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### REVIEW ON ROBO VIRAL INFECTION

*Arunn Jaikumarr Ram<sup>1</sup>, N.P.Muralidharan<sup>2</sup>, Anitha Roy<sup>3</sup>*

<sup>1</sup>Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai - 77, Tamil Nadu, India

<sup>2</sup>Department of General Microbiology, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai 77, Tamil Nadu, India

<sup>3</sup>Department of Pharmacology, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai 77, Tamil Nadu, India

<sup>1</sup>151801057.sdc@saveetha.com, <sup>2</sup>muralidharan@saveetha.com, <sup>3</sup>anitharoy@saveetha.com

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#### **ABSTRACT**

The Robo virus is a zoonotic virus that belongs to the family Arenaviridae and Bunyaviridae. It is rodent-borne, and also called the arborob virus, as Robo virus and arbovirus both come in equally. Spread is through droplets, food, and many others. Unsanitary and crowded places are mostly prone to this infection. Hantavirus and Lassa virus are important under this category. Because of the high dreariness and mortality related to hantavirus pneumonic disorder and the chance of vaporized transmission of hantaviruses, people taking care of known store species in the field, lab, or study hall should play it safe to limit the danger of contamination. The hemorrhagic fever and The Hantavirus pulmonary syndrome are the two important factors. Rodents are the most abundant and diversified order of living mammals in the world. Already since the Middle Ages, we know that they can contribute to human disease, as black rats were associated with the distribution of plague. Persons who have frequent contact with rodents as part of their occupation may be at increased risk of exposure to rodent-borne viruses. Many factors, mainly the climatic conditions play a role in the population, increase, and decrease. Ribavirin and favipiravir are the two important drugs for the treatment of this disease. Self-hygiene is important to keep yourself safe from this deadly disease. Therefore the climatic conditions have a significant role in hemorrhagic fever with renal syndrome, robo viral infection. Following the safety measures is very important to stay away from this disease. Humans and animals are affected by the Robo virus – rodent-borne and its progression and transmission in this environment are mainly due to carelessness.

## INTRODUCTION

Robo virus is a zoonotic virus which is rodent-borne (Transmitted by rodent vector). This virus mainly belongs to the family Hantaviridae and Arenaviridae. Arthropod-borne – arbovirus and tick borne-Tibo virus, the name is a reference for the method of transmission. *Yersinia pestis* roughly is responsible for causing the plague, which results in the death of millions of people (1, 2). Until the 1970s the hantavirus was not discovered, then after that, it was found in the striped field mice, *Apodemus agrarius*.

Sometimes it can be called ArboRobo virus with a combination of both Robo virus and arbovirus. This disease is occasionally transmitted to humans from rodents which are the natural hosts (3). Many homeless individuals live in crowded conditions, In urban areas, high – income countries, places which are prone to diseases, especially vector, rodent-borne diseases as the sanitation level and self-hygiene is not up to the mark. The zoonotic pathogens that are destructive in people are commonly avirulent in their regular repositories: similar pathogens are along these lines frequently restoratively significant yet prototype 'endemic' in the rodent population (4).

The ectoparasites in these areas can transmit infection (5). Rodentia, or more in number and are a diversified type-order of living mammals. These contribute to about 43% of the total mammalian population. The rodent species are present everywhere other than Antarctica (6). These rodents mostly live closely with humans, like in their farms are you even as a pet. Rodents mainly attack the food, this causes infection and disorder to humans who consume them. The pre-harvest damage to cereals is very high in these conditions.

Most of the damage which is faced by the villages are caused by rodents (7). The Hantavirus Infection is mostly seen in Columbia (8). Many rodent-borne diseases are unknown to human life. Only the ones which are caused dominantly are being concentrated on. Studies regarding gene and bioactive compounds have been useful in knowing the characteristics of a particular gene (9).

Habituation is a situation in which rodents are usually characterized as a change in exploratory or locomotor action after some time. Various neuroactive substances are known to impact habituation. Synapses that perform significant jobs are serotonin, acetylcholine, dopamine, and glutamate. Even though habituation is an intricate procedure, concentrates in the course of recent decades have shown that there is a hereditary segment (10).

## MODE OF TRANSMISSION

The transmission of the rodent-borne infection can be different forms like saliva, scratches, bites, faces, etc. The main place where they increase the population, habitat are the shed, Barnes, unused places, dense urban areas (11). Some of the diseases are also spread through direct contact with the

rodents. Sometimes transmission is also through the arbovirus- arboborne, mites, ticks, and fleas. So there are two routes to transmit this disease. A direct route where biting is an option in this route or consumption of food products by humans which has Rodent feces, which mostly it's not visible. Rodent urine( leptospirosis) contaminates the water which we consume or (Hantavirus) affects our health by contaminating the air which we breathe with germs, rodent extremities (12,6). In the 2nd mode, Indirect cause, rodent to an arthropod, then to human or rodent affect the livestock which in turn affects the food products and finally, the humans are affected.

### **TYPES OF RODENT CAUSED DISEASES**

Hantavirus, lymphocytic choriomeningitis, tularemia, and plague are the main diseases caused by rodents. Rat supply zoonoses are numerous and different: they go from the moderately minor (cowpox) to the lethal ( bubonic plague), and they might be transmitted straightforwardly from rodents to people (for example hantaviruses) or maybe conveyed by arthropods ( insects on account of the plague, ticks on account of Lyme illness, flies on account of leishmaniasis) (6). Emerging infections are Argentine hemorrhagic fever, caused by Junin virus and hantavirus infections like hantavirus pulmonary syndrome, HPS, and hemorrhagic fever with renal syndrome, (HFRS). The source of many other diseases is still unknown. The cyclic frequency of the Guillain-Barré condition (GBS) was found to be exceptionally essentially connected with cycles in the wealth of bank voles (*Clethrionomys glareolus*). GBS has been accounted for as a result of infection with various specialists(13).

### **DISEASES TRANSMITTED BY RODENTS**

Hantavirus Pulmonary Syndrome, emorrhagic Fever with Renal Syndrome, Lassa Fever, Leptospirosis, Lymphocytic Chorio-meningitis (LCM), Omsk Hemorrhagic Fever, Plague, Rat-Bite Fever, Salmonellosis, South American Arenaviruses (Argentine hemorrhagic fever, Bolivian hemorrhagic fever, Sabiá-associated hemorrhagic fever, Venezuelan hemorrhagic fever).

### **HANTAVIRUS PULMONARY SYNDROME**

The Hantavirus belonging to the Bunyaviridae Family can cause two types of human diseases. Hemorrhagic fever with renal syndrome and Hantavirus pulmonary syndrome. The Hantavirus pulmonary syndrome was first recognized in the United States, with several, related strains of the virus with genus Hantavirus, Bunyaviridae Family (14,15). Some Rod and species like Californian mouse, cactus mice, harvest mice, were all, causing -producing SNV antibodies. Cotton rat, rice rat, white-footed mouse, and cloudland deer mouse are all hosts of Hantavirus pulmonary syndrome. In view of the high dreariness and mortality related to hantavirus pneumonic disorder and the chance of vaporized transmission of hantaviruses, people taking care of known store species in the field, lab, or study hall should play it safe to limit the danger of contamination. The clinical symptoms sometimes resemble that of acute respiratory distress syndrome. Inflammation of the lung and many breathing problems are also faced due to this disease. Bilateral inters pulmonary infiltrates are also seen and a variety of accents have been found using the recombinant DNA technology (16,17).

### **HEMORRHAGIC FEVER WITH RENAL SYNDROME (HFRS)**

The hemorrhagic fever with renal syndrome (HFRS) caused by genus Hantavirus, of the family Bunyaviridae is also known as Korean fever. This HFRS is related to TULV infection, evidence states that TULV is after a rodent bite. In HFRS there are symptoms like Capillary damages which cause Capillaries leakage and hemorrhage, cardiovascular diseases (18), climate also plays a major role in the occurrence of hemorrhagic fever with renal syndrome (HFRS). The Hantavirus is continuously evolving with the host and has an impact on human life(19).

### **LYMPHOCYTIC CHORIOMENINGITIS (LCM)**

Lassa virus or Arenavirus belongs to the family Arenaviridae. Humans are infected by both, the arenavirus has been divided into two groups, Lassa - Lymphocytic Choriomeningitis (LCM) and Tacrable serocomplex (20). But they are more or less associated with the mammal host. Infection is also through direct and indirect contact Where Junin, Lassa are viruses that cause severe hemorrhagic fever (21). The LCM infection can cause infection in organ transplant, malformation – congenital, and acute central nervous system disease. The PCR based techniques are the way to detect the virus. The Lassa fever was mostly seen in West Africa caused by single-stranded RNA – family Arenaviridae. The isolation of the disease was from a multimammate rat (*Mastomys natalensis*) (22). The killer virus causes Lassa hemorrhagic fever which is deadly to humans (23). This multimammate rat is abundantly found in the forest of Africa the transmission is through air and food. The Ribavirin shows limited efficacy in controlling this disease and has various side-effects. The favipiravir - a broad-spectrum antiviral drug was used against this virus and was successful (24).

### **PLAGUE**

Plague, is caused by *Yersinia pestis*, is one of the most famous irresistible infections ever, and has taken millions of lives overall during the plague pandemics. It is still present in many parts of the world (25). Plague in people is constrained by concealment of rat repository, their bugs, and by early discovery and treatment of instances of infection (26). Inward breath of the bacterium *Yersinia pestis* brings about the primary pneumonic plague. Pneumonic plague is the most extreme sign of plague, with death rates moving toward 100% without treatment. Its lethal progression is rapid and also can be transmitted through aerosol, thus *Yersinia pestis* can be used as a biological weapon (27). The 200 million deaths in 3 pandemics have made plague the oldest and most virulent pathogen. A recent attack was in 2017 at Madagascar with 2348 cases, 202 deaths (28).

### **INDIRECT TRANSMISSION OF DISEASE BY RATS**

Colorado Tick fever is carried by the Rocky Mountain ticks. It is a double stranded RNA virus with 12 segments. The symptoms of this disease or fever, headache, muscle soreness and light sensitivity. The deer mice (*Peromyscus maniculatus*) is the voice for the virus (29). It is mainly caused by the Rocky Mountain wood tick. Rodents here serve as a reservoir but technically it is the arbovirus. The chipmunk, ground squirrels, deer mice, gold mantled ground

squirrel and UINTA chipmunk are the carriers of the disease. Humans can also get infected due to the bite marks. It's also called Colorado tick fever, because it was first for Colorado in the 1970s. Congenital, mother to child transmission was also found (30). Due to this, pericarditis has also been reported. PCR techniques help early diagnosis of this disease. Sometimes Ribavirin was given to patients to relieve them from fever and pain and also some symptomatic treatment was performed with acetaminophen.

### **FACTORS OF ROBO VIRUS**

The population is being heavily affected by many factors in which climatic conditions as a major one. The rodent survives mostly under warmer winters and increased rainfall. This helps the rodent to increase their reservoir and also to increase their population. Flooding caused due to the increased rainfall increases the human-rodent contact (31, 32). Global warming and climate conditions affect the population and makes it difficult for the rodent to survive. Therefore the climatic conditions have significantly role on haemorrhagic fever with renal syndrome, robo viral infection (33). Overwhelming precipitation empowers exorbitant wild grass seed creation that supports expanded open air rat populace densities; and flooding powers rodents from their tunnels close to water sources into the constructed condition and closer to people (34).

### **PREVENTIVE STRATEGIES AND MEASURES**

Prevention of disease in rodents is far more successful than treatment. Supply of fresh food, freshwater; outfitting satisfactory safe house that incorporates conceal from direct daylight; staying away from drafts and over the top temperature or stickiness changes; keeping confines clean by forestalling the gathering of overabundance excrement and pee etc are needed to be followed. The most ideal approach to prevent a rat invasion and contact with rodents is to evacuate the food sources, water, and items that provide shelter for rodents. The presentation of ivermectin, despite the fact that not endorsed for use in any rat species, has permitted routine foundational treatment of pet rodents with pinworms and bugs (35). Maintaining oral hygiene is also important in this case, so regular mouth rinse should be done with mouthwash (36,37). Vaccination should also be taken in order to prevent the disease "prevention is better than cure" (38). Take precautions before and during clean up of rodent-infested areas.

Many researches have been conducted in order to find a better drug for this disease caused by the robovirus. Some of them include research with urine samples (39,40), many in vitro studies regarding the antibacterial, anti-inflammatory activity are also being conducted (41,42). Researches with *enterococcus* and *staphylococcus* have been effective in this field (43,44). Papers related to *Acinetobacter baumannii* have been emerging rapidly and have been useful in inventing a drug, thereby helping in preventing the infection (45,46,47,48). Recent outbreak of rodent borne disease was seen in Europe. Drought goes hand in hand with plague outbreaks, high temperature is a main reason for this. France, Italy and some countries were threatened with the attack of plague (49).

## CONCLUSION

Robo virus can spread infection between humans and animals. These rodent borne infections can cause morbidity or can be life threatening. The population growth of the rodents near human habitat needs to be controlled in order to decrease the spread of this infection. It is best to prevent the disease by taking precautionary measures than treating it after getting affected. This review article gives information about the infection, its mode of transmission and control.

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