Review

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Mpox and Public Health in Türkiye: Epidemiology, Diagnostics, Vaccination and Prevention

Mpox ve Türkiye'de Halk Sağlığı: Epidemiyoloji, Tanısal Yaklaşım, Aşılama ve Korunma

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ABSTRACT

Mpox, formerly known as monkeypox, has transformed from a localized African threat into a global public health concern, notably with the 2022 multi-country outbreak and the 2024 resurgence of clade I in Central Africa, both leading to public health emergency of international concern declarations. This review synthesizes the current understanding of mpox, covering its microbiology, global and regional epidemiology (with a specific focus on Türkiye), transmission dynamics, clinical manifestations, diagnostic criteria, specific case definitions as outlined by the Türkiye General Directorate of Public Health, therapeutic options, and vaccination strategies for public health professionals. The review also addresses the complexities of mpox in Türkiye, marked by inconsistent official reporting, underscoring the need for transparent surveillance. Besides, this review underscores the necessity of adaptive public health responses, ongoing genomic monitoring, and coordinated global efforts to mitigate mpox's evolving threat.

Keywords: Mpox, monkeypox, epidemiology, Türkiye, public health

ÖZ

Maymun çiçeği olarak bilinen mpox, Afrika ile sınırlı bölgesel bir tehdit olmaktan çıkarak küresel bir halk sağlığı sorunu haline gelmiştir. Özellikle 2022'deki çok ülkeli salgın ve 2024'te Orta Afrika'da clade I'in yeniden ortaya çıkışı, her iki durumda da uluslararası önemi haiz halk sağlığı acil durumu ilanına yol açmıştır. Bu derleme, mpox'a ilişkin güncel bilgileri özetlemekte; mikrobiyolojisi, küresel ve bölgesel epidemiyolojisi (özellikle Türkiye bağlamında), bulaşma dinamikleri, klinik belirtileri, tanısal ölçütleri, Türkiye Halk Sağlığı Genel Müdürlüğü tarafından tanımlanan olgu tanımları, tedavi seçenekleri ve halk sağlığı profesyonellerine yönelik aşılama stratejilerini kapsamaktadır. Ayrıca, resmi bildirimlerdeki tutarsızlıklarla karakterize edilen Türkiye'deki mpox durumuna dikkat çekilerek şeffaf sürveyans ihtiyacı vurgulanmaktadır. Bunun yanında, mpox'un giderek evrilen tehdidini azaltmak için uyarlanabilir halk sağlığı yaklaşımları, sürekli genomik izlem ve uluslararası koordineli çabaların gerekliliği üzerinde durulmaktadır.

Anahtar Kelimeler: Mpox, maymun çiçeği, epidemiyoloji, Türkiye, halk sağlığı

Introduction

Mpox, formerly known as monkeypox, is a zoonotic viral disease caused by the mpox virus (MPOXV), a member of the *Orthopoxvirus* genus. This virus is known to cause a smallpox-like illness in both humans and animals (1). While historically confined to Central and West Africa, mpox garnered significant global attention with an unprecedented multi-country outbreak that began in 2022. This rapid international dissemination, extending beyond traditional endemic regions, led the World

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Health Organization (WHO) to declare the outbreak a public health emergency of international concern (PHEIC) on July 23, 2022 (1). This declaration fundamentally altered the perception of mpox, transforming it from a localized threat into a pressing global health challenge. The previous understanding of mpox as an "exclusively African disease with sporadic cases" has been superseded by evidence of sustained human-to-human transmission in non-endemic areas, necessitating a re-evaluation of global public health surveillance, preparedness, and response strategies (1). In August 2024, rising clade I transmission in Central Africa led WHO to declare mpox a PHEIC (2).

This review aims to synthesize the current understanding of mpox disease, providing healthcare professionals with an updated, evidence-based resource. This review will cover general information, microbiology, global and regional epidemiology (with a specific focus on Türkiye), transmission dynamics, clinical manifestations, diagnostic criteria, therapeutic options, vaccination strategies, and public health prevention measures. The objective is to facilitate informed clinical practice and public health interventions in light of the evolving epidemiological landscape.

Methods

This narrative review was conducted by searching scientific literature published between 2000 and July 2025. The primary databases utilized were PubMed/MEDLINE, Scopus, Web of Science, and Google Scholar. Key search terms included: "mpox", "monkeypox", "*Orthopoxvirus*", "epidemiology", "transmission", "diagnosis", "treatment", "vaccination", "Türkiye", and "Turkey". Additional sources were identified from the references of retrieved articles, official reports from the WHO, the European Centre for Disease Prevention and Control (ECDC), the United States (US) Centers for Disease Control and Prevention (CDC), and the Turkish Ministry of Health. The selection criteria prioritized recent systematic reviews, meta-analyses, original research articles, and authoritative guidelines relevant to the topics covered.

General Information and Historical Context

Definition, Microbiology and Classification of Mpox

Mpox is an infectious disease caused by the MPOXV, a double-stranded DNA virus. It belongs to the *Orthopoxvirus* genus, which is part of the *Poxviridae* family. Notably, MPOXV shares genetic similarities with the variola virus (~96% genome identity), the causative agent of smallpox (3). As a zoonotic disease, mpox can be transmitted between animals and humans. Rodents and primates are recognized as primary reservoirs for the virus, playing a crucial role in its natural cycle (4).

MPOXV exhibits genetic diversity, primarily categorized into two distinct clades: clade I (historically referred to as the Congo Basin clade) and clade II (historically known as the West African clade) (5). These clades differ significantly in their historical pathogenicity and current epidemiological patterns, influencing disease severity and transmission dynamics.

Clade I: This clade is currently responsible for the rise in mpox cases observed in Central and Eastern Africa (5). Clade I infections have historically been linked to more severe disease, with case fatality rates of up to 10%. However, in subsequent epidemics, fatality rates have decreased to about 1-3.3% (5). Clade I further comprises two subclades: clade Ia and clade Ib (6). Clade Ia is predominantly found in Central Africa, with transmission often linked to contact with infected animals and household spread. The majority of cases reported in this category were among children under the age of 15. Clade Ib, on the other hand, has been found to spread in eastern Democratic Congo through sexual interaction, as well as heterosexual transmission via sex trade workers. This subclade has shown a lower case-fatality rate compared to clade Ia, suggesting ongoing viral evolution that may affect virulence (6).

Clade II: Endemic to West Africa, clade II was the primary cause of the global mpox outbreak that commenced in 2022 (5). Infections resulting from clade II mpox are generally less severe, with a survival rate exceeding 99.9%. The ongoing global outbreak is specifically attributed to subclade IIb. Since 2022, clade II has predominantly circulated outside the African continent, with a notable prevalence among men who have sex with men (MSM) (7).

The distinct epidemiological patterns associated with each clade highlight a crucial aspect of MPOXV: while both are MPOXVs, their biological properties, particularly pathogenicity and transmissibility, appear to vary. This variation influences their capacity for sustained human-to-human spread and the severity of the disease. The prominence of sexual transmission for clade IIb, especially among specific demographic groups, suggests an adaptive or opportunistic shift in transmission routes for this particular clade. This divergence in transmission dynamics carries profound implications for the design and implementation of targeted public health interventions and risk communication strategies. Continuous genomic surveillance is therefore essential to monitor these evolving characteristics and adapt public health responses accordingly.

Discovery and Early Human Cases

The MPOXV was first identified in 1958 in Copenhagen, Denmark, during two distinct outbreaks of a pox-like disease observed in colonies of research monkeys. This discovery led to the disease being named "monkeypox". The first documented human case of mpox occurred in 1970, affecting a nine-month-old boy in Bokenda, Equateur Province, Democratic Republic of the Congo (DRC) (8). The child manifested symptoms that were similar to those of smallpox, including a pustular rash, malaise, and fever (9). Between September 1970 and March 1971, more cases of the disease were reported in West Africa, mostly in young children who had not been vaccinated against smallpox (10).

Evolution of Mpox as a Public Health Issue

Historically, mpox was largely confined to Central and West Africa, with cases considered sporadic (11). During the intense global efforts to eradicate smallpox, surveillance for MPOXV

was limited, and early outbreaks were often overshadowed by the prevailing focus on smallpox elimination. The success of smallpox eradication, while a monumental public health achievement, inadvertently led to a global decline in cross-protective immunity against orthopoxviruses, as routine smallpox vaccination ceased. This waning population immunity likely contributed to increased susceptibility to mpox, particularly in regions where it was not historically endemic, making subsequent outbreaks more impactful.

A pivotal shift occurred in 2003 when mpox was reported outside Africa for the first time. An outbreak in the US was traced to a shipment of animals from Ghana, which included several rodent species identified as MPOXV carriers. Fourty seven confirmed and probable cases were reported in six Midwestern states as a result of the virus being spread by these infected rodents to prairie dogs that were marketed as pets (9). This event highlighted the potential for international dissemination through animal trade. The possibility of the virus spreading from person to person is indicated by the return of over 200 cases in Nigeria in 2017 and 2018 (1). The most significant turning point was the 2021-2022 outbreak, which saw MPOXV spread extensively across multiple continents, including Europe, North America, South America, and parts of Asia. The possibility of endemic occurrence in recently impacted areas by 2022-2023 is indicated by ongoing transmission outside of Africa, underscoring the critical need for long-term surveillance and control efforts.

Worldwide Epidemiology

Historical Endemic Regions and Sporadic Outbreaks

Mpox was first recognized in humans in 1970 in the DRC (formerly Zaire) (12). Thereafter, cases occurred sporadically in Central and West African countries, often in remote forested areas, with occasional secondary cases from human-to-human spread. Endemic regions included DRC, Nigeria, Cameroon, and surrounding countries. The virus's cross-border spread gained attention in 2003 when an imported shipment of rodents from Africa caused an outbreak in the US (clade II virus) via transmission to pet prairie dogs (1,8).This incident underscored the potential for international dissemination of the virus through animal trade. Subsequent limited outbreaks occurred in United Kingdom (2018), Israel, Singapore and other non-African countries, typically linked to travelers from endemic areas (13).

The Global Outbreak: Trends, Geographical Distribution, and Demographics

The 2022-2025 Clade IIb Pandemic

The global epidemiology of mpox has changed significantly since the emergence of widespread outbreaks in 2022. Beginning in May 2022, the clade IIb strain of mpox spread rapidly beyond its traditional endemic zones, first reaching countries that had never before reported the virus. By September 2022, more than 62,000 cases had been logged across over 100 nations, and by mid-2025 this figure had exceeded 100,000 in 122 countries (6,8,14). The vast majority of these infections occurred among adult men (median age ~35), with well over 90% of transmission events linked to intimate contact within networks of MSM (7,15). In high-resource settings, the clinical course was generally mild, and mortality remained below 0.1% (16). Following relentless case rises in non-endemic regions, the WHO designated the 2022 outbreak a PHEIC in July of that year (1).

Resurgence of Clade I in Endemic Regions

In parallel, clade I mpox has continued to pose a significant public health threat in endemic regions, particularly Central Africa. Since mid-2022, countries like the DRC and neighboring nations have experienced a marked increase in clade I cases. In 2023, the WHO African region reported a dramatic surge, including cases among heterosexual individuals and children, suggesting sustained community spread beyond the MSM networks observed elsewhere (17). On August 14, 2024, the WHO declared the clade I surge, centered in the DRC, a PHEIC (1,2). As of June 2025, ongoing human-to-human transmission of clade I mpox persisted in several African countries, including the DRC, Kenya, and Uganda, with over 100 reported deaths (6). Sporadic travel-associated clade I cases have also been detected in various countries outside Africa, including the US, Europe, and Asia, in 2024-2025 (6).

Current Global Distribution and Clade-specific Patterns

According to the WHO's global mpox trends report published on July 4, 2025, from January 2022 through May 31, 2025, global surveillance documented 148,892 confirmed pox cases with 341 deaths across all WHO regions (18). The current regional distribution shows the Americas leading with 69,234 cases and 151 deaths, followed by the African region with 41,652 cases and 148 deaths, the European region with 30,189 cases and 9 deaths, the Western Pacific region with 5,869 cases and 16 deaths, the South-East Asia region with 1,038 cases and 14 deaths, and the Eastern Mediterranean region with 910 cases and 3 deaths.

Clade I mpox remains predominantly endemic in Central and Eastern Africa, with outbreaks primarily affecting children through household or zoonotic transmission. Countries most affected include the DRC, Uganda, and neighboring states (6). Sporadic travel-associated clade I cases have also been reported outside the region, including in Australia, Europe, and North America. In contrast, clade IIb, responsible for the 2022 global outbreak, continues to circulate at low levels across multiple non-endemic regions, particularly within networks of MSM (6,7). Its demographic profile remains mostly male, with intimate contact being the primary mode of transmission (7).

The simultaneous circulation of clade I and clade II underscores the complexity of mpox epidemiology. In summary, mpox now circulates on multiple continents. The coexistence of these two distinct epidemiological patterns underscores the need for tailored public health responses. For clade I outbreaks in Central and Eastern Africa, strategies should focus on zoonotic spillover prevention and addressing household transmission (1). In contrast, for the global clade IIb outbreak, interventions should emphasize targeted measures like vaccination and promoting

safe sexual practices within specific risk groups in non-endemic regions. As highlighted in Table 1, the two clades differ significantly in terms of transmission dynamics, fatality rates, and affected populations, requiring context-specific strategies. The challenges in data interpretation, particularly in areas with limited testing capacity, can obscure the true burden of the disease, especially among vulnerable populations. The emergence of sexually transmitted clade Ib within Africa further highlights the dynamic nature of mpox epidemiology, necessitating enhanced diagnostic capabilities and nuanced demographic surveillance to accurately assess disease burden and refine intervention strategies. Continued global monitoring and adaptive disease management are crucial to effectively control the spread of mpox.

Epidemiology in Türkiye

The epidemiological situation of mpox in Türkiye presents a complex picture, marked by varying reports from different official sources. The first human case in Türkiye was confirmed on 30 June 2022. In a press briefing on 2 August 2022, the former Turkish Health Minister Fahrettin Koca stated that five cases had been identified by early August (four recovered, one isolated) (19). Early cases in Türkiye, particularly those reported in 2022, primarily involved men who had sexual contact with other men, with several cases highlighting underlying conditions such as human immunodeficiency virus (HIV) positivity and other immunocompromised states (20). However, subsequent official statements regarding the number of infected individuals have been inconsistent.

As of August 15, 2024, the Turkish Health Ministry publicly stated that no mpox cases had been detected in Türkiye in 2024 (21,22). This statement was made in the context of the WHO declaring a mpox outbreak in Africa a public health emergency. The ministry further indicated that there was no need for any restrictions or additional measures against the spread of the virus at that time (21). Health Minister Kemal Memişoğlu reiterated this stance, emphasizing that the ministry was closely monitoring developments related to mpox and coronavirus disease 2019, but saw no immediate cause for alarm (22).

In contrast, data from the US CDC provides a different perspective. As of January 1, 2024, and updated through June 3, 2025, the CDC's global mpox case dashboard lists Türkiye within the category of countries reporting 26 to 100 confirmed mpox cases (6). Also, according to the joint ECDC-WHO Regional Office for Europe mpox Surveillance Bulletin produced on 24 April 2025, a total of 34 cumulative mpox cases in Türkiye were identified through data submitted to The European Surveillance System, or identified via International Health Regulations mechanisms or official public sources between 2022 and 2025 (23). Furthermore, the Turkish Medical Association, a prominent doctors' union in Türkiye, released a statement citing CDC data from September 2023, which indicated that 12 mpox cases had been detected in Türkiye by that time (24).

This discrepancy in reporting between national health authorities and international bodies, as well as between different national sources, highlights a significant challenge in accurately assessing the epidemiological landscape of mpox within Türkiye. The absence of a centralized, publicly accessible, real-time national surveillance dashboard for mpox, coupled with potential under-testing and under-reporting due to stigma associated with the primary transmission routes (e.g., among MSM), likely contributes to this data gap (25). Such inconsistencies can undermine public trust and hinder effective public health communication and response. Opposition parties in Türkiye have voiced concerns regarding the potential spread of mpox, particularly with the return of African students to Turkish universities at the end of summer, and have called for greater transparency and clearer measures from the government (24). The situation underscores the critical need for robust, transparent, and real-time epidemiological surveillance systems and consistent data reporting to ensure that healthcare professionals and the public receive accurate and timely information, enabling appropriate preventive and control measures in Türkiye.

Modes of Transmission

Mpox is a zoonotic disease caused by the MPOXV, with transmission occurring both from animals to humans and between individuals. Historically endemic in West and Central

Table 1. Key epidemiological trends of mpox clades (worldwide)

Feature	Clade I (Congo Basin)	Clade II (West African)
Historical endemicity	Central and Eastern Africa (5)	West Africa (5)
Current geographical focus	Central and Eastern Africa (ongoing outbreaks) (5)	Global (low-level spread in many countries) (6)
Historical case fatality rate	Up to 10% (5)	Less severe, >99.9% survival (5)
Recent case fatality rate	1-3.3% (5)	Very low fatality rate (5)
Subclades	Clade Ia, clade Ib (6)	Subclade IIb (6)
Primary transmission patterns	Contact with infected animals, household transmission (clade Ia); intimate/sexual contact (clade Ib) (6)	Close contact, intimate/sexual contact, contaminated materials (7)
Key demographics	High proportion in children <15 years (clade Ia); adults, including sex trade workers (clade Ib) (6)	Predominantly men who have sex with men (7)
Global outbreak role	Sporadic travel-associated cases outside Africa (6)	Caused the 2022 global outbreak (5)

Mpox: Monkeypox

Africa, the virus is believed to be maintained in nature by small mammals, such as rodents and monkeys, although the exact animal reservoir has not yet been conclusively identified (4). Human infections may result from direct exposure to infected animals through activities like hunting, handling, processing, or consuming bushmeat. Contact with animal fluids, bites, scratches, or contaminated materials (e.g., bedding or cages) can also facilitate transmission (4). Consequently, individuals in or traveling to endemic regions are advised to avoid contact with wild or sick animals and to take precautions during activities that may increase exposure risk.

While zoonotic transmission remains a primary concern in endemic areas, recent outbreaks—particularly the 2022-2023 global surge—have underscored the virus's capability for sustained human-to-human spread (1). Transmission between people typically requires close, prolonged contact, with the virus entering the body through broken skin, mucous membranes, or the respiratory tract (4).

Direct contact with infectious lesions or body fluids remains the most frequent route of transmission. Skin-to-skin contact, including during sexual activity, has been a major driver in recent outbreaks, especially within sexual networks involving MSM (1,3,4). Although MPOXV has been detected in semen and genital secretions, it is unclear whether the virus is a conventional sexually transmitted infection (STI) or primarily spreads through intimate physical contact.

Fomite transmission via contaminated objects such as clothing, bedding, towels, or utensils has also been documented. Sharing personal items or surfaces used by an infected individual can contribute to indirect spread, particularly if these items are not properly disinfected (4,5).

Respiratory transmission, though theoretically possible through droplets during prolonged face-to-face contact, appears to play a less prominent role in real-world scenarios (5). Unlike airborne diseases, mpox does not seem to spread easily across large distances or in casual public settings (5). Nonetheless, healthcare authorities recommend wearing masks during close interactions, especially in caregiving situations, as a precautionary measure.

Vertical transmission from a pregnant person to the fetus has been observed, either transplacentally during pregnancy or perinatally at the time of delivery, posing risks of congenital infection and adverse neonatal outcomes (4,5). Additionally, while rare, there have been concerns about reverse zoonosis, with infected humans potentially transmitting the virus to pets through close physical contact.

The evolving understanding of mpox transmission, particularly the prominence of intimate contact in the 2022 global outbreak, has significant implications for prevention strategies. Initially, the focus was heavily on zoonotic spillover, but the sustained human-to-human spread, especially via sexual networks, has necessitated a shift in public health messaging and interventions. This highlights the virus's adaptability in finding new transmission routes, emphasizing that public health responses must be dynamic and responsive to observed epidemiological shifts.

Incubation Period, Clinical Signs and Symptoms

The incubation period for mpox generally ranges from 5 to 21 days, with most cases developing symptoms within 7 to 14 days. The disease commonly begins with a prodromal phase characterized by non-specific systemic symptoms (3). During this time, individuals are usually not contagious and may remain asymptomatic.

The prodromal symptoms often include fever, fatigue, headache, muscle aches, and back pain (3,5,26). A notable clinical hallmark that distinguishes mpox from other poxvirus infections, such as smallpox and chickenpox, is lymphadenopathy, typically affecting the cervical, axillary, or inguinal lymph nodes (3). This phase generally lasts between 1 and 5 days before the appearance of skin lesions. Following the prodrome, most patients develop a characteristic rash, which generally appears 1 to 4 days after fever onset. The lesions are usually well-demarcated, deep-seated, and may have a central depression (umbilication). While the classical rash distribution is centrifugal, beginning on the face and spreading to the trunk and extremities (including palms and soles), mucosal surfaces such as the mouth, genitals, and anus may also be affected, presenting as painful ulcers or vesicles (3,26). The rash phase generally lasts two to four weeks, after which lesions crust over and fall off, leaving healed skin that may result in permanent scarring. Lesions are often painful during early stages and become itchy during healing. The number of lesions can vary widely, from a few localized spots to thousands across the body.

Atypical presentations have been increasingly reported in recent outbreaks. In particular, some individuals—especially those infected through sexual contact—may present with a rash localized to the genital or perianal region, sometimes without preceding systemic symptoms such as fever (3). These atypical cases may involve a small number of lesions, which may be mistaken for other STIs such as herpes simplex virus (HSV), syphilis, or varicella-zoster virus (VZV) (27). Furthermore, in some instances, lesions may develop asynchronously, with different types of lesions appearing at the same time on different body parts, complicating diagnosis.

Additional symptoms associated with mpox can include anorectal pain, tenesmus, and rectal bleeding, particularly in patients with genital or rectal mucosal involvement. Co-infections with other STIs are not uncommon and should be considered in the differential diagnosis (3).

Although most mpox cases are mild or moderate, the disease can be severe, particularly among vulnerable populations. Complications may include secondary bacterial infections, dehydration (especially when mucosal lesions hinder eating or drinking), eye involvement (e.g., conjunctivitis, keratitis), bronchopneumonia, sepsis, and central nervous system involvement such as encephalitis (3,8). Higher risks are observed in young children, pregnant individuals, and immunocompromised

persons, especially those with advanced HIV (5). In such cases, the disease may be more extensive, painful, and prolonged.

Case Definitions (According to the Türkiye General Directorate of Public Health's Mpox Guideline)

Standardized case definitions are essential for surveillance, reporting, and public health response. According to the Türkiye General Directorate of Public Health's mpox guideline, updated in August 2024, mpox cases are categorized into "possible case" and "confirmed case" to guide clinical and epidemiological actions (28).

As also detailed in Table 2, the possible case definition includes systemic symptoms combined with contact history or characteristic rash presentations, with particular emphasis on mucosal lesions to broaden clinical suspicion. These definitions provide a structured approach for healthcare professionals in Türkiye to identify suspected cases and guide laboratory testing. The emphasis on both systemic symptoms with contact history and characteristic rash presentations, particularly including mucosal lesions, broadens the scope for initial clinical suspicion. The definitive confirmation relies on laboratory testing, specifically polymerase chain reaction, which is the most common and accurate diagnostic method (26). This standardization is critical for accurate data collection, which in turn informs public health interventions and resource allocation.

Differential Diagnosis

Mpox rash and symptoms overlap with many other infectious and non-infectious conditions. Key differentials include: VZV (chickenpox or shingles), HSV, molluscum contagiosum, hand-foot-and-mouth disease; eczema herpeticum; and other poxviruses (e.g. cowpox) (27). In travelers from endemic areas, rickettsial infections (e.g. "African tick-bite fever") might be considered, as might drug reactions or allergic eruptions. Visual comparison of the characteristic lesions can be crucial for differential diagnosis. Figure 1A-D provides a comparative illustration of mpox lesions alongside those of common differentials like varicella and HSV (29). Furthermore, a detailed comparative analysis of the morphological and clinical characteristics of select poxviruses relevant to human disease, which is essential for the differential diagnosis of mpox, is provided in Table 3.

Treatment Options

Currently, there is no single treatment specifically approved for MPOXV infections (26,30). For most patients who do not develop severe illness or have risk factors for poor outcomes, management primarily involves supportive care aimed at facilitating natural recovery. This includes pain control for lesions, ensuring adequate hydration and nutrition, and meticulous wound care to prevent secondary bacterial infections. Patients are also advised to isolate until their rash has fully healed, avoiding contact with others and pets.

For individuals with severe or life-threatening mpox manifestations, or those identified as being at high risk for severe disease (e.g., severely immunocompromised individuals, very young children, pregnant women, or those with eczema), antiviral medications may be considered. Tecovirimat is generally the first-line investigational treatment (26,30). While studies have shown it to be safe, its effectiveness in reducing lesion duration has been limited, suggesting that robust supportive care, including hospitalization and comprehensive pain management, plays a crucial role in improving outcomes. Other antiviral options, such as cidofovir and its oral prodrug brincidofovir, which inhibit viral DNA polymerase, may be considered, particularly for severely immunocompromised patients or if tecovirimat is unavailable. vaccinia immune globulin, consisting of pooled antibodies, is also available from national stockpiles for severe cases, often in combination with antivirals (30). These specialized treatments are typically accessed under specific protocols due to their stockpile status. Close clinical monitoring and comprehensive hospital support are critical for reducing mortality, especially in severe or high-risk cases.

Vaccination

Preventing mpox relies on both behavioral precautions and vaccination with orthopoxvirus vaccines. Smallpox vaccination

Table 2. Mpox case definitions (Türkiye General Directorate of Public Health)

Case category	Criteria
Possible case	A person meeting one of the following: **1a.** Acute onset of fever **AND** one or more of the following symptoms: weakness, headache, muscle pain, joint pain, lymphadenopathy **AND** **1b.** A history of contact with a confirmed mpox case within 21 days prior to the onset of symptoms **OR** **2.** Presence of skin rashes (macular, papular, or vesicular or pustular lesions of the same age/stage), ulcerative or vesicular mucosal lesions (including oral and anal mucosa). This must be supported by a clinician's medical history consistent with criteria 1a or 1b, or a history of travel to a high-risk area (Note: Mucosal lesions can be single or multiple and may be found in the mouth, conjunctiva, urethra, penis, vagina, or anorectal area)
Confirmed case	Polymerase chain reaction positivity is detected in a sample taken from a person who fits the possible case definition

Mpox: Monkeypox

Table 3. Comparative characteristics of select poxviruses relevant to human disease

Feature	Mpox virus	Variola virus (smallpox)	Vaccinia virus	Cowpox virus
Primary host(s)	Rodents, primates (zoonotic) (4)	Humans (eradicated) (3)	Unknown (laboratory strain)	Rodents, cats, cows (zoonotic)
Human-to-human transmission	Moderate (requires close contact) (1,4)	High (airborne/droplet)	Very low (accidental inoculation)	Low (direct contact with lesions)
Case fatality rate (historical)	Clade I: up to 10%; clade II: <1% (5)	~30% (ordinary type) (3)	Negligible (in immunocompetent)	Very low (<1%)
Rash distribution	Centrifugal (face -> extremities), often palms/soles (3)	Centrifugal (face -> extremities) (3)	Localized (inoculation site)	Localized (often hands/face)
Lymphadenopathy	Prominent (3)	Not typical	Not typical	Common
Vaccine cross-protection	Yes (smallpox vaccine ~85% effective) (31,32)	N/A (target of vaccine)	N/A (used as vaccine)	Yes (smallpox vaccine protective)
Antiviral treatment	Tecovirimat, brincidofovir, cidofovir (30)	Tecovirimat (not used clinically)	Supportive	Supportive, tecovirimat if severe

Mpox: Monkeypox, N/A: Not applicable

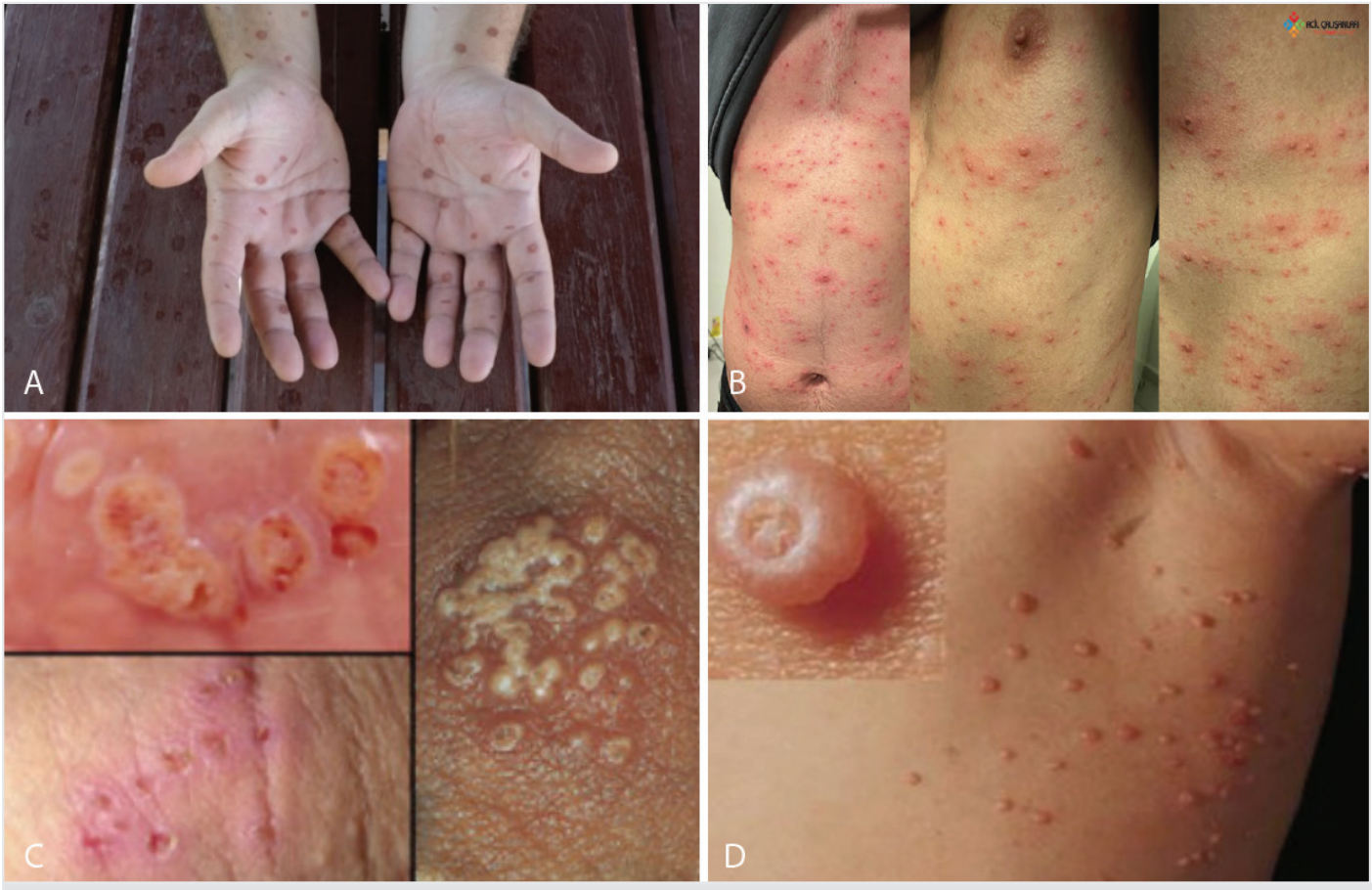

Figure 1. Comparative dermatological presentation of monkeypox (mpox) and common differential diagnoses

A) Typical mpox lesions (deep-seated, umbilicated, at similar stages) on arm/face. B) Varicella (chickenpox) lesions (superficial, in different stages) on trunk. C) Herpes simplex virus (HSV) lesions (grouped vesicles) on genital area. D) Molluscum contagiosum lesions (pearly, umbilicated papules)

Mpox lesions are often deeper, more uniform in stage, and frequently involve the palms/soles compared to varicella. Unlike the grouped vesicles of HSV, mpox lesions are more disseminated. Molluscum lesions are typically smaller and lack a prodromal illness

historically provided cross-protection against mpox due to the antigenic similarity between the viruses. Estimates suggest that smallpox vaccination is about 85% effective in preventing mpox (31). This cross-protective immunity is the basis for using existing orthopoxvirus vaccines against mpox. The primary vaccine used is JYNNEOS (also known as Imvamune/Imvanex), a live, non-replicating modified vaccinia Ankara vaccine, favored for its superior safety profile (32,33). It is administered as a two-dose series, typically 28 days apart, and has demonstrated substantial effectiveness (approximately 75-86% after two doses) in preventing mpox (33). JYNNEOS is recommended by organizations like the WHO and CDC and is generally available in limited supply for high-risk individuals in many countries. An older alternative, ACAM2000, is a live, replicating vaccinia vaccine that offers cross-protection but carries a higher risk of adverse effects, such as myocarditis, making it less preferred, especially for immunocompromised individuals (33). In Türkiye, JYNNEOS (Imvanex) is the primary vaccine used for pre- and post-exposure prophylaxis (PEP) in high-risk groups, as per the Ministry of Health guidelines. ACAM2000 is not typically used in the national program due to its safety profile. Another smallpox vaccine, LC16, has shown strong protective efficacy in animal models and excellent safety outcomes in human trials (32).

Vaccination strategies prioritize individuals with known exposure or those at high risk. This includes healthcare workers who care for mpox patients, laboratory personnel handling orthopoxviruses, and individuals within communities experiencing high transmission rates, such as MSM with multiple sexual partners, sex workers, or attendees of large events where mpox could spread (32). However routine vaccination against mpox is not recommended for the general public or healthcare personnel (32). PEP with JYNNEOS is recommended as soon as possible after potential exposure, ideally within four days to prevent illness, though it may still reduce severity if given up to 14 days post-exposure (32).

Preventive Measures

Preventive efforts against mpox hinge on interrupting transmission through a combination of personal behaviors and organized public health actions. At the individual level, minimizing direct contact with infected persons or potentially contaminated materials is paramount; this entails avoiding skin-to-skin interactions (including intimate or sexual contact) with anyone exhibiting rash or lesions, refraining from sharing personal items (such as clothing, bedding, utensils, or sexual devices) without thorough disinfection, and practicing rigorous hand hygiene using soap and water or alcohol-based sanitizers (5,34). In regions where mpox is endemic, additional caution around wild animals—particularly rodents and primates—is advised, as zoonotic spillover remains a recognized risk (5). When infection occurs, patients should isolate until all lesions have healed and scabs have detached, covering any remaining lesions and wearing a mask when around others; they must also abstain from close contact with pets to prevent reverse zoonosis. Within healthcare and other institutional settings, strict infection control protocols are essential. Personnel examining suspected or confirmed mpox cases should adhere to airborne and contact precautions, including the use of N95 respirators, eye protection, gloves, and gowns (5,34). Environmental decontamination of surfaces, textiles, and instruments must employ agents proven effective against enveloped viruses. PEP via vaccination can be considered for high-risk contacts within four days of exposure to avert illness or, if administered up to 14 days post-exposure, to lessen disease severity (5,32,34).

The multi-faceted nature of mpox prevention, encompassing both vaccination and behavioral changes, is crucial for effective disease control. The emphasis on avoiding direct skin-to-skin contact and contaminated materials, particularly in the context of intimate activities, reflects the primary transmission routes identified in recent outbreaks. The limitations of certain measures, such as condoms not providing complete protection, highlight the need for comprehensive risk reduction strategies rather than relying on single interventions. Public health efforts must continuously adapt their messaging and interventions based on the evolving epidemiological understanding of the virus, ensuring that preventive measures are both relevant and effectively communicated to at-risk populations.

At the population level, surveillance systems and prompt case reporting enable timely identification of clusters, while comprehensive contact tracing helps break chains of transmission. Clear risk communication—tailored to affected communities and disseminated through diverse channels—promotes early symptom recognition, reduces stigma, and encourages rapid healthcare seeking. Although routine travel restrictions are generally unnecessary, advisories for travelers to endemic areas stress avoidance of wildlife contact and compliance with local health guidance (34). Collectively, these layered interventions—spanning personal precautions, clinical infection control, and public health strategies—form the cornerstone of effective mpox prevention.

Conclusion

Mpox has rapidly evolved from a regional zoonosis into a global public health concern, underscored by the unprecedented 2022-2025 multi-country outbreak and the ongoing surge of clade I cases in Africa. This transformation highlights a fundamental shift in the virus's behavior, moving beyond isolated animal-to-human spillover to sustained human-to-human transmission. This necessitates a critical re-evaluation of global public health surveillance, preparedness, and response strategies, acknowledging the distinct epidemiological and pathological characteristics of the two main clades. Despite typical clinical presentations involving rash and lymphadenopathy, atypical cases complicate diagnosis, emphasizing the need for high clinical suspicion and accurate laboratory confirmation. Challenges in consistent data reporting, as seen in Türkiye, further highlight the need for robust and transparent surveillance systems.

From a public health standpoint, key takeaways include the paramount importance of surveillance and rapid response, even in areas with no current reported cases. Prevention relies on isolating infected individuals and strategically vaccinating exposed or at-risk populations with safer orthopoxvirus vaccines like JYNNEOS. Treatment primarily remains supportive, with antivirals reserved for severe cases and vulnerable groups, as their impact on milder illness is limited.

For Türkiye, specific public health recommendations include:

1) Strengthening the national surveillance system for mpox to ensure real-time, transparent, and accurate data reporting, potentially through a dedicated dashboard.

2) Ensuring adequate and accessible stockpiles of JYNNEOS vaccine and tecovirimat for high-risk groups and severe cases, respectively.

3) Implementing targeted vaccination campaigns for high-risk populations, such as MSM with multiple partners, based on ethical and non-stigmatizing approaches.

4) Enhancing genomic surveillance capacity to track circulating clades and variants.

5) Conducting continuous training for healthcare professionals on case identification and management, focusing on the evolving atypical presentations.

The global mpox experience underscores that eradicating one poxvirus does not guarantee immunity to related viruses, making continued research into viral ecology, vaccines, and therapeutics essential. Coordinated global efforts, guided by international recommendations and supported by national authorities, are crucial to control mpox and protect populations in an interconnected world where the emergence of unexpected outbreaks remains a constant threat.

Footnotes

Authorship Contributions

Concept: S.U.U., Design: S.P., S.U.U., Data Collection or Processing: S.P., Analysis or Interpretation: S.P., S.U.U., Literature Search: S.P., S.U.U., Writing: S.P.

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