

The Association between Seroepidemiology of Hantavirus Disease and Climate Change, Taiwan, 2020

Shu-Fen Chang*, Kai-Jung Yang, Pei-Yun Shu

Abstract

Hantavirus syndrome is a zoonotic infectious disease caused by Hantavirus. From 2001 to 2020, a total of 35 cases were reported in Taiwan, of which, 11 cases were hemorrhagic fever with renal syndrome (HFRS) in 2020. The number of cases was the highest on record. Five cases were identified in Kaohsiung City, three in Pingtung County, two in New Taipei City, and one in Keelung City. Most of the cases were engaged in work related to catering, food wholesale and retail. Serological typing results showed that these 11 cases were all infected with Seoul virus (SEOV). A total of 72 mice were captured near the cases' work and residence and 1 tested positive for hantavirus antibody of Seoul virus. The rodent serological surveillance at international ports in 2020 showed that among 293 rodents captured, 10 were seropositive for hantavirus, and 9 of them were *Rattus norvegicus*, which is still the main reservoir host for SEOV in Taiwan. We also analyzed the correlation between the HFRS-confirmed cases and environmental variability in Kaohsiung City. The warm winter in 2019–2020 and the decreased precipitation in 2020 might have an impact on the rodent host-hantavirus system that affected rodent population dynamics and the drought-induced food shortage for rodents, which could enhance host-human interaction and hantaviral transmission events.

Keywords: Hantavirus hemorrhagic fever with renal syndrome, Seoul virus, climate change

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Outbreak of Hantavirus Infection, Southern Taiwan, 2020

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Abstract

On January 3, 2020, the local public health authority was notified of a case of hantavirus infection. A woman in her 60s presented with high fever, headache, generalized soreness and diarrhea. Laboratory investigation found abnormal renal function and history taking revealed rat infestation of her residence and working place. Hantavirus hemorrhagic fever with renal syndrome (HFRS) was suspected and was confirmed by Taiwan Centers for Disease Control on January 12. The local public health authority immediately carried out outbreak investigation, environmental sanitization, rodent trapping and health education. One of her colleagues was diagnosed with HFRS after expanded contact investigation. Four rodents captured around the working place were tested seropositive for hantavirus. The most important way to prevent hantavirus infection is rodent prevention. When an outbreak occurs, rapid implementation of environmental sanitation and rodent prevention measures for high-risk locations is imperative, preferentially through cross-sector collaboration. Medical staff should also strengthen inquiry about travel history, occupation, contact history and cluster (TOCC) and stay vigilant to quickly respond to the epidemic.

Keywords: Hantavirus, hemorrhagic fever with renal syndrome

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week 2–week4, 2023 (Jan.8, 2023–Jan.28, 2023)

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Weekly Data of Notifiable Inases (by week of diagnosis)

Case diagnosis year		Week 2★		Week 1–2			
Classification	Disease Diagnosed	2023	2022	2023		2022	
				Total cases★	Imported cases	Total cases★	Imported cases
Category I	Plague	0	0	0	0	0	0
	Rabies	0	0	0	0	0	0
	SARS	0	0	0	0	0	0
	Smallpox	0	0	0	0	0	0
Category II	Acute Flaccid Paralysis	1	2	1	0	2	0
	Acute Viral Hepatitis type A	2	1	4	0	4	0
	Amoebiasis	4	2	13	4	6	0
	Anthrax	0	0	0	0	0	0
	Chikungunya Fever	0	0	0	0	0	0
	Cholera	0	0	0	0	0	0
	Dengue Fever	2	0	5	5	0	0
	Diphtheria	0	0	0	0	0	0
	Enterohemorrhagic E. coli Infection	0	0	0	0	0	0
	Epidemic Typhus Fever	0	0	0	0	0	0
	Hantavirus syndrome	0	0	0	0	0	0
	Malaria	0	0	0	0	0	0
	Measles	0	0	0	0	0	0
	Meningococcal Meningitis	0	0	0	0	0	0
	Paratyphoid Fever	0	0	0	0	0	0
	Poliomyelitis	0	0	0	0	0	0
	Rubella	0	0	0	0	0	0
	Shigellosis	1	2	2	1	2	0
Typhoid fever	0	0	0	0	0	0	
West Nile Fever	0	0	0	0	0	0	
Zika virus infection	0	0	0	0	0	0	
Monkeypox	0	0	0	0	0	0	
Category III	Acute Viral Hepatitis type B	0	4	5	0	9	0
	Acute Viral Hepatitis type C	11	9	24	0	19	0
	Acute Viral Hepatitis type D	0	0	0	0	0	0
	Acute Viral Hepatitis type E	0	0	0	0	0	0
	Congenital Syphilis	0	0	0	0	0	0
	Congenital Rubella Syndrome	0	0	0	0	0	0
	Enteroviruses Infection with Severe Complications	1	0	3	0	0	0
	Haemophilus Influenza type b Infection	0	0	0	0	0	0
	Japanese Encephalitis	0	0	0	0	0	0
	Legionnaires' Disease	3	9	14	0	23	0
	Mumps	5	5	10	0	9	0
	Neonatal Tetanus	0	0	0	0	0	0
Pertussis	0	0	0	0	0	0	
Tetanus	0	0	0	0	0	0	
Category IV	Botulism	0	0	0	0	0	0
	Brucellosis	0	0	0	0	0	0
	Complicated Varicella	0	0	1	0	0	0
	Endemic Typhus Fever	0	0	0	0	0	0
	Herpesvirus B Infection	0	0	0	0	0	0
	Influenza Case with Severe Complications	1	0	2	0	0	0
	Invasive Pneumococcal Disease	4	6	13	0	8	0
	Leptospirosis	2	1	2	0	1	0
	Listeriosis	2	1	5	0	2	0
	Lyme Disease	0	1	0	0	1	1
	Melioidosis	1	0	1	0	0	0
	Q Fever	0	0	0	0	0	0
	Scrub Typhus	10	3	12	0	4	0
Toxoplasmosis	0	1	0	0	1	0	
Tularemia	0	0	0	0	0	0	
Category V	Ebola Virus Disease	0	0	0	0	0	0
	Lassa Fever	0	0	0	0	0	0
	Marburg Hemorrhagic Fever	0	0	0	0	0	0
	Middle East Respiratory Syndrome	0	0	0	0	0	0
	Coronavirus Infections	0	0	0	0	0	0
	Novel Influenza A Virus Infections	0	0	0	0	0	0
	Rift Valley Fever	0	0	0	0	0	0
Severe Pneumonia with Novel Pathogens	154296	445	336745	4774	733	651	
Yellow Fever	0	0	0	0	0	0	

1. ★The weekly and cumulative total numbers include indigenous and imported cases of notifiable infectious diseases.
 2. MDR-TB, Tuberculosis, Syphilis, Gonorrhea, HIV Infection, AIDS, Hansen's Disease and Creutzfeldt-Jakob Disease are excluded from the table.
 3. Numbers of mumps and tetanus cases are summed up by the week of report.
 4. Since 2022/6/23, " Monkeypox " was listed as a Notifiable Infectious Disease.
 5. Hantavirus Syndrome was applied since September 6, 2021.

Suspected Clusters

- Twenty-one clusters related to diarrhea (16), tuberculosis (3), varicella (1) and upper respiratory tract infection (1) were reported during week 2.

Imported Infectious Diseases

- There were 2461 imported cases from at least 21 countries / areas during week 2.

Severe Pneumonia with Novel Pathogens : 2458 cases from China (1207), Japan (72), Korea (20), Thailand (16), Vietnam (9), USA (9), Singapore (5), Turkey (4), Italy (4), Hong Kong (4), Malaysia (3), the Philippines (3), Macau (3), France (2), Canada (2), New Zealand (2), Australia (2), Ecuador (1), Hungary (1), Fiji (1), and Unknown (1088).

Dengue Fever : 2 cases from Vietnam (2).

Amoebiasis : 1 case from Indonesia (1).

Summary of Epidemic

- **Severe Pneumonia with Novel Pathogens** : The COVID-19 decreased. Due to the flow of people and gatherings increase during the New Year Holiday, the risk of epidemic spread may increase.

Weekly Data of Notifiable Inases (by week of diagnosis)

Case diagnosis year		Week 3-4★		Week 1-4			
Classification	Disease Diagnosed	2023	2022	2022		2021	
				Total cases★	Imported cases	Total cases★	Imported cases
Category I	Plague	0	0	0	0	0	0
	Rabies	0	0	0	0	0	0
	SARS	0	0	0	0	0	0
	Smallpox	0	0	0	0	0	0
Category II	Acute Flaccid Paralysis	1	1	2	0	3	0
	Acute Viral Hepatitis type A	1	4	5	0	8	0
	Amoebiasis	13	15	26	7	21	5
	Anthrax	0	0	0	0	0	0
	Chikungunya Fever	0	0	0	0	0	0
	Cholera	0	0	0	0	0	0
	Dengue Fever	2	0	7	7	0	0
	Diphtheria	0	0	0	0	0	0
	Enterohemorrhagic E. coli Infection	0	0	0	0	0	0
	Epidemic Typhus Fever	0	0	0	0	0	0
	Hantavirus syndrome	0	0	0	0	0	0
	Malaria	1	0	1	1	0	0
	Measles	0	0	0	0	0	0
	Meningococcal Meningitis	0	0	0	0	0	0
	Paratyphoid Fever	1	0	1	0	0	0
	Poliomyelitis	0	0	0	0	0	0
	Rubella	0	0	0	0	0	0
	Shigellosis	1	3	3	1	5	0
	Typhoid fever	0	0	0	0	0	0
	West Nile Fever	0	0	0	0	0	0
Zika virus infection	0	0	0	0	0	0	
Monkeypox	0	-	0	0	-	-	
Category III	Acute Viral Hepatitis type B	5	2	10	0	11	0
	Acute Viral Hepatitis type C	21	15	44	0	34	0
	Acute Viral Hepatitis type D	0	0	0	0	0	0
	Acute Viral Hepatitis type E	0	0	0	0	0	0
	Congenital Syphilis	0	0	0	0	0	0
	Congenital Rubella Syndrome	0	0	0	0	0	0
	Enteroviruses Infection with Severe Complications	0	0	3	0	0	0
	Haemophilus Influenza type b Infection	0	0	0	0	0	0
	Japanese Encephalitis	0	0	0	0	0	0
	Legionnaires' Disease	10	11	24	0	34	0
	Mumps	11	9	21	0	18	0
	Neonatal Tetanus	0	0	0	0	0	0
	Pertussis	0	0	0	0	0	0
Tetanus	0	1	0	0	1	0	
Category IV	Botulism	0	0	0	0	0	0
	Brucellosis	0	0	0	0	0	0
	Complicated Varicella	1	1	2	0	1	0
	Endemic Typhus Fever	0	0	0	0	0	0
	Herpesvirus B Infection	0	0	0	0	0	0
	Influenza Case with Severe Complications	4	0	6	0	0	0
	Invasive Pneumococcal Disease	6	3	19	0	11	0
	Leptospirosis	1	1	3	0	2	0
	Listeriosis	4	6	9	0	8	0
	Lyme Disease	0	0	0	0	1	1
	Melioidosis	0	0	1	0	0	0
	Q Fever	0	1	0	0	1	0
	Scrub Typhus	3	6	15	0	10	0
Toxoplasmosis	2	2	2	0	3	0	
Tularemia	0	0	0	0	0	0	
Category V	Ebola Virus Disease	0	0	0	0	0	0
	Lassa Fever	0	0	0	0	0	0
	Marburg Hemorrhagic Fever	0	0	0	0	0	0
	Middle East Respiratory Syndrome	0	0	0	0	0	0
	Coronavirus Infections	0	0	0	0	0	0
	Novel Influenza A Virus Infections	0	0	0	0	0	0
	Rift Valley Fever	0	0	0	0	0	0
Severe Pneumonia with Novel Pathogens	273796	923	610536	7887	1656	1210	
Yellow Fever	0	0	0	0	0	0	

1. ★The weekly and cumulative total numbers include indigenous and imported cases of notifiable infectious diseases.
2. MDR-TB, Tuberculosis, Syphilis, Gonorrhoea, HIV Infection, AIDS, Hansen's Disease and Creutzfeldt-Jakob Disease are excluded from the table.
3. Numbers of mumps and tetanus cases are summed up by the week of report.
4. Since 2022/6/23, " Monkeypox " was listed as a Notifiable Infectious Disease.

Suspected Clusters

- Forty-six clusters related to diarrhea (35), tuberculosis (6) and upper respiratory tract infection (5) were reported during week 3-4.

Imported Infectious Diseases

- There were 3117 imported cases from at least 21 countries / areas during week 3–4.
 - Severe Pneumonia with Novel Pathogens** : 3111 cases from China (1191), Japan (77), Korea (11), Singapore (10), USA (10) Thailand (8), Malaysia (7), Hong Kong (6), Vietnam (6) , Canada (5), Indonesia (3), Australia (2) , Turkey (1), France (1), New Zealand (1), the Philippines (1), Germany (1), UAE (1), UK (1) and Unknown (1768).
 - Malaria** : 1 case from Cote Divoire (1).
 - Dengue Fever** : 2 cases from India (1), Indonesia (1).
 - Amoebiasis** : 3 cases from the Philippines (2), Indonesia (1).
- During week 1–4, there were 7903 imported cases from at least 29 countries / areas. The top three countries are China (2978), Japan (203), Korea (49).
- During week 1–4, the notifiable diseases with the highest number of imported cases is Severe Pneumonia with Novel Pathogens (7887).

Summary of Epidemic

- **Severe Pneumonia with Novel Pathogens** : Duo to the flow of people and gatherings increased during Lunar New Year, the risk of epidemic spread raised.

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