IJID Regions 11 (2024) 100358

Contents lists available at ScienceDirect

IJID Regions

journal homepage: www.elsevier.com/locate/ijregi

Short Communication

Epidemiology, clinical presentation, and outcome of mpox: A study of 381 cases in Saudi Arabia

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ARTICLE INFO

Keywords:
Mpox
Epidemiology
Clinical characteristics
Genomic sequencing
Saudi Arabia
Monkeypox virus

ABSTRACT

Objectives: There are limited data on the clinical and epidemiological aspects of mpox in Saudi Arabia. This study investigates the characteristics of Mpox cases from May to September 2023.
Methods: A total of 381 cases of Mpox were included in this study, diagnosed based on a combination of clinical symptoms and laboratory testing.
Results: The majority of mpox cases were males (91.1%), with a mean age of (±SD) of 32.4 (±8.3) years; 356 (93.4%) did not report travel, 277 (72.7%) denied engaging in extra-marital sex, and 379 (99.5%) were not linked to secondary cases. Fever was reported in 371 (97.4%), whereas headache was present in 314 (82.4%). Cough (1.3%) and conjunctivitis (0.5%) were rare. The most commonly affected areas in terms of lesions were the palms and soles (297 cases, 78%), followed by the genitals (206 cases, 54%), face (198 cases, 52%), and mouth (160 cases, 42%). Of the 1325 identified contacts, 1134 (85.5%) were hospital contacts, and 191 (14.5%) were community contacts, and 393 (29.6%) were high-risk contact. Of the high-risk contacts, 284 (72.3%) accepted post-exposure vaccination. The genotyped samples were all subclade IIb (formerly the West Africa clade).
Conclusions: This study provides valuable insights into mpox characteristics in Saudi Arabia. The genome of monkeypox virus belonged to subclade IIb of the West Africa clade. Further analysis of the global tree sublineage is needed.

Introduction

Mpox, which had previously only been seen in Central and West Africa, has recently spread geographically to non-endemic countries, including Saudi Arabia and its neighboring nations [1,2]. Since January 1, 2022 to November 30, 2023, 92,783 laboratory-confirmed cases of mpox, including 171 deaths, were reported to the World Health Organization (WHO) from 116 countries/territories/areas in the six WHO regions [3]. Effective disease surveillance, diagnosis, and preventive methods require a thorough understanding of the epidemiology and clinical features of mpox. It sheds light on the disease's burden, identifies high-risk groups, and supports public health initiatives. The clinical characteristics and epidemiology of mpox in Africa, where the majority of cases have been reported, have been the subject of several research. However, there are limited data on mpox in Saudi Arabia and its neighboring countries [1,2,4]. Thus, we conducted this study to fill this knowledge gap.

Materials and methods

This is a retrospective observational study of mpox cases in Saudi Arabia. Individuals with a confirmed diagnosis of mpox based on clinical symptoms and laboratory testing met the inclusion criteria. Information about demographics (age and gender), clinical presentation (symptoms and duration), test results, and contact tracings were analyzed. A laboratory-confirmed monkeypox virus (MPXV) infection was defined as a positive result of MPXV by polymerase chain reaction assay in samples from skin lesions or a throat swab, per the Saudi Arabian Public Health Authority, as described previously [1,5]. MPXV whole genome sequencing was performed at the laboratories of the Saudi Public Health Author-

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https://doi.org/10.1016/j.ijregi.2024.100358
Received 22 February 2024; Received in revised form 18 March 2024; Accepted 19 March 2024

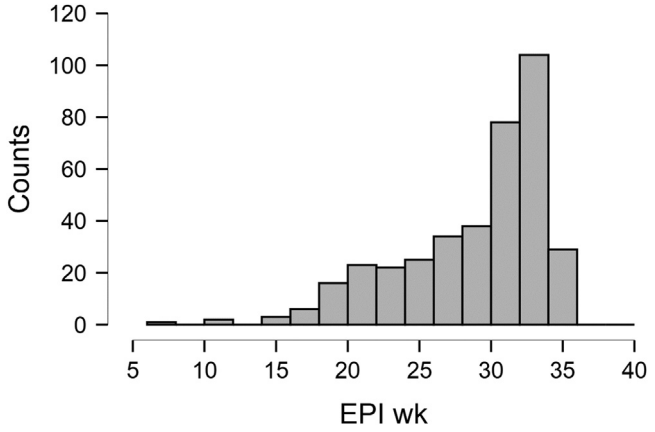

Figure 1. The distribution of Mpox cases in Saudi Arabia based on the epidemiology week during the study period: May-September 2023. EPI wk: epidemiology week.

ity on positive samples with cycle threshold values ≤30. Extracted DNA was subjected to whole genome amplification. The normalized libraries were sequenced on a DNBSEQ-G400 platform according to manufacturer's protocol. The processed reads were aligned to the MPXV reference genome (MT903344.1) for a reference-based analysis. Lineage designation for sequences was determined using Nextclade (v2.14.0) and using the human MPXV database. The study used existing surveillance data of confirmed mpox cases in Saudi Arabia from the Health Electronic Surveillance Network [1]. Contact investigation was done according to national public health authority guidelines. Contact is defined as a person who, in the period beginning with the onset of the source case's first symptoms and ending when all scabs have fallen off, has had one or more of the following exposures with a probable or confirmed case of mpox: face-to-face exposure (including health care workers without respiratory protection), direct physical contact including sexual contact, or contact with contaminated materials such as clothing or bedding. A high-risk contact is further defined as a person being in frequent contact such as laboratory workers who handle MPXV-contaminated specimens, health care personnel who dealt with mpox cases without personal protective equipment, or a close contact in residence. Individuals with high-risk exposures were offered post-exposure vaccination with the smallpox/mpox vaccine (JYNNEOS), with two doses 1 month apart as soon as possible and within 4 days after exposure.

Descriptive statistics were used to summarize the demographic, clinical, and outcome variables. The chi-square or Fisher's exact tests were used to evaluate the associations between categorical variables. Statistics were done using JASP statistics (University of Amsterdam, Amsterdam, The Netherlands). The study was approved by the Saudi Ministry of Health Institutional Review Board (IRB-23-108M).

Results

During the study period from May to September 2023, there were 381 cases of mpox, with 347 (91.1%) males and a mean age (±SD) of 32.4 (±8.3) years. The 30-34 years age group had the highest frequency (102; 26.8%) of cases, followed by the 25-29 (87; 22.8%), 20-24 (43; 11.3%), and 35-39 years (65; 17.1%) years age groups. Of the included cases, the majority were reported in the epidemiology weeks 30-35 (228; 59.8%) (Figure 1), and most of the cases were reported from Riyadh (268, 70.3%) and Jeddah (70, 18.4%).

Most (356, 93.4%) cases did not report any travel history and 375 (72.7%) denied engaging in extra-marital sex (either heterosexual or homosexual activity). In addition, 379 (99.5%) were not linked to secondary cases and only 2 (0.5%) were secondary cases. Headache was present in 82.4% of cases and cough in 1.3%, and only 0.5% of the patients had conjunctivitis (Table 1). The most frequent location of lesions were palms and soles (297, 78%), genitals (206, 54%), face (198, 52%), and mouth (160, 42%).

Table 1
Characteristics of 381 patients with confirmed mpox in Saudi Arabia between February and August 2023.

Characteristic	No. (%)
Gender	
Male	347 (91.1)
Female	34 (8.9)
Race and ethnicity	
Asian	144 (38)
African	6 (2)
Arab (national)	191 (50)
Arab (non-national)	40 (10)
Possible exposure ≤3 weeks before symptom onset	
Sexual, marital	6 (1.6)
Sexual, extra-marital	104 (27.3)
Other intimate exposure	9 (2.4)
Unknown (declined to report)	262 (68.8)
Self-reported contact with a person with suspected mpox	
Intimate or sexual contact	6 (1.6)
No known contact	375 (98.4)
HIV status	
Positive	3 (0.8)
Negative	253 (66.4)
Unknown (declined testing)	125 (32.8)
Symptoms	
Fever	371 (97.4)
Headache	314 (82.4)
Cough	5 (1.3)
Conjunctivitis	2 (0.5)
Myalgia	17 (4.5)
Backpain	14 (3.7)
Lymphadenopathy	29 (7.6)
Exhaustion	17 (4.5)
Rash location[a]	
Palms and soles	297 (78)
Genitals	206 (54)
Face	198 (52)
Mouth	160 (42)
Conjunctiva	69 (18)

[a] Patients may have skin lesions at multiple sites.

Of the 1325 identified contacts, 1134 (85.5%) and 91 (14.5%) were hospital and community contacts, respectively. Of the contacts, 393 (29.6%) were high-risk contact and of those, 284 (72.3%) accepted post-exposure vaccination.

Only one patient tested positive for syphilis and all other tested patients were negative for gonorrhea (n = 32), syphilis (n = 62), hepatitis C virus (n = 254), hepatitis B virus (n = 255), and HIV (n = 254). All cases recovered and discharged and none required intensive care unit admission. Viral genome sequences of the samples were all subclade IIb (formerly the West Africa clade).

Discussion

There are limited data on mpox and its epidemiology, clinical presentation, and outcomes in Saudi Arabia [1]. The study shows the continued occurrence of mpox cases after the WHO had ended the public health emergency of mpox [6]. A total of 381 mpox cases were included in this study, with men predominating (91.1%). This finding is in line with earlier studies indicating a higher incidence of mpox in males [1,7]. The affected individuals were, on average, 32.4 years old, with the age group 30-34 years having the highest number of cases. The findings align with previous studies indicating a higher prevalence of identified cases among young individuals [1,2]. The most prevalent symptoms were fever (97.4%), headaches (82.4%), and maculopapular rash (96.6%) and other symptoms were uncommon, consistent with earlier studies of mpox [1,2].

The relatively low percentage (27.3%) of Mpox cases associated with extra-marital sex raises the possibility that sexual transmission may not be a significant mode of spread for this infection in the study population. Alternatively, it could indicate that patients did not disclose the precise source of infection. Likewise, the significant proportion (99.5%) of cases not being linked to secondary cases suggests that patients may not have fully disclosed the mode of acquisition of Mpox. The initial study conducted in Saudi Arabia indicated that the majority of mpox cases were associated with travel [1]. However, the findings of the current study reveal a significant difference, as a large number of patients (93.4%) did not report any travel history. This observation suggests a potential shift in the disease's epidemiology and is consistent with a recent report of 16 mpox cases in Riyadh, Saudi Arabia [4]. It is worth noting that mpox can be transmitted through sexual or nonsexual interactions. Nonsexual transmission can occur through the respiratory droplets or oral fluids of infected individuals, direct contact with lesions or scabs, or contact with objects or surfaces contaminated by infected individuals [8].

None of the identified contacts developed mpox. During an investigation in Colorado, USA, none of the 313 medical professionals who were exposed to patients with mpox contracted the infection. However, seven individuals, including four who did not wear an N95 respirator, were exposed during aerosol generating produces [9]. An additional evaluation of 57 people residing in a dormitory with a patient with mpox revealed no positive cases [10]. Of the contacts, 393 (29.6%) were high-risk contact and of those 284 (72.3%) accepted post-exposure vaccination. In a post-exposure prophylaxis study, 484 close contacts were included and 230 were vaccinated within 14 days of exposure, with an adjusted effectiveness of the of 88.8% (95% confidence interval 76.0-94.7) [11].

The notable proportion (68.8%) of cases where individuals declined to disclose their exposure is a significant public health concern. This lack of information poses challenges to effectively contain and manage the outbreak. Furthermore, the considerable number of cases associated with extra-marital sexual activity emphasizes the need for targeted interventions and education within this demographic. This is particularly crucial considering the recent global outbreak within the men who have sex with men community, requiring specific attention and tailored strategies. Additional efforts are needed to explore the specific sexual contacts of cases with mpox. The genomic characterization showed the predominance of the subclade IIb (formerly the West Africa clade). This finding is consistent with an earlier study that a phylogenetic analysis of the MPXV genome from 38 countries/regions showed that the current global mpox outbreak was caused by multiple sub-clades in the clade IIb lineage [12]. This clade is of particular importance because the DNA was detected in the air and thus could have an impact on immunocompromised patients in health care facilities. On the other hand, clade IIb was labeled to be associated with less severe symptoms and a lower lethality rate than clade I (formerly the "Congo Basin" clade). In non-endemic regions, clade IIb transmission of mpox has been linked to a high concentration within dense sexual networks, >95% in men, and the vast majority of those who identify as men having sex with men. According to the study's findings, patients may not have disclosed all epidemiological information necessary to fully identify contacts and chains of transmission. Further genomic characterization of APOBEC3 or other genes linked to infection and transmission, as well as the conceivable identification of virus introduction sites (zoonotic or nosocomial), would be required.

In conclusion, this study provides valuable insights into the epidemiology, clinical manifestation, and outcome of mpox in Saudi Arabia. Continued surveillance and research are of utmost importance to monitor the prevalence and dynamics of mpox overtime. In addition, the genome of the monkeypox virus was classified as subclade IIb of the West Africa clade. However, further analysis of the global tree sublineage is required for a comprehensive understanding.

Declarations of competing interest

All authors have no competing interests to declare.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Ethical approval statement

The study was approved by the Saudi Ministry of Health Institutional Review Board (23-108 M).

Acknowledgment

We are grateful to all those who assisted in this study. We acknowledge the Health Directorates, Public Health Laboratory, and regional focal points for data collection, input, and response.

Author contributions

Study concept design: AMA, HA, JAA; Data Collection: HA, MA, EAK, MHA, MSA, AAA, ASA, AJA; Data Analysis: AMA, HA, JAA; Initial Draft: AMA, HA, JAA; all authors edited and approved the final draft.

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