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Salmonella gastroenteritis outbreak in a family: a case report

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Abstract

Five members of a family were brought to emergency with complaints of high grade fever, pain abdomen, diarrhoea and vomiting. The symptoms started after five hours of food, the vegetable curry by this family. Four of them were in hypovolemic shock and two had significant pus cells in stool examination. All of them were discharged by seven days. Stool culture of three of these patients showed salmonella.

Keywords: food poisoning, hypovolemic shock, diarrhea, emergency, gastroenteritis, salmonella, vomiting

Case Report

On 12th August 2019, five patients presented to the emergency department of Patan Hospital, Patan Academy of Health Sciences, Lalitpur, Nepal, with complaints of multiple episodes of loose stool. Patients were from the same family and were residing at Koteshwor, Kathmandu, Nepal. There were three male aged 16 years, 28 years and 38 years; two female aged 17 years and 31 years.

The family gave history of ingestion of food at 9:30 am that morning. The food contents were: Rice, Vegetable curry (Snake gourd, potato, tomato, garlic), Lentils and Pickle (Cannabis and tomato). Seven family members which includes the one who had cooked took the same food. Six family members who took vegetable curry started having pain abdomen around 2:00 pm (five hours after food) and this was followed by diarrhoea. All six who had diarrhoea had fever by 4:00 pm (seven hours after food). However, one of the seven family members who did not take vegetable curry was asymptomatic. The one who had cooked the food herself said that she had done proper hand washing prior to cooking. She admits washing vegetables properly prior to cooking with same water that she used on other days. The vegetables that she prepared were brought from the local market.

All six patients were taken to a nearby hospital where one patient got admitted to the intensive care unit for hypotension and rest were referred as beds for admission were not available. These five patients were received at Patan hospital, emergency department. On presentation, all patients had history of multiple episodes of watery diarrhoea along with intermittent severe colicky abdominal pain. Four of them were hypotensive but responded well to fluid resuscitation. Out of these four patients three were febrile on presentation (101^oF to 102.9^oF). Investigations revealed leukocytosis (range 10,750 to 20,310 per cumm) with neutrophilic predominance (range 84 to 94%). All of them had normal electrolytes, renal function test, liver function tests and urine routine examination on first

day. However, all of the patients had mild hyponatremia (129-131 mEq/L) and one patient had hypokalemia (3 mEq/L) on the second day of admission. Hanging drop test for cholera was negative in stool sample of all patients. Microscopic examination of stool showed pus cells and red blood cells in two patients. Stool culture was also sent at the same time. Urine routine examinations were normal. All five patients were admitted on maintenance intravenous fluid, paracetamol and third generation cephalosporin (Ceftriaxone).

Four of these patients became afebrile after two days and diarrhoea resolved on fourth day. So, these four patients were discharged on the fourth day. Stool culture of two patients out of these four showed Salmonella sp. sensitive to Ampicillin, Azithromycin, Ceftriaxone, Chloramphenicol and Cotrimoxazole. However, one patient had prolonged symptoms, she was the person who had cooked food for the family. She had persistent fever for four days which decreased on the fifth day. This patient had blood mixed diarrhoea which resolved after the seventh day. Stool culture of this patient showed Salmonella resistant to Nalidixic acid.

The incident was notified to authority through early warning and reporting system (EWARS) in two instances, 1st at presentation to hospital emergency and 2nd after Salmonella sp. was identified in stool culture. The samples of food they consumed were sent to the Department of Food technology and quality control for analysis.

Discussions

All five patients presented to emergency within six hours of food cooked at home. *Staphylococcus aureus* and *Bacillus cerus* are organisms that causes symptoms within one to six hours.¹ *Staphylococcus enterotoxin* is associated with consumption of foods prepared by food handler, such as dairy, meat, eggs and salads.^{2,3} *Bacillus cerus* can produce heat stable emetic enterotoxin in starchy foods

like rice.⁴ The history of food intake was not suggestive of *Staphylococcus aureus*, however as all patients had taken rice, so *Bacillus cereus* was still a possibility. *Bacillus* and *Staphylococcus* both present predominantly with vomiting symptoms, but all of our patients presented with predominantly diarrhoeal symptoms. Another possibility of such acute event can be due to pre-formed toxins secondary to use of pesticides and preservatives. However, the patient had mixed symptoms and did not have specific sign symptom related cholinergic, anticholinergics, sympathomimetic, sympatholytic, sedatives or hallucinogens. The food specimen was sent to the Department of Food Technology and Quality Control (DFTQC). Tests for organophosphorous and organochlorine compounds were negative. However, since all patients had high grade fever and two of the patients had significant white blood cells in stool suggesting less possibility of pre-formed toxins and more possibility of inflammatory diarrhoea.

So, the possible organism according to history were non-typhoid *Salmonella* sp., *Campylobacter* sp., *Shigella* sp., *Enterohemorrhagic E coli*, *Yersinia* sp., *Vibrio parahemolyticus* and *Entamoeba histolytica* though all these organism presents with clinical signs and symptoms after 24 hours.⁵ Stool culture of three patients were positive for *Salmonella* sp. and negative for sp. *enterohemorrhagic E coli*, *Vibrio cholera* and *Shigella*. Therefore, the probability of salmonella was more likely. We are not able to identify strain of salmonella as it was not available in the lab. In our cases patient might have presented with clinical features in less than 24 hours either due to ingestion of large number of organism or small number of virulent organism. It has been shown that development of disease after ingestion of salmonella is influenced by the number and virulence of the organisms ingested as well as individual host factors. In most cases a large number of bacteria in the range of one million to one billion must be ingested to cause symptomatic infection.⁶

Clinical features were more suggestive of nontyphoidal salmonellae in our cases. This is a major cause of diarrhoea worldwide. The global burden of nontyphoidal *Salmonella* gastroenteritis has been estimated at about 94 million cases (mostly foodborne) and 155,000 deaths yearly. The burden of nontyphoidal *Salmonella* gastroenteritis appears to be particularly high in Asia.⁷ Non typhoidal salmonella is caused by consumption of chicken and egg.⁸ However, it has also been associated with fresh produce, meat, fish, milk, nut butters, spices and contaminated water.⁹ In our cases, contaminated food or water can be the possible cause of the outbreak.

In our patients, we used empirical antibiotics and further continued after reports of stool culture. Antibiotic treatment is generally not recommended for immunocompetent individuals between 12 months and 50 years of age who have documented *Salmonella* gastroenteritis with mild to moderate symptoms, as the illness is typically self-limited.¹⁰ Since our patients had fever and frequent loose stool along with pain abdomen, we considered antibiotics. Antibiotics has been considered in severely ill patient: diarrhoea more than 10 stools per day, high fever and need for hospitalization and shown to improve symptoms and speed the clinical recovery by one to two days.¹¹ We continued ceftriaxone as one of our patient had salmonella that was resistant to nalidixic acid.

Salmonella sp. are also classified as Category B biological threat agents according to Centres for Disease Control (CDC) which suggests moderate ease of dissemination and a lower mortality rate than category A agent such as anthrax.¹² As salmonella sp. is a major health problem as well as a biological threat, food surveillance needs to be functional in the country. The Consumer Protection Act 2054 (1998) of Nepal states the rights of consumers to protect from the sale and supply of consumer goods and services that may harm life, body health and property.¹³ In Nepal, food safety and quality management lies under the jurisdiction of the Ministry of Agriculture and

cooperatives. Department of Food Technology and Quality Control (DFTQC) under the Ministry of Agriculture and Cooperatives is the major government institution responsible for food safety and quality management. Enforcement of food act 1966 is the major regulatory activity of the DFTQC. Although food safety related matters are mostly handled by the DFTQC, Department of Agriculture (DoA) and Department of Livestock Services (DLS) share some responsibilities to regulate food safety. Similarly, Nepal Council for Standards (NCS) and Nepal Bureau of Standards and Metrology (NBSM) are the governing body for food related standards.^{14,15} There is also a legal provision for punishment regulated by the pesticide Act 2048 (1991).¹⁶

Despite all these, there are a lot of challenges to trace and control the point source epidemic in food borne disease. We did not find directives (Nirdeshika) and standard operating procedures (SOP) for food safety and monitoring on EDCD (Epidemiology and Disease Control Division) website. A joint action plan between EDCD¹⁷ and DFTQC and their linkup mechanism is either unavailable or not accessible. Legislation of food vendors and shop and awareness of food safety is essential components of preventing food borne outbreaks.

Conclusions

Five members of a family presented in emergency with outbreak of acute gastroenteritis following five hours following meal at home. Stool culture of three of these patients showed salmonella. Non-typhoidal salmonella is one of the common cause of foodborne outbreak. Mild to moderate clinical presentation do not need antibiotics. Surveillance and food quality monitoring needs to be functional to prevent this.

Conflict of Interests

None

Fundings

None

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