Foodborne Disease Incidents in the Eastern Province of Saudi Arabia - A Five-Year Summary, 1982-1986

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ABSTRACT

The available information on foodborne diseases reported in the Eastern province of Saudi Arabia between January 1982 and December 1986 was examined. Ninety incidents and 1,531 cases of foodborne diseases were reported during the study period. The average number of incidents and cases per 100,000 population were 1.3 and 22.4, respectively. Saudis were involved in small incidents in which the food was probably mishandled at private homes. The expatriates, who were mostly workers of Indian or Southeast Asian origin, constituted the majority of cases of relatively large foodborne outbreaks in which the food was probably mishandled in their camps. Dairy foods, meat, and chicken were the foods most frequently reported in association with foodborne diseases (36, 30, and 22.2% of incidents, respectively). Staphylococcus aureus was the agent or the suspect agent of more incidents than Salmonella spp. Insufficient cooking and improper storage were the main factors suspected of contributing to incidents (17.8 and 13.3%, respectively). Although a general view can be drawn from the available data, more information on foodborne diseases in the Eastern province is needed.

The main purpose of notification, registration, and investigation of foodborne diseases is to provide information for the control of such incidents in the community. A long-term study to evaluate the accumulated information regarding foodborne disease incidents is essential to reach useful recommendations for their control. Such studies on foodborne diseases in Canada, Netherlands, and the United States have been reported (2,3,10). Similar studies on foodborne diseases in the Kingdom of Saudi Arabia have apparently not been done or reported.

The information on foodborne diseases in Saudi Arabia is limited. Weeks (11) investigated an outbreak of acute food poisoning with the insecticide endrin in Al-hofuf on July 1967. There were 183 cases and two deaths associated with the outbreak. The victims had eaten bread made from imported flour contaminated with concentrated endrin during shipping. These findings were confirmed by Curley et al. (4). Another food poisoning outbreak caused by Salmonella muenster was reported in January 1980 (6). The incident involved 12 people who ate roast beef contaminated with the Salmonella bacteria. The meat had been improperly stored after cooking. A study done by the Regional Poison Control Center in Dammam, Eastern province, on poisoning in children found that poisonings accounted for 25% of the causes of death in children (5).

In a study done in Riyadh, on the microbiological quality of shawarma (a meat sandwich similar to gyros), it was found that Staphylococcus aureus, Clostridium perfringens, and Salmonella spp. were isolated from many samples (1). However, the number of pathogenic bacteria was not high in most of these samples. The presence of bacteria was attributed mainly to postcooking contamination from knives, dips from the uncooked portion, and by food handlers. Ramia et al. (7) reported on the enteropathogens associated with pediatric diarrhea in Riyadh. In a two-year study (1985-1986), it was found that rotavirus was the pathogen most frequently (51.3%) detected in samples of patients’ feces, followed by Salmonella spp. (8%) and Campylobacter jejuni (2.9%).

This paper is a report of the status of foodborne diseases in the Eastern province of Saudi Arabia during a five-year period between January 1982 and December 1986. The definitions of incident, food, agent, suspect agent, outbreak, case, and single case are as reported by Todd (9).

The information on reported foodborne disease incidents and cases during the period was collected from the Preventive Medicine Department of the General Directorate of Health Affairs in the Eastern province. The data were extracted from food poisoning investigation forms, tabulated, and analyzed using the statistical analysis system or SAS (8).

During the study period, 90 incidents and 1,531 cases of foodborne disease were reported in the Eastern province. Two of the incidents had a single case. The average number of cases per incident was 17 with a range between 1 and 366 cases. The average number of incidents and cases per 100,000 population were 1.3 and 22.4, respectively.

There was an increase in the number of incidents from 1982 to 1986. This increase could be due to the extent of

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reporting rather than an actual increase in incidents. The number
of cases and hospitalized cases did not show any trend. The average number of incidents and cases per year were 18 and 306, respectively. The data did not show clear seasonal trends in the number of reported incidents in each year. However, the total and the average number of incidents per year show an increase during the months of April, May, and June (Fig. 1).

Among the hospitalized cases (524), only 25.7% were females. This was because most of the cases were expatriate male workers. The distribution of cases with hospital records by age (Fig. 2) shows that the age group with most cases was from 20 to 30 years (38.5%), but children between the age of 1 and 10 years were also frequently reported ill (20%).

Saudis were ill in 50% of the reported incidents, but they constituted only 18.5% of cases. The expatriates (mostly from the Indian subcontinent or Southeast Asia) were involved in the other 50% of incidents; however, they made up 81.5% of cases. Workers (mostly expatriate construction workers) constituted 80% of cases in the reported foodborne incidents (Table 1).

Even though private homes were the sites where food was probably mishandled in 56.7% of incidents, workers' camps were the sites where food was probably mishandled in the incidents with the most (77.5%) cases. Foodservice establishments and workers' homes (workers of small companies usually live in homes with improper cooking and refrigeration facilities) were third and fourth, respectively, in both the number of incidents and cases.

From the above information, it appears that Saudis were involved in incidents with small numbers of cases in which food was probably mishandled at private homes. The expatriates, who were mostly workers of Indian or Southeast Asian origin, constituted the majority of cases of relatively large foodborne outbreaks in which food was probably mishandled in camps.

During the investigation of foodborne incidents, samples were taken from suspected food in 52 incidents; stool and vomitus specimens and rectal swabs of affected people in 63 incidents; and stool specimens and rectal and throat swabs of cooks in 70 incidents. Tests were carried out only for *S. aureus* and *Salmonella* spp. *S. aureus* was isolated from specimens of cases in 26 incidents including eight incidents where it was isolated from both food and cases. However, *Salmonella* spp. were isolated from cases in only seven incidents including two incidents where they were isolated from both cases and food (Table 2). Definitive typing of organisms or toxin detection was not carried out on any of the samples. From the above, it appears that *S. aureus* was the agent of more incidents (28.9%) than *Salmonella* spp. (7.8%). It was also isolated from food samples in another 12 incidents and thus was the suspected agent in those incidents. The incubation periods of symptoms were short (<6 h) in 75.6% of incidents (Table 3) which is further evidence that these incidents were probably due to foodborne intoxications rather than foodborne infections.

Due to the incompleteness of the investigations, it was not possible to incriminate specific foods for each incident.

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**Figure 1. Foodborne incidents and cases, total and average numbers from 1982 to 1986, by month of onset.**

**Figure 2. Foodborne cases with hospital records by age.**

**TABLE 1. Distribution of cases in the reported foodborne incidents by occupation.**

<table>
<thead>
<tr>
<th>Occupation</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worker</td>
<td>1225</td>
<td>80.0</td>
</tr>
<tr>
<td>Student</td>
<td>121</td>
<td>7.9</td>
</tr>
<tr>
<td>Housewife</td>
<td>40</td>
<td>2.6</td>
</tr>
<tr>
<td>Unemployed</td>
<td>83</td>
<td>5.4</td>
</tr>
<tr>
<td>Office worker</td>
<td>44</td>
<td>2.9</td>
</tr>
<tr>
<td>Others</td>
<td>18</td>
<td>1.2</td>
</tr>
<tr>
<td>Total</td>
<td>1531</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*aMostly construction workers living in camps.
*bSchool children and university students.
*cIncluding young children and retired people.

However, the most frequently reported foods associated with foodborne incidents were dairy foods (36.7%), meat (30%), and chicken (22.3%) (Table 4). Raw milk and laban (fermented milk product similar to buttermilk) were consumed by some Saudis who were ill. From 28 incidents in which milk and laban were suspected, Saudis were involved in 19. Most foods associated with foodborne disease incidents were eaten in the evening (dinner time, 52%) and at midday (lunch time, 25%). Improperly stored leftovers...
TABLE 2. The bacteria isolated from the samples taken during foodborne incidents investigation.

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Food</th>
<th>Cases</th>
<th>Incidents of Food and Cooks</th>
<th>No.</th>
<th>Cases</th>
<th>%</th>
<th>All samples</th>
<th>No.</th>
<th>Cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. aureus</td>
<td>20 (67%)</td>
<td>26 (407)</td>
<td>8 (319)</td>
<td>26 (879)</td>
<td>9 (354)</td>
<td>5 (70)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salmonella</td>
<td>N. sp. Staph.</td>
<td>+ Sal.</td>
<td>0 (8)</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a Stool and vomitus specimens, and rectal swabs.
b Stool specimens, and rectal and throat swabs.
c Number in parentheses are for cases.

TABLE 3. Incubation time of symptoms in the reported foodborne incidents and cases.

<table>
<thead>
<tr>
<th>Incubation time (h)</th>
<th>Incidents</th>
<th>%</th>
<th>Cases</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 6</td>
<td>68</td>
<td>75.6</td>
<td>792</td>
<td>51.7</td>
<td></td>
</tr>
<tr>
<td>7 - 12</td>
<td>16</td>
<td>17.8</td>
<td>132</td>
<td>8.6</td>
<td></td>
</tr>
<tr>
<td>&gt; 12</td>
<td>5</td>
<td>5.5</td>
<td>391</td>
<td>25.6</td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>1</td>
<td>1.1</td>
<td>216</td>
<td>14.1</td>
<td></td>
</tr>
</tbody>
</table>

Total 90 100 1531 100

from lunch (the main meal), which was eaten in the evening, was probably the main reason for the large number of incidents associated with meals eaten at dinner time. Cooked foods (both unheated and reheated) were associated with more incidents (56%) than uncooked foods (20%).

The major factors contributing to incidents during the reporting period are listed in Table 5. Insufficient cooking and improper storage (time and temperature) were the main factors most frequently suspected of contributing to incidents (17.8 and 13.3%, respectively). More than one factor was associated with 22.3% of incidents. Infected cooks were suspected to be the major factor contributing to 4.4% of incidents. S. aureus was found in both specimens from cooks and suspect foods in nine incidents, and in five of these incidents, the organism was also found in specimens from the cases (Table 2). However, these findings are insufficient to incriminate these cooks. It was also found that 65.6% of the cooks associated with foodborne incidents had no health certificates.

Despite the incompleteness and shortcomings of the reporting system, a general view can be derived from the available information. Improvement of food preparation and storage facilities at workers’ camps could reduce foodborne disease incidents among workers. However, more detailed information is required to draw specific conclusions about the status of foodborne diseases in the Eastern province of Saudi Arabia. A developed centralized foodborne disease reporting and control system is required to provide such information.

ACKNOWLEDGMENTS

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REFERENCES

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