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A review on Hantavirus

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ABSTRACT

Hantaviruses are comes under the family of viruses that are mainly spread by rodents and can cause severe respiratory infections termed hantavirus pulmonary syndrome (HPS) & hemorrhagic fever with renal syndrome (HFRS) in people worldwide. The hantavirus hemorrhagic fever with renal syndrome (HFRS), or hantavirus pulmonary syndrome (HPS) also known as hantavirus cardiopulmonary syndrome (HCPS) is a rare respiratory illness connected with the inhalation of aerosolized rodent excreta (feces and urine) contaminated by the particles of hantavirus. The key sign and symptoms of Hantavirus are fever greater than 101F, headache, body aches, nausea, vomiting, and also breathing difficulty etc. Human can be infected with Hantaviruses through contact with rodents urine, saliva and feces. These viruses are transmitted to humans by indirect or direct contact with the saliva, feces and urine of rodents, like deer mice, field mice, and ground voles. Increase in the number of Hantavirus pulmonary syndrome cases was identified in 2013 & 2014; however the cause remains unclear. In the spring & early summer season this cases majorly occurred and also associates with the risk factors for viral exposure. According to the Centre for Disease Control (CDC) the best prevention way of Hantavirus is to minimize contact with rodents in the home or workplace. There is no specific treatment, cure, or vaccine for Hantavirus pulmonary syndrome. Hantavirus pulmonary syndrome (HSP) can be fatal and it has mortality rate of 38%.

Keywords: Hantavirus, virus, rodents, Hantavirus pulmonary syndrome (HPS), Hemorrhagic fever with renal syndrome (HFRS). Hantavirus cardiopulmonary syndrome (HCPS).

INTRODUCTION

Hantavirus or orthohantavirus is a single-stranded, negative-sense RNA virus and enveloped that involved in the family of Hantaviridae [1-3]. Hantaviruses are enveloped RNA viruses measuring 80 nm to 120 nm. The genome is divided into three segments. The large (L) segment coding for viral transcriptase, the medium (M) segment coding for glycoproteins of the capsule

and the small (S) segment coding for the protein of the viral nucleocapsid [6-10].

“New World” hantaviruses known as hantavirus in the Americas and may cause hantavirus pulmonary syndrome (HPS), and “Old World” hantaviruses known as hantavirus, are found mostly in Europe & Asia that may cause hemorrhagic fever with renal syndrome (HFRS). As of January 2017

in the US, Hantavirus has affected about 800 people [11-14].

What is Hantavirus?

Hantavirus is a group of viruses that cause hemorrhagic fever and pneumonia. According to

the Centre for Disease Control (CDC) the Hantavirus is mainly spread from rodents. Hantavirus is also called orthohantavirus.

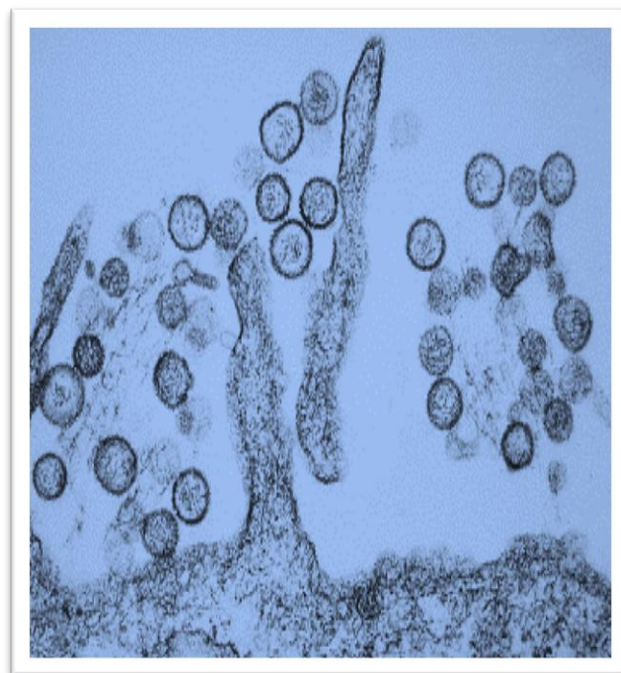
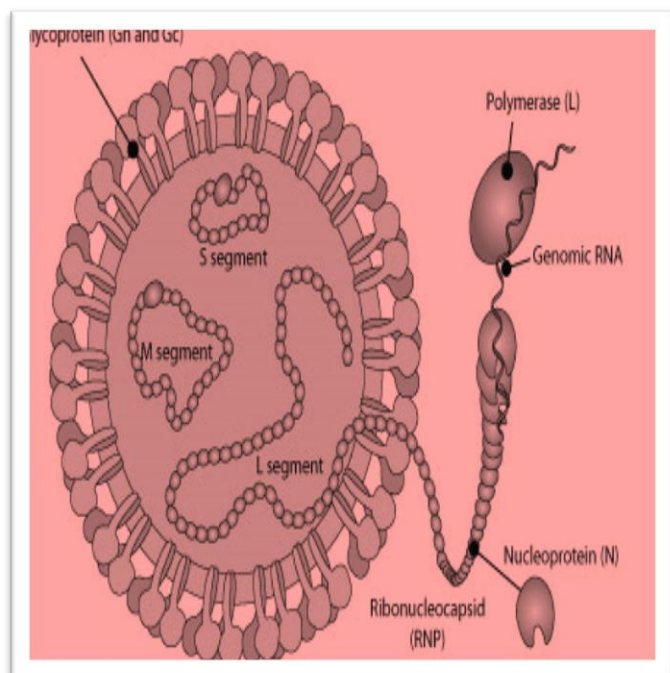


Fig: 1: Structure of Hantavirus

HISTORY

HPS was first identified in the United States in 1993 but after further research it has been determined that Hantavirus pulmonary syndrome (HPS) is not a new disease. Other early cases have been discovered by the same examinations and HPS was confirmed back in 1959.

Hantavirus was first recognized as an infectious disease in the early 1950s when a cluster of 3,000 United Nation troops stationed in Korea was struck by a mysterious illness.

November 1, 2012 the National Park Service (NPS) announced a total of 10 confirmed cases of Hantavirus infection in people who recently visited Yosemite National Park.

More than 15,000 HFRS cases are estimated to occur yearly worldwide, more than half of them in china. As of January 2017, 728 cases of Hantavirus disease have been reported since surveillance in the US began in 1993. These are all laboratory-

confirmed cases and include Hantavirus pulmonary syndrome (HPS) and non-pulmonary Hantavirus infection.

Symptoms

The symptoms of Hantaviruses are recorded cases they developed 1 to 8 weeks after exposure. Early symptoms like fever, fatigue, chills and muscle aches, especially in the large muscle groups- hips, back, thighs and sometimes shoulders. These symptoms are universal.

After 1-2 days later symptoms may occur like dry cough, headaches, nausea, vomiting, diarrhea and abnormal pain, are similar to many other viral illnesses. And also 4-10 days after the initial phase of illness, the late symptoms of HPS appear, symptoms such as coughing & shortness of breath.

The main symptoms and signs for Hantavirus are include:

- ✓ A high temperature (fever) greater than 101 F, headaches, body aches and chills.

- ✓ Nausea, vomiting and also abdominal pain.
- ✓ A dry cough with breathing difficulty.

Hemorrhagic Fever with Renal Syndrome (HFRS)

The symptoms of hemorrhagic fever with renal syndrome are include;

- ✓ High Fever
- ✓ Abdominal pain and bleeding
- ✓ Severe lower back pain
- ✓ Intravascular Coagulation
- ✓ Intestinal problems are common with associated like nausea, vomiting, diarrhea etc.

Hantavirus pulmonary syndrome (HPS)

The symptoms of Hantavirus pulmonary syndrome are include;

- ✓ High fever
- ✓ Headache
- ✓ Myalgia
- ✓ Respiratory problems are common later in the infections such as elevated heart rate, hypoxia (Oxygen deprivation) and rapid breathing etc.

CAUSE

Hantaviruses are a group of viruses that can cause severe illness in humans (HPS). “New World” Hantaviruses known as Hantavirus, may cause Hantavirus pulmonary syndrome (HPS), and “Old World” Hantaviruses known as Hantavirus, may cause hemorrhagic fever with renal syndrome (HFRS). There are several species of Hantavirus causing Hantavirus pulmonary syndrome (HPS) also known as Hantavirus cardiopulmonary syndrome (HCPS). Hantavirus Pulmonary Syndrome (HPS) is a rare but severe, sometimes fatal, respiratory disease in humans caused by infection with Hantavirus.

The host for Sin Nombre Hantavirus is the deer rat (*Peromyscus maniculatus*) found in rural regions along the Mississippi river. The New York

virus is associated with the white footed mouse (*Peromyscus leucopus*). The other Hantaviruses are the Black Creek Canal virus, the Bayou virus with the main host being wild rats from the Muridae family.

Hosts

Hantavirus are different species with each genus having a different rodent like rat or mice as its reservoir. The different species of Hantaviruses are;

1. **Deer Mouse** (*Peromyscus maniculatus*) - Sin Nombre Virus (SNV).
2. **Cotton Rat** (*Sigmodon hispidus*) - Black Creek Canal Virus (BCCV).
3. **Rice Rat** (*Oryzomys palustris*) - Bayou Virus (BAYV).
4. **White-Footed Mouse** (*Peromyscus leucopus*) – New York Virus (NYV).

Incubation Period

According to the CDC, in North America, the incubation period (time from initial exposure to the virus and development of the first symptoms) is between one to five weeks after initial exposure to infected rodent urine, droppings, or saliva. In South American outbreaks, researchers estimate that the incubation period varies from about 12-27 days.

Transmission

The Hantaviruses transmitted from the rodents that carry it to a person. The rodents share the virus in their urine, saliva and feces; the virus is mainly transmitted to people when they breathe in the air contaminated with the virus. This process is known as airborne transmission.

Human can get Hantavirus Pulmonary Syndrome when they are exposed to infected rodents, touching eyes, nose or mouth after touching rodent droppings, urine, or nesting materials that contain the virus and also a bite from an infected rodent. Hantavirus Pulmonary Syndrome is not spread from person to person.

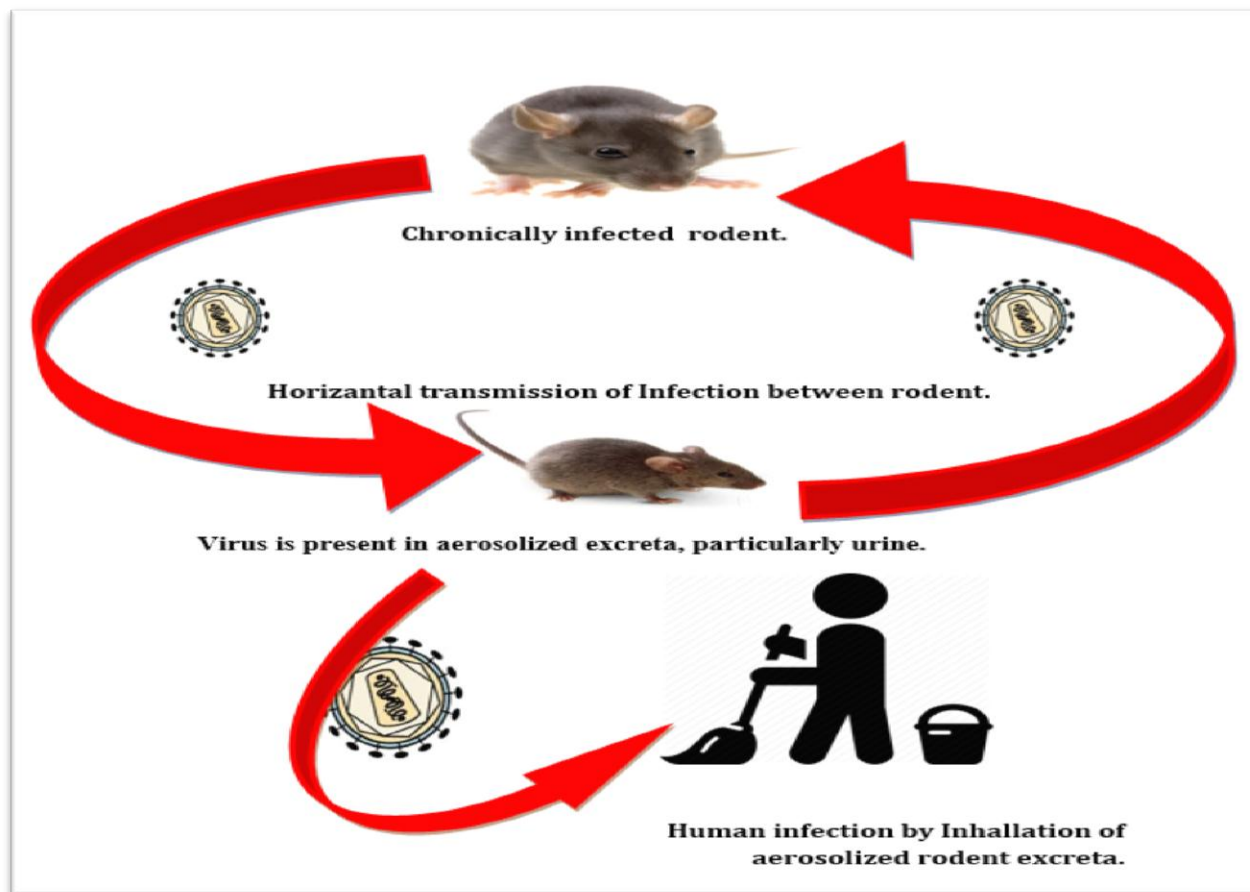


Fig: 2: Transmission of Hantavirus

Diagnosis

Diagnosis of HPS is difficult, when any person has get infected for a few days because early symptoms such as fever, chills, muscle aches and fatigue are easily confused with influenza.

Laboratory diagnosis of Hantavirus is commonly performed by testing of detection of antigens by Immunohistochemistry, specific antibodies by recombinant proteins and also RT-PCR for viral antigen detection. Blood tests identify proteins associated with the virus and this tests can also express sign of the disease. These signs may include large than normal white blood cells & abnormally low amount of platelets. To check the oxygen levels in blood.

Prevention

Rodent control is the primary strategy to control Hantavirus infection in human. Prevention of Hantaviruses are generally done by the eliminate or minimize contact with rodents in the home,

workplace, or campsite etc. according to Centre for Disease Control (CDC).

General prevention can be performed by disposing of rodent nests, sealing any cracks and holes in homes where mice or rats could get in, setting up traps, or using natural predators like cats in the home.

Treatments

For the treatment of hantavirus there is no specific treatment, vaccine, or cure, now Ribavirin may be a drug for (HPS) and (HFRS) but its effectiveness remains unknown, still spontaneous recovery is possible with supportive treatment.

People with suspected Hantavirus infection may be admitted to the hospital, given oxygen and mechanical ventilation support to help them breathe during the acute pulmonary stage with severe respiratory distress.

The CDC suggests that early treatment in an intensive care unit may allow the patient to survive severe Hantavirus pulmonary syndrome.

Therefore, if you have been around rodents and have signs & symptoms of high temperature (fever), headache, severe shortness of breath, vomiting and deep muscle aches, so, contact with your doctor immediately.

CONCLUSION

Not all rodents carry Hantavirus and there is usually no way to tell when a rodent has the virus. So, it is wise to avoid all contact with rodents when possible. Be sure to tell your doctor if you have had recent contact with rodents. Care must be taken to

avoid inhaling aerolized dried excreta when cleaning rodent infected structures. Avoiding control of rodents and rodent droppings. With the exception of the Andes Hantavirus, the virus does not spread through person-to-person contact. "More recently, cases of HPS stemming from related hantaviruses have been documented in Argentina, Brazil, Canada, Chile, Paraguay, and Uruguay, making HPS a pan-hemispheric disease," says the CDC. "However, we do know that if infected individuals are recognized early and receive medical care in an intensive care unit, they may do better. In intensive care, patients are intubated and given oxygen therapy to help them through the period of severe respiratory distress," says the CDC.

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