WEEKLY EPIDEMIOLOGICAL REPORT

A publication of the Epidemiology Unit
Ministry of Healthcare and Nutrition
231, de Saram Place, Colombo 01000, Sri Lanka
Tele: + 94 11 2695112, Fax: +94 11 2696583, E mail: epidunit@sltnet.lk
Epidemiologist: +94 11 2681548, E mail: chepid@sltnet.lk

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Hantavirus Infections

Clinical presentation of Hantavirus infections is common with some other important infectious diseases including dengue haemorrhagic fever and Leptospirosis. There were serological evidence suggestive of the circulation of hantavirus in Sri Lanka. Therefore, it is important to think of possible hantavirus infection when patients are having the typical clinical presentation especially when it cannot be attributed to other possible infections.

Hantaviruses are a group of RNA viruses that infect rodents worldwide. They are the causative agents of haemorrhagic fever with renal syndrome (HFRS) and hantavirus pulmonary syndrome (HPS). Several strains of the virus are known to infect humans. Infection with Seoul virus is found worldwide, Hantann virus mainly in Asia and less often in Europe while infection with Puumala virus is found in Europe. The human infection in Europe has been described as early as 1913. The virus was first isolated from a field rodent near the Hantaan River in Korea in 1977 . Hantavirus disease is a major public health problem in China and Republic of Korea. The occurrence is seasonal and mainly affects the rural community. There are an estimated 100,000 to 200,000 cases of hantavirus infection each year worldwide. Subclinical infection with some hantaviruses are common and it is estimated that subclinical to clinical ratio could be 14:1 to 20:1. For both HFRS and HPS, infection is more common in males than females (M: F, 2:1 to 3:1) and in those aged 20 – 40 years.

Some mice and rat species including the deer mouse, the white-footed mouse, the rice rat, and the cotton rat can transmit the hantavirus infection to humans. Field rodents are the natural reservoir for the virus while humans become accidental hosts. Among the rat population as much as 50% can have the infection at any given time. Human infection occurs when man enters the ecosystem inhabited by the reservoir host or when the reservoir host moves into man's habitation. The Hantaviral Pulmonary Syndrome where the target organ is lung was identified relatively recently in 1993 among Native American populations. Later it has been identified in Canada and other countries in Latin America. However, evidence suggest that the disease may have been there for a much longer time.

Mode of transmission: The most probable mode of human transmission is by aerosol transmission from rodent excreta and to a lesser extent by rat bites. However, there may be other modes of transmission as this does not explain all human cases and all forms of inter-rodent transmission. Virus can be found in urine, faeces and saliva of persistently infected asymptomatic rodents. The maximal virus concentration is in lungs.

Indoor exposure in closed, poorly ventilated homes, vehicles, and outbuildings with visible rodent infestation is especially important in aerosol transmission. A rare occurrence of person-to-person transmission has been reported during some outbreaks of HPS.

Incubation period: The incubation period is usually 2-4 weeks but may vary from a few

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days to nearly 2 months. The period of communicability is not well defined. Person-to-person transmission is rare. Almost every person is susceptible to the infection and lifelong or prolonged immunity is likely to be followed by the infection as second attacks have not been documented.

Pathogenesis: Both syndromes appear to be produced by immune and inflammatory mediators that result in an enormous increase in vascular permeability. In HPS this results in pulmonary oedema and in HFRS the vascular leak is into the retroperitoneum.

The severity of human infection varies with primary impact effect on the vascular endothelium, resulting in increased vascular permeability, hypotensive shock and haemorrhagic manifestations. The usual target organ of human hantaviral infection is kidney but in HPS, lungs are primarily affected.

Clinical features: There is an abrupt onset of fever, lower back pain, varying degrees of haemorrhagic manifestations and renal involvement. The disease is characterized by 5 clinical phases. These phases frequently overlap. They are febrile, hypotensive, oliguric, diuretic and convalescent. Symptoms at the onset of the infection are high fever, headache, malaise and anorexia. This is followed by severe abdominal or lower back pain, nausea and vomiting. Facial flushing, petechiae and conjunctival injection are commonly present in the febrile phase and can last 3-7 days. Hepatic involvement is very common among HFRS due to Seoul virus. The hypotensive phase can last from several hours to 3 days and is characterized by defervescence (return to normal body temperature after high fever) and abrupt onset of hypotension. This may progress to shock and more apparent haemorrhagic manifestations. In the oliguric phase which may last 3-7 days, blood pressure returns to normal or remains high and nausea and vomiting may persist. Severe haemorrhage and dramatic fall of the urine output may also occur. The case fatality rate varies from 5 – 15% and the majority of deaths occur during the hypotensive and oliguric phases. With the onset of recovery in most cases polyuria of 3 – 6 litres per day would occur. Convalescence phase may last from several weeks to months.

Clinical outcome vary with the type of the virus. For example, Puumala virus causes less severe illness with a case fatality rate less than 1% and is referred as nephropathia epidemica. Infection caused by Seoul virus is also milder but there is the possibility to occur severe disease.

In HPS, initial clinical illness is followed by abrupt onset of respiratory distress and hypotension. There will be a rapid progression to severe respiratory failure and shock. The fatality rate is as high as 40-60%. In survivors, recovery from acute illness may be rapid but full convalescence may last few weeks to months. Respiratory intensive care management is often necessary. Overhydration which may worsen pulmonary oedema and hypoxia should be avoided.

Diagnosis: Diagnosis depends upon initial clinical suspicion, detection of the virus by culture, antigen detection, genome detection or detection of a serologic response to the Hantavirus. The presence of proteinuria, leukocytosis, haemoconcentration, thrombocytopenia and elevated blood urea nitrogen support the diagnosis. Leptospirosis and Rickettsioses must be considered in differential diagnosis. The 'gold standard' for detection of a known or as yet undiscovered hantaviruses is by reverse transcription polymerase chain reaction, which is highly sensitive and specific and can also be used for determining the genetic relatedness on hantavirus. Serological diagnosis is by detection of IgM and IgG antibodies using ELISA or IFA.

Patient management: Bed rest and early hospitalization saves life. Careful attention should be made to fluid management in order to avoid fluid overload and to minimize effects of shock and renal failure. Dialysis may be necessary for some patients. For severe HPS and HFRS, early admission to an intensive care unit is necessary. The antiviral drug ribavirin has shown some beneficial effects. Isolation of patients or quarantine of contacts is not necessary.

Preventive measures: Prevention is by limiting contact between humans and the hantavirus-infected rodent hosts and their excreta. Rodent control in households and in other areas with human activity is considered as the most important measure in prevention of the disease among humans. The following measure can be adopted:

- Exclude and prevent rodent access to houses and other buildings
- Exterminate rats.
- Store human and animal food under rodent-proof conditions
- Disinfect rodent-contaminated areas by spraying a disinfectant solution (e.g. Diluted bleach) prior to cleaning. Do not sweep or vacuum rat-contaminated areas; use a wet mop or towels moistened with disinfectant. Avoid inhalation of dust as much as possible by using appropriate face masks especially when cleaning previously unoccupied premises.
- Minimize exposure to wild rodents and their excreta.
- Laboratory rodents should be tested to ensure that they are free from asymptomatic infection.

References

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Hart C A and Bennett M. (1999) Hantvirus infections: epidemiology and pathogenesis. Microbes and infection. 1(14): 1229-1237.

Table 1: Vaccine-preventable Diseases & AFP

03rd - 09th January 2009 (02nd Week)

Disease	No. of Cases by Province									Number of cases during current week in 2009	Number of cases during same week in 2008	Total number of cases to date in 2009	Total number of cases to date in 2008	Difference between the number of cases to date in 2009 & 2008
	W	C	S	N	E	NW	NC	U	Sab					
Acute Flaccid Paralysis	02 GM=1 KL=1.	01 KD=1	00	00	00	00	00	00	00	03	01	03	05	-40.0%
Diphtheria	00	00	00	00	00	00	00	00	00	00	00	00	00	-
Measles	00	00	01 MT=1	00	00	00	00	00	00	01	03	07	03	+133.3%
Tetanus	00	00	00	00	00	00	00	01 MO=1	01 RP=1	02	00	02	01	+100.0%
Whooping Cough	01 GM=1	01 KD=1	00	00	00	00	01 PO=1	00	00	03	00	07	00	-
Tuberculosis	37	02	03	01	00	00	00	00	13	56	244	405	555	-27.0%

Table 2: Newly Introduced Notifiable Disease

03rd - 09th January 2009 (02nd Week)

Disease	No. of Cases by Province									Number of cases during current week in 2009	Number of cases during same week in 2008	Total number of cases to date in 2009	Total number of cases to date in 2008	Difference between the number of cases to date in 2009 & 2008
	W	C	S	N	E	NW	NC	U	Sab					
Chickenpox	19	10	11	02	00	06	25	09	10	92	68	186	155	+20.0%
Meningitis	03 CB=2 GM=1	01 ML=1	00	00	00	04 KR=4	03 PO=3	01 BD=1	03 RP=2 KG=1	15	45	33	70	-52.9%
Mumps	03	02	06	01	01	03	18	03	04	41	52	90	91	-01.1%
Leishmaniasis	00	00	06 HB=2 MT=4	00	00	00	01 AP=1	00	00	07	Not available*	14	Not available*	-

Key to Table 1 & 2

Provinces: W: Western, C: Central, S: Southern, N: North, E: East, NC: North Central, NW: North Western, U: Uva, Sab: Sabaragamuwa.

DPDHS Divisions: CB: Colombo, GM: Gampaha, KL: Kalutara, KD: Kandy, ML: Matale, NE: Nuwara Eliya, GL: Galle, HB: Hambantota, MT: Matara, JF: Jaffna, KN: Killinochchi, MN: Mannar, VA: Vavuniya, MU: Mullaitivu, BT: Batticaloa, AM: Ampara, TR: Trincomalee, KM: Kalmunai, KR: Kurunegala, PU: Puttalam, AP: Anuradhapura, PO: Polonnaruwa, BD: Badulla, MO: Moneragala, RP: Ratnapura, KG: Kegalle.

Data Sources:

Weekly Return of Communicable Diseases: Diphtheria, Measles, Tetanus, Whooping Cough, Chickenpox, Meningitis, Mumps.

Special Surveillance: Acute Flaccid Paralysis.

Leishmaniasis is notifiable only after the General Circular No: 02/102/2008 issued on 23 September 2008.

Table 3: Laboratory Surveillance of Dengue Fever

03rd - 09th January 2009 (02nd Week)

Samples	Number tested	Number positive	Serotypes *				
			D1	D2	D3	D4	Negative
Number for current week	03	01	00	00	01	00	00
Total number to date in 2009	04	01	00	00	01	00	00

Sources: Genetic Laboratory, Asiri Surgical Hospital

* Not all positives are subjected to serotyping.

NA= Not Available.

Table 4: Selected notifiable diseases reported by Medical Officers of Health

03rd - 09th January 2009 (02nd Week))

DPDHS Division	Dengue Fever / DHF*		Dysentery		Encephalitis		Enteric Fever		Food Poisoning		Leptospirosis		Typhus Fever		Viral Hepatitis		Human Rabies		Returns Received Timely**
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	%
Colombo	39	83	3	9	0	0	8	17	0	3	2	18	0	0	1	4	0	0	**54**
Gampaha	19	45	3	7	0	0	2	2	0	1	3	5	0	0	2	6	0	0	**93**
Kalutara	11	16	18	25	1	1	0	1	0	0	1	4	0	0	1	2	0	0	**83**
Kandy	42	59	21	38	0	0	0	0	0	0	8	17	5	5	0	2	0	0	**84**
Matale	9	30	4	6	0	0	1	3	1	2	25	37	0	1	0	1	0	0	**83**
Nuwara Eliya	1	3	5	13	0	0	3	8	20	20	3	4	0	1	0	0	0	0	**77**
Galle	2	2	4	12	0	0	0	0	0	0	2	12	0	0	0	0	0	0	**95**
Hambantota	3	8	1	6	0	0	0	0	0	0	0	0	2	3	2	2	0	0	**82**
Matara	18	44	7	28	0	0	0	1	0	0	2	8	4	9	0	0	0	0	**88**
Jaffna	1	2	5	9	0	2	5	9	18	18	0	0	13	15	0	0	0	0	**63**
Kilinochchi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**00**
Mannar	0	0	0	2	0	0	2	5	0	0	0	0	0	0	1	1	0	0	**25**
Vavuniya	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**100**
Mullaitivu	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	**20**
Batticaloa	0	0	8	15	1	1	0	1	0	0	0	0	0	0	1	1	0	0	**64**
Ampara	0	0	0	0	0	0	1	2	0	0	1	1	0	0	0	1	0	0	**43**
Trincomalee	0	1	2	4	0	0	0	0	0	0	0	0	0	2	0	1	0	0	**50**
Kurunegala	10	22	5	8	1	2	1	1	0	1	2	6	4	5	3	3	0	0	**58**
Puttalam	2	7	2	9	0	1	4	5	0	0	2	5	3	4	0	0	0	0	**78**
Anuradhapura	0	0	0	2	0	0	0	0	0	2	3	6	0	0	1	2	0	0	**58**
Polonnaruwa	0	1	0	6	0	0	0	1	0	0	0	11	0	0	0	0	0	0	**71**
Badulla	1	2	7	26	0	0	3	5	6	13	6	8	1	5	5	16	0	0	**93**
Monaragala	0	0	1	3	0	0	0	0	0	0	0	0	3	5	2	5	0	0	**82**
Ratnapura	2	8	9	15	0	1	1	5	0	0	1	4	0	0	0	0	0	0	**67**
Kegalle	21	47	6	9	0	0	2	3	0	0	1	6	1	1	3	5	0	0	**82**
Kalmunai	0	2	2	11	0	0	0	1	0	0	0	0	0	0	0	0	0	0	**62**
SRI LANKA	**181**	**382**	**115**	**267**	**3**	**8**	**33**	**71**	**45**	**60**	**62**	**152**	**36**	**56**	**22**	**52**	**0**	**0**	**72**

Source: Weekly Returns of Communicable Diseases (WRCD).
*Dengue Fever / DHF refers to Dengue Fever / Dengue Haemorrhagic Fever.
**Timely refers to returns received on or before 17 January, 2009 Total number of reporting units =311. Number of reporting units data provided for the current week: 225
A = Cases reported during the current week. B = Cumulative cases for the year.

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ON STATE SERVICE

Dr. P. PALIHAWADANA
EPIDEMIOLOGIST
EPIDEMIOLOGY UNIT
231, DE SARAM PLACE