ORIGINAL ARTICLE

ACUTE GASTROENTERITIS OUTBREAK AMONG SCHOOL STUDENTS ON EXCURSION TO KODAIKANAL, TAMIL NADU, INDIA, 2024 - AN EPIDEMIOLOGICAL INVESTIGATION

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ABSTRACT

INTRODUCTION : Contaminated food sickens one in ten people globally every year. In Kodaikanal, Tamil Nadu, India, On 12th November, 2024 an acute gastro-enteritis outbreak occurred among school students who came for excursion from Kerala. Food borne outbreaks commonly occur due to poor hygiene or handling practices. The objective is to analyse patterns, to pinpoint the source (food or environmental) and symptoms, thereby providing insight for prevention strategies.
METHODS : As modified the case definition as; Any case with one episode of diarrhoea with or without vomiting and fever and not Integrated disease surveillance programmes standard case definition. Interviews were conducted, line listed with demographic and clinical symptom (person). An epi-curve (time) and spot map (place) aided in understanding the outbreak's temporal and geographical distribution. Attack rates were calculated. Stool, blood & water samples were collected. A retrospective cohort study analysed food exposures, while risk ratios were computed using epi-info software.
RESULTS: Among the 187 (184 were students and 3 were teachers) consumed steamed biriyani, Chicken curry, Rice, Parotta, Gobi 65, Chapatti and Vegetable curry for dinner. There were 109 cases, with vomiting (47%) and diarrhoea (14%) with fever (11%). The median incubation period was 6 hours and 45 minutes. Microbiology results for stool and blood samples were inconclusive, as were the water samples; We found an association between symptoms and food consumption. A retrospective cohort study indicated a risk ratio of 1.36 (95% CI: 1.10 – 1.84) for chicken curry, attributing 80% of cases to it.
CONCLUSION: The acute gastroenteritis outbreak was a single-exposure, point-source event with rapid symptom onset following the consumption of chicken curry; despite inconclusive laboratory and water sample results.
KEY WORDS: Gastro-enteritis, Foodborne outbreak, Chicken, Risk ratio, India

INTRODUCTION

Food borne diseases remain a major public health problem. Globally and estimated one out of every ten people are affected globally each year as per World Health Organisation.[1] In India foodborne disease outbreaks also remain a major public health concern, especially during group gatherings and mass catering events.[2] According to the Integrated Disease Surveillance Programme (IDSP), acute diarrheal diseases constitute one of the leading causes of reported outbreaks nationwide (IDSP Annual Report, 2022.[3] Schools and excursion groups are particularly vulnerable due to bulk food preparation under suboptimal hygienic conditions.[4]

Kodaikanal, a popular hill station in Tamil Nadu, attracts large numbers of student excursion groups. The sudden occurrence of gastroenteritis among healthy adolescents poses risks of rapid spread, significant morbidity, and public panic. Investigating such outbreaks is crucial not only to mitigate immediate health risks but also to identify food safety lapses and strengthen preventive measures. Outbreak Notification. On 12 November 2024 midnight, Kodaikanal Government Hospital reported a cluster of

students presenting with vomiting, fever, and diarrhoea. The students were part of a class 10 of a school who came for excursion from central Kerala. The Chief Medical Officer confirmed the outbreak and alerted the block health team. The district IDSP unit was informed for immediate response after confirming the outbreak.

This outbreak offered an opportunity to conduct a systematic field investigation, combining descriptive and analytical epidemiology, to establish the likely source and recommend targeted interventions.

OBJECTIVES

1. To describe the outbreak of acute gastroenteritis among students by time, place, and person among school students who came from Kerala to Kodaikanal, Tamil Nadu, India, 2024

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2. To identify the potential source of exposure (whether it is environmental or food source) associated with this illness among school students who came from Kerala to Kodaikanal, Tamil Nadu, India, 2024.

METHODS

Case Definition used for active case finding

A probable case was defined as occurrence of one or more episodes of loose stools per day, with or without vomiting, with or without fever, among school students and teachers who came for excursion to Kodaikanal, Tamil Nadu, India between 12/11/2024 & 13/11/2024. This was modified from the standard case definition of IDSP to capture more cases.

Case Search and Data Collection

Active case search for new cases among all students, nearby hotel staff, and the local community to find any spillover infections was done. A Passive-case findings from all the hospitals in the town were also undertaken. A structured questionnaire to gather information on people's age, gender, symptoms, when their symptoms started, and what specific food they ate was created. Data was collected using Epi-collect software and data were collated in Microsoft excel 2019 software.

Clinical and Laboratory Investigation

To identify the cause of the illness, collected stool and blood samples from four sick students, as well as water samples from the food preparation area. These were all sent to the district microbiology laboratory for analysis. However, it was not possible to collect the food samples as the food were already discarded and not in place.

Descriptive Epidemiology

Based on the onset of symptoms, to understand the trends and pattern, an epidemic curve was created (Figure 1). A spot map was also used to show how the cases were clustered geographically. We calculated the incidence the illness by sex and age using attack rates (Table 1), and the different clinical symptoms (Table 2) were described as proportions.

Analytical Epidemiology

Study design: A Retrospective cohort study instead of a case control study was done based on two reasons. The first is we had a defined set of school students and it is a closed event; Secondly, it was able to list out all the food items that were prepared, served and consumed.

Population: All the 184 students and 3 teachers who came for excursion from Kerala to Kodaikanal.

Exposure: The specific food items consumed for dinner were listed with a structured questionnaire again using epi-collect software and collated using Microsoft excel -2019. The questionnaire had questions based on the time of food consumption, Time of Onset of symptoms, food that they ate. Analysis: For Analysis Attack rates were calculated, relative risks (RR), and 95% confidence intervals calculated using Epi Info 7.2 software.

RESULTS

Descriptive Findings

It was found that among the 184 students and 3 teachers who came for excursion; They consumed food in a hotel at around 7:00 PM; Students started to develop symptoms at around 8:30 PM (Index case) on 12/11/2025. No other people suffered similar symptoms as evidently seen from the hospital records and nearby private clinics. All were treated as outpatient and none were presented with severe dehydration requiring hospitalisation with in-patient care.

Table 1. Description of Acute Gastro enteritis among students who came for excursion to Kodaikanal, Tamil Nadu, India, 2024 categorised by Gender and those presented with symptoms explained in Proportions. (N=187) (n=109)

Symptoms by Gender	With symptoms		Without symptoms		Total
Male	56	(53.3%)	49	(46.7%)	105
Female	53	(64.6%)	29	(35.4%)	82
Total	109	(58.3%)	78	(41.7%)	187

Table 2. Description of Acute Gastro enteritis among students who came for excursion to Kodaikanal, Tamil Nadu, India, 2024 categorised by symptoms type explained in Proportions. (N=187) (n=109)

Symptom Profile	n	%
Vomiting	88	47.1
Diarrhoea	26	13.9
Fever	20	10.7

Out of 184 students and 3 teachers exposed, there were 109 cases, resulting in an attack rate of 58.3% (Table 1). The median incubation period for symptoms to appear was 6 hours and 45 minutes (Figure 1). As evidently seen in the epi-curve it is a point source outbreak. Among boys, there were 56 cases, accounting for 53.3%, while 53 girls were affected, accounting for 64.6% (Table 1). Girls were more affected than boys. The most common symptom was vomiting 47%, followed by diarrhoea at 14% and fever at 11% (Table 2).

Table 3. Risk of getting the disease and the type of food consumed among students who came for excursion to Kodaikanal, Tamil Nadu, India, 2024 (N=187) (n=109)

Food	Ate specific food			Not eaten specific food			Risk ratio
	Sick	Total	(%)*	Sick	Total	(%)*	
Biriyani	91	154	59.09	18	33	54.55	1.08(0.78-1.51)
Cabbage Curry	3	5	60.00	106	182	58.24	1.03(0.50-1.52)
Chapatti	33	55	60.00	76	132	57.58	1.04(0.80-1.35)
Chicken Curry	80	125	64.00	29	62	46.77	**1.36(1.10-1.84)**
Fish curry	9	20	45.00	100	167	59.88	0.75(0.46-1.23)
Gobi 65	10	26	38.46	99	161	61.49	0.63(0.38-1.43)
Mandhi Rice	55	103	53.40	54	84	64.29	0.83(0.65-1.06)
Parotta	65	114	57.02	44	73	60.27	0.95(0.74-1.21)
Vegetable Curry	20	50	40.00	58	137	42.34	1.06(0.71-1.56)

*Attack Rate calculated

Epi-Curve showing point source outbreak (N=187 & n=109)
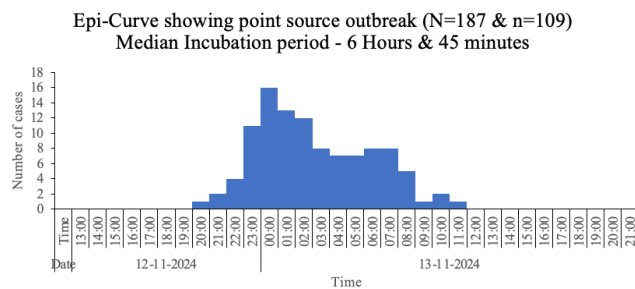Median Incubation period - 6 Hours & 45 minutes

Figure 1. Distribution of cases by time of onset of symptoms among students and teachers who came for excursion to Kodaikanal, Tamil Nadu, India, 2024 (N=187) (n=109)

Laboratory Findings

Initial lab results from the samples were negative for enteric pathogens. Stool cultures did not show any enteric pathogens, and blood cultures had no bacterial growth. Additionally, the water samples tested negative for coliforms.

Analytical Findings

Analysis of the different food items revealed that only chicken curry was significantly associated with the illness. The attack rate for those who ate the chicken curry was 64%, compared to 47% among those who did not. This gave a relative risk of 1.36 (95% CI 1.10-1.84) (Table 3), indicating a strong link between consuming chicken curry and becoming sick. In contrast, other foods like biriyani, cabbage curry, chapati showed no significant association, with relative risks of 1.08, 1.03, and 1.04, respectively as it included the null value. The consumption of these other items was also not statistically significant.

DISCUSSION

This outbreak of acute gastroenteritis was characterized by abrupt onset of vomiting, short incubation period, and clustering among students who consumed a common meal. No other Person in the town other than these students suffered similar symptoms as evidently seen from the hospital records and nearby private clinics. The epidemiological evidence implicated chicken curry as the vehicle of infection.

Etiological Consideration

The median incubation period (6–7 hours) and predominant vomiting suggest Staphylococcus aureus enterotoxin[5] or Bacillus cereus emetic toxin[6] as possible agents. Both toxins are heat-stable, explaining the lack of culture positivity in stool or food samples[7,8] (Lindström et al., 2011; Bennett et al., 2013). The negative microbiological findings may also be due to delayed sample collection and prior antibiotic administration.[9]

Gender Differences

A higher attack rate was observed among females (64.6%) compared to males (53.3%). This could be due to variations in portion size, preference for chicken curry, or chance variation given the cohort size.

Public Health Importance

Foodborne outbreaks in excursion groups have significant consequences. They pose a clinical burden, as young people can experience rapid dehydration and may even require hospitalization. There is also a reputational risk associated with these outbreaks. For tourist destinations like Kodaikanal, such incidents could negatively impact tourism.[10] Ultimately, a single outbreak can harm both the health of individuals and the economic well-being of a community.

Comparison with Literature

Similar outbreaks due to chicken-based dishes have been reported in India, with common pathogens including S. aureus[11] and B. cereus.[12] The attack rate in our outbreak (58.3%) aligns with earlier documented foodborne incidents involving single contaminated dishes served to large groups.[13]

LIMITATIONS

There are three main limitations to this study. Firstly, there is a possibility of recall bias, as students may not have accurately remembered food consumption details; Secondly, laboratory limitations, since prior antibiotic use and the absence of leftover food limited the confirmation of the causative pathogen and the lack of an environmental investigation, which did not include screening food handlers for carrier states.

CONCLUSION

This was a single-exposure, foodborne outbreak among excursion students in Kodaikanal. The epidemiological investigation implicated chicken curry as the likely source, with a clinical presentation compatible with toxin-mediated gastroenteritis.

RECOMMENDATIONS

To prevent future foodborne outbreaks, several measures shall be implemented. First, there must be compliance with FSSAI guidelines at all tourist destinations. Additionally, cooks and hotel staff preparing large meals for groups should undergo mandatory food safety training. Routine inspections of catering units serving excursion groups are also necessary to ensure these standards are maintained at-least if not done. Schools organizing excursions should also be educated on the importance of selecting caterers with safe practices.

Action Taken

The restaurant and the hotel were closed for a week; All employees were given training to handle food hygienically. Awareness Programme was conducted to all food handlers in town about safe hygiene practices.

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