



## OUTBREAK OF FOOD POISONING IN AN EDUCATIONAL INSTITUTION

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## ABSTRACT

**Background :** Foodborne infections are a major cause of illness and death all over the world . In developing countries, foodborne infection is the cause of death of many children.

**Objectives :** 1. To investigate an outbreak of food poisoning which occurred in an educational institution

**Method :** A retrospective cross sectional descriptive study was carried out in the setting of an educational institution in a metropolitan city. Standard statistical methods such as calculation of percentage and chi square were utilized for analysis.

**Results (a) Person distribution:** All fifteen (100%) cases were students of the educational institution. All the fifteen (100%) cases were boys.

**(b) Time distribution:** All the cases occurred within 2 to 5 hrs of consuming the food.

**(c) Possible causative organism:** Taking into account the clinical findings of the cases and the incubation period of food poisoning the causative agent appears to be *Staphylococcus aureus*. No food sample was preserved and hence microbiological confirmation could not be carried out.

**Conclusion :** A small scale outbreak of food poisoning occurred in an educational institution. Clinically the most likely causative organism was suspected to be *Staphylococcus aureus*.

**KEYWORDS :** Outbreak , Food Poisoning , Microorganism

## INTRODUCTION

Food poisoning is defined as an illness caused by the consumption of food or water which may be contaminated with bacteria and / or their toxins, parasites, viruses, or chemicals. The symptoms of food poisoning vary in degree as well as in combination. They include abdominal pain, vomiting, diarrhea; and headache. Life-threatening neurologic, hepatic, and renal syndromes leading to permanent disability or death can result in more severe cases. Severe disease may occur in some cases necessitating hospitalization, aggressive management of dehydration, and antibiotic treatment. 1

A food borne disease outbreak is defined by the following 2 criteria:

1. Similar illness, often gastrointestinal, in 2 or more people.
2. Evidence of food as the source.

Foodborne infections are a major cause of illness and death all over the world . In developing countries, foodborne infection is the cause of death of many children. The resulting diarrhoea can have long term effects on children's growth as well as on their physical and cognitive development . In industrialized countries, considerable illness caused by foodborne infection also affects healthcare systems heavily. 2

Food borne illnesses can result due to various etiologies. They can follow ingestion of infectious microorganisms or noninfectious substances . Food borne illnesses include classic toxin mediated food poisoning , e.g botulism , gastroenteritis following ingestion of preformed *Staphylococcus aureus* toxin, ingestion of chemicals in foods, besides bacterial , parasitic , and viral infections. 3

## Background

On 30 May 2019, 15 students of an educational institute in a metropolitan city of India reported to the Emergency Department of the local hospital with complaints of pain abdomen, vomiting and loose motions.

## Materials and Methods

## Research Design :

The study design was a retrospective cohort study design

## Data collection :

Line listing of all the cases was carried out and relevant epidemiological history was obtained from each case; and recorded on an epidemiological case sheet . Case sheets and laboratory reports were perused for abnormally high incidence of other food and water borne diseases . The workers also searched for more cases by visiting private practitioners and Government Civil hospital of the city . However, no additional cases were found by medical survey other than those who had already reported sick . We analysed surveillance data obtained from all the above sources for all the cases. Detailed environmental survey was also carried out.

## RESULTS

## (a) Person distribution:

All fifteen (100%) cases were students of the educational institution. No staff of the educational institution was involved. All the fifteen (100%) cases were boys. Most of the students had already left the hostel for the term break. Hence, there were only 19 students who had taken dinner on 30 May 2019.

## (b) Time distribution:

All the cases occurred within 2 to 5 hrs of consuming the food. Epidemic curve depicting hour wise occurrence of cases is given in Figure 1.

Possible source of the food poisoning was one of the food items, cooked and consumed on the night of 30 May 2019. Attack rate among those who had consumed and among those who did not consume each food item, Relative risk and Attributable Risk of each food item is presented in Table 1 .

## (c) Possible causative organism:

Taking into account the clinical findings of the cases and the incubation period of food poisoning the causative agent appears to be *Staphylococcus aureus*. Chart giving correlation of clinical picture with microbiological cause is depicted in Table 2 . Though, as per the chart *Bacillus cereus* Type I could also be the causative organism, *Staphylococcus aureus* is more likely in this case, as *Bacillus cereus* Type I food poisoning is more likely to occur through rice based food items; and not through milk based food item, which was so in this case. No food sample was preserved and hence

microbiological confirmation could not be carried out .

**(d) Results of the environmental survey:**

Gulabjamun, which was one of the items of the menu for dinner on 30 May 2019 was prepared one day prior. Subsequently, due to improper storage conditions, it got contaminated with Staphylococcus aureus which proliferated due to favourable weather conditions.

**(e) Evaluation of ecological factors**

General hygiene and sanitation of the kitchen educational institution was unsatisfactory. The working area and the counters were dirty. Refrigeration of raw and cooked food was grossly inadequate. The kitchen staff were drawing the water from the water cooler by opening the top of the water cooler; and immersing a jug into the water.

Physical, chemical and bacteriological analysis of water was carried out in Jan 2019 and was found satisfactory. The doors and windows had fly proofing but they were open when the team went for epidemiological investigation. Meteorological conditions were also studied as on that day. Maximum and minimum temp was 34 C and 26 C respectively, relative humidity was 89% and rainfall 0 mm. Thus the meteorological conditions were highly favourable for bacterial growth in any food item which could have been previously contaminated . Monthly medical examination of all cooks and food handlers, employed in the kitchen was last carried out in Sep 2018. There was no water / sewage pipeline leakage or sewage overflow in the unit area where the outbreak of food poisoning occurred .

**Discussion**

CDC reported four cases of a waterborne disease due to the Vibrio vulnificus bacterium following Hurricane Katrina in Sep 2005.4

In four years from, 1996 to 2000 , an estimated 1,724,315 cases of indigenous foodborne disease per year led to 21,997 hospitalizations and 687 deaths . Commonest causative organism was Campylobacter infection (160,788 primary care visits and 15,918 hospitalizations) , while salmonellosis caused the most deaths (209).<sup>2</sup>

Morroy G et al reported two clusters of scombroid (histamine) poisoning after eating tuna fish in 2018.5 Juru T et al reported an outbreak of food poisoning in a girls school.6 Jones TF et al observed that from 1961 to 1998 a mean of 42% of food poisoning outbreaks were of known etiology, which has subsequently increased to 65%, with a marked increase in norovirus outbreaks.7 Lanier WA et al observed that chicken liver has been implicated in several food poisoning outbreaks in the US.8 Out of 604 outbreaks of foodborne disease in schools reported by states and local health departments from 1973 to 1997 in 60% of the outbreaks an etiology could not be determined,, while in 45% of the outbreaks a specific food vehicle of transmission could not be identified.9 Singh PMP et al also reported an outbreak of food poisoning of unknown etiology.<sup>10</sup>

**Limitations :**

The limitation of the present study is that only clinical correlation with causative organism could be carried out. No microbiological confirmation could be carried out as no food sample was available for carrying out microbiological confirmation.

**CONCLUSION :**

A small scale outbreak of food poisoning occurred in an educational institution. Clinically the most likely causative organism was suspected to be Staphylococcus aureus.

**Table 1 : Relative risk and Attributable Risk of each food item**

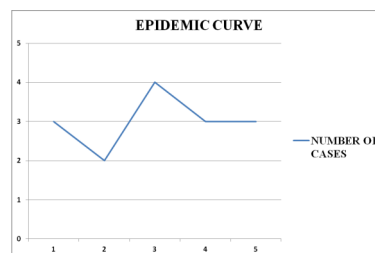
FOOD ITEM	CONSUMED THE ITEM			DID NOT CONSUME THE ITEM			RELATIVE RISK	ATTRIBUTABLE RISK
	ILL	NOT ILL	TOTAL	ILL	NOT ILL	TOTAL		
Chapati	12	02	14	03	02	05	60%	142.85%
Aloo Gobi sabji	12	04	16	03	00	03	100%	75%
Chana dal	13	02	15	02	02	04	50%	173.32%
Rice	10	02	12	05	03	07	71.42%	116.67%
Gulab Jamun	14	02	16	01	02	03	33.33%	262.5%
Pickle	12	04	16	03	00	03	100%	75%

**Table 2 : Chart giving correlation of clinical picture with microbiological cause**

S NO	MICROORGANISM	CLINICAL FEATURES							MEDIAN INCUBATION PERIOD	REMA	
		DIARR	VOM	NAU	FEV	AC	BIS	DE			NS
1	STAPHYLOCOCCUS AUREUS	+	+++	+++	-	-	-	-	-	1/2 TO 6 HRS	
2	BACILLUS CEREUS TYPE I	+	+++	+++	-	-	-	-	-	1/2 TO 6 HRS	
3	SALMONELLA TYPHIMURIUM	+++	+	++	+++	+	-	++	-	14 TO 30 HRS	
4	CLOSTRIDIUM PERFRINGENS	+++	+	+	+	+	-	-	-	12 TO 18 HRS	
5	BACILLUS CEREUS TYPE II	+++	+	+	+	++	-	-	-	12 TO 18 HRS	
6	SHIGELLA	+	+++	+++	+++	++	-	++	-	4 TO 6 HRS	
7	CLOSTRIDIUM BOTULINUM	+	+++	+++	+++	++	-	++	+	4 TO 24 HRS	
8	PRESENT EPISODE	+++	+	+	+	+	-	++	-	13 HRS	SALMONELLA TYPHIMURIUM

Legend : Diarr = Diarrhoea , Vom = Vomiting , Nau = Nausea , Fev = Fever , AC = Abdominal Cramps , BIS = Blood In Stools , DE = Dehydration , NS = Neurological Symptoms

**Figure 1 : Epidemic curve depicting hour wise occurrence of cases**



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