SALMONELLOSIS OUTBREAK LINKED TO IMPROPER HANDLING OF FOOD IN A HOTEL IN BAHRAIN

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ABSTRACT

In July 1986, an outbreak of gastroenteritis occurred at a wedding party in one of the hotels in Bahrain. Out of 159 guests who were contacted, 105 (66%) developed symptoms at median incubation period of 11 hours. The symptoms were characterised by severe diarrhoea, abdominal pain, headache, high fever, nausea and/or vomiting. Out of 105 patients, 13 (12.4%) received intravenous drip (IV) and four were hospitalised. Salmonella serotypes Norwich group C_1, Paris group C_3, and Kentucky group C_3 were isolated from patients, food and food handlers. An epidemiologic investigation demonstrated that cold roast chicken, garlic chicken, chicken curry, cold turkey, cold roast beef, cold fish, salad, rice and dessert were vehicles of the outbreak. No left-over foods were available, but similar food preparations and ingredients were analysed 36 hours later and found to be contaminated with Salmonella. We assume that raw foods of animal origin (meat, poultry, eggs, fish) were highly contaminated with Salmonella, and other foods became contaminated by cross-contamination. Improper food handling and inadequate time/temperature exposure were the main contributing factors of the outbreak.

Salmonellosis is one of the major foodborne diseases which causes morbidity and economic losses in the world[1,2]. It is a world wide problem which appears to be increasing in most countries[3,4,5]. In the United States for example, one to two million infections are estimated to occur annually and more than 100 people die each year[2,6]. In Bahrain several outbreaks and individual cases of salmonellosis are reported to the Public Health Directorate annually and each year cases of salmonellosis have been increasing (with occasional fluctuations); ninety six different Salmonella serotypes (other than S. typhi and S. paratyphi) were isolated in Bahrain during 1981-1985[7,8,9]. The main vehicles of foodborne salmonellosis are raw foods of animal origin such as beef, chicken, turkey, milk and eggs. Other food items such as dry milk, fish chocolate candy, yeast and coconut have also been reported in outbreaks[3,10,11,12]. Most salmonellosis outbreaks occur as a result of improper cooling of food, inadequate cooking or thermal processing, eating of contaminated raw food products and cross contamination[3,13]. The purpose of this investigation was to identify the food items responsible for and the processes involved in this outbreak.

METHODS

159 guests that had attended the party were contacted by telephone and by visits to hospitals and homes from July 5 to July 9, 1986. Information on age, sex, nationality, date and time of eating, date and time of onset of symptoms, nature of symptoms, details of medical treatment, and food items eaten at the party were recorded by the investigators on a specially designed questionnaire. Stool specimens were collected within 4 hours of the onset of symptoms from 14 of the 105 people (13%) that were taken ill, and cultured for enteric pathogenic micro-organisms. It was not possible to obtain left-over food. However, similar food ingredients and water samples from the hotel were analysed. A full inspection of sanitary conditions in the kitchen and dining area was carried out on July 5, and the following information for each food item was collected: ingredients, original raw food items, date of purchase, method of storage, date

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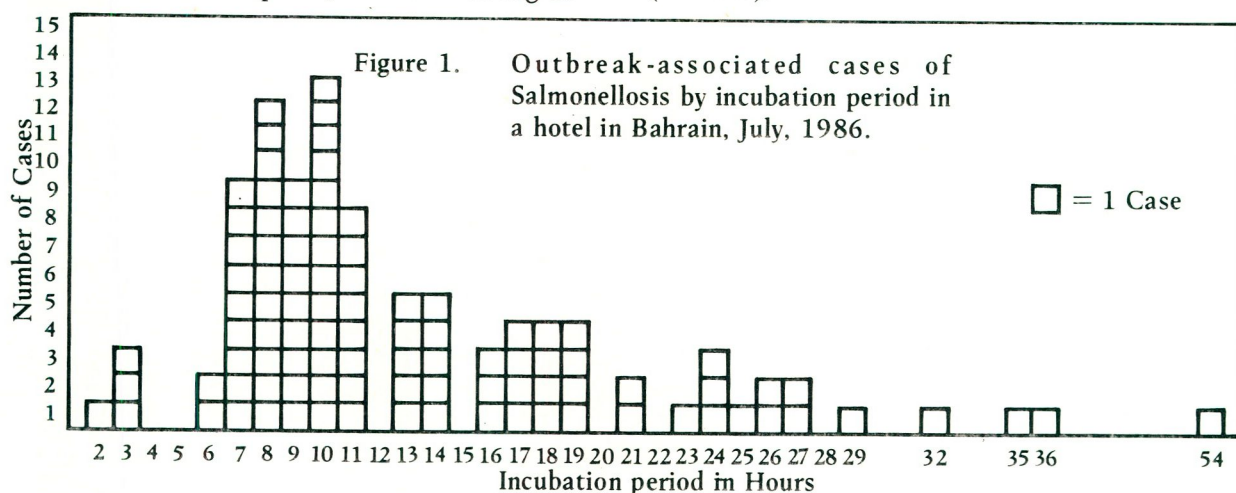   College of Health Sciences, State of Bahrain.

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and time of preparation of food, method of preparation and method of storage of cooked food. History of illness in the recent past was taken from cooks involved in the preparation of the food. Cooks were then subjected to medical examination; throat swabs and stool specimens were taken for culture.

RESULTS

Of the 200 who attended the party, only 159 could be contacted. Of these, 105 people (66%) developed symptoms suggestive of food poisoning between 2 hours 30 minutes and 54 hours after consumption, as shown in Fig 1.

75 patients (71.4%) sought medical care, but only 13 (12.4%) required intravenous drip, out of which four were hospitalised. S. Norwich and S. Paris were isolated from stools of 13 out of 14 patients (Table II).

All 14 food-handlers were interviewed and examined. No skin lesions, upper respiratory infections or gastrointestinal diseases were detected on history and physical examination. Throat cultures were negative. Salmonella were isolated from stool specimens of food handlers (Table II).

Figure 1. Outbreak-associated cases of Salmonellosis by incubation period in a hotel in Bahrain, July, 1986.

The mean, median and mode of incubation period were 13.5, 11 and 10 hours respectively. Of the 105 cases, 4.8% were children under 18 years of age, and 41% of those aged 18 years and over were women. The onset of symptoms in all cases was acute. The principal symptoms were: diarrhoea, abdominal pain, headache and fever (Table I).

TABLE I

Percentage of patients with symptoms of salmonellosis outbreak in a hotel in Bahrain, July 1986.

Symptom	Percentage of patients with symptoms
Diarrhoea	97.1
Abdominal pain	89.5
Headache	75.2
Fever	74.3
Nausea	49.5
Vomiting	38.1
Prostration	13.1

TABLE-II

Salmonella serotypes isolated from stool specimens of patients and food handlers during an outbreak of salmonellosis in a hotel in Bahrain, July 1986

Serotypes	Patients No. isolated	Food Handlers No. isolated
Norwich	6	–
Paris	5	5
Mixed (Paris & Norwich)	2	2
Kentucky	–	1
Cerro	–	1
Typhimurium	–	1
Total	13	10

Of the food specimens, fried rice and salads were positive for S. Paris, and cold roast beef was positive for S. Kentucky. Water samples were satisfactory. Attack rates among people who ate specified food items against those who did not eat the same food items are presented in Table-III.

TABLE-III

Attack rates and p.values according to whether or not each item of food was taken

| Food or drink | Group A | | | | Group B | | | | P. value * |
| | Persons who ate specified food | | | | Persons who did not eat specified food | | | | |
	Ill	Not Ill	Total	Attack Rate %	Ill	Not Ill	Total	Attack Rate%	
Soft Drink	44	23	67	65.76	61	31	92	66.30	P> 0.5
Alcohol	70	31	101	69.31	35	23	58	60.34	0.5>P>0.2
Cake	63	25	88	71.5	42	29	71	59.15	0.2>P> .1
Cold Roast Chicken	60	25	73	82.19	45	41	86	52.32	P< .001
Garlic Chicken	37	4	41	90.24	68	50	118	57.63	P< .001
Chicken Curry	68	18	86	79.07	37	36	73	50.68	P< 0.001
Cold Turkey	43	7	50	86.00	62	47	109	56.88	0.01> P> .001
Cold Roast Beef	55	6	61	90.16	50	48	98	51.02	P< 0.001
Cold Hamour Fish	75	9	84	89.29	30	45	75	40.00	P< 0.001
Salad	87	26	113	76.99	18	28	46	39.13	P< 0.001
Rice	78	27	105	74.29	27	27	54	50.00	0.01>P> 0.001
Bread	27	9	36	75.00	78	45	123	63.41	0.2> P> 0.1
Dessert	58	19	77	75.32	47	35	82	57.32	0.05>P> 0.02
Butter	10	5	15	66.67	95	49	144	65.97	P> 0.5

* 2 x 2 Chi-Square

The differences in attack rates between the two groups were statistically significant at P< 0.05 for cold roast beef, garlic chicken, chicken curry, cold turkey, cold roast chicken, cold fish, salad, rice and dessert. Brand preparations of soft drinks, alcoholic drinks and table butter were used in company sealed containers. It was found that cold cuts, viz: cold roast beef, cold turkey, cold roast chicken and cold hamour fish were prepared in the main kitchen at noon and were kept in chillers with temperatures ranging from 8°C to 10°C until served on the buffet at 7.00 p.m. Garlic chicken and chicken curry were also prepared at noon and kept warm in water heated containers until served. Raw and cooked foods were processed in the same area, using the same cutting equipment and utensils.

The guests started arriving from 8.00 p.m. onwards and consumption of food started in groups from 10.30 p.m. until 1.00 a.m. Most guests complained of hot and stuffy conditions in the buffet room, and for this reason some left without eating.

DISCUSSION

105 (66%) of the people who ate at the wedding party suffered from Salmonella foodborne illness. The clinical features and the mean incubation period were typical of salmonellosis. The high attack rate and the severity of the symptoms could be attributed to gross contamination and severe growth of Salmonella, involvement of more virulent

Salmonella serotypes and high susceptibility of the hosts [3] [14].

Food items responsible for the outbreak were: cold roast chicken, garlic chicken, chicken curry, cold turkey, cold roast beef, cold fish, salad, rice and dessert.

That several food items were implicated suggests that raw foods of animal origin were the main source of contamination. Processing of raw and cooked foods in the same area using the same equipment and utensils resulted in cross contamination of cooked foods. Though samples of raw food items could not be obtained for laboratory analysis, scientific literature and epidemiological studies have made it clear that raw foods of animal origin are often contaminated by Salmonella [4] [11].

Although eight of the food handlers were carriers of the same Salmonella serotypes that were isolated from the patients and three food items, food handlers may themselves have been victims, and not the source of this outbreak because they have the habit of tasting and/or eating foods they prepare[11]. Food handlers as the primary source of an outbreak have been rarely documented[1]. The reason that food handlers did not develop the disease could be due to the naturally acquired immunity (limited protection) from previous exposures, and/or due to an inadequate dose of Salmonella [3] [13] [14].

The following factors contributed to the contamination, survival and growth of Salmonella:

1. Cross-contamination occurred as the raw food area and cooked food area were not separated and the same cutting equipment, utensils and personnel were involved in the preparation of raw and cooked food.

2. Food was cooked in large quantities.

3. The storage temperature in the chillers should have been below 7°C but it was found to be between 8°C and 10°C.

4. Most of the dishes were served cold and then were kept in the buffet room at room temperature

for as long as 4 to 6 hours.

It has been reported that thermal processes sometime fail to destroy Salmonella especially if the level of contamination is high, the food quantities are large, the temperature is very low or if processing time is very short[3].

The economic impact of this outbreak on individuals and the community should be considered. 34 patients (32.4%) were absent from work for 1-3 days. Those who attended work were not able to perform their duties adequately. In addition, medical care constituted a great economic loss to the community. Furthermore, there is the impact of this outbreak on the reputation of the hotel to consider.

CONCLUSION

It was found that Salmonella was the causative agent of the food poisoning outbreak, and multiple vehicles were involved because of cross-contamination. Moreover, food handling errors were the main contributing factors. It is recommended that existing food inspection procedures in Bahrain should be evaluated to prevent the recurrence of such incidents. Health inspectors should emphasise, during their inspection of food services establishments, those factors that mainly contribute to the outbreaks of foodborne diseases. They should also analyse the hazards, identify critical control points during food processing and establish a proper control and monitoring programme.

In addition, they should educate the food handlers as to the problems, vehicles and factors that contribute to the outbreak of foodborne diseases, and the methods to control such hazards.

Upon suspicion of foodborne disease, physicians must collect appropriate specimens and must report cases to the Public Health Directorate immediately.

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