

Original Research Article

Assessing knowledge, attitudes, and practices regarding Mpox among healthcare workers at a rural teaching hospital in Bihar

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ABSTRACT

Background: Mpox is a viral zoonotic disease that has garnered global attention due to recent outbreaks. Healthcare workers (HCWs) play a critical role in managing such infectious diseases, making their knowledge, attitudes, and practices (KAP) essential for effective disease control. This study aimed to assess the KAP regarding Mpox among healthcare workers at a rural teaching hospital in Bihar, India.

Methods: A cross-sectional survey was conducted among 120 healthcare workers, including interns, residents, faculty, and nursing staff. A structured, self-administered questionnaire was used to assess knowledge, attitudes, and practices related to Mpox. Data were analyzed using descriptive statistics, chi-square tests, and logistic regression.

Results: A majority of participants (65.8%) had poor knowledge about Mpox, with younger healthcare workers (<35 years) showing better understanding. Most participants recognized Mpox as a public health threat but lacked confidence in managing cases. Compliance with infection control practices was high, but only 56.7% had received specific infectious disease training.

Conclusions: Significant knowledge gaps exist among healthcare workers regarding Mpox, highlighting the need for targeted training and awareness programs to improve preparedness and response to Mpox and other emerging infectious diseases in rural healthcare settings.

Keywords: Attitude, Epidemiology, Healthcare workers, KAP, Knowledge, Mpox, PHEIC, Zoonoses

INTRODUCTION

Mpox, formerly known as monkeypox, is a viral zoonotic disease caused by the monkeypox virus, a member of the Orthopoxvirus genus within the Poxviridae family.¹⁻³ Historically endemic to Central and West Africa, Mpox has recently garnered global attention due to increased cases and outbreaks, leading the World Health Organization (WHO) to declare it a Public Health Emergency of International Concern (PHEIC).⁴ This declaration underscores the urgency for effective public health strategies to mitigate the disease's spread, especially in non-endemic regions.

The emergence of Mpox is particularly alarming given its similarities to smallpox, a disease that has been eradicated but remains a concern due to the potential for bioterrorism and the zoonotic spillover of related viruses.^{1,3} Recent outbreaks have highlighted the importance of understanding the disease's epidemiology, transmission dynamics, and the need for preparedness at the healthcare level. In India, the first reported case of the Clade 1b strain of Mpox was documented in September 2024, emphasizing the critical need for enhanced awareness and readiness among healthcare professionals.^{5,6}

Healthcare workers (HCWs) play a pivotal role in managing infectious diseases, as their knowledge, attitudes, and practices directly influence patient care and public health responses. Despite the increasing threat of Mpox, limited research exists on the KAP of HCWs, particularly in rural healthcare settings.⁷ This gap in knowledge raises concerns about the preparedness of healthcare staff to recognize, respond to, and manage Mpox cases effectively.

Objective

The objective of this study was to assess the knowledge, attitudes, and practices regarding Mpox among healthcare workers at a rural teaching hospital in Bihar. By understanding the current level of awareness and preparedness among HCWs, this study aimed to identify potential gaps in knowledge and training that could hinder effective disease management. The findings will inform strategies to enhance the capacity of healthcare professionals to respond to Mpox and similar infectious diseases, thereby improving public health outcomes.

METHODS

Study design

This study employed a cross-sectional design to assess the knowledge and practices regarding Mpox among healthcare professionals in a rural hospital setting in India.

Study setting

The study was conducted at a teaching hospital located in Bihar, India.

Study period

This study took place from December 2024 to February 2025 (3 months).

Study participants

Participants included interns, residents, faculty members, and nursing staff actively working in the hospital. Those on extended leave or not directly involved in patient care were excluded to ensure relevant and accurate data collection.

Sample size

The sample size was calculated using a cross-sectional study formula with a 95% confidence level ($Z=1.96$), assuming a maximum variability proportion of 0.5 and a

margin of error of 0.1, resulting in an initial estimate of 97 participants. A 20% increase was applied to account for non-responses, bringing the target sample size to approximately 116.

Data collection

Data were collected using a structured, pretested, self-administered questionnaire. The questionnaire comprised several sections, beginning with demographic information such as age, gender, designation (intern, resident, faculty, nursing staff), years of experience, and any previous training on infectious diseases. The knowledge section included 12 multiple-choice questions focusing on various aspects of Mpox, including its causative agents, transmission methods, symptoms, and preventive measures. Participants' knowledge scores were categorized as poor (0-4 correct answers), fair (5-8 correct answers), and good (9-12 correct answers). Attitudes towards Mpox were evaluated using a 5-point Likert scale, assessing participants' views on the significance of Mpox as a public health threat, their confidence in managing cases, and the importance of staying informed about the disease. Practices were assessed through self-reported measures regarding the use of personal protective equipment, hand hygiene, participation in training, and preparedness for managing infectious disease outbreaks.

Data analysis

Data analysis was conducted using SPSS version 16. Descriptive statistics summarized demographic characteristics and KAP scores. Chi-square tests assessed associations between knowledge levels and demographic variables, while a two-step logistic regression analysis identified factors influencing knowledge regarding Mpox. A p value of less than 0.05 was considered statistically significant.

Ethical considerations

Ethical approval was obtained from institute ethics committee. Informed written consent was collected from all participants prior to data collection. Participants were assured of the confidentiality of their responses and the voluntary nature of their involvement in the study.

RESULTS

A total of 120 healthcare workers participated in the study. The majority were under 35 years of age (63.3%) and male (67.5%). Most participants were interns (40.0%) with less than 5 years of experience (70.8%). Most participants (85.0%) had not received training on infectious diseases (Table 1).

Table 1: Sociodemographic characteristics of participants.

Sociodemographic characteristics (n=120)	Frequency (%)
Age	
Under 35 years	76 (63.3)
35 years and older	44 (36.7)
Gender	
Male	81 (67.5)
Female	39 (32.5)
Designation	
Intern	48 (40.0)
Resident	26 (21.7)
Faculty	28 (23.3)
Nursing staff	18 (15.0)
Years of experience	
Less than 5 years	85 (70.8)
5 years and more	35 (29.2)
Received infectious disease training	
Yes	18 (15.0)
No	102 (85.0)

Table 2: Association between knowledge regarding mpox and demographic factors.

Demographic variables	Knowledge score			Univariate		Multivariate	
	Poor (0-4) (N=79)	Fair (5-8) (N=26)	Good (9-12) (N=15)	Chi square	P value*	OR (95%CI)	P value*
Age							
<35 years (n=76)	66 (86.8)	9 (11.8)	1 (1.3)	43.9	<0.001	0.825 (0.101-4.96)	0.840
≥35 years (n=44)	13 (29.5)	17 (38.6)	14 (31.8)				
Gender							
Male (n=81)	55 (67.9)	16 (19.8)	10 (12.3)	0.588	0.745	2.144 (0.458-10.27)	0.329
Female (n=39)	24 (61.5)	10 (25.6)	5 (12.8)				
Designation							
Intern (n=48)	46 (95.8)	2 (4.2)	0 (0.0)	76.8	<0.001	8.677 (1.474-71.90)	0.023
Resident (n=26)	20 (76.9)	4 (15.4)	2 (7.7)				
Faculty (n=28)	1 (3.6)	14 (50.0)	13 (46.4)				
Nursing staff (n=18)	12 (66.7)	6 (33.3)	0 (0.0)				
Years of experience							
Less than 5 years (n=85)	74 (87.1)	10 (11.8)	2 (2.4)	58.1	<0.001	1.570 (0.131-18.84)	0.710
5 years and more (n=35)	5 (14.3)	16 (45.7)	13 (37.1)				
Received infectious disease training							
Yes (n=18)	0 (0.0)	5 (27.8)	13 (72.2)	74.7	<0.001	29.119 (5.232-247.89)	<0.001
No (n=102)	79 (77.5)	21 (20.6)	2 (2.0)				

*p value<0.05=significant

Participants had limited knowledge of Mpox, with 65.8% scoring poorly, 21.7% scoring fairly, and only 12.5% demonstrating good knowledge. Table 2 shows that younger healthcare workers (<35 years) had better knowledge of Mpox than those ≥35 years ($p<0.001$). Interns had significantly poorer knowledge than faculty and nursing staff ($p<0.001$), and those who received infectious disease training had significantly better knowledge ($p<0.001$). In terms of information sources, 57.5% of participants reported the internet as their primary source, while 28.3% relied on medical

journals/articles. Other sources included television (15%) and newspapers (13.3%). As the question allowed for multiple responses, participants indicated more than one source of information.

Most participants recognized Mpox as a significant public health threat, but 45.0% lacked confidence in managing potential cases. While many acknowledged the importance of staying informed, a significant portion remained neutral on the urgency of controlling Mpox (Table 3). High compliance with infection control

practices was noted, with 68.3% regularly using PPE and 74.2% practicing proper hand hygiene. However, only 56.7% participated in training related to infectious

diseases, and 60.0% felt prepared to manage an infectious disease outbreak (Table 4).

Table 3: Attitudes towards Mpox among healthcare workers.

Attitude questions	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean (SD)
Mpox poses a significant public health threat in my community	14 (11.7)	22 (18.3)	36 (30.0)	30 (25.0)	18 (15.0)	2.75 (1.22)
I feel confident in my ability to manage cases of Mpox if they were to occur in my healthcare setting	25 (20.8)	31 (25.8)	41 (34.2)	17 (14.2)	6 (5.0)	2.30 (1.15)
I believe that Mpox could spread rapidly within the population if not properly managed	20 (16.7)	23 (19.2)	40 (33.3)	25 (20.8)	12 (10.0)	2.75 (1.18)
It is important for healthcare professionals to stay informed and updated about Mpox to prevent outbreaks	11 (9.1)	20 (16.7)	38 (31.7)	30 (25.0)	21 (17.5)	3.00 (1.02)
I believe that the Mpox vaccine is an effective measure to prevent the spread of the disease	14 (12.0)	22 (18.0)	36 (30.0)	30 (25.0)	18 (15.0)	2.80 (1.15)

Table 4: Practices regarding Mpox among healthcare workers.

Practice Question	Yes (%)	No (%)
Do you regularly use personal protective equipment (PPE) as part of routine infection control procedures?	82 (68.3)	38 (31.7)
Do you follow proper hand hygiene (washing/sanitizing hands) after patient contact, regardless of diagnosis?	89 (74.2)	31 (25.8)
Do you stay updated on infection prevention guidelines and actively participate in training or refresher courses related to infectious disease outbreaks	75 (62.5)	45 (37.5)
Would you be able to manage a potential infectious disease outbreak in your healthcare setting?	72 (60.0)	48 (40.0)
Would you be willing to receive the Mpox vaccine if it becomes available?	66 (55.0)	54 (45.0)

DISCUSSION

This study assessed the knowledge, attitudes, and practices (KAP) regarding Mpox among healthcare workers (HCWs) at a rural hospital. The findings revealed significant knowledge gaps, with 65.8% of participants scoring poorly, and 45.0% lacking confidence in managing potential cases. Similar deficiencies in Mpox knowledge have been reported in other studies, with healthcare workers in non-endemic regions, including Egypt, Pakistan, and Nigeria, demonstrating limited awareness.⁸⁻¹⁰ These gaps in knowledge delay diagnosis, increase transmission risks, and hinder effective disease control, especially in areas where Mpox is less commonly encountered.

Younger healthcare workers (<35 years) in our study demonstrated better knowledge of Mpox, which aligns with findings from Egypt and Pakistan.^{8,9} This may be attributed to greater access to digital information. Nevertheless, addressing knowledge gaps in older

healthcare workers is essential to ensure effective outbreak responses. Furthermore, healthcare workers with prior training in infectious diseases showed better knowledge, underscoring the need for structured education and continuous professional development to equip all healthcare workers, regardless of age, with the knowledge needed to manage emerging infectious diseases.

Despite these knowledge gaps, most participants recognized Mpox as a significant public health threat. However, nearly half expressed concerns about their preparedness to handle outbreaks, a sentiment shared by healthcare workers in other studies.¹¹ These findings suggest the need for more robust training programs to build confidence in managing emerging diseases. Additionally, over 50% of participants expressed willingness to receive the Mpox vaccine, in line with findings from Egypt and Pakistan.^{8,9} However, vaccine hesitancy remains an issue in regions like Vietnam, emphasizing the importance of targeted public health

campaigns that address concerns about vaccine safety and efficacy.^{12,13}

Regarding the perception of Mpox as a global threat, only 39.8% of healthcare workers in our study viewed it as a potential global pandemic, a perception also noted in Egypt.⁸ This highlights a critical concern, as effective disease control requires not only knowledge but also an understanding of global health risks. Healthcare workers with better knowledge, such as doctors and those in urban areas, were more likely to perceive Mpox as a global threat, suggesting that rural healthcare workers may benefit from targeted education on global health issues.

Although our study participants demonstrated good compliance with basic infection control practices, such as PPE use and hand hygiene, only 56.7% had received specific training on infectious diseases. Similar concerns regarding inadequate training for emerging diseases have been raised in other countries as well.¹¹ This underscores the need for ongoing training programs that focus on emerging infectious diseases and are integrated into medical curricula and professional development initiatives. Ensuring healthcare workers are equipped to handle new health threats is crucial for improving public health responses.

This study provides valuable insights into Mpox awareness and preparedness among healthcare workers in a rural setting. It includes a diverse group of professionals, offering a broad perspective on the issue. However, it has some limitations. The study was conducted at a single hospital, which may affect the generalizability of the results. Additionally, self-reported data could introduce bias, and the cross-sectional design limits the ability to assess long-term trends. Further studies are needed to explore these aspects in greater detail.

CONCLUSION

This study highlights critical gaps in knowledge and preparedness among healthcare workers, emphasizing the urgent need for targeted training and awareness programs. Addressing these gaps through continuous education and practical preparedness strategies will strengthen healthcare systems and improve responses to Mpox and other future outbreaks. Public health initiatives should prioritize training, improving infection control practices, and tackling vaccine hesitancy to ensure better management and containment of such diseases.

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REFERENCES

1. World Health Organization (WHO). Mpox. Available from: <https://www.who.int/news-room/fact-sheets/detail/mpox>. Accessed on 12 January 2025.
2. Breman JG, Steniowski MV, Zanotto E, Gromyko AI, Arita I. Human monkeypox, 1970-79. Bull World Health Organ. 1980;58(2):165-82.
3. World Health Organization (WHO). Monkeypox: experts give virus variants new names. 2022. Available from: <https://www.who.int/news/item/12-08-2022-monkeypox--experts-give-virus-variants-new-names>. Accessed on 24 January 2025.
4. World Health Organization. WHO Director-General declares Mpox outbreak a Public Health Emergency of International Concern. 2024. Available from: <https://www.who.int/news/item/14-08-2024-who-director-general-declares-mpox-outbreak-a-public-health-emergency-of-international-concern>. Accessed on 24 January 2025.
5. National Centre for Disease Control. Communicable Disease Alert: Mpox. New Delhi: NCDC; 2024. Available from: <https://ncdc.mohfw.gov.in/wp-content/uploads/2024/08/CD-Alert-Mpox-August-2024.pdf>. Accessed on 29 January 2025.
6. Press Information Bureau. India reports first case of Mpox from fast-spreading clade 1b variety. New Delhi: PIB; 2024. Available from: <https://static.pib.gov.in/WriteReadData/specificdocs/documents/2024/sep/doc2024910390801.pdf>. Accessed on 2 February 2025.
7. Ministry of Health and Family Welfare, Government of India. Guidelines for management of monkeypox disease. 2022. Available from: <https://ihpoe.mohfw.gov.in/RTI/Monkeypox%20Guidelines.pdf>. Accessed on 8 January 2025.
8. Amer FA, Nofal HA, Gebriel MG, Bedawy AM, Allam AA, Khalil HES, et al. Grasping knowledge, attitude, and perception towards monkeypox among healthcare workers and medical students: an Egyptian cross-sectional study. Front Cell Infect Microbiol. 2024;14:1339352.
9. Kumar N, Ahmed F, Raza MS, Rajpoot PL, Rehman W, Khatri SA, et al. Monkeypox Cross-Sectional Survey of Knowledge, Attitudes, Practices, and Willingness to Vaccinate among University Students in Pakistan. Vaccines. 2022;11(1):97.
10. Orok E, Adele G, Oni O, Adelusi A, Bamitale T, Jaiyesimi B, et al. Assessment of knowledge and attitude of healthcare professionals towards Mpox in a Nigerian hospital. Sci Rep. 2024;14(1):27604.
11. Abd ElHafeez S, Gebreal A, Khalil MA, Youssef N, Sallam M, Elshabrawy A, et al. Assessing disparities in medical students' knowledge and attitude about

monkeypox: a cross-sectional study of 27 countries across three continents. *Front Public Health*. 2023;11:1192542.

12. Nguyen HTN, Nguyen TV, Tran KV, Nguyen HV, Vo LY, An PL, et al. Healthcare providers' knowledge, attitude, and practices regarding prevention of Mpox in Vietnam. *Sage Open*. 2024;14(4):21582440241306827.
13. Ghazy RM, Okeh DU, Sallam M, Hussein M, Ismail HM, Yazbek S, et al. Psychological Antecedents of

Healthcare Workers towards Monkeypox Vaccination in Nigeria. *Vaccines*. 2022;10(12):2151.

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