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REVIEW

Mpox: Transmission, clinical manifestations, prevention, and treatment – a narrative review

Mpox: transmisión, manifestaciones clínicas, prevención y tratamiento: una revisión narrativa

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ABSTRACT

Objective: to identify the transmission methods, symptoms, complications, prevention, and treatment associated with Mpox.
Design: literature review based on a narrative synthesis.
Data Sources: Web of Science, Google Scholar, Scielo, ScienceDirect, Redalyc, and Scopus.
Study Selection: documents were selected and analyzed through a critical literature review, considering inclusion and exclusion criteria.
Results: a literature review was conducted with a corpus of 17 articles, including 11 narrative reviews, 2 systematic reviews, and 4 statistical analyses. Mpox is more prevalent among children, adults, pregnant women, and homosexual and bisexual individuals. The regions with the highest outbreak incidence are Asia, South America, Europe, the United States, and especially West and Central Africa, where it is endemic. Clinical conditions associated with Mpox include fever, skin rashes, abdominal pain, and meningitis, and it is strongly linked to HIV. Most reported cases have been among lower-class individuals, with some from the middle class.
Conclusions: the Mpox virus is transmitted through various means, primarily contact, bodily fluids, and sexual relations between men. It significantly affects children and pregnant women and presents a range of symptoms, with skin lesions being the most frequent, followed by fever, headaches, oral lesions, and others. If left untreated or inadequately managed, it can lead to severe complications, with HIV-positive individuals and immunocompromised patients at the highest risk. Pneumonia can be fatal in severe cases. Good personal hygiene is recommended, and although there are no approved vaccines for Mpox, Tecovirimat and Brincidofovir show potential for approval in case of future outbreaks.

Keywords: Virus; Mpox; Transmission; Symptoms; Prevention; Treatment.

RESUMEN

Objetivo: identificar los métodos de transmisión, síntomas, complicaciones, prevención y tratamiento asociados al Mpox.
Diseño: revisión de literatura basada en una síntesis narrativa.
Fuentes de datos: Web of Science, Google Scholar, Scielo, ScienceDirect, Redalyc y Scopus.
Selección de estudios: los documentos fueron seleccionados y analizados a través de una revisión crítica de la literatura, considerando criterios de inclusión y exclusión.

Resultados: se realizó una revisión de la literatura con un corpus de 17 artículos, incluyendo 11 revisiones narrativas, 2 revisiones sistemáticas y 4 análisis estadísticos. El Mpox es más prevalente en niños, adultos, mujeres embarazadas e individuos homosexuales y bisexuales. Las regiones con mayor incidencia de brotes son Asia, Sudamérica, Europa, Estados Unidos y especialmente África occidental y central, donde es endémica. Las condiciones clínicas asociadas con Mpox incluyen fiebre, erupciones cutáneas, dolor abdominal y meningitis, y está fuertemente vinculado al VIH. La mayoría de los casos reportados han sido en individuos de clase baja, con algunos en la clase media.
Conclusiones: el virus Mpox se transmite por diversas vías, principalmente contacto, fluidos corporales y relaciones sexuales entre hombres. Afecta significativamente a niños y mujeres embarazadas y presenta una variedad de síntomas, siendo las lesiones cutáneas las más frecuentes, seguidas de fiebre, cefaleas, lesiones orales y otras. Si no se trata o se maneja de manera inadecuada, puede conducir a complicaciones graves, siendo los individuos VIH positivos y los pacientes inmunocomprometidos los que tienen mayor riesgo. La neumonía puede ser mortal en casos graves. Se recomienda una buena higiene personal y, aunque no existen vacunas aprobadas para el Mpox, Tecovirimat y Brincidofovir muestran potencial para su aprobación en caso de futuros brotes.

Palabras clave: Virus; Mpox; Transmisión; Síntomas; Prevención; Tratamiento.

INTRODUCTION

Mpox is a zoonotic disease transmitted through contact with infected animals and enters the body through broken skin, respiratory pathways, and mucosal surfaces (Català et al., 2023a; García-Junior et al., 2023). The presence of oral mucosal lesions is one of the earliest signs of infection (García-Junior et al., 2023). Although the upper respiratory tract mucosa has innate local resistance, the virus evades containment, and lower respiratory tract involvement is a late manifestation that is rarely recognized (Elsayed et al., 2022). Additionally, Mpox is characterized by ocular symptoms, including rashes in the periocular area (conjunctival lesions) (Zong et al., 2023). Conjunctivitis can indicate disease progression, potentially leading to corneal scarring and blindness (Lucena-Neto et al., 2023). During pregnancy, Mpox can lead to spontaneous abortion between 6 weeks and 24 days of gestation (Schwartz & Pittman, 2023). In some cases, fetuses present hydrops fetalis, hepatomegaly, peritoneal effusion, and body lesions (Gutiérrez-Chablé et al., 2024). These findings highlight the importance of international collaboration to protect high-risk populations against emerging diseases (Elsayed et al., 2022).

Some studies indicate that hospitalization is not always necessary for Mpox patients, who are often diagnosed via PCR of mucocutaneous lesions but currently lack specific treatments (Català et al., 2023). Other studies report that, although Mpox is generally a mild and self-limiting disease, it can be severe and even fatal for individuals living with HIV (Protopapas et al., 2024).

An observational study covering more than 50 countries confirmed that Mpox is primarily transmitted through sexual contact between men and that severe cases can lead to pneumonia. Preventive measures such as personal hygiene, hospital immunization, and waste surveillance have been recommended (Mansoor et al., 2023). Another observational study conducted in China recruited 41 individuals, divided into those with Mpox and those with Mpox + HIV. The clinical characteristics were similar, except for pruritus and eschar, which had lower incidence in Mpox + HIV cases (Yang et al., 2024).

The objective of this study is to conduct a literature review on Mpox, focusing on its transmission, symptoms, complications, prevention, and treatment.

METHOD

A comprehensive narrative review was conducted to explore the existing scientific literature. The databases Scopus, Web of Science, ScienceDirect, Scielo, Google Scholar, and Redalyc were consulted to identify relevant studies. To refine the search, the keywords “Monkeypox,” “Virus infection,” “Transmission,” and “Mpox” were used, along with the Boolean operators AND and quotation marks to expand and focus the search scope. The search period extended from August to October 2024, including articles published between 2022 and 2024. The review considered texts in English and Spanish, while excluding case reports, interviews, letters to the editor, theses, and books, as these are less empirical or too specific in focus. Initially, 2,529 articles were identified through the search process: 793 from Scopus, 346 from Web of Science, 254 from ScienceDirect, 8 from Scielo, 655 from Google Scholar, and 473 from Redalyc. After removing 2 498 duplicate or irrelevant articles, a further 14 studies were excluded for not aligning with the study objective or meeting inclusion criteria. This filtering process resulted in a final selection of 17 articles that were deemed relevant for the review.

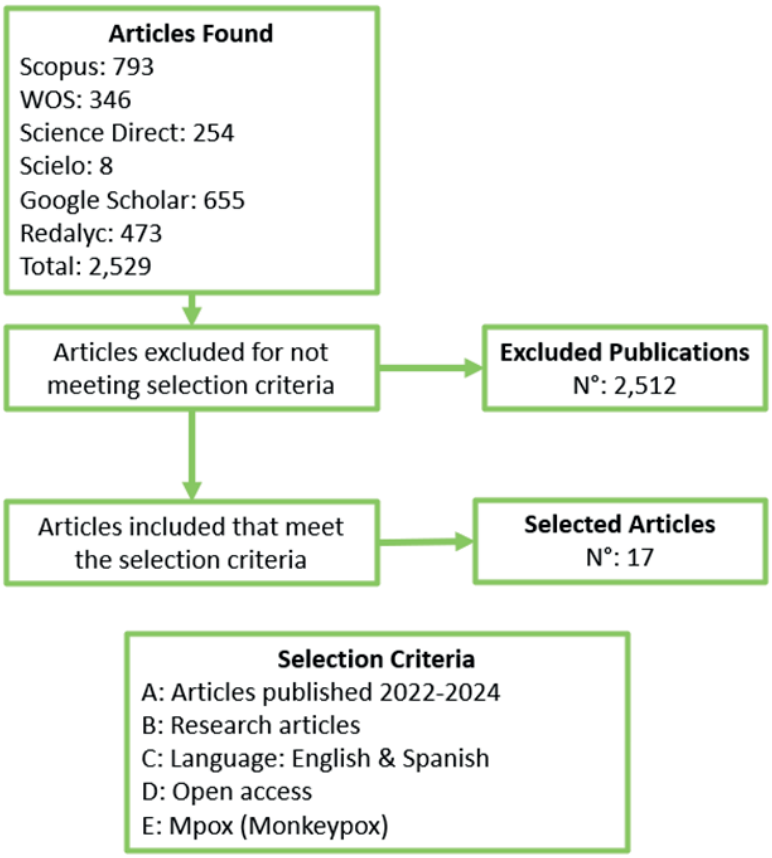

Figure 1. Databases Scopus, Web of Science, ScienceDirect, Scielo, Google Scholar, and Redalyc

RESULTS

A literature review was conducted with a corpus of 17 articles, consisting of 11 narrative review studies, 2 systematic reviews, and 4 statistical analyses. Mpox has been more frequently observed in children, adults, pregnant women, homosexual and bisexual individuals. Additionally, the regions with the highest incidence of outbreaks include Asia, South America, Europe, the United States, and especially West and Central Africa, where the disease is endemic. Clinical conditions associated with Mpox have been reported, including fever, skin rashes, abdominal pain, and meningitis. The virus has also been strongly linked to HIV. The majority of reported cases have occurred in low-income individuals, with some cases also affecting those in the middle class.

Table 1. Statistics cases

N°	Study Title	Methodology	Objective/Sample	Main Findings
1	Monkeypox infection: a he past, present, and future (Upadhayay et al., 2022)	Literature review	Understanding Mpox transmission and current treatments is key to controlling its future spread.	Monkeypox is transmitted through contact and currently has no definitive cure, only vaccines. Further research is needed.
2	Skin Manifestation of Human Monkeypox (Wang & Lun, 2023)	Literature review	Investigate skin manifestations of Mpox in vulnerable groups such as children, pregnant women, and people with HIV.	Mpox is sexually transmitted and severely affects children, pregnant women, and immunocompromised individuals.
3	Clinical characteristics of ambulatory and hospitalized patients with monkeypox virus infection: an observational cohort study (Mailhe et al., 2023)	Observational study	The study included six individuals in contact with Mpox patients, analyzing throat, skin, and blood samples.	Men exhibited adverse effects in anal areas, with severe complications such as rash, fever, and ocular involvement.
4	Advances in recognizing, treating, and preventing Mpox infection (Pitcock et al., 2024)	Literature review	Raise awareness of Mpox transmission, clinical presentation, treatment, and prevention strategies.	In 2022, Mpox cases surged in the U.S. and Europe, linked to sexual activity, particularly among men. Antivirals and vaccines are used for management.

5	Unveiling the Global Surge of Mpox (Monkeypox): a comprehensive review of current evidence (Duarte et al., 2024)	Bibliographic review	Review the global increase in Mpox cases and examine evidence on its transmission.	Highlights the global increase in Mpox, with high transmission rates through direct contact with lesions or bodily fluids.
6	Management from Primary Care of Monkeypox Infection (MPOX) in Humans (Arranz Izquierdo et al., 2023)	Review article and practical guide	Provide recommendations for diagnosing and managing Mpox infection in primary care.	Protocols for diagnosis and treatment should be implemented, and healthcare workers in primary care should receive training to effectively manage Mpox infections.
7	Mpox - Formerly Monkeypox - in Dermatology: a Review of Epidemiologic Features, Clinical Presentation, Diagnosis, and Treatment (Català et al., 2023)	Literature review	Provide an update for dermatologists on the epidemiology, diagnosis, and treatment of Mpox.	Transmission occurs through sexual relations between men. Presents subclinical manifestations and mild rash.
8	The resurgence of monkeypox: epidemiology, clinical features, and public health implications in the post-smallpox eradication era (Singh et al., 2024)	Literature review	Investigate epidemiological data to understand transmission dynamics, viral patterns, and available treatments.	The recent Mpox resurgence has driven the development of new diagnostic and treatment methods, including antivirals like Tecovirimat and vaccines such as MVA-BN. Transmission occurs via respiratory droplets and symptoms include fever and rash.
9	Characteristics of confirmed Mpox cases among clinical suspects: a prospective single-center study in Belgium during the 2022 outbreak (Hens et al., 2023)	Literature review	Identify factors associated with Mpox infection and analyze clinical symptoms in both diagnosed patients and those with symptoms but negative test results.	Findings indicate that 93,5 % of patients had skin lesions, 46,5 % had lymphadenopathy, and 32,3 % developed proctitis. Complications included bacterial skin infections and penile edema.
10	Update on the Mpox virus and safety measures taken against it globally (Mansoor et al., 2024)	Literature review	Provide insights into global safety measures for preventing Mpox and its consequences.	Over 50 countries were affected by Mpox within a month. Initially, transmission occurred via bodily fluids, but now it is primarily sexually transmitted among bisexual men and men who have sex with men (MSM). Symptoms include rectal pain, bleeding, tenesmus, pus, and pneumonia, which can be fatal. Preventive measures should include maintaining personal hygiene, monitoring pet health, and pre- and post-exposure vaccination.
11	Monkeypox: a comprehensive review of a multifaceted virus (Elsheikh et al., 2023	Literature review	Conduct an extensive review of historical outbreaks, transmission, pathophysiology, clinical presentation, and management over the years.	The outbreak differed from previous ones due to the rapid spread of cases. Transmission occurs via undercooked rodent meat, respiratory droplets, and sexual contact, primarily affecting lymphoproliferative organs with symptoms such as fever, headache, and muscle pain.
12	Spatial and Epidemiological Aspects of Monkeypox (MPX) in Rio Grande do Sul (Polidoro et al., 2023)	Observational and descriptive study	Analyze the spatial and epidemiological characteristics of Mpox in Rio Grande do Sul, Brazil, focusing on case distribution and transmission patterns.	Findings indicate Mpox is mainly transmitted through sexual contact among bisexual and MSM populations. Black and brown individuals had an Mpox incidence rate three times higher than the white population.
13	Monkeypox infection and bacterial cellulitis: a complication to look for (de Sousa et al., 2022)	Case report	Provide information on a potentially unreported Mpox complication.	Mpox was confirmed through swabbing of skin lesions. Subsequently, erythema, pain, and edema developed at the site of prior papules, leading to the diagnosis of a deep bacterial skin infection as a complication.

14	Monkeypox virus genome sequence from an imported human case in Colombia (Laiton-Donato et al., 2022)	Descriptive and experimental study	Analyze the genome of the monkeypox virus in an imported case in Colombia and determine its relation to the 2022 global outbreak.	The Mpox case detected in Colombia was closely related to Clade IIb, responsible for outbreaks in multiple countries in 2022.
15	Mpox in people with HIV: a narrative review (Nakamura & Yamamoto, 2024)	Review article	Analyze the impact of the Mpox outbreak on people living with HIV.	People with HIV are at higher risk of severe Mpox complications, especially those with advanced immunosuppression. Early treatment initiation prevents disease progression, and the smallpox vaccine effectively prevents Mpox infections in this group.
16	Oral lesions in human monkeypox disease and their management—A scoping review (Joseph & Anil, 2023)	Literature review	Identify and describe oral manifestations of Mpox in humans and analyze treatment strategies based on available data.	Oral symptoms include mouth and mucosal lesions, ulcers, and tongue swelling. Dentists may be the first to detect Mpox symptoms in patients.
17	Antiviral Drugs for Treatment of Human Monkeypox (Abdelghany et al., 2024)	Review/Meta-analysis	Evaluate the efficacy and safety of antiviral drugs for treating Mpox in humans.	Tecovirimat and Brincidofovir were found to be safe with no adverse effects. While no antivirals are officially approved, these drugs may be authorized for future outbreaks.

DISCUSSION

The purpose of this brief inquiry was to identify key aspects of the transmission, symptoms, complications, and treatment of monkeypox (Mpox).

Transmission

The transmission of the Mpox virus occurs primarily through various forms of contact (Upadhayay et al., 2022). This transmission happens through sexual relations, with limited evidence of its impact on children, pregnant women, and patients (Wang & Lun, 2023a). Containment requires effective measures to control its spread (Duarte et al., 2024). It is transmitted through contact and droplets, emphasizing the importance of hygiene and distancing (Singh et al., 2024). Another transmission route is through undercooked rodent meat (Elsheikh et al., 2023) and sexual activity among bisexual and homosexual men via bodily fluids (Català et al., 2023; Mansoor et al., 2024).

The Mpox virus spreads through multiple forms of direct contact with infected animals or individuals, including sexual contact (Upadhayay et al., 2022). It can also be transmitted through close physical contact with skin lesions. Another transmission route is from person to person, occurring through the respiratory tract, skin wounds, or mucosal surfaces (Zacur et al., 2023). Additionally, the virus can spread during sexual activity between men who have sex with men (Català et al., 2023). Furthermore, airborne transmission occurs when the virus travels in small particles (aerosols) released during sneezing, coughing, or speaking, remaining suspended in the air for prolonged periods (Beeson et al., 2023).

Cases of Mpox have been reported in pregnant women (Wang & Lun, 2023). However, these cases have had incomplete follow-ups, and the disease has been classified as a neglected tropical infection. To date, no population-based studies on births during pregnancy—either before or during the outbreak—have been conducted (Schwartz & Pittman, 2023). Viral infections during pregnancy are a major cause of significant perinatal complications, such as congenital defects, fetal neurological syndromes, miscarriages, and other adverse pregnancy outcomes (Velázquez-Cervantes et al., 2023). Pregnancy provides a unique opportunity to screen for infections like HIV in asymptomatic women, making it essential to offer proper counseling during the first prenatal visit (Abarzúa et al., 2005). A study demonstrated that among reported cases, one resulted in a healthy birth, one in fetal death, and two in spontaneous miscarriages (Gemelli et al., 2022).

Severe cases of Mpox have recently been reported in a 2-month-old infant and a neonate (Bellido-Blasco et al., 2023). In such cases, the virus can be transmitted via the placenta, during childbirth, or postnatally, leading to congenital infection or direct infection at birth if the newborn comes into contact with lesions (Gutiérrez-Chablé et al., 2024). Furthermore, most monkeypox cases have been recorded in children aged 4 to 5 years, with more than 80 % of cases occurring in individuals under 15 years of age. Between 2000 and 2019, Mpox cases increased (Wang & Lun, 2023b). On August 4, 2022, the WHO reported 96 cases in individuals under 18, with the most affected age group being 11 to 17 years (51 %) and 26 % of cases occurring in children under four years old (Romo López et al., 2022).

Symptoms and Complications

Monkeypox presents with various symptoms, the most common being cutaneous manifestations in the perianal and genital regions (Mailhe et al., 2023). Other observed symptoms include papules, erythema, edema, and mild rashes (de Sousa et al., 2022). Some patients have also experienced ocular involvement (Mailhe et al., 2023), as well as fever, muscle aches, headaches (Elsheikh et al., 2023), oral sores, and mucosal lesions (Joseph & Anil, 2023). In severe cases, symptoms include lymphadenopathy, proctitis, urethritis, and tonsillitis (Hens et al., 2023). If the initial symptoms are not promptly or correctly treated, complications may arise, such as deep bacterial skin infections (de Sousa et al., 2022; Hens et al., 2023), sepsis, encephalitis, hemorrhagic disease, blindness, and pneumonia—this last one being potentially fatal (Mansoor et al., 2024). Individuals with HIV are at the highest risk of severe complications, particularly those who are immunocompromised (Nakamura & Yamamoto, 2024).

The inflammatory response is evident after lesion onset but subsides as wounds progress to scabbing (Reynolds et al., 2017). The vesiculopustular rash develops in different stages over approximately 2 to 3 weeks, sometimes beginning on the tongue or inside the mouth (Chakravarty et al., 2024). A 2022 outbreak study conducted in London suggested that Mpox's clinical characteristics differed from previous outbreaks, as lesions were more commonly found on the genital or perianal skin than on the face (Liu et al., 2023).

Ocular involvement in Mpox patients includes eyelid, peri-orbital, and orbital symptoms, as well as conjunctivitis (Gurnani et al., 2023). Keratitis due to Mpox is rare, and the lack of awareness among healthcare professionals makes diagnosis and treatment difficult (Croasdale et al., 2024). When Mpox lesions affect vulnerable sites like the eyes, the consequences can be severe, potentially leading to blindness (Speiser et al., 2024).

Other reported symptoms include fever, lymphadenopathy, muscle pain, and headaches (Elsheikh et al., 2023). Lymphadenopathy is a distinguishing feature of Mpox compared to smallpox and is described as a systemic and potentially life-threatening disease (Ritter et al., 2024). A study of 70 patients during the 2022 outbreak found that fever was the second most common symptom, followed closely by headaches (Gupta et al., 2023). Some patients also experienced difficulty breathing and fatigue, though these symptoms were less frequent (Colon et al., 2024).

In severe cases, Mpox leads to proctitis, urethritis, and tonsillitis (Hens et al., 2023). If not treated properly, it can cause deep bacterial skin infections (de Sousa et al., 2022; Hens et al., 2023), as well as sepsis, encephalitis, hemorrhagic disease, blindness, and pneumonia, the latter being highly fatal (Mansoor et al., 2024). A study conducted in a hospital in China found that complications such as encephalitis and bacterial infections of the skin and mucosa are rare. However, men with HIV had a higher likelihood of developing severe skin lesions and bacterial infections (Yang et al., 2024). Other studies suggest that the clinical presentation of Mpox does not significantly differ between HIV-positive and HIV-negative men, indicating a need for further research (Hoffmann et al., 2023). A case of co-infection with Mpox and cytomegalovirus resulted in death, with the cause being pneumonia, sepsis, and multiple organ failure despite treatment (Zevallos et al., 2023).

Prevention and Treatment

The smallpox vaccine has proven effective in preventing Mpox infection in individuals with HIV and immunocompromised patients (Nakamura & Yamamoto, 2024). Additionally, antiviral treatments such as Tecovirimat and Brincidofovir, particularly the MBA-BN vaccines, have been shown to be safe and effective. While no antivirals have yet been officially approved, these drugs have the potential to be authorized in future outbreaks, though more studies are needed to confirm their efficacy (Abdelghany et al., 2024; Singh et al., 2024). Furthermore, maintaining good personal hygiene, properly caring for pets, and ensuring vaccination before and after exposure are crucial measures to prevent new infections (Mansoor et al., 2024).

The smallpox vaccine prevents infection in individuals with HIV and immunocompromised patients (Nakamura & Yamamoto, 2024). Antivirals such as Tecovirimat, Brincidofovir, and MBA-BN have demonstrated safety and efficacy, although they have not yet been fully approved but may be authorized for future outbreaks (Abdelghany et al., 2024; Singh et al., 2024). These treatments have also been considered for severe cases of the disease (Rizk et al., 2022; Soheili et al., 2022). Preemptive immunization with the smallpox vaccine can provide protective effects and improve clinical manifestations of the infection. Currently, three vaccines—JYNNEOS™, ACAM2000, and the Aventis Pasteur smallpox vaccine—are authorized and may be used for further clinical research (Rizk et al., 2022). Additionally, Tecovirimat has proven effective in preventing the worsening of the disease (Shamim et al., 2023).

Maintaining good personal hygiene, ensuring proper pet care, and vaccinating both before and after exposure are critical practices to prevent further infections (Mansoor et al., 2024). Isolating infected patients, practicing good hand hygiene, and using appropriate personal protective equipment are measures the public can adopt to prevent Mpox infection (Soheili et al., 2022). Active skin lesions should be managed with home isolation, with strict precautions regarding contact with the environment and pets. Infected individuals should wear surgical masks and keep lesions covered until scabs fall off and a new layer of skin has formed (de la Calle-Prieto et al.,

2023). In some hospitals, there has been evidence of low self-efficacy in protection due to contextual factors, including perceived limited access to cleaning supplies, disinfection materials, and hygiene resources (Hassan et al., 2024).

This study had several limitations affecting the generalizability and applicability of its conclusions. The review included only 17 studies published between 2022 and 2024, which limits historical and comparative perspectives. The lack of consensus on specific treatments and vaccines for Mpox, combined with reliance on observational studies, restricts conclusions on prevention and management. Additionally, the limited geographic and demographic representation—especially concerning vulnerable groups such as pregnant women and children—restricts the findings. Methodological and scope differences between studies make uniform comparisons difficult, and the lack of longitudinal research prevents the assessment of long-term effects.

CONCLUSIONS

The Mpox virus is transmitted through direct contact with infected individuals or animals, including sexual contact. It also spreads via respiratory droplets and through wounds in the skin or mucosal surfaces. Airborne transmission is possible through aerosols produced by sneezing, coughing, or speaking. Cases of Mpox in pregnant women have been documented, although research remains limited. Viral infections during pregnancy can lead to congenital damage and miscarriages; one study reported a healthy birth, a fetal death, and two spontaneous miscarriages. In infants as young as two months old and neonates, the virus can be transmitted through the placenta, during childbirth, or postnatally, causing congenital infections if the newborn comes into direct contact with lesions. The majority of cases have been recorded in children between 4 and 5 years old.

Cutaneous manifestations of Mpox can appear in specific regions of the body, leading to inflammation, lesions, and peeling, with this process lasting approximately 2 to 3 weeks. Ocular involvement is observed in the eyelids, peri-orbital areas, and cases of conjunctivitis, as well as the rarer keratitis, which can cause blindness in vulnerable populations. Other reported symptoms include lymphadenopathy, fever, and headaches, which are among the most frequent. In some cases, patients experience difficulty breathing and fatigue, though these symptoms are less common. Mpox complications can lead to deep bacterial skin infections, sepsis, encephalitis, and blindness—though these are rare. Pneumonia, however, is highly fatal. Individuals with HIV and immunosuppression are at a significantly higher risk of acquiring the virus and developing severe complications.

Preemptive immunization with antiviral vaccines such as Tecovirimat, Brincidofovir, and MBA-BN can help protect patients with HIV. Currently, three vaccines—JYNNEOS™, ACAM2000, and Aventis Pasteur—have been authorized. Maintaining good personal hygiene and ensuring vaccination before and after exposure is crucial to preventing new infections. Infected individuals should be isolated, practice proper handwashing, and keep cutaneous lesions covered to minimize further transmission risks.

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