DOI: 10.36347/sjams.2017.v05i03.007

Scholars Journal of Applied Medical Sciences (SJAMS) **ISSN 2320-6691 (Online)**
Sch. J. App. Med. Sci., 2017; 5(3A):717-722 **ISSN 2347-954X (Print)**

(An International Publisher for Academic and Scientific Resources)
www.saspublisher.com

Original Research Article

Role of Integrated Disease Surveillance Programme in eliciting an E coli 0157: H7 gastroenteritis outbreak at Tribal Girls Hostel, Solan, H.P.

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Abstract: Outbreak surveillance provides valuable insights into the foods, germs, and settings linked to food borne diseases. The Integrated Disease Surveillance Programme (IDSP) in India reported 1964 outbreaks in 2013, 1562 in 2014 and 1935 in 2015. In confirming the existence of the outbreak, identifying the source of the infection and the mode of the transmission and Initiating control and preventive measures. The investigations were initiated in the context of a public health response to a suspected outbreak highlighted by the Integrated Disease Surveillance Programme. A suspect case of sickness was defined as the one, being resident of the hostel (male or female), from 23rd June to 2nd July, suffering from either one of the or combination of the symptoms of passage of loose watery stools of a frequency of 3 or more than 3 in 24 hours, at least one episode of vomiting, abdominal cramps or pain and fever as feeling of a warm body any time throughout the sickness. The overall attack rate of illness as 42.6%. . Only one food item was found to be significantly associated with illness i.e. Cabbage (p=0.000). Rice and water were also found to be associated with illness but was statistically not significant with p=0.986 and p=0.753 respectively. The present study observed an overall attack rate of 42.6%. Similar outbreak investigations by Surinder N Gupta in Dharamshala of the state showed the overall attack rate of 14% and 12.6% by Gupta et al in an outbreak of gastroenteritis in medical students in Madhya Pradesh in 2005.
Keywords: Gastroenetritis, IDSP, Tribal, Outbreak

INTRODUCTION:

The World Health Organization, in its resolution of World Health Assembly in 1995, emphasized the role of improved detection and disease surveillance in prioritizing the public health efforts [1]. Outbreak surveillance provides valuable insights into the foods, germs, and settings linked to food borne diseases [2]. Surveillance data identifies common and rare foods associated with outbreaks and aids in identifying specific pathogen food pairs repeatedly linked to outbreaks and illnesses [3]. According to WHO Fact sheet, 2011, Enterohaemmorhagic E.coli (EHEC) is the most common bacteria responsible for food borne outbreaks throughout the world [4]. Moreover most of the information on EHEC is related to the serotype 0157: H7 as it is easily differentiated biochemically from the other strains of E.coli. This strain is transmitted to humans primarily through the consumption of contaminated foods such as raw or undercooked ground meat, fruits and undercooked vegetables [5]. Worldwide 18 million Disability Adjusted Life Years were attributed to food borne diarrheal disease agents belonging to E.coli and Non typhoidal Salmonella families [6]. The highest burden was found in Africa followed by the regions of the Southeast Asia and Microbiological contamination of food and water has been a major cause of illness and death in Bangladesh, Indonesia and India due to hot and humid weather conditions [6]. The Ohio Department of Agriculture surveillance on food borne pathogen detection and response has prevented many outbreaks [7]. Multi - jurisdictional outbreak response to an E coli 0157:H7 outbreak in Canada showed the importance of early notification and collaboration and the value of centralized interviewing [8]. The Integrated Disease Surveillance Programme (IDSP) in India reported 1964 outbreaks in 2013, 1562 in 2014 and 1935 in 2015 [9]. Majority of the outbreaks reported were due to acute diarrheal diseases and food poisoning. In Himachal Pradesh 350459 cases and 52 deaths were attributed to diarrhea [9].

AIMS AND OBJECTIVES:

The outbreak investigation of the gastroenteritis in the Girls Hostel provided us with an excellent opportunity to act promptly on the first hand information report of the sensitized and trained Emergency Medical Officer. The Staff sensitization programs and the trainings imparted to the Medical Officers under IDSP in district Solan, helped to identify the early trigger events which led to the prompt investigation with the objectives of

(1) Confirming the existence of the outbreak,
(2) Identifying the source of the infection and the mode of the transmission and
(3) Initiating control and preventive measures.

MATERIAL AND METHODS:

On June 26th the Emergency Medical Officer of district Hospital Solan, informed telephonically the District Surveillance Officer (DSO) about a cluster of around 40 Girl resident students of a Government College and mostly falling sick with diarrhea, vomiting, fever and abdominal pain out of which five cases were admitted in the Hospital. The DSO immediately acted upon this trigger event and lodged a Firsthand Information report with the District Health authorities. The early warning signal was uploaded electronically on the IDSP reporting portal. The DSO himself being the member of Rapid Response Team visited the ward and enquired about the illness from the five admitted patients. The Rapid Response Team was put on alert and special permission was sought from the District Health Authority to include a Female Health Worker in the Rapid Response Team, to comply with the medical ethics as the team was to visit the Girl's Hostel. The investigations were initiated in the context of a public health response to a suspected outbreak highlighted by the Integrated Disease Surveillance Programme. The previous 3 years surveillance data of IDSP, of the area did not show any untoward increase of number of cases of Diarrhea during such period of time of the year.

A suspect case of sickness was defined as the one, being resident of the hostel (male or female), from 23rd June to 2nd July, suffering from either one of the or combination of the symptoms of passage of loose watery stools of a frequency of 3 or more than 3 in 24 hours, at least one episode of vomiting, abdominal cramps or pain and fever as feeling of a warm body any time throughout the sickness. The null hypothesis of water being the cause of the outbreak was postulated.

After seeking the permission from the Warden of the Hostel the members of the Rapid Response Team of IDSP visited the hostel and conducted preliminary enquiry to test the null hypothesis. An epidemiological survey of the residents of the neighborhood, sanitation and cleanliness of the Hostel and the surrounding area was undertaken. The water supply of the area and the Hostel was inspected. Water samples from two adjoining houses and tap water supply of the Hostel were sent for laboratory testing. However the food items and the suspected Spinach stored in the fridge could not be sent for the microbiological examination due to the lack of facility. The sanitation of the kitchen and the food handlers was investigated. The nonfunctioning water purifier of the Kitchen and Refrigerator use was also investigated. The cook was thoroughly enquired about all the food handling and cooking practices of the last 3 days prior to the onset of the illness.

All the sick were given the medicines and the health education. The team was able to collect one stool sample on the spot from one of the patients, prior to having consumed the medicines. The stool sample was transported in the cold chain for investigation (isolation of the pathogen and antibiotic susceptibility) to the Microbiology laboratory of the Medical College at a place about 50 kilometers away from Solan. On 2nd July, the team revisited the Hostel and interviewed the students and the resident staff. Semi-structured questionnaire in "Hindi" was administered to the study population (which was defined as all the residents of the hostel form 23rd June to 2nd July). Epidemiological tracing back of the events was undertaken to identify the source and mode of the transmission. The outbreak was thereafter reported on IDSP portal.

OBSERVATION

The present study, which was an outbreak of gastroenteritis, conducted in June-July 2015, amongst the 42 hostel students and 5 staff members of Government Girls college hostel, Solan district, Himachal Pradesh. The Rapid Response Team, an outcome of Integrated Disease Surveillance Programme strengthening, was put on alert and special permission was sought from the District Health Authority to include a Female Health Worker in the Rapid Response Team, to comply with the medical ethics as the team was to visit a Girl's Hostel.

Table 1 shows that there were total 47 (42 students and 5 staff members) study subjects. Out of total study subjects 42.5% developed gastroenteritis. Nearly 43% of students and 40% of the staff members developed illness.

Table 2 depicts that certain food item consumption were not associated with illness like Yellow dal, Rongi dal, curd and salad. Only one food item was found to be significantly associated with illness i.e. Cabbage (p=0.000). Rice and water were also found to be associated with illness but was statistically not significant with p=0.986 and p=0.753 respectively.

Table-1: Distribution of study subjects according to illness (N=47)

Study subjects	Illness (cases)	No illness	Total
Students	18 (42.9%)	24 (57.1%)	42 (100.0%)
Staff	2 (40.0%)	3 (60.0%)	5 (100.0%)
Total	20 (42.5%)	27 (57.5%)	47 (100.0%)

Table-2: Comparison of illness according to food items consumed among study subjects (N=47)

Food Item Consumed		Illness		Chi square value	p value
		Yes	No		
PARANTHA	Yes	2	5	0.658	0.417
	No	18	22		
GHEE	Yes	3	3	0.156	0.693
	No	17	24		
MILK	Yes	9	15	0.512	0.474
	No	11	12		
CURD	Yes	2	16	11.8	**0.000**
	No	18	11		
RICE	Yes	17	23	0.003	0.986
	No	3	4		
CHAPATI	Yes	12	15	0.098	0.761
	No	8	12		
ROONGIDAL	Yes	1	15	13.1	**0.000**
	No	19	12		
BLACKDAL	Yes	0	15	16.3	**0.000**
	No	20	12		
SALAD	Yes	1	18	18.1	**0.000**
	No	19	9		
WATER	Yes	18	25	0.099	0.753
	No	2	2		
CABBAGE	Yes	20	2	39.6	**0.000**
	No	0	25		
YELLOW DAL	Yes	1	23	29.6	**0.000**
	No	19	4		

Table-3: Frequency of food items consumed among cases (n=20)

Food Item Consumed		Illness	
		Yes	%
PARANTHA	Yes	2	10.0
	No	18	
GHEE	Yes	3	15.0
	No	17	
MILK	Yes	9	45.0
	No	11	
CURD	Yes	2	10.0
	No	18	
RICE	Yes	17	85.0
	No	3	
CHAPATI	Yes	12	60.0
	No	8	
ROONGIDAL	Yes	1	5.0
	No	19	
BLACKDAL	Yes	0	0.0
	No	20	
SALAD	Yes	1	5.0
	No	19	
WATER	Yes	18	90.0
	No	2	
CABBAGE	Yes	20	100.0
	No	0	
YELLOW DAL	Yes	1	5.0
	No	19	

All the cases had consumed Cabbage (100%) followed by water (90%), rice (85% and chappati (60%) before the onset of illness. (Table 3)

Table-4: Attack rate among study subjects of Tribal Girls Hostel, Solan, Himachal Pradesh, India, 2015

	Attack rate	Attack rate (%)
Attack rate among the students	18/42 X 100	42.86%
Attack rate among the staff	2/5 X 100	40.00%
Sex (Female) specific attack rate in staff	2/2X100	100.00%
Overall attack rate	20/47 X 100	42.6%

An attack rate is an incidence rate (usually expressed as a per cent), used only when the population is exposed to risk for a limited period of time such as during this epidemic. It relates the number of cases in the population at risk and reflects the extent of the epidemic. The above table shows the overall attack rate of illness as 42.6% .

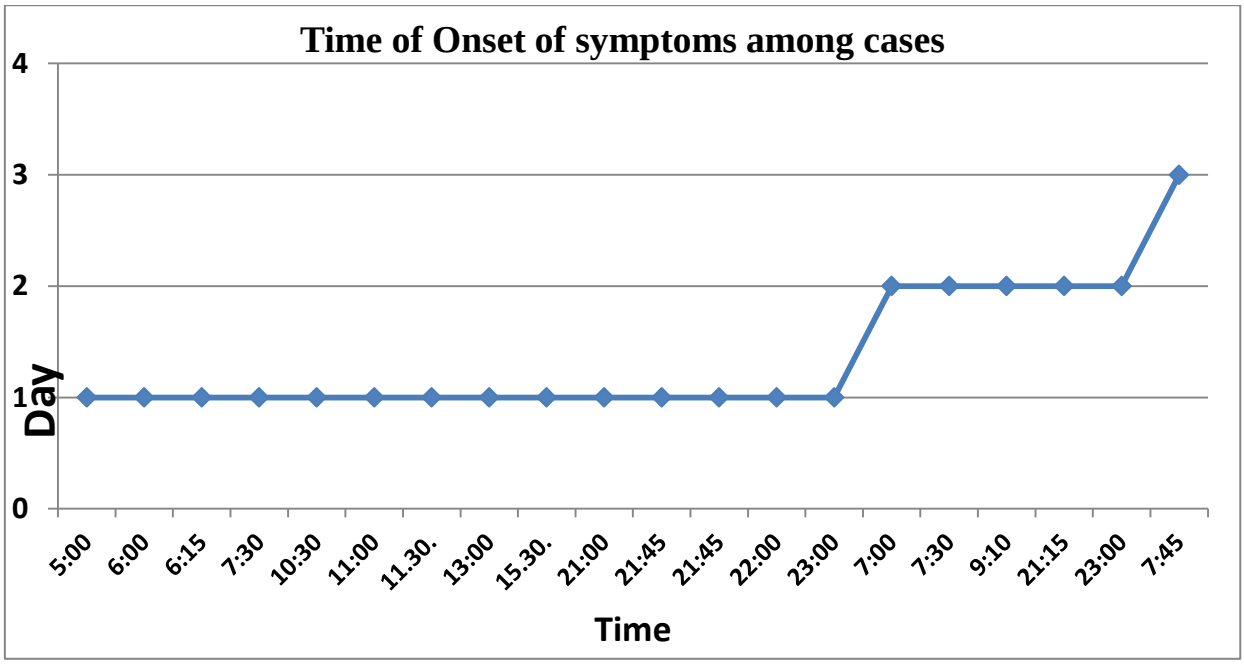

Fig 1: Time of Onset of symptoms among cases

Figure 1 depicts time wise onset of symptoms among cases. Following consumption of infected food item 14 cases developed on day 1, constituting the peak of the outbreak, followed by 5 cases on day 2 and 1 case on day 3. The entire outbreak was over by the fourth day.

Table-5: Coliform count of water collected from three representative sites of the area

Source of water	Sampling site	Coliform count (per 100 ml of water)
Tap water	House No 1	0
Tap water	House No 2	0
Tap water	Hostel	0

The single stool sample sent for microbiological examination confirmed the presence of the E coli serotype 0157: H7

DISCUSSION

The main point of the interest which emerges from this study is the practical application of the strong Integrated Disease Surveillance Programme (IDSP) in place which ensured the immediate transfer of information from an Emergency Medical Officer to the System and thereafter led to the prompt management of the outbreak. The programme components of the IDSP incorporate the concept of training of the medical officers along with other stakeholders such as the team members of the Rapid Response Team and the paramedical staff on the principles of the disease surveillance [10]. Similarly the Fourth Annual IDSP Task Force Meeting in the African region held on 28th

May 2003, highlighted the improvement in the timeliness and completeness in reporting of surveillance data in six countries after intensive sensitization undertaken for the stakeholders under the programme [11]. A study by Lukwagoo et al in Uganda in 2007 also showed the utility of strengthened disease surveillance system in increasing the reporting and timeliness of suspected outbreaks and thereafter prompt management of the same [12]. In the present study the trigger event of the episode of diarrhea in large number of cases within short period of time prompted the members of the Rapid Response Team to act immediately (within 3 hours of the trigger event) for the management of the outbreak. This is in accordance to the outbreak mechanism (trigger and response) level 3, as envisaged in the IDSP guidelines. The present study observed an overall attack rate of 42.6%. Similar outbreak investigations by Surinder N Gupta in Dharamshala of the state [13] showed the overall attack rate of 14% and 12.6% by Gupta et al in an outbreak of gastroenteritis in medical students in Madhya Pradesh in 2005 [14]. The present study observed that the sanitation condition of the kitchen and the food handler was poor. It was found that the cook of the hostel had kept the cabbage in the fridge for a period of about 6 hours and did not wash it before cooking. The cabbage might have been infected prior to this or may have got infected from the old spinach lying in the refrigerator. As cabbage is semi-cooked, the potential E coli did not get kill and led to the outbreak. In this study the cabbage was found to be significantly (p value 0.000) associated with the illness. In its report, the Organic Centre documents the similar methods of contamination of spinach and leafy vegetables such as cabbage, with E coli and their role in causing food borne outbreaks [15]. The present study faced constraints in the testing of specimens of water and food specimen due to the lack of local Public Health Laboratory. Wilson M, Gradus S, Zimmerman S, in their study observed that local Public Health Laboratory tests, local environmental issues like water quality etc and strengthen the Disease control Programmes [16]. This study emphasized the fact that with training, sensitization of the staff under IDSP along with feedback and good communication, an outbreak of gastroenteritis was immediately managed. Thus IDSP is not a simple surveillance tool but also a comprehensive package of prevention and cure strategies. Phalkey K R et al in their study also observed the practical utility of the IDSP [17].

ACKNOWLEDGEMENT:

We pay our thanks and gratitude for the Warden, Government Tribal Girls Hostel, Solan, for her kind cooperation and help. We are thankful to the Professor and Head, Department Microbiology, IG Medical College Shimla for testing the lone stool sample in the investigation.

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