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Review Article

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Brief overview of mpox: To worry or to ignore?

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ABSTRACT

Mpox was first discovered in the Democratic Republic of Congo as a zoonotic infectious disease with various possible transmission routes. Currently, it is a reemerging disease being monitored by the World Health Organization (WHO) after a surge of reported cases in several non-endemic countries in May 2022 and August 2023. This study probes into the issue of whether mpox should or should not be concerned as a potential threat during and after the current COVID-19 pandemic. Literature reviews were conducted using PubMed, DOAJ, and Cochrane to understand and synthesize more information on the virulence and lethality of mpox. The keywords used included "monkeypox", "outbreak", "reemerging infectious disease", "southeast asia", "smallpox", "sars cov", and "transmission", which were all associated with the Boolean operators "AND" and "OR". A total of 30 articles acquired from various journals and international official websites were included in this study. The sudden outbreaks across the Asia-Pacific region may be attributed to countries lifting their travel restrictions. Studies have shown that mpox has similar transmission routes to COVID-19 and manifests similar symptoms to smallpox. However, mpox needs prolonged contact for its transmission and has a lower case fatality rate (CFR). Several studies highlighted that current outbreaks have different epidemiological and clinical characteristics from classic cases. Mpox is not as highly transmissible as COVID-19 and not as severe as smallpox, but it still poses a potential threat to human health and needs further observation and immediate containment to prevent further transmission worldwide. The preparation of smallpox vaccination in case of emergency and further clinical trials of smallpox drugs are recommended.

KEYWORDS: Mpox; Outbreak; Reemerging infectious disease

1. Introduction

First discovered in the Democratic Republic of Congo (DRC) in 1970, mpox is a zoonotic infectious disease endemic to Central and West Africa[1,2]. Over the years, the cases of mpox have spread beyond the regions neighboring its birthplace. The first outbreak outside of Africa was recorded in 2003 in six states – Illinois, Indiana, Kansas, Missouri, Ohio, and Wisconsin[3,4]. Transmission was then traced back to pet prairie dogs housed with Gambian pouched rats and dormice imported from Ghana[4]. In the following years, mpox was then reported as sporadic cases attributed to international transmission. Examples of such cases include mpox transmission to Israel in 2018; UK in 2018, 2019, 2021, and 2022; Singapore in 2019; and the USA in 2021[4].

Mpox is identified to be caused by monkeypox virus (MPXV), which is a member of the family Poxviridae. Similar to its relative, the smallpox, MPXV has a double-stranded DNA and is known to defend itself by modulating its host's immune response[5,6]. Due to its genetic configuration, the virus is less susceptible to mutation due to errors in replication, thus being more stable and predictable. The virus has two clades, the Congo Basin (CB) and West African (WA) clade. Studies have shown that CB MPXV had higher transmissibility and mortality rate (10.6%) compared to WA MPXV (3.6%), which is the main clade circulating in countries outside of Africa[1,7].

The virus may infect humans both through animal-to-human and human-to-human transmission. Reports have shown that mpox spreads through respiratory droplets, direct contact, or fomites. Zoonosis occurs via direct contact with the infected animal's blood, body fluids, mucocutaneous lesions, or via consumption[5,8]. Nosocomial transmission was also first reported in UK[5,9].

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Mpox is a reemerging disease being monitored by the WHO amidst the COVID-19 pandemic. This reemerging disease caught global attention when an outbreak of cases was reported in a number of non-endemic countries in May 2022. By June 2022, there were more than 1 500 cases reported in 43 countries. In July 2022, the number of cases in the US had reached 3 591, constituting 19% of all global confirmed cases[10,11]. The outbreak was then declared as a Public Health Emergency of International Concern (PHEIC) by WHO on 23rd of July 2022[12]. There was a period of decrease and stability in number of Mpox cases after reaching its peak in August 2022[13]. However, a new surge of cases was reported again in 2023, especially from the region of South-East Asia and Western Pacific[14]. Therefore, the authors would like to observe whether monkeypox should or should not be concerned as a potential threat during and after the current COVID-19 pandemic.

2. Methods

We reviewed literatures from trusted scientific databases such as PubMed, DOAJ, and Cochrane to understand and synthesize relevant information on how monkeypox acts as an uprising potential threat in times of the COVID-19 pandemic. We searched these databases using the keywords “monkeypox”, “outbreak”, “reemerging infectious disease”, “southeast asia”, “smallpox”, “sars cov”, and “transmission”. The keywords used had been checked on the Medical Subject Heading (MeSH) thesaurus prior to searching. All the keywords were associated using the Boolean operators “AND” and “OR”. Articles that were not available in full text, were not written in English, were not peer-reviewed, or were ongoing, were excluded from the reviewing process. Any disagreement or uncertainty was resolved through discussion among the authors.

3. Results

A total of 20 articles acquired from various journals across PubMed, DOAJ, and Cochrane were included in this study. An additional of 10 articles from international official websites, such as the World Health Organization, Centers for Disease Control and Prevention, European Centre for Disease Prevention and Control, and California Department of Public Health, were also included. The included articles were reviewed and analyzed for relevant information. The information obtained was then synthesized into this literature review.

4. Discussion

Since its outbreak in 2022, there has been over 90 000 confirmed mpox cases reported by the Americas, European, African, Western Pacific, South-East Asia, and Eastern Mediterranean regions of WHO as per September 2023. In September, there was a sudden 328% increase in global reported weekly cases. WHO considered mpox’s global public health risk to be low in the general population[14]. As for regional population, the risk was considered high in the Americas region; moderate in the European, African, South-East Asia, and Eastern Mediterranean regions; and low in the Western Pacific region[13]. The highest cumulative number of cases is still from the Americas region, constituting over 60% of global cases. However, the majority of new mpox cases reported from August to September 2023 were from the Western Pacific region, followed by the South-East Asia region[14]. These were interesting findings considering that the risk was considered low in the Western Pacific region and moderate in the South-East Asia region. The overall low number of reported cases during the 2022 outbreak which then peaked in late August to early September 2023 in the Western Pacific and South-East Asia regions were in contrast to the Americas region, which number of reported cases peaked in August 2022 and gradually decreased to a relatively stable state[15].

During the 2022 outbreak, there were only a total of 38 cases reported from Southeast Asia with 12 cases from Thailand, 2 cases from Vietnam, 19 cases from Singapore, 1 case from Indonesia, and 4 cases from Philippines. Singapore was the first Southeast Asian country to report an imported mpox case[16]. As of 11th September 2023, WHO reported that there was a total of 353 and 2 024 mpox cases in their South-East Asia and Western Pacific regions respectively. A total of 136 of the South-East region cases and 548 of the Western Pacific region cases were new cases reported in the past three weeks alone[14]. It should be noted that the WHO South-East Asia and Western Pacific regions consisted of Asia-Pacific countries. Asia-Pacific countries included countries with large numbers of international tourist arrivals, such as China, Japan, Korea, and countries from Southeast Asia[17]. This increase in new cases may have been due to countries lifting their travel restrictions after the new normal era of COVID-19 pandemic, thus promoting tourism and widespread human mobility. After a period of dormancy in tourism during the COVID-19 pandemic, the high demand for international tourism in these regions could be a risk for international mpox importation which could then lead to potential outbreaks[16].

Similar to smallpox, the MPXV belongs to the genus Orthopoxvirus, making it currently the most prevalent Orthopoxvirus affecting humans[18]. As we know, smallpox was declared eradicated worldwide in 1980 and the vaccination of smallpox have been ceased in present time. In correlation to mpox, smallpox vaccines were found to be approximately 85% effective against mpox. In one of the literatures, it was found that 80%-96% of monkeypox cases had occurred in individuals who hadn’t had prior smallpox vaccination[1]. The overall waning of the herd immunity may be an explanation towards the resurgence of mpox cases nowadays. This is further strengthened by the fact where mpox was found to primarily affect young children a few years ago, but recently there have been a shift in the median age of cases to an older age of 21 years old in 2010-2019. This is due to the fact that in the 2000s, people below the age group of 20-25 years old wouldn’t have gotten smallpox vaccination in their younger years[1].

Most of the mpox cases are attributed to animal-to-human transmission and only in recent outbreaks are cases outside of Africa caused by human-to-human transmission. Despite taking up the name of Monkeypox, the main reservoir host or primary carriage of this virus is currently not yet known. Even so, the

suspected intermediate hosts which maintained the virus in nature are predominantly rodents such as squirrels, Gambian pouched rats, striped mice, and dormice rather than primates[11,18]. When compared to COVID-19, mpox generally does not spread as easily. It is true that mpox can also be spread through respiratory droplets, but it is only through direct or during prolonged face-to-face contact that mpox may be transmitted to a healthy immunocompetent person. Other possible routes of transmission include direct contact with bodily fluids, mucosa, and open lesions. The virus is also transmissible through contaminated objects used by infected person such as bedding or clothing[18,19]. Hence, mpox usually infects people such as family members who live in same house, drink and eat from the same utensils, or sleep in the same room. Healthcare workers are also at a higher risk of being infected since they are constantly exposed to infectious matter from patients[1]. Recent findings of mpox cases amongst men having sex with men (MSM) are also supported by this explanation since MSM includes intimate contact and also a higher risk of exposure to anal mucosal lesion. Mpox is also expected to have relatively limited asymptomatic transmissions in contrast to COVID-19 which transmission could still occur in high rates during its presymptomatic and asymptomatic phases[20,21]. In terms of transmission, mpox is pretty similar to smallpox[22]. However, patients with mpox were found to manifest milder symptoms and were rarely fatal[23]. As compared to smallpox which had an average case fatality rate (CFR) of 30%, the CFR of mpox was only 3.6% for the WA clade and 10.6% for the CB clade[1,24].

Just like any other diseases, mpox can be suspected through the manifestation of particular symptoms. The classic mpox infection prior to the recent outbreak was described to have an incubation period ranging from 7 to 17 days. Classic prodromal symptoms included fatigue, fever, headache, backache, and lymphadenopathy. Rashes usually appear 1-3 days after the prodrome, starting from the mouth before spreading to the face, palms, and soles in a seemingly centrifugal pattern[8,25]. However, the cases during the 2022 outbreak were reported to differ from these classic symptoms[1,26]. There were many patients who were reported to have only a few lesions which were usually localized to the genitals and manifested without the classic prodromal symptoms. Several patients were reported to not manifest any rashes during their courses of disease. Other reported symptoms which differed from the classic symptoms, included anal pain and bleeding[27,28]. The current shift in epidemiological features imposed a challenge upon clinicians in diagnosing patients with acute rashes and history of exposure. Most of the cases reported from non-endemic countries were attributed to MSM communities and the history of exposure mainly from within MSM communities has made sexually transmitted diseases highly possible differential diagnoses. Several sexually transmitted diseases which displayed similar symptoms to mpox included herpes simplex virus infection, syphilis, and disseminated gonococcal infection[28]. Definite diagnosis may only be established after PCR test. Swab samplings for mpox suspects are performed on skin lesions rather than nasal[8].

In effort to prevent further transmission, communities are expected to take preventive measures, such as avoiding physical contact with the rash of mpox patients. For people who live in the same house with a mpox patient, it is advisable to avoid sharing utensils, bedding, towels, and clothing with the patient. As there is a surge of cases amongst MSM communities, people from the said communities are suggested to avoid kissing, hugging, cuddling, or having intercourse with people suspected of mpox, or use condoms during intercourse to minimize contact with bodily fluids and mucosal lesions[29]. Healthcare workers tasked to manage both suspected and confirmed cases are recommended to put on appropriate personal protective equipment, practice hand hygiene, and be cautious of patients' droplets[30]. Vaccination should also be taken into consideration since smallpox vaccines were found to be quite effective in the prevention of mpox, as mentioned before. These vaccines were more commonly used as a postexposure prophylaxis and were shown to successfully limit the transmission of mpox[8]. Several smallpox drugs, such as immune globulin, Brincidofovir, and Tecovirimat, were also under study regarding their efficacy and effectiveness in the treatment of mpox cases[27].

5. Conclusions

In times of the COVID-19 pandemic, mpox arises as a new public health concern as the number of cases increases. However, it seems that mpox is not as highly transmissible as COVID-19 and the symptoms, although similar, are not as severe as smallpox. However, despite its lower transmission rate and severity as compared to its predecessors, mpox still poses a potential threat in need of further observation and immediate containment to prevent further transmission worldwide. We still haven't seen the urgency for smallpox vaccines to be launched as a global preexposure countermeasure such as in COVID-19, but should still be prepared in times of emergency. Further clinical trials of smallpox drugs as means to assess their efficacy and effectiveness in treating mpox infection are also recommended.

Conflict of interest statement

The authors claim there is no conflict of interest.

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Data availability statement

The data supporting the findings of this study are available from the corresponding author upon request.

Authors' contributions

Purnamasidhi CAW developed conceptualization and supervised the project as the guarantor. Junior D and Suteja RC both contributed to the definition of intellectual content within the article. Junior D,

Purnama GV, Suteja RC, and Adiputra IKH all contributed to the literature search process. Junior D and Purnama GV both prepared and drafted the manuscript. Adiputra IKH, Wulandari PK, and Diksha IGNAS all contributed to the editing of the manuscript. Junior D, Purnama GV, Suteja RC, Wulandari PK, and Diksha IGNAS reviewed the final version of the manuscript and contributed to the administration of the manuscript.

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