

Nipah Virus Infection

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ABSTRACT

Nipah virus is a type of RNA virus and this virus may usually circulate among specific types of fruit bats. In the year 1998, this disease was first identified by a team of scientists at the Faculty of Medicine, University of Malaya in Malaysia and the disease was named after a village called Sungai Nipah in Malaysia. The out breaks of Nipah virus infection have been reported in Malaysia, India, Singapore, Bangladesh and Philippines. Typically, the spread requires direct contact with an infected source. Through the oro-nasal route, the virus enters its host and causes the infection. From the terminal stages of the disease, human tissues have only been studied and the site of the initial replication was found to be unknown. After the exposure of the virus, it may take 5-14 days for the onset of the symptoms. The symptoms of Nipah virus infection can be fever, headache, cough, shortness of breath and confusion. This review article was mainly focused in describing various aspects of Nipah virus infection. Human to human nosocomial infections can be prevented by strictly following the standard infection control practices. Implementation of infection control practices like isolation of patients, good hand hygiene practices and the use of personal protective equipments may help us in the prevention of person to person transmission. Health care workers exposed to the suspected Nipah virus patients must inform their higher officials and should undergo testing for the Nipah virus. Discourage the funeral practices that require the direct contact with the remains.

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Introduction

Nipah virus is a type of RNA virus and may usually circulate among specific types of fruit bats. In the year 1998, this disease was first identified by a team of scientists at the Faculty of Medicine, University of Malaya in Malaysia and the disease was named after a village called Sungai Nipah in Malaysia [1]. The out breaks of Nipah virus infection have been reported in Malaysia, India, Singapore, Bangladesh and Philippines [2]. Typically, the spread requires direct contact with an infected source. The people who were in close contact with the infected pigs are the main reason for transmission of Nipah virus infection in Singapore and Malaysia. In the year 1999, millions of pigs were killed by the Malaysian authorities to stop the spread of disease [3,4]. Almost 700 human cases of Nipah virus were occurred as of May 2018 and more than half of the infected patients were dead. In India, an outbreak of this Nipah virus infection occurred in Kerala that caused 17 deaths in the year 2018. In Kerala, this infection was transmitted due to the consumption of fruits which were partially eaten by the bats and also using the water from the wells where the bats were inhabited [5].

Pathogenesis

Through the oro-nasal route, the virus enters its host and causes the infection. From the terminal stages of the disease, human tissues have only been studied and the site of the initial replication was found to be unknown. The probable sites of initial replication were found to be lymphoid and respiratory tissues, as these tissues were found to have high concentration of antigens. The spread of the virus is lead by the early viraemia and is followed by the secondary replication that takes place in the endothelium. The glycoprotein G of Nipah virus binds to the cellular receptor Ephrin-B2 that is expressed on endothelium and smooth muscle cells in the brain, lungs, placenta and prostate along with the blood vessels in various other tissues. The clinical and pathological features of this disease can be explained by this receptor distribution. During embryogenesis, Ephrin-B2 plays a significant role in the migration of neuron precursors. Hence, it is highly conserved between different classes of animals that lead to wide host range [6-9]. After the exposure of the virus, it may take 5-14 days for the onset of the symptoms. During the early stages of the infection we can observe the respiratory issues.

Clinical Manifestations

The symptoms of Nipah virus infection can be fever, headache, cough, shortness of breath and confusion. When symptoms gets worse, this condition may lead to coma within one or two days and almost 50-75% of the patients may die due to this infection [10,11].

Diagnosis

By means of reverse transcriptase polymerase chain reaction (RT-PCR), RNA can be detected during acute and convalescent stages of the disease. IgG and IgM antibody detection can confirm a prior Nipah virus infection after recovery [2].

Management

All the patients who were suspected with Nipah virus infection must be isolated during the medical care. Supportive care is the only way of management and there is no specific treatment available. Fluid and electrolyte balance must be maintained properly. Mechanical ventilation must be provided to the patients with acute respiratory failure and severe pneumonia [2].

Ribavirin, m102.4 monoclonal antibody and Favipiravir were being studied to treat this infection as of 2019 [12]. Remdesivir, Acyclovir and Favipiravir have been assessed as the potential antiviral drugs that can act against this infection [13,14]. Ribavirin was found to be ineffective when it was tested in the animal models but, the National Centre for Disease Control (NCDC) recommends the paraenteral or oral Ribavirin for all the confirmed cases in the absence of effective antivirals. In case of chemoprophylaxis, Ribavirin is not recommended. In cell culture, chloroquine was found to be effective. But, in a hamster model in isolation or in combination with Ribavirin it failed to prevent the death. In a hamster model, the drug Favipiravir has been found to be effective. In a non-human primate model, neutralizing the human monoclonal antibody has been observed to be effective. In India, approval was given for the use of anti-g and anti-f monoclonal antibodies in an emergency setting. After getting confirmed with a negative RT-PCR result, the patients should be discharged. The patients who were recovered from the infection may have the complications like seizures and inflammation of the brain.

As the overall case burden is small and the course of infection is acute, prophylaxis and effective treatment strategies are unavailable due to the lack of studies in human subjects. Various vaccine approaches have been developed for Nipah virus and most of which have been tested in animal models. After a single dose, all the approaches have showed complete protection against oro-nasal Nipah virus challenge in the animal models. No vaccine is available at present for human use[2].

Conclusion

Human to human nosocomial infections can be prevented by strictly following the standard infection control practices. Avoiding exposure to bats and sick pigs can be the preventive measures. Gloves and other protective clothing should be used while dealing with sick animals in order to decrease the risk of animal to human transmission. Implementation of infection control practices like isolation of patients, good hand hygiene practices and the use of personal protective equipments may help us in the prevention of person to person transmission. Health care workers exposed to the suspected Nipah virus patients must inform their higher officials and should undergo testing for the Nipah virus. Discourage the funeral practices that require the direct contact with the remains.

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