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Shraddha Sinha

Department of Teaching
Veterinary Clinical Complex,
Dau Shri Vasudev Chandrakar
Chhattisgarh Kamdhenu
University, Anjora, Durg,
Chhattisgarh, India

Neeti Bante

Department of Teaching
Veterinary Clinical Complex,
Dau Shri Vasudev Chandrakar
Chhattisgarh Kamdhenu
University, Anjora, Durg,
Chhattisgarh, India

SK Maiti

Department of Teaching
Veterinary Clinical Complex,
Dau Shri Vasudev Chandrakar
Chhattisgarh Kamdhenu
University, Anjora, Durg,
Chhattisgarh, India

HK Ratre

Department of Teaching
Veterinary Clinical Complex,
Dau Shri Vasudev Chandrakar
Chhattisgarh Kamdhenu
University, Anjora, Durg,
Chhattisgarh, India

Corresponding Author:

Shraddha Sinha

Department of Teaching
Veterinary Clinical Complex,
Dau Shri Vasudev Chandrakar
Chhattisgarh Kamdhenu
University, Anjora, Durg,
Chhattisgarh, India

Mason–Pfizer Monkey Virus (MPMV) infection in primates: A review

Shraddha Sinha, Neeti Bante, SK Maiti and HK Ratre

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Abstract

Mason–Pfizer monkey virus (MPMV) is a type-D simian retrovirus that primarily infects Old World monkeys and has been associated with immunodeficiency and tumor development in susceptible hosts. In captive primate colonies, infection may result in increased morbidity and mortality due to secondary opportunistic infections. Transmission occurs mainly through direct contact with infected animals or exposure to infected body fluids, and vertical transmission has also been reported. Clinical manifestations are commonly related to immune suppression, hematological abnormalities, and gastrointestinal disturbances. Diagnosis involves serological and molecular techniques such as ELISA, Western blot, and polymerase chain reaction (PCR). Currently, there is no specific curative therapy, and disease management relies on supportive care and prevention strategies within captive populations. This review summarizes the etiology, epidemiology, transmission, pathophysiology, diagnosis, treatment, and control measures associated with MPMV infection in primates.

Keywords: Mason–Pfizer monkey virus; Betaretrovirus; Simian retrovirus; Non-human primates; Immunosuppression; Viral disease

Introduction

Mason–Pfizer monkey virus (MPMV) is classified as a simian type-D retrovirus affecting Old World monkeys belonging to the family Cercopithecidae^[1,2]. Infection has been linked with immunodeficiency syndromes and tumor development in susceptible primate hosts^[3]. In captive colonies and zoological facilities, the disease can contribute to increased mortality, particularly among young animals, due to the occurrence of opportunistic infections^[4]. Although the virus primarily infects non-human primates, its potential zoonotic significance for humans remains unclear and requires further investigation^[5].

Etiology

MPMV belongs to the genus Betaretrovirus within the family Retroviridae and the order Ortervirales^[6]. The viral genome consists of positive-sense single-stranded RNA organized as a dimer. Similar to other retroviruses, the genome contains three major genes: gag, pol, and env. The gag gene encodes structural proteins that form the viral core, whereas the pol gene produces enzymes including reverse transcriptase and integrase that are essential for viral replication. The env gene encodes envelope glycoproteins responsible for viral entry into host cells^[7]. Additionally, a smaller genomic region called pro encodes a viral protease involved in post-translational processing of viral proteins. The envelope glycoprotein gp70 plays an important role in antigenicity and immune recognition in infected hosts^[8].

Epidemiology

Simian retroviruses related to MPMV were first identified during investigations of mammary tumors in rhesus macaques in the 1970s^[9]. Subsequent research identified several variants collectively known as simian retrovirus (SRV). During the early 1980s, multiple SRV types were detected in captive primate colonies maintained in research centers in North America and other regions^[10]. SRV-1 infections were reported in macaque species such as *Macaca*

cyclopis and *Macaca fascicularis*, while SRV-2 infections were documented in pig-tailed monkeys and Japanese macaques [11]. Later studies identified additional variants including SRV-4 and SRV-5 in primate facilities worldwide. A related strain known as SRV/D-Tsukuba was reported in cynomolgus macaques by Japanese researchers in 2010 [12]. In India, MPMV infection has been detected in captive Nilgiri langurs (*Semnopithecus johnii*) housed at the Nandankanan Zoological Park and this species is listed on the IUCN Red List [13].

Transmission

MPMV infection is considered contagious among primates and is mainly transmitted through direct contact between infected and susceptible animals. Transmission may occur through biting, scratching, mating, or exposure to infected bodily fluids such as saliva, blood, urine, and lacrimal secretions [4]. Vertical transmission may occur through transplacental infection or through milk during the post-natal period. Some infected animals may shed the virus intermittently even in the absence of clinical signs, complicating early detection and control measures. Latent infections have been reported particularly in cynomolgus macaques [5].

Pathophysiology

Following entry into the host, the virus initially targets lymphoid tissues where inflammatory responses occur. Viral replication may lead to lymphoid hyperplasia and subsequent dissemination to organs such as bone marrow and kidneys. As infection progresses, hematological abnormalities including anemia, neutropenia, and lymphocytopenia may develop. Loss of T- and B-lymphocyte populations results in severe immunosuppression. Damage to the gastrointestinal tract may also occur, leading to digestive disturbances such as diarrhea, reduced appetite, and enteritis. Due to weakened immunity, infected animals become susceptible to opportunistic pathogens including cytomegalovirus, *Cryptosporidium parvum*, and *Pneumocystis* species [3].

Diagnosis

Diagnosis of MPMV infection involves clinical evaluation, hematological analysis, and laboratory testing. Blood examinations may reveal neutropenia, anemia, and lymphocytopenia reflecting immune suppression. Serological techniques such as enzyme-linked immunosorbent assay (ELISA) and Western blot are commonly used for detecting antibodies against viral proteins. Molecular techniques such as polymerase chain reaction (PCR) allow detection of viral genetic material and are widely used for confirmation of infection [8].

Treatment

Currently, there is no specific curative therapy available for MPMV infection. Management generally focuses on supportive care and treatment of secondary infections caused by opportunistic pathogens. Experimental use of antiretroviral drugs has been explored and may improve survival in certain cases.

Prevention and Control

Prevention strategies rely on strict monitoring and screening of captive primate populations. Newly introduced animals should undergo diagnostic testing using serological assays and molecular techniques such as PCR analysis of peripheral blood mononuclear cells to identify infected individuals. Isolation of infected animals, proper hygiene practices, and

careful colony management are essential measures to limit viral transmission. Experimental vaccines targeting envelope glycoproteins have also been investigated as preventive tools [11].

Conclusion

MPMV infection represents an important viral disease affecting captive primate populations. Effective surveillance, early diagnosis, and improved management practices are essential for controlling disease spread. Collaboration among veterinarians, wildlife authorities, and researchers is necessary to enhance disease control strategies and protect both primate health and conservation efforts.

Conflict of Interest

Not available

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Not available

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