疫情報導
TAIWAN EPIDEMIOLOGY BULLETIN
November 24, 2015 Vol.31 No.22
Original Article

Epidemiology of *Vibrio parahaemolyticus* in Southern Taiwan, 2004–2013

Chien-Chou Lin *, Po-Shan Lin, Li-Li Kou, Yu-Ping Hong, Ho-Sheng Wu

Abstract

Vibrio parahaemolyticus has been the ranked first pathogen that causes bacterial foodborne illness in Taiwan for many years. Since *V. parahaemolyticus* occurs naturally in warm brackish waters, estuaries, and salt marshes, the fish and shellfish in such environments are easily contaminated with this pathogen. The causes of food poisoning often resulted from eating raw oysters or undercooked fish carrying foodborne pathogens or contamination with pathogens during food handling and cooking processes.

Between 2004 and 2013, a total of 7,126 food poisoning outbreaks were reported from southern Taiwan, including Chiayi, Tainan, Kaohsiung, Pingtung and Penhu cities/counties. Of these outbreaks, *V. parahaemolyticus* was the first leading responsible agent (n = 1,262, 18%). The annual average number of patients affected by *V. parahaemolyticus* was 126, and the monthly average was about 10.5 (range 5.9–14.3), peaking in August. Females (56%) and persons aged 20–44 years (56%) were the most affected group. The prevalence of *V. parahaemolyticus* infections were 41 per 100,000 population in Pingtung County, followed by 12.6 in Chiayi County, 11.2 in Penhu County, 6.7 in Tainan City, 6.0 in Kaohsiung City, and 3.5 in Chiayi City, respectively. Among the 935 isolates of *V. parahaemolyticus*, serotype K6 predominated (n = 507, 54%), followed by serotype K8 (n = 147, 15%). The surface temperature of the sea water in southern Taiwan, however, ranged 22.0℃ –29.8℃, and was never lower than 15℃ over the past 10 years.

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Received：Apr. 23, 2015
DOI：10.6525/TEB.20151124.31(22).001
Accepted：May. 15, 2015

Despite recent economic growth and improvement in living standards, the food poisoning outbreaks have not decreased. We recommend people working in a food business must follow the business food safety program, including (1) good personal hygiene, such as thoroughly washing and drying hands when handling food; (2) avoidance of cross-contamination, such as keeping raw foods and ready-to-eat foods separate, and using separate, clean utensils, containers and equipment; (3) if staff working in a food handling has gastrointestinal symptoms such as diarrhea and/or vomiting, the restaurant manager must exclude staff with these symptoms from working with food at least for 48 hours until symptoms diminish; and (4) once a food poisoning outbreak occurs, the health agencies must conduct investigation and identify the suspicious foodborne pathogens to prevent the spreading of illness.

Keywords: *Vibrio parahaemolyticus*；Serotype K6；Prevalence of *Vibrio parahaemolyticus*

Foodborne Outbreaks, Eastern Taiwan, 2014

Shu-Chun Chiu *, Kuang-Lo Chen, Jung-Jung Mu

Abstract

In 2014, 326 clinical specimens collected from eastern Taiwan were tested for foodborne pathogens; 81 (25%) were positive. *Vibrio parahaemolyticus* was the leading bacterial etiologic agent (12%), followed by *Salmonella* (7%), and *Staphylococcus aureus* (3%). The number of foodborne outbreaks was the highest in Ilan County (n = 25) and number of patients affected was the highest in Taitung County (n = 137). More than 60% of patients in Hualien County and Taitung County were tourists while in Ilan County were mostly local residents. After the Taipei-Ilan Expressway (Hsuehshan Tunnel) opened in 2006, travel time between Taiwan's capital Taipei and Ilan County was significantly reduced. Moreover, group tourists from mainland China were allowed to travel independently to Taiwan since 2008. These factors contribute to the rapid increment for tourist visiting eastern Taiwan. Local governments and catering should pay more attention to improve food safety not only for public's health but also to maintain the quality of our tourism.

Keywords: Foodborne disease ; *Salmonella* ; *Vibrio parahaemolyticus* ; *Staphylococcus aureus*

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Received：May. 29, 2015
Accepted：Jul. 29, 2015

Norovirus Outbreak at A Farm — Taichung City, February 2015

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Abstract

During Feb 14–23, 2015, a foodborne outbreak was reported in Taichung City. Of the 330 people used the catering services in a farm, 87 showed symptoms of gastroenteritis (attack rate 26%). Of 31 bacterial anal swabs and 29 stool specimens for virological tests, enterotoxin type B Staphylococcus (n = 1), enterotoxin type C Staphylococcus (n = 1), norovirus GII.17 (n = 11), norovirus GII.4 (n = 2), and rotavirus (n = 3) were detected. Epidemiologic investigation concluded that this is an outbreak of norovirus infection. With the cooperation of environmental disinfection, halt catering service, and the joint health unit inspections, no new patient was identified since March 2. This outbreak sickened more than 200 people and attracted public attention from the media and society. The health agencies put lots of resources in prevention and control, and the farm had closed for days. Norovirus outbreak can result in enormous social and personal losses and remind us the importance of its prevention and control.

Keywords: Farm；Norovirus；Cluster infection

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Received：Jun. 26, 2015
Accepted：Sep. 02, 2015
DOI：10.6525/TEB. 20151124.31(22).003

week 44-45 (Nov. 1 - Nov. 14 , 2015)

DOI: 10.6525/TEB.20151124.31(22).004

Weekly Data of Notifiable Infectious Diseases（by week of diagnosis）

Case diagnosis week		Week 44		Week 1—44	
Classification	**Disease Diagnosed[1]**	**2015**	**2014**	**2015**	**2014**
Category I	Plague	0	0	0	0
	Rabies	0	0	0	0
	SARS	0	0	0	0
	Smallpox	0	0	0	0
Category II	Acute Flaccid Paralysis	0	0	19	29
	Acute Viral Hepatitis type A	5	7	120	100
	Amoebiasis	2	8	300	244
	Anthrax	0	0	0	0
	Chikungunya Fever	0	0	4	7
	Cholera	0	0	10	4
	Dengue Fever	2197	1446	31926	8866
	Diphtheria	0	0	0	0
	Enterohemorrhagic E. coli Infection	0	0	0	0
	Epidemic Typhus Fever	0	0	0	0
	Hantavirus Pulmonary Syndrome	0	0	0	0
	Hemorrhagic Fever with Renal Syndrome	0	0	2	1
	Malaria	1	0	9	18
	Measles	0	3	29	24
	Meningococcal Meningitis	0	0	3	3
	Paratyphoid Fever	0	0	3	8
	Poliomyelitis	0	0	0	0
	Rubella	0	0	6	5
	Shigellosis	4	5	157	117
	Typhoid fever	1	1	25	21
	West Nile Fever	0	0	0	0
Category III	Acute Viral Hepatitis type B	2	3	104	97
	Acute Viral Hepatitis type C[5]	2	6	174	161
	Acute Viral Hepatitis type D	0	0	1	1
	Acute Viral Hepatitis type E	0	0	2	11
	Acute Viral Hepatitis untype	0	0	2	4
	Congential Rubella Syndrome	0	0	0	0
	Enteroviruses Infection with Severe Complications	0	0	5	7
	Haemophilus Influenza type b Infection	0	0	2	3
	Japanese Encephalitis	0	1	29	16
	Legionellosis	2	4	142	113
	Mumps[2]	15	12	672	769
	Neonatal Tetanus	0	0	0	0
	Pertussis	0	0	74	60
	Tetanus[2]	1	0	10	6
Category IV	Botulism	0	0	2	0
	Brucellosis	0	0	2	0
	Complicated Influenza	2	1	808	1756
	Complicated Varicella[4]	1	1	46	49
	Endemic Typhus Fever	0	0	30	23
	Herpesvirus B Infection	0	0	0	0
	Invasive Pneumococcal Disease	11	7	441	489
	Leptospirosis	1	5	71	81
	Lyme Disease	0	0	2	2
	Melioidosis	2	2	31	29
	Q Fever	0	1	38	46
	Scrub Typhus	17	7	352	383
	Toxoplasmosis	0	0	11	12
	Tularremia	0	0	0	0
Category V	Ebola Virus Disease	0	0	0	0
	Ebola-Marburg Hemorrhagic Fever	0	0	0	0
	Novel Influenza A Virus Infections[6]	0	0	0	0
	Lassa Fever	0	0	0	0
	Rift Valley Fever	0	0	0	0
	Middle East Respiratory Syndrome Coronavirus	0	0	0	0
	Yellow Fever	0	0	0	0

1. The following 8 chronic diseases are excluded from the table: MDR-TB, Tuberculosis, Syphilis, Gonorrhea, HIV Infection, AIDS, Hansen Disease and Creutzfeldt-Jakob Disease.
2. Reported cases.
3. Since 2014/1/1, "Varicella" was modified to "Complicated Varicella".
4. Since 2014/3/6, the case definition for confirmed Acute hepatitis C was changed from "meet the clinical and laboratory conditions" to "meet the clinical or laboratory conditions".
5. Since 2014/7/1, various subtypes of human cases of avian influenza are reported as "novel influenza A virus infections", a Category V Notifiable Infectious Disease. The original "H5N1 flu" and "H7N9 flu", which were respectively listed as a Category I Notifiable Infectious Disease and a Category V Notifiable Infectious Disease were removed from the list on the same day.

Suspected Clusters

●Eleven clusters were reported, including 10 diarrhea clusters, and 1 varicella cluster.

Imported Infectious Diseases

●22 confirmed cases were imported from 8 countries during Week 43 of 2015.

Country / Disease	Indonesia	Vietnam	Thailand	Malawi	Philippines	Myanmar	Cambodia	China	Total
Shigellosis	11	1							12
Dengue Fever		2	1		1	1	1		6
Melioidosis			1						1
Malaria				1					1
Hepatitis A								1	1
Typhoid fever	1								1
Total	12	3	2	1	1	1	1	1	22

Note: The statistics listed in this table include imported cases that were either confirmed or updated★ in the previous week.

●A total of 651 confirmed cases were imported from 34 countries in 2015.

●Top 3 imported diseases：Dengue fever (290), Amoebiasis (171), Shigellosis (84).

●Top 3 countries responsible for most imported cases：Indonesia (308), Philippines (59), Vietnam (55).

Summary of Epidemic

●**Dengue Fever**：Dengue activity has entered the peak of the epidemic season. The public is urged to clean up and remove any vector breeding sites. The epidemic has increased in Kaohsiung City and the number of new cases reported during Week 44 is 1.1 times higher than that reported during Week 43. The hot spots of the epidemic in Kaohsiung City are Sanmin District, Lingya District, Fongshan District and Cianjhen District. On the other hand in Tainan City, the epidemic has slowed down for 7 weeks and the number of new cases reported during Week 44 is 40% less than that reported during Week 43. The majority of the cases were reported in East District, Tainan City. Since May 1, 2015, 141 deaths were confirmed to be caused by dengue infection, while 30 deaths are waiting to be reviewed. As of now, 27 dengue cases are still being treated in the intensive care unit (ICU), and 94.0% of the reported cases have recovered.

●**Enterovirus**：Enterovirus season has continued and enterovirus activity is above the epidemic threshold. The numbers of visits to outpatient services and ER for enterovirus infection during Week 44 are slightly higher than that during Week 43. Coxsackie A16 virus is currently the dominant strain circulating in the community. Since September 1, 2015, specimens tested positive for Enterovirus 71 have been identified in the community. The majority of the cases were reported in Yilan County.

●**Influenza**：During Week 44, two cases of severe complicated influenza have been confirmed. Influenza activity has not fluctuated and remained at the baseline level. H3N2 is currently the dominant strain circulating in the community.

Weekly Data of Notifiable Infectious Diseases（by week of diagnosis）

Case diagnosis week		Week 45		Week 1—45	
Classification	**Disease Diagnosed[1]**	**2015**	**2014**	**2015**	**2014**
Category I	Plague	0	0	0	0
	Rabies	0	0	0	0
	SARS	0	0	0	0
	Smallpox	0	0	0	0
Category II	Acute Flaccid Paralysis	0	0	19	29
	Acute Viral Hepatitis type A	3	10	123	110
	Amoebiasis	3	7	303	251
	Anthrax	0	0	0	0
	Chikungunya Fever	0	0	4	7
	Cholera	0	0	10	4
	Dengue Fever	2163	1488	34081	10354
	Diphtheria	0	0	0	0
	Enterohemorrhagic E. coli Infection	0	0	0	0
	Epidemic Typhus Fever	0	0	0	0
	Hantavirus Pulmonary Syndrome	0	0	0	0
	Hemorrhagic Fever with Renal Syndrome	0	0	2	1
	Malaria	0	0	9	18
	Measles	0	1	29	25
	Meningococcal Meningitis	0	0	3	3
	Paratyphoid Fever	0	0	3	8
	Poliomyelitis	0	0	0	0
	Rubella	0	0	6	5
	Shigellosis	3	2	160	119
	Typhoid fever	1	0	26	21
	West Nile Fever	0	0	0	0
Category III	Acute Viral Hepatitis type B	2	3	106	100
	Acute Viral Hepatitis type C[5]	10	4	184	165
	Acute Viral Hepatitis type D	1	0	2	1
	Acute Viral Hepatitis type E	0	0	2	11
	Acute Viral Hepatitis untype	0	0	2	4
	Congential Rubella Syndrome	0	0	0	0
	Enteroviruses Infection with Severe Complications	0	0	5	7
	Haemophilus Influenza type b Infection	0	0	2	3
	Japanese Encephalitis	1	1	30	17
	Legionellosis	2	3	144	116
	Mumps[2]	12	18	684	787
	Neonatal Tetanus	0	0	0	0
	Pertussis	1	2	75	62
	Tetanus[2]	0	0	10	6
Category IV	Botulism	0	0	2	0
	Brucellosis	0	0	2	0
	Complicated Influenza	3	2	811	1758
	Complicated Varicella[4]	1	0	47	49
	Endemic Typhus Fever	0	0	30	23
	Herpesvirus B Infection	0	0	0	0
	Invasive Pneumococcal Disease	10	8	451	497
	Leptospirosis	1	3	72	84
	Lyme Disease	0	0	2	2
	Melioidosis	0	1	31	30
	Q Fever	1	1	39	47
	Scrub Typhus	26	10	378	393
	Toxoplasmosis	0	1	11	13
	Tularremia	0	0	0	0
Category V	Ebola Virus Disease	0	0	0	0
	Ebola-Marburg Hemorrhagic Fever	0	0	0	0
	Novel Influenza A Virus Infections[6]	0	0	0	0
	Lassa Fever	0	0	0	0
	Rift Valley Fever	0	0	0	0
	Middle East Respiratory Syndrome Coronavirus	0	0	0	0
	Yellow Fever	0	0	0	0

1. The following 8 chronic diseases are excluded from the table: MDR-TB, Tuberculosis, Syphilis, Gonorrhea, HIV Infection, AIDS, Hansen Disease and Creutzfeldt-Jakob Disease.
2. Reported cases.
3. Since 2014/1/1, "Varicella" was modified to "Complicated Varicella".
4. Since 2014/3/6, the case definition for confirmed Acute hepatitis C was changed from "meet the clinical and laboratory conditions" to "meet the clinical or laboratory conditions".
5. Since 2014/7/1, various subtypes of human cases of avian influenza are reported as "novel influenza A virus infections", a Category V Notifiable Infectious Disease. The original "H5N1 flu" and "H7N9 flu", which were respectively listed as a Category I Notifiable Infectious Disease and a Category V Notifiable Infectious Disease were removed from the list on the same day.

Suspected Clusters

●Fifteen clusters were reported, including 7 diarrhea clusters, 5 tuberculosis clusters, 1 upper respiratory tract infection cluster, 1 fever cause unknown origin cluster, and 1 varicella cluster.

Imported Infectious Diseases

●10 confirmed cases were imported from 7 countries during Week 45 of 2015.

Country / Disease	Indonesia	Philippines	Hong Kong	Singapore	Maldives	Malaysia	Vietnam	Total
Dengue Fever		1		1	1	1		4
Amoebiasis	1	1						2
Typhoid fever	1							1
Hepatitis A			1					1
Shigellosis	1							1
Scrub Typhus							1	1
Total	3	2	1	1	1	1	1	10

Note: The statistics listed in this table include imported cases that were either confirmed or updated★ in the previous week.

●A total of 661 confirmed cases were imported from 34 countries in 2015.

●Top 3 imported diseases：Dengue fever (294), Amoebiasis (173), Shigellosis (85).

●Top 3 countries responsible for most imported cases：Indonesia (311), Philippines (61), Vietnam (55).

Summary of Epidemic

●**Dengue Fever**：Dengue activity has entered the peak of the epidemic season. The public is urged to clean up and remove any vector breeding sites. The epidemic has increased in Kaohsiung City and the number of new cases reported during Week 45 is 1.3 times higher than that reported during Week 44. The hot spots of the epidemic in Kaohsiung City are Sanmin District, Fongshan District, Cianjhen District and Lingya District. On the other hand, in Tainan City, the epidemic has slowed down and the number of new cases reported during Week 45 is 30% less than that reported during Week 44. The majority of the cases were reported in East District, Tainan City. Since May 1, 2015, 150 deaths were confirmed to be caused by dengue infection, while 37 deaths are waiting to be reviewed. As of now, 45 dengue cases are still being treated in the intensive care unit (ICU), and 93.6% of the reported cases have recovered.

●**Enterovirus**：Enterovirus season has continued and enterovirus activity is above the epidemic threshold. The ER consultation rate for enterovirus infection during Week 45 is higher than the epidemic threshold. Coxsackie A virus is currently the dominant strain circulating in the community.

●**Influenza**：Influenza activity has not fluctuated and remained at the baseline level. H3N2 is currently the dominant strain circulating in the community.

The Taiwan Epidemiology Bulletin series of publications is published by Centers for Disease Contrd, Ministry of Health and Welfare, Taiwan (R.O.C.) since Dec 15, 1984.
Address : No.6, Linshen S. Road, Taipei, Taiwan 100 (R.O.C.) **Telephone No :** (02) 2395-9825
Publisher : Hsu-Sung Kuo
Editor-in-Chief : Wan-Ting Huang
Executive Editor : Hsueh-Ju Chen, Hsiu-Lan Liu **Website :** http://www.cdc.gov.tw/
Suggested Citation :
[Author].[Article title].Taiwan Epidemiol Bull 2015;31:[inclusive page numbers]. [DOI]