

## Exploring the Knowledge and Attitude of Medical and Allied Health Sciences Students towards Monkey Pox Virus



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### Abstract

**Background:** Human Monkey Pox (HMPX) is a zoonotic disease caused by the pathogenic agent Monkeypox Virus (MPXV) and remains a global health burden. After Africa, its outbreak has been reported in America, Europe, and a few other regions of Africa. While quite a few cases were also reported in Pakistan. Although it is a self-limiting disease, it remains a potential threat to the human population, with an increasing morbidity rate and case fatality rate.

**Methods:** In a cross-sectional study conducted from September to December 2022, the aim was to assess the knowledge and attitudes of medical and allied health students regarding Mpox. Three hundred students from various medical and allied health departments at Hamdard University of Karachi participated in the study using convenience sampling. They were given an electronic questionnaire to gather their responses.

**Results:** The findings showed that participants had an average knowledge of ( $X^2=1.080$ ,  $p>0.05$ ). Many participants showed positive attitudes towards disease ( $X^2=67.22$ ,  $p<0.001$ ). Based on gender, the knowledge of male participants was better ( $X^2=17.32$ ,  $p<0.01$ ), whereas attitude was positive in both genders ( $X^2=24.87$ ,  $p<0.01$ ). MBBS and Pharm D students demonstrated average knowledge ( $X^2=81.058$ ,  $p<0.01$ ) while DPT students showed positive attitudes toward Mpox.

**Conclusion:** Knowledge regarding emerging pandemics needs to be improved in students of health professions. Thus, a more focused learning attitude is crucial to developing a futuristic professional attitude.

### Keywords

Healthcare, Knowledge, Monkeypox, Pandemic.



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## Introduction

Human Monkeypox (HMPX) is recognized as an “international public health concern” by the World Health Organization (WHO), where the series of multi-country outbreaks of HMPX continues to increase across the globe<sup>1</sup>. The smallpox virus and other orthopoxviruses are members of the same family as the virus that causes Monkeypox (Mpox). Mpox outbreaks were prevalent in American and Dutch monkey colonies between 1958 and 1968; these epidemics included casualties but no documented human infections<sup>2</sup>. Although it is a self-limiting disease, it remains a potential threat to a human population with an increasing morbidity rate and case fatality rate (CFR) of up to 11% with significant potential to spread to non-endemic regions<sup>3</sup>.

Monkeypox virus (MPXV) is an enveloped, complex double-stranded DNA virus of genome 190 kb, compromising more than 200 open reading frames (ORFs) and translating 100 viral proteins<sup>4</sup>. The zoonotic transmission event occurs significantly with direct contact with animal reservoirs and through bites, consumption of animal products, body fluids, and respiratory droplets<sup>5</sup>. The spread of the infection is further elicited by secondary transmissions, i.e., human-to-human contact. Notably, during the viral pandemic, the course of transmission (specifically secondary transmission) provides an opportunity and time for MPXV to improve its pathogenicity against a human host significantly<sup>6</sup>.

In light of previous studies, it is established that HMPX exhibits a similar clinical presentation as smallpox. Furthermore, infection under consideration comprises three distinct phases: 1) incubation, 2) prodrome, and 3) eruptive stage. The latency period of HMPX usually lasts from 6 to 13 days but can range from 5 to 21 days<sup>7</sup>. Furthermore, HMPX exhibits a broad spectrum of mild to severe symptoms, including back pain, conjunctivitis, fever, generalized headache, fatigue, lesions, lymphadenopathy, myalgia, pruritus, rash, and sore throat. The symptoms can significantly be affected by the route of transmission<sup>8</sup>.

Understanding the associated knowledge and attitudes is essential to successfully prevent, detect, and manage Mpox<sup>9</sup>. Healthcare workers educate the public about its symptoms, transmission routes, and prevention strategies<sup>10</sup>. Improving surveillance methods and international cooperation are essential to stop the virus's spread. Pakistan, a low-middle-income country, faces problems due to unequal resource distribution. In 2021, the nation allocated only 1.2% of its gross domestic product to healthcare, coming far short of the World Health Organization's recommended 5%<sup>11</sup>. As of December 1, 2022, there have been 81,225 reported cases and 56 fatalities across 110 locations worldwide. From January 1 to November 17, 2022, 80,221 confirmed cases and 52 deaths have been reported to the WHO from 110 countries<sup>12</sup>. Globally, 84,318 confirmed cases had been recorded by January 5, 2023. Of those cases, 83,127

were discovered in areas with no prior history of Mpox (103 nations), with 1191 cases found in regions where the virus is known to exist (7 countries)<sup>13</sup>. The National Institute of Health (NIH), Islamabad, confirmed the first occurrence of Mpox in Pakistan on April 25, 2023, in a 25-year-old man who had travelled to Saudi Arabia<sup>14</sup>. Local news reports claim that four additional suspected cases of Mpox were recently isolated at government isolation centres near Karachi airport, with two of them travelling to Somalia<sup>15</sup>.

On the contrary, a report presented by WHO demonstrated the need for more awareness of HMPX amongst healthcare professionals. To a greater extent, the general public can significantly cause hindrance in preventing HMPXV epidemics and pandemics<sup>16</sup>. Thus, this study aimed to determine the awareness of HMPX disease among Pakistan's healthcare professionals and assess knowledge and attitude<sup>17</sup>.

## Methodology

### *Study Design and Duration*

A cross-sectional study was conducted from September to December 2022 to determine medical and allied health students' knowledge and attitude about Mpox.

### *Sample Size and Target Population*

A sample of n=300 was estimated based on 25% anticipated frequency, 95% confidence interval, and 5% error through Open EPI, a sample size calculator. The students were enrolled from the Departments of Medicine, Dentistry, Pharmacy, Eastern Medicine, and Physical Therapy at Hamdard University through a convenience sampling technique.

### *Inclusion Criteria*

- Both male and female students.
- Aged 18 to 28 years.
- Mentally and physically fit students.
- Provided consent for participation.
- Students belong to the health and medical sciences disciplines.

### *Exclusion Criteria*

- Students of non-medical background.
- Revocation of consent.

### *Developing Questionnaire*

To devise an appropriate questionnaire, the researcher reviewed published studies employing the keywords “**monkeypox**”, “**knowledge**”, and “**attitudes**” from databases, libraries, and websites, i.e. Google Scholar and PubMed Central, Centers for Disease Control and Prevention, and WHO respectively. The relevant articles were selected and thoroughly reviewed; thus, a questionnaire is self-designed in English with closed-ended questions. It comprised: 1. Knowledge

(9 items) and 2. Attitude (3 items). Thus, an electronic form of this questionnaire was generated and disseminated to the participants for data collection<sup>18</sup>.

### Statistical Analysis

The data was analyzed using IBM SPSS version 22. The independent t-test was applied to determine the potential variations among variables. The qualitative variables were presented as frequencies and percentages to evaluate the knowledge and attitude of HMPX disease among healthcare professionals. The questionnaire was validated using Cronbach's alpha analysis of scale. Pearson's chi-square was applied to observe the knowledge and attitude of the respondents toward HMPX disease. The results were considered significant at  $p < 0.05$ .

### Results

The reliability of knowledge measures was determined to be 0.781 for 9 items and 0.71 for 3 items related to attitudes. The results indicated that, on average, participants had a moderate level of knowledge ( $X^2=1.080$ ,  $p > 0.05$ ). However, most exhibited positive attitudes towards the disease in question ( $X^2=67.22$ ,  $p < 0.001$ ). Further analysis based on gender revealed that male participants possessed better knowledge ( $X^2=17.32$ ,  $p < 0.01$ ), yet positive attitudes were similarly high among both genders ( $X^2=24.87$ ,  $p < 0.01$ ). Education-based stratification showed that Medicine and Pharm D students had an average knowledge score ( $X^2=81.058$ ,  $p < 0.01$ ), while DPT students were more likely to hold positive attitudes. In contrast, students of Eastern Medicine were observed to have a 100% negative attitude ( $X^2=118.28$ ,  $p < 0.01$ ). These specifics are detailed further in Table-1.

Table-1 Demographic Details of Participants			
Variable	Value	n (%)	$\chi^2$
			p-value
Age	< 20 years	129 (43%)	$X^2= 5.880$ $p=0.015$
	> 20 years	171 (57%)	
Gender	Male	106 (35.3%)	$X^2=162.540$ $p=0.000$
	Female	187 (62.3%)	
	Not Specified	7 (2.3%)	
Education	MBBS	100 (33.3%)	$X^2=122.700$ $p=0.000$
	BDS	4 (1.3%)	
	PHARM D	99 (33%)	
	DPT	69 (23%)	
	Eastern Medicine	28 (9.3%)	

In a survey about the HMPX virus perceptions, a majority of participants (45%) believed that the virus could infect individuals across all age groups. Regarding the prognosis of the disease, nearly half (48.7%) were unsure of the outcome. Concerning their own vulnerability, a significant portion (47.3%) did not know their chances of contracting the virus, though a clear concern for transmission and impacts was noted. When considering whom they would contact if diagnosed, 46% mentioned they would first inform their families, while 39% would reach out to their family physicians. This highlights a strong leaning towards medical support and familial connections in times of health crises. Uncertainty was also evident in views on how the virus spreads, with 31.7% acknowledging its ease of transmission between people. However, 42.7% identified skin lesion contact as a primary route, and a smaller segment concerned with other modes. Post-diagnosis concerns were significant, with 70% worried about spreading the virus to family members. The impact of the disease on personal health was a concern for 28.9% of participants, and financial burdens were considerable for 16% of the respondents. This summary reflects key insights into public perceptions and responses regarding the HMPX virus, underlining common concerns and areas of uncertainty among the surveyed population. Detailed statistical data supporting these points is provided in Table-2.

Table-2 Participants Responses on HMPX Disease Questionnaire			
Questions	Options	N (%)	$\chi^2$
			p-value
Knowledge			
Have you heard of the disease?	Yes	226 (75.3%)	$\chi^2=254.960$ $p=0.000$
	No	66 (22%)	
	Don't know	8 (2.75%)	
Source of information about HMPX	Newspaper	9 (3%)	$\chi^2=769.233$ $p=0.000$
	Social media	252 (84%)	
	Family friends	12 (4%)	
	Health workers	8 (2.7%)	
	Don't know	19 (6.3%)	
Pathogenic agent of the respective disease	Bacterial infection	32 (10.7%)	$\chi^2=240.987$ $p=0.000$
	Viral infection	187 (62.3%)	
	Fungal infection	15 (5%)	

	Don't know	66 (22%0	
<b>Attitude</b>			
<b>What are the major symptoms?</b>	Fever	37 (12.3%)	X <sup>2</sup> =74.400 p=0.000
	Feeling of discomfort	74 (24.7%)	
	Headache	57 (19%)	
	Fatigue	19(6.3%)	
	Swollen lymph nodes	38(12.7%)	
	Rash	36(12%)	
	Back pain	26(8.7%)	
	Don't know	13(4.3%)	
<b>What is the incubation period of the disease?</b>	>5 days	37 (12.3%)	X <sup>2</sup> =107.067 p=0.000
	5-21 days	123 (41%)	
	≥ 21 days	24 (8%)	
	Don't know	116 (38.7%)	
<b>Does the disease spread easily?</b>	Yes	185 (31.7%)	X <sup>2</sup> =133.580 p=0.000
	No	93 (31%)	
	Don't know	22 (7.3%)	
<b>If yes then, what are the routes of transmission?</b>	Skin lesions	128 (42.7%)	X <sup>2</sup> =227.367 p=0.000
	Respiratory droplet infection	44 (14.7%)	
	Bedding/towels	9(3%)	
	Sexual activity	4(1.3%)	
	Don't know	115 (38.3%)	
<b>The most common age group affected by this disease</b>	Infants /toddlers	40 (13.3%)	X <sup>2</sup> =142.067 p=0.000
	Adolescents	37(12.3%)	
	Senior citizen	17(5.7%)	
	All	135(45%)	
	Don't know	71(23.7%)	

What is the prognosis of the disease?	Fatal	30 (10%)	X <sup>2</sup> = 165.033 p=0.000
	Resolve in a weeks	22 (7.3%)	
	Resolve in 2 weeks	51 (17%)	
	Resolve in 3 weeks	51 (17%)	
	Don't know	146 48.7%)	

## Discussion

The evaluation of awareness and knowledge regarding HMPX at Hamdard University in Karachi, Pakistan, provides insight into the current understanding of the disease among medical and allied health sciences students. The university, known for its extensive educational facilities, hosted this survey with a diverse participation pool, primarily from the medical, pharmacy, and physiotherapy departments.

The participants' demographics indicate a balanced mix of genders and a significant representation from various departments, showcasing the inclusive approach of the study. Interestingly, a significant portion of the respondents were above 21 years of age, which could have influenced the maturity and seriousness of the responses. A key finding of this study is the broad awareness of HMPX among most students despite varying degrees of detailed knowledge. This awareness is crucial in medical education, where a foundational understanding of emerging diseases is essential<sup>19</sup>. Notably, social media and other online sources are the primary channels through which students have acquired information about HMPX. This trend aligns with global observations regarding the role of digital platforms in health education, as discussed in recent research<sup>20</sup>. However, relying on such sources also emphasizes the need for students to have critical evaluation skills to discern accurate information.

Comparatively, a study at the University of Bangladesh exhibited more detailed knowledge about Mpox among students<sup>21</sup>. This contrast could be attributed to different educational frameworks, resources, or the curriculum's emphasis on infectious diseases<sup>22</sup>. The global health community recognizes the importance of comprehensive education on infectious diseases, as evidenced by WHO guidelines and various health education models.

The survey also revealed gaps in understanding the transmission and source of HMPX, indicating areas for improvement in health education curricula. Addressing these gaps is crucial, especially in misinformation-prone topics like disease transmission. Encouragingly, a minority of students have engaged with professional healthcare workers for information, highlighting healthcare professionals' role in education beyond clinical settings<sup>23-24</sup>.

Health sciences education should increasingly leverage reliable digital platforms while fostering critical thinking and evaluation skills by incorporating these findings. Additionally, enhancing interactions between students and healthcare professionals could be beneficial. This approach broadens students' knowledge base and prepares them to communicate health information effectively in their future professional roles<sup>25-26</sup>.

This analysis contributes to the ongoing discourse on health education and awareness, emphasizing the need for adaptable, multi-channel educational strategies that reflect the changing landscapes of both health threats and information dissemination. Future studies could explore the effectiveness of these strategies in enhancing awareness and understanding of not just HMPX but other emerging infectious diseases as well.

## Conclusion

There is currently limited information about Mpox, with most data coming from individual cases, outbreak reports, intermittent surveillance, and various other sources. As a result, there is a significant knowledge gap regarding Mpox, including its evolving epidemiologic and clinical manifestations and the factors involved in its transmission. In order to effectively monitor, collect data, prevent, and respond to Mpox, it is crucial to strengthen public health and surveillance capacities in Pakistan. This will require coordinated, locally-led, interdisciplinary efforts focused on capacity development and training to improve public health preparedness. It is also essential to align proactive surveillance programs with priority research areas.

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## Conflict of Interest

None.

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None.

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The following authors have made substantial contributions to the manuscript as under:

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All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.



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