

Monkeypox Represents Re-Emerging Zoonotic Disease: Review

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Abstract

One of the major public health disasters is the re-emerge of monkeypox (MPX) infection. This disease was considered emerging zoonotic that affects humans as well as animals, including monkeys. The re-emergence of zoonotic diseases with little documentation has led to dispersal of inaccurate facts. Therefore, the aim of this review is to summarize important issues about this infection. The genome of MPX virus is double-stranded DNA. Rodents are the likely source of infection, along with monkeys, porcupines, and sun squirrels actively contributing to the transmission of this contagion. In general, humans' infection occurs by direct contact with infected animals through the contents of the skin lesion, as well as body secretions. After the virus enters the host, it multiplies at the site of infection, penetrating the lymph nodes. Symptoms are characterized by fever, lymphadenopathy, and high rate of lesions in genitals, perianal, and oral regions. In order to achieve prevention, the smallpox vaccine must be used, especially for frontline workers who are most vulnerable to infection, with an emphasis on implementing the principles of one health to control the non-reemerging of this infection.

Keywords: Monkeypox, zoonotic disease, one health.

Introduction

Monkeypox (MPX) infection has been identified as a zoonotic disease that affects a wide variety of animals, including monkeys [1]. Unfortunately, the twenty-first century witnessed the re-emerge of many zoonotic infectious diseases, especially viral ones, including Nipah, Ebola, Corona, and Monkeypox viruses [2-5]. At first the causative virus was isolated in 1958 in a vaccine research laboratory in Copenhagen (Denmark) from Asian monkeys infected with a smallpox-like lesions [6]. However, the first human infection with MPX was diagnosed in 1970 in Congo [7]. Although MPX represents an epidemic disease in humans as well as a potentially fatal infection, it can nevertheless be considered a neglected disease, as it has not been widely studied [8]. Its sudden re-emergence coincided with the world's hopes that the 2019 Corona virus pandemic would recede, which caused concern for public health as well as global economies [9]. In early 2022, infections with MPX virus were reported from several

regions to the World Health Organization, heralding a terrible comeback of this disease [10]. Besides, in May of the same year, an outbreak of this infection was announced globally in endemic countries in Africa as well as non-endemic countries, especially in Europe, with reference to the absence of mortality rates [11]. The growing concern about the emergence and/or re-emergence of zoonotic diseases with the lack of new documentation has led to spread of misinformation [12]. Insufficient articles about monkeypox have contributed to deliberation of inaccurate facts. Therefore, the aim of this review is to clarify the important health details available about this infection.

Monkeypox virus

In general, Orthopoxvirus genus is a subgroup of the Poxviridae family, which includes monkeypox virus [13] as illustrate in figure (1).

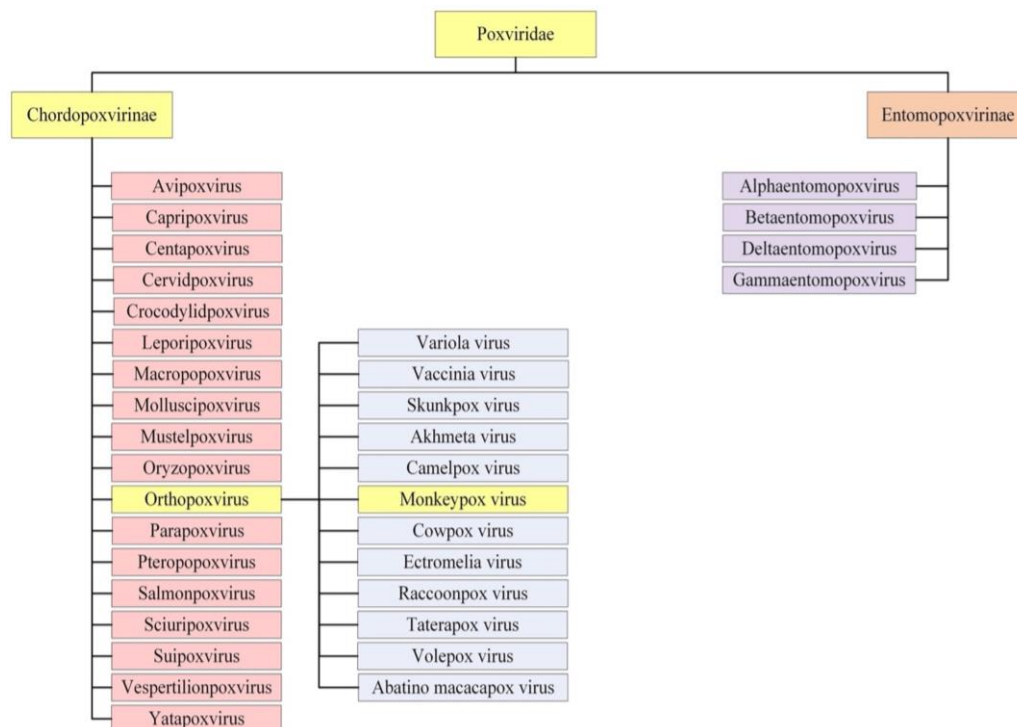


Figure 1: Taxonomy of MPX virus in the Poxviridae family [14].

This zoonotic virus consisting of a brick-shaped structure sized approximately 200–400 nm, and surrounded by a lipoprotein layer. Also, it has a double-stranded DNA genome consisting of 197 base pairs, and replicated inside the cytosol [15]. As shown in figure (2), monkeypox virus is distinguishes based on its surface layers into two infectious forms, the first is the internal mature virion (IMV) and the second is the external enveloped virion (EEV). These virions set the intricate mechanisms that assist viral entrance into host cells [16, 17].

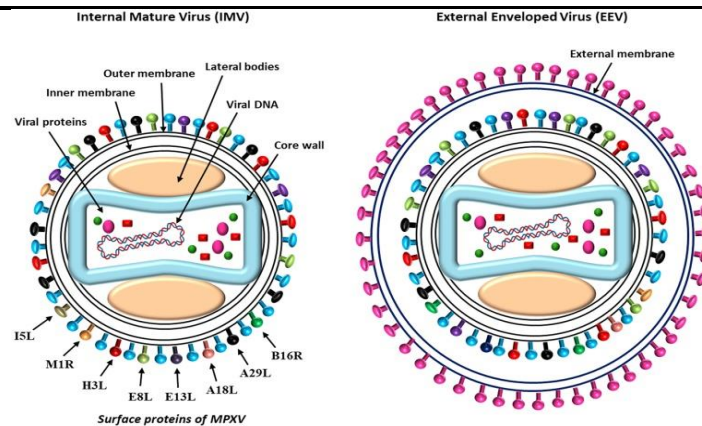


Figure 2: Infectious forms of MPX virus [17].

Transmission

Until now, the natural reservoir of MPX virus has not been identified. However, rodents may be the main potential source of human infection. A wide variety of animals are susceptible to transmit this disease, including monkeys, porcupines, and sun squirrels [18,19]. Rodents have contributed to human outbreaks in regions of Africa aided by climatic fluctuations as well as highly migratory populations. Figure 3 illustrates the possible routes of transmission of this infection, whether between humans or humans and animals [20]. It is worth mentioning that the zoonotic infection is usually by contact with infected animals, especially the contents of the skin lesion, as well as the body secretions when a person is bitten or scratched, in addition to eating their undercooked meat [21].

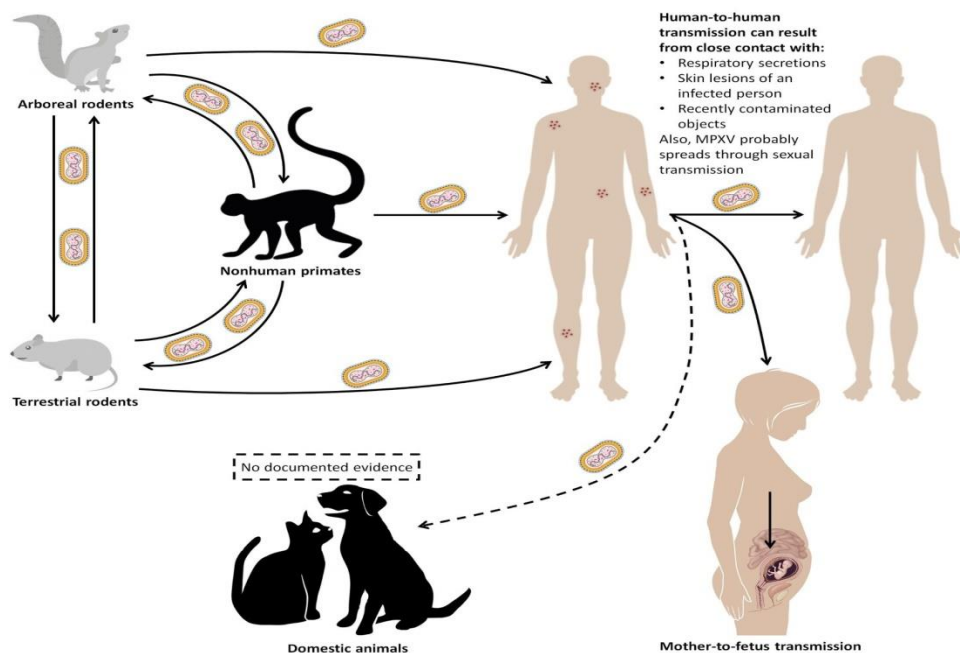


Figure 3: Transmission of monkeypox virus [20].

Clinical signs

The entry of this virus into the body of the host is usually through several routes, including skin, entrances to the respiratory tract, the eyes, placenta, possibly anogenital. At place of contagion, virus replicate then it penetrate the local lymph nodes, and thus spread in the bloodstream producing viremia. This is followed by MPX virus reaching the target organs, which leads to the emergence of clinical manifestations [22]. It is noteworthy that incubation period may range from 5 days to 3 weeks, while symptoms may persist for approximately 2-5 weeks [23]. Symptoms usually begin with fever, headache, myalgia, and lymphadenopathy (figure 4). It then progresses to oral cavity lesions (enanthem) and full thickness epidermal necrosis. The rash, especially on the face and extremities, develops into crusts. It should be noted that infected cases are considered actual sources of contagion from fever starting until the vesicles crust over [24]. Signs may involve pneumonia, eye problems, and encephalitis. However, outbreak features are high incidence of genital, perianal, and perioral lesions [25]. Although the symptoms of this disease are less severe than in smallpox, it is still considered a fatal disease, and the fluctuating mortality rate may reach 10% [26].

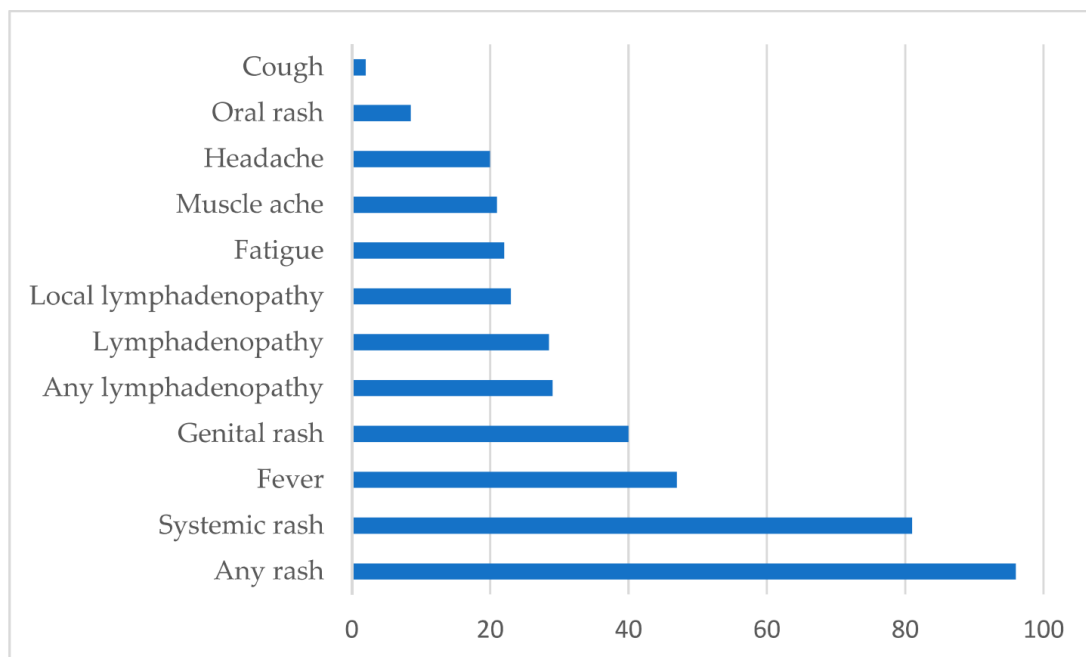


Figure 4: Ratios of symptoms in humans diagnosed with MPX as of July 2022 [27].

Prevention and Control

The first key to achieving prevention is the use of vaccinations, as the Centers for Disease Control and Prevention warned to prioritize frontline workers at risk of vocational exposure, especially health care staff including physicians, nurses and other

employees whether in hospitals, health centers or vaccine laboratories. Besides of veterinarians as well as those of men who have sex with men [28,29]. Smallpox vaccine has been licensed since 2019 to be used to provide high protection against MPX as well as reduce the severity of the infection. There is no doubt that intensifying efforts for early detection of new cases of infection with monitoring of close contacts has a great role in breaking the chain of transmission [30]. In order to effectively impede the spread of infection, one health strategies must be implemented, especially in communities at high risk of exposure, through joint efforts by experts and specialists such as physicians, veterinarians, biologists, and environmental scientists [31].

Conclusions

There is a clear global apprehension of another pandemic, especially viral one of zoonotic diseases, including monkeypox. Therefore, there is an urgent need to implement a comprehensive approach toward the handling of transmissible diseases in all countries that have suffered from the effects of this infection.

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