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Monkeypox - review

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Abstract

Introduction and purpose:

This review aims to analyze the current information about monkeypox and the virus which causes the disease.

Material and method:

This review was based on articles collected in PubMed and published in the years 2012-2022

The research was done by looking through keywords as follows: „monkeypox”; „zoonosis”; „tecovirimat”

Results:

The selected studies have demonstrated that the monkeypox virus is a high-danger pathogen that causes a disease important to public health. More research on this topic has to be done to prevent and better comprehend the potential threat.

Conclusions:

According to the cited research, public health systems should be aware of practical methods to reduce the risk of monkeypox spreading. It is crucial to monitor the spreading of the monkeypox disease and create effective preparation. Moreover, governments should develop strategies to prevent their population.

Keywords: monkeypox; emerging infectious diseases; orthopoxvirus; zoonosis

Description of the state of knowledge

Introduction

Monkeypox (MPX) is an emerging viral zoonotic disease caused by a member of the Orthopoxvirus genus in the Poxviridae family [1, 2, 3]. Monkeypox virus (MPXV) was firstly identified in 1958 in monkeys, which were transported for research purposes to Copenhagen from Africa. For this reason, the disease was called „monkeypox”. It emerged that the term was inadequate since rodents are considered to be the largest animal reservoirs of MPXV (e.g. rats or squirrels) [3]. The clinical picture of MPX is similar to the smallpox one but less severe. Additionally, MPX seems to be rarely

fatal. MPXV in zoonotic (animal-to-human) transmission occurs directly by contact with infected animals' blood, cutaneous/mucosal lesions or bodily fluids [1]. The human-to-human transmission can be caused by respiratory droplets, body fluids, lesions or contaminated personal objects (clothing, towels or bedding) [1,4]. Moreover, MPXV can be transferred to the fetus via the placenta from the mother, (which can cause congenital monkeypox), or by close contact during/after birth [1]. Fetal deaths have been also reported [5].

Outbreaks of monkeypox

1970 was the first year when the MPXV was described in humans in the Democratic Republic Of Congo. Infrequent outbreaks of infection have been noted in Africa, particularly from contact with rodents (wildlife reservoirs). As a result of the fact that the research into MPX has been underfunded, incomplete and neglected, the MPXV has spread for decades most notably in endemic regions [3, 6]. In the 1970s cases were observed and confirmed in six African countries - with a number of 48 confirmed and probable MPX cases - whereas during the 1980s the number was 9 times higher (n=343) with 14 other cases reported in four other African countries. Additively, there was a growing tendency of cases in the 1990s, with 511 MPX cases (confirmed or probable/possible). According to the collected data, during the past fifty years, the Democratic Republic of the Congo was the place most affected by MPX, while Nigeria was the second [7].

Global public health neglected the MPX's potential threat until 2003 when the first cases were detected outside Africa in the United States. Eventually, the outbreak report showed the cases from 6 states (Illinois, Indiana, Kansas, Missouri, Ohio, and Wisconsin). The investigation concluded that MPXV was imported into the US from Ghana with a small mammals shipment. Over the last few years, several travel-associated MPX cases were reported and 2018 was another year that attracted the attention of global media. 3 patients were diagnosed with MPX in the United Kingdom, two were traveling back from Nigeria, and the third was a health care worker exposed to nosocomial transmission. Simultaneously, there was one case in Israel, and one in Singapore a year after [3,7].

According to the published World Health Organization (WHO) data between 1 January and 10 August 2022, there have been 31,655 MPX worldwide cases confirmed by the laboratory and a number of 150 probable cases (with 12 deaths). Furthermore, since 13 May 2022, a large percentage of that cases have been reported from the countries, where the MPX transmission has never been documented. The global risk is assessed by WHO as Moderate, whereas the European Region was defined as High [8].

As opposed to the previous infrequent cases the present outbreak has appeared in humans without travel connections to endemic regions of Africa [9]. Despite the fact, that MPV has a limited transmission rate, the multinational health authorities are on high alert due to the current global outbreak's unusually large number of patients. It was partially explained by the following points [10]. (1) Occurrence of the decreasing population immunity against smallpox. According to the studies, the smallpox vaccine has an effectiveness rate of 85% against the monkeypox virus. Since the 1970s, when an effort to eradicate smallpox (a virus closely similar to MPX) came to an end, researchers have been observing MPX. Public health experts stopped advising smallpox immunization after smallpox was no longer a concern due to widespread vaccination. Noteworthy, since smallpox was eradicated, more people have developed weaker or nonexistent immunity for both of those viruses [11,12]. (2) Increased contact between people and animals - that function as a reservoir for MPXV - may be encouraged by additional factors like deforestation, demographic, or climate change. [13] (3) MPX's genetic evolution might be a contributing factor item - these could possibly cause or impact the outbreak in May 2022. [9,10]

Symptoms and Signs

Although not all MPX patients suffer flu-like symptoms, a common manifestation of the disease includes headache, fever, swollen lymph nodes (especially neck, groin and armpits ones), muscle and back aches and fatigue. Based on the WHO research, fever is the most prevalent symptom, occurring in 71% of cases with at least one described clinical sign, whereas any rash occurs in around 70% [8]. Patients usually have a rash within 1 to 3 days after fever occurrence. The rash firstly spread from the face to other areas of the body and may appear on the mucosa. [14] Moreover, systemic rash was notified in 43% [8].

Treatment

The majority of MPX patients recover without medical therapy. To decrease gastrointestinal fluid losses (for those having gastrointestinal symptoms) is required receiving oral/intravenous rehydration. However, the prognosis for convalescing is linked to the previous vaccination history, coexisting condition and previous general health. As a result, providing personalized therapy appears to be the most rational solution. Tecovirimat represents the first antiviral method approved for the treatment of symptomatic smallpox [15, 16]. As confirmed by the study, Tecovirimat presents wide anti-orthopoxviruses activity (in vitro and in vivo) and might be developed for

promoting recovery of orthopoxvirus infections such as MPX. [17] Nevertheless, the collected data are assessed as inadequate to demonstrate the effectiveness of Tecovirimat against MPX in humans. The National Institutes of Health (NIH) had already begun preparations for a controlled and randomized trial in an epidemic area in the Democratic Republic of Congo (DRC), so as to investigate the accurate efficiency and safety of using Tecovirimat as a MPX treatment [16].

Summary

It is highly important to evaluate the danger of a monkeypox pandemic. Clinicians have to be wide awake for any symptoms that look like monkeypox and precisely identify it. Awareness and specialist training are essential for improving monkeypox diagnosis and appropriate treatment. Therewithal, in order to protect the affected community, additional research into monkeypox drug treatment is necessary.

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