Omsk Hemorrhagic Fever (OHF)

Omsk hemorrhagic fever (OHF) is caused by Omsk hemorrhagic fever virus (OHFV), a member of the virus family Flaviviridae. OHF was described between 1945 and 1947 in Omsk, Russia from patients with hemorrhagic fever.

Rodents serve as the primary host for OHFV, which is transmitted to rodents from the bite of an infected tick. Common tick vectors include *Dermacentor reticulatus*, *Dermacentor marginatus*, *Ixodes persulcatus* and common rodents infected with OHFV include the muskrat (*Ondatra zibethica*), water vole (*Arvicola terrestris*), and narrow-skulled voles (*Microtus gregalis*). Muskrats are not native to the Omsk region but were introduced to the area and are now a common target for hunters and trappers. Like humans, muskrats fall ill and die when infected with the virus.

OHF occurs in the western Siberia regions of Omsk, Novosibirsk, Kurgan and Tyumen.

Transmission

Humans can become infected through tick bites or through contact with the blood, feces, or urine of an infected, sick, or dead animal – most commonly, rodents. Occupational and recreational activities such as hunting or trapping may increase human risk of infection.

Transmission may also occur with no direct tick or rodent exposure as OHFV appears to be extremely stable in different environments. It has been isolated from aquatic animals and water and there is even evidence that OHFV can be transmitted through the milk of infected goats or sheep to humans.

No human to human transmission of OHFV has been documented but infections due to lab contamination have been described.

Signs and Symptoms

After an incubation period of 3-8 days, the symptoms of OHF begin suddenly with chills, fever, headache, and severe muscle pain with vomiting, gastrointestinal symptoms and bleeding problems occurring 3-4 days after initial symptom onset. Patients may experience abnormally low blood pressure and low platelet, red blood cell, and white blood cell counts.

After 1-2 weeks of symptoms, some patients recover without complication. However, the illness is biphasic for a subset of patients who experience a second wave of symptoms at the beginning of the third week. These symptoms include fever and encephalitis (inflammation of the brain).

The case fatality rate of OHF is low (0.5% to 3%).

Risk of Exposure

In areas where rodent reservoirs and tick species are prevalent, people with recreational or occupational exposure to rural or outdoor settings (e.g., hunters, campers, forest workers, farmers) are potentially at increased risk for OHF by contact with infected ticks and animals. Furthermore, those in Siberia who hunt and trap muskrats specifically are at higher risk for OHF.

Exposure may also occur in the laboratory environment.

Diagnosis

OHF virus may be detected in blood samples by virus isolation in cell culture or using molecular techniques such as PCR. Blood samples can also be tested for antibody presence using enzyme-linked immunosorbent seologic assay (ELISA).

Treatment

There is no specific treatment for OHF, but supportive therapy is important. Supportive therapy includes the maintenance of hydration and the usual precautions for patients with bleeding disorders.

Though rare, OHF can cause hearing loss, hair loss, and behavioral or psychological difficulties associated with neurological conditions and long term supportive case may be needed.

Prevention

There is no vaccine currently available for OHF, but vaccines for tick-borne encephalitis disease (TBE) have been shown to confer some immunity and may be used for high-risk groups.

Additionally, utilizing insect repellents and wearing protective clothing in areas where ticks are endemic is recommended.

References

Charrel RN, Attoui H, Butenko AM, et al. Tick-borne virus diseases of human interest in Europe. Clinical Microbiology and Infection. 2004; 10(12):1040-1055.

Gould EA and Solomon T. Pathogenic flaviviruses. Lancet. 2008; 371(9611):500-509.

Gritsun TS, Lashkevich VA, Gould EA. Tick-borne encephalitis. Antiviral Research. 2003; 57(1-2):129-146.

Kharitonova, N. N. and Leonov, Yu. A. Omsk Hemorrhagic Fever - Ecology of the agent and epizootiology. New Delhi: Amerind Publishing Co Pvt. Ltd; 1985.

Orlinger KK, Hofmeister Y, Fritz R, et al. A Tick-borne Encephalitis Virus Vaccine Based on the European Prototype Strain Induces Broadly Reactive Cross-neutralizing Antibodies in Humans. Journal of Infectious Diseases. 2011; 203(11):1556-1564.

Rùžek D, Yakimenko VV, Karan LS, and Tkachev SE. Omsk haemorrhagic fever. Lancet. 2010; 376(9758):2104-2113.