.4% of them were women. In the history of all patients, the use of cooked wheat groats, as a votive food from the neighborhood inhabited, was detected, which was a long time period between cooking and consumption while food was not kept in the refrigerator. The time period between food consumption and onset of symptoms varied from eight to 13 hours and the most common symptoms were diarrhea (90.4%), vomiting (85.7%), and abdominal pain (80.9%). Five patients (19%) had bloody diarrhea, although 71.4% of stool exams were positive for WBC and RBC, and 23.8% of stool cultures were positive with *Shigella boydii*. In the course of hospitalization, 5 other patients (19%) developed dysentery and eight of them (38%) developed labial herpes. All patients received rehydration and antibiotic therapy, and were discharged with no complication.

**Conclusions:** This is the first outbreak of *Shigella boydii* in Iran that occurred in a votive food distribution. Votive food is a very common convention in Iran; therefore, there must be more notices about cooking and keeping food until the consumption to prevent such events.

**Keywords:** *Shigella boydii*, Outbreak, Kerman, Iran

## 1. Background

Anduhjerd is a city in the Kerman province, southeastern Iran. The population of the town is estimated to be 2915 people and is located in the arid and desert area. On October 15, 2015, a 22-year-old woman who lived in Anduhjerd went to the doctor with complaints of diarrhea, fever, and chills. She was admitted to the hospital with the diagnosis of acute gastroenteritis. Followed by the next day, 241 residents of the city with similar complaints came to clinics and hospitals in the town and the city of Kerman.

Food poisoning occurs following consumption of food contaminated with pathogens or bio-toxins (1). Foodborne diseases cause a significant morbidity, mortality, and also costs worldwide. Therefore, they consider a major public health problem (2). However most food poisonings are

mild and self-limiting, however, some are severe and cause a lot of concern, especially in high-risk groups of patients (3). It became more serious when an epidemic has occurred.

## 2. Objectives

In this study, we aimed to assess 21 patients who had been admitted in this *Shigella boydii* outbreak based on epidemiologic, clinical, and paraclinical characteristics.

## 3. Methods

On October 15, 2015, a 22-year-old woman who lived in Anduhjerd, was admitted to the hospital with the diagnosis of acute gastroenteritis. Followed by the next day,

241 residents of the city with similar complaints came to clinics and hospitals in the town and the city of Kerman. Meanwhile; a total of 118 people came or were referred to Afzalipoor Hospital of Kerman. Afzalipoor is an academic governmental referral center for gastrointestinal diseases. Among them, 21 patients were admitted due to fever, dysentery, old age, or bad general condition.

We conducted a cross sectional study. All 21 hospitalized patients were included without any exclusion. Clinical and paraclinical information was obtained by two medical students and one trained nurse. The source of information was a medical document in the period of hospitalization. Moreover, imperfect or incomplete histories were completed by interview. Collected data include demographic characteristics, medical history, time period, and new manifestations in the course of hospitalization and also paraclinic information including complete blood count (CBC), estimated sedimentation rate (ESR), stool examination (S/E), and stool culture (S/C). All laboratory tests were done in a standard laboratory of our academic referral hospital. S/C samples were in the laboratory less than 15 minutes. CBC was done with a hematology analyzer, sysmex kx21. It is necessary to mention that all information be reviewed and kept a secret.

Data analysis was done with SPSS statistical software v16. Descriptive tests including mean, standard deviation, and frequency was used for analysis.

#### 4. Results

The mean age of inpatients was 38.1 years old (15 minimum and 79 maximum), while 71.4% of them were women. In the history of all patients, the use of cooked wheat groats in the neighborhood inhabited by them was reported. The mentioned votive food was distributed due to the long tradition of Muharram and the religious good. The time period between the food consumption and onset of symptoms varied from 8 to 13 hours. The most common symptoms were diarrhea (90.4%) with a frequency of more than 7 times a day, vomiting (85.7%), and abdominal pain (80.9%). Four patients (19%) had bloody diarrhea and 14 (66.6%) reported a fever. After admission, the patients administered oral rehydration therapy and those who did not tolerate oral, were treated by intravenous fluid. Initial tests including CBC, stool exam, stool culture, ESR, and CRP were requested; then, the patients undergo empirical treatment with ciprofloxacin while three pregnant women received ceftriaxone. One of these three pregnant women suffered a placental abruption and underwent cesarean deliver; one delivered successfully and the other one was discharged without any complications.

A total of 13 patients (61.9%) had leukocytosis and 1 case (4.7%) reported leukopenia. In addition, 4 cases with

thrombocytopenia (19%) and 6 cases of anemia (28.5%) were detected. In patients' stool exam, 15 cases (71.4%) had positive WBC and RBC. Among a total of 21 patients, 5 patients had positive stool culture, which represented *Shigella boydii*.

In the course of hospitalization, 5 other patients developed dysenter as well as 8 of them (38%) who developed skin lesions on the lips. After examining, the lesions were diagnosed as labial herpes, and no special treatment was done. Among these patients, three cases mentioned a history of labial herpes in the past.

All patients were discharged from the hospital with a good general condition while the average length of hospitalization was 3.1 days and no mortality happened.

#### 5. Discussion

Based on our knowledge, there was no previous outbreak of *Shigella boydii* in Iran. *Shigella* is one of the world's health problems (4). Four species of this bacteria, including *dysentery*, *flexneri*, *boydii* and *sonnei* can cause disease in humans, while *flexenari* and *boydii* have an epidemiological importance in developing countries (5-7). Clinical presentations and severity of the disease vary with *Shigella* species and serotype (8). However, all species cause an acute bacterial disease involving the large and distal small intestine that presents with diarrhea, fever, nausea, vomiting, stomach cramps, rectal spasm, and sometimes toxemia. The patients usually have dysentery; however, many cases present with watery diarrhea. The disease may have two phases; begin with a period of watery diarrhea and cramps, followed by development of dysentery. The disease is usually self-limited and lasts four to seven days (9-11).

A number of 10 bacteria are enough to develop an infectious diarrhea. However *Shigella* is a sensitive bacteria and great care is required to collect samples and culture them (12). This point should be considered in interpreting the results of the culture of the bacteria in patients with shigellosis and our cases.

The recommended antibiotic treatments for *Shigella* bacteria are different, however, based on the studies conducted in Iran; these bacteria have no resistance to ciprofloxacin and nalidixic acid (13). Our cases have a good response to this ciprofloxacin.

The main cause of this outbreak appears to be the growth of *Shigella* in the place where food had been cooked. According to the long traditions in Iran, especially in feasts or religious mourning, many people cook votive food and offer it to other families or people. The distribution of food can be in the form of serving in the place of cooking or sending food dishes to other people's houses. According to the evidence, this food that causes

gastroenteritis in a large group of people was sent to people's houses from the place of cooking, in traditional packaging. Moreover, there was a time duration of about 3 to 6 hours from the cooking to consumption, while food might not be kept in the refrigerator after cooking.

Votive food distribution is very common in Iran, therefore, to prevent these events and food poisonings, there must be more notices regarding cooking and keeping food until the consumption, because in such outbreaks, people may face the underlying problems; irreparable damage and considerable mortality might happen.

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