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A Food Poisoning Outbreak in Miaoli County

On 10 November 1992, some 50 students of a primary school and a neighboring junior high school and residents in a neighborhood in Tahu Township, Miaoli County, after having taken breakfast including egg cake, pork dumpling, soybean milk, or rice milk at a breakfast restaurant, had developed symptoms of abdominal pain, nausea, vomiting and tiredness. Most cases, after some treatment in hospitals, were sent home.

An investigation team was dispatched by the Department of Health to gather information immediately after the outbreak was notified. Methods of investigation included personal interview with a questionnaire (re: age, sex, status, meal time, foods eaten, time of onset, symptoms, etc.) of the students and residents who had eaten breakfast on that day at the restaurant. Food handling and processing practice of the restaurant, and the sanitary conditions of the work site and surroundings were observed.

Data collected through interviews were processed with the personal computer software EPI-INFO. Nineteen food, environment and human specimens were collected by the Miaoli County Health Bureau and sent to the National Laboratories of Foods and Drugs of the Department of Health for testings on insecticides, heavy metals and bacteria.

Students who did not have breakfast on that day at the restaurant did not develop any symptoms. Of the 79 persons who had eaten breakfast, 79 were interviewed. Of them, 46 had developed symptoms, and 44 treated at hospitals. Table 1 shows the statuses of those who had developed symptoms. Figure 1 gives the frequency distribution of the outbreak. The median incubation period is 30 minutes. Their clinical symptoms as shown in Table 2 are: nausea (76%), abdominal pain (61%), tiredness (54%), and vomiting (54%). Table 3 analyzes the connection of each food item to the onset of illness. Of all food items, pork dumpling stuffed with bamboo shoots ($p=0.000004$), egg cake ($p=0.001$), and steamed bread roll ($p=0.009$) are found significantly related to the illness.

The 19 food, environment and human speciments collected by the Miaoli County Health Bureau on the day of outbreak were tested by the National Laboratories of Foods and Drugs for insecticides, heavy metals (cadmium, lead) and staphylococcus aureus

and also tested with mice. The findings show methomyl in flour made foods (see Table 8).

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Editorial note: The place where the outbreak occurred is known of its strawberry farming. In farming, S-methl-(methylcarbamoyl oxy) thioacetimidate, LD50-235 mg/kg; 1,3-bis-(carbamoyl-thio)-2-(N, N-dimethylamino)-propane hydrochloride, LD50-250 mg/kg; and cis.trans 3-(2,2-dichlorovinyl)-2,2-dimethlcyclopropanecdarboxylate, LD50=4000 mg/kg are frequently used.

Insecticides, being stable to heat, will not be destroyed by the process of cooking such as steaming, stir-frying and boiling. The insecticide used in this area is primarily carbamate. The chemical substance can cause nausea, abdominal pain, tiredness, vomiting, diarrhea, obscure vision, sweating and without fever. These symptoms are similar to the findings of Dr Namba, showing moderate poisoning. Experimental studies have indicated that the conditions of patients with insecticide porsioning will vary with age. The cases were therefore divided into three age groups: primary school students, junior high school students and adults and tested with one-way ANOVA and Scheffe's test for the analysis of incubation periods (see Tables 6 and 7). The result shows a significant difference between the three age groups ($P < 0.01$). The finding also serves to explain the right skewness of the epidemic curve. (Fig. 1).

Interview findings show a short incubation period of 30 minutes. Flour-made foods were found to be responsible for the outbreak. The flour was found to contain methomyl, the insecticide. The outbreak, thus, was speculated to be induced by flour contaminated with insecticide. Early diagnosis and prompt treatment are essential to the care of insecticide poisoning patients. Health workers in areas where insecticides are frequently used should stay alert to give patients timely treatment.

References:

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Table 1. No. of Cases by Status

Ststus	No. Interviewed	No. of Cases	Attack Rate (%)
Primary school	50	25	50
Jr. high school	22	12	54.5
General public	7	7	100

Table 2. Major symptoms of Patients*

Synptom	Nausea	Abdominal pain	Tiredness	Vomiting	Diarrhea	Obscure vision	Sweating
No.	35	28	25	25	10	6	6
%	76	61	54	54	22	13	13

*One patient was dignozed to have the dilatation of pupil.

Table 3. Disease Onset by Food Item

Food	Taken			Not taken			Relative risk 95% confidence interval	p-value
	Became ill	Not ill	Attack rate(%)	Became ill	Not ill	Attack rate(%)		
Egg cake	0	24	0	18	30	38	0.00	*0.001
Steamed roll	5	2	71	13	52	20	1.82<3.57<7.02	*0.009
Pork dumpling	10	2	83	8	52	13	3.13<6.25<12.5	*0.000004
Rice	1	10	9	17	44	28	0.05<0.33<2.21	0.17
Sweet dumpling	0	1	0	18	53	25	0.00	0.75
Soybean milk	2	14	13	16	40	29	0.11<0.44<1.71	0.16
Rice milk	1	3	25	17	51	25	0.17<1.00<5.74	0.69
Peanut dumpling	1	2	33	17	52	25	0.26<1.35<7.06	0.58
Dried radish	0	1	0	18	53	25	0.00	0.75
Pepper sauce	0	3	0	18	51	26	0.00	0.41
Noodle	1	6	14	17	48	26	0.09<0.55<3.51	0.43

Notes: 1. Population used for the analysis are 72 primary and junior school students.
2. Illness is defined as tiredness or nausea.

Table 4. Intake of Food by Patients by Age Groups

Food	(N=50) Primary school	(N=22) Junior high school	(N=7) Adult
Egg cake	20 (40%)	4 (18%)	0 (0%)
Steamed roll	3 (6%)	5 (23%)	2 (29%)
Pork dumpling	3 (6%)	7 (32%)	4 (57%)
Rice	8 (16%)	3 (14%)	0 (0%)
Sweet dumpling	0 (0%)	1 (5%)	1 (14%
Soybean milk	16 (32%)	0 (0%)	0 (0%)
Rice milk	4 (8%)	0 (0%)	0 (0%)
Peanut dumpling	2 (4%)	0 (0%)	0 (0%)
Dried radish	1 (2%)	0 (0%)	0 (0%)
Pepper sauce	1 (2%)	2 (9%)	0 (0%)
Fried noodle	4 (8%)	3 (14%)	0 (0%)

Table 5. Incubation Period by Patients by Age Groups

Age group	nj	$\bar{X}$-j	Sj	$\sum_{j=1}^{nj} (X_{ij})$	$\sum_{i=1}^{nj} (X_{ij}-\bar{X}_j)$	$\Sigma\Sigma(X_{ij}-\bar{\bar{X}})^2$
Primary school	27	67.59	8.918	1825	2068	
Jr. high school	12	33.75	8.235	405	746	
Adult	7	8.57	1.542	60	14.26	
Total	46	109.91	18.695	2290	2828.3	85598

Table 6. Incubation Period by Age Groups

Source	Sum of square	d.f.	Mean of square	F
Between	82769.3	2	41384.85	629.23
Within	2828.3	43	65.77	

$F_{.01}$ (2.43)=4.98, upper 1%, $p<0.01$

Scheffe's Comparison Posterior (No. of comparison = $\frac{k\ (k\ -\ 1)}{2}$ = 3)

$$F\ (\bar{X}_0\ -\ \bar{X}_1)\ =\ \frac{\bar{X}_0\ -\ \bar{X}_1}{MWSS}\ =\ 145.58$$

$F\ (\bar{X}_0\ -\ \bar{X}_1)\ =\ 313,82,\ F\ (\bar{X}_1\ -\ \bar{X}_2)\ =\ 42.65$

$(k\ -\ 1)\ \times\ F_{.01}\ (2.43)\ =\ 2\ \times\ 4.98\ =\ 9.96$

*$F\ (X_0 - X_1)$ compare the mean incubation period of primary school students (X_0) with that of the junior high school students (X_1); 0 of X_0 stands for the age group the patient is in.

Table 7. Flour-Made Food, Rice / Soybean Milk and Onset of Illness

Food	Taken			Not taken			Relative risk 95% confidence interval	p-value
	Became ill	Not ill	Attack rate(%)	Became ill	Not ill	Attack rate(%)		
Flour-made food	29	17	63	8	18	31	1.10<2.05<3.80	0.017
Rice/soybean milk	11	9	55	26	26	50	0.68<1.10<1.78	0.907

*Flour-made foods include egg cake, steamed roll, pork dumpling, sweet dumpling, peanut dumpling
Rice/soybean milk includes rice fluid and soybean milk
Illness is defined as tiredness or nausea

Table 8. Testings of Suspected Foods and Materials

Food/material	Test items and findings				
	Insecticide (ppm)		Lead, Cadmium (ppm)	Staphylococcus aureus	Mice test
Pork dumpling	Methomyl	*59.9	—	negative	died
Sweet dumpling	Methomyl	85.0	—	negative	died
Bean stuffing	Methomyl	7.3	—	negative	lived
Soybean milk	Not found		—	negative	lived
Soybean sauce	Not found		—	—	lived
Fish mince	Not found		—	—	lived
Dried radish	Not found		—	negative	lived
Pepper sauce	Not found		—	—	lived
Oil	Not found		0.03	—	lived
Spring water	Not found		—	negative	lived
Steamed roll	Methomyl	61.2	—	negative	died
Minced pork	Not found		—	—	lived
Sticky rice	Not found		—	—	lived
Rice/noodle	Not found		3.3	0.08	— lived
Yeast powder	Not found		—	—	— lived
Peanut powder	Not found		0.28	0.03	negative lived
Bamboo shoot	Not found		—	—	— lived
Flour	Methomyl	42.2	—	0.05	— died

Figure 1. Distribution of Cases by Incubation Period