Are Saudi Healthcare Workers (HCW) Willing to Receive the Monkeypox Virus Vaccine

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Abstract

Early experience with Covid-19 shows that vaccines can be the most effective way of preventing the spread of infection. However, vaccine hesitancy is among the most significant hurdles in preventing the spread of novel infections. Monkeypox (MPX) has already been declared a global health emergency by WHO. Thus, there is an urgent need to understand the MPX vaccine willingness in various population groups. In this cross-sectional study, an online survey was conducted among Saudi healthcare workers (HCWs) to understand the monkeypox vaccine willingness in healthcare workers in Saudi Arabia. Saudi has already confirmed multiple MPX cases, and thus it is essential to initiate timely protective measures, including vaccination. The study had 743 respondents. The study found that among Saudi HCWs, 52.7% were willing to receive the MPX vaccine. The study found that sociodemographic factors had a small impact on vaccine willingness. However, early experience with vaccination had a significant impact. Thus, more than 70% who had influenza or COVID-19 vaccine were willing to receive the MPX vaccine. Some of the most significant concerns influencing vaccine acceptability were the safety and efficacy of the vaccine. Hence, it is strongly recommended to focus on disseminating information regarding the safety and efficacy of the MPX vaccine.

Keywords: Monkeypox vaccine, vaccine willingness, healthcare workers

Introduction

The coronavirus (COVID-19) pandemic is far from over. Now, it seems that another kind of global health emergency is emerging. COVID-19 has affected more than 630 million people by the autumn of 2022, causing more than 6.5 million death tolls.[1] Monkeypox (MPX) cases have constantly been rising; thus, WHO declared it a global public health emergency.[2], [3] There are already close to 80,000 confirmed cases of MPX globally. MPX cases have been reported from 110 nations, with confirmed 50 deaths.[4] Though these figures might not sound massive, experts warn against the potential risk of underestimating the threat or responding too late. Studies regarding the COVID-19 outbreak show that lack of vaccine availability in the early stages of the epidemic and improper

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disease containment strategies were behind the spread of the infection. Hence, experts warn that if similar mistakes are repeated with MPX, it may become a more significant threat.[5]

It is vital to understand that the COVID-19 pandemic is still ongoing, and studies show that vaccine hesitancy has emerged as a significant reason for the pandemic. For COVID-19, numerous vaccines are already available, yet many remain unvaccinated. That is why researchers call vaccine hesitancy a most significant health threat, a driving force behind the pandemic. [6], [7] It only underlines the importance of identifying the factors influencing the willingness to receive the vaccine in different population groups. Moreover, when it comes to monkeypox, vaccines are already available since studies show that smallpox vaccines are highly effective in countering infection. Thus JYNNEOS vaccine and ACAM2000 vaccine can help prevent the spread of the infection.[8]–[10]

Monkeypox virus is Orthopoxvirus belonging to the family Poxviridae. It causes a self-limiting illness lasting 2-4 weeks and has a mortality rate of 3-6%. It is transmitted by coming in close contact with a person or animal infected with the virus. Its clinical picture somewhat resembles smallpox with widespread lesions. In this condition, skin eruptions begin 1-3 days after the appearance of fever. Lesions are commonly present on the face, hands, and soles of the feet, mucous membranes, and genitalia. The infection is mainly endemic to West Africa, in the nations like the Democratic Republic of the Congo, Nigeria, Gabon, Sierra Leone, and Cote d'Ivoire. However, its outbreaks outside Africa have been reported earlier, like the 2003 outbreak in the US.[11] Nonetheless, the present outbreak is unique, as it is the first time that MPX has been reported in so many nations. Though the total number of cases reported in Saudi Arabia remains low, it still poses a significant public health threat. To date, less than 10 cases have been confirmed in Saudi Arabia. However, it is pretty likely that cases are under-reported[4]. Most cases in Saudi were imported from other nations, which also means that tourism, a huge sector in Saudi, poses a significant threat.[9], [10]

Keeping in mind that MPX poses a significant public health threat, it is vital that vaccination must start with healthcare workers since they are most likely to come in contact with the infection. Early experience with COVID-19 shows a lack of understanding of the risk posed by infection by travelers and vaccine hesitancy caused the epidemic in Saudi.[12] Moreover, educating the population about the risks requires much effort, as shown by the lack of awareness and slow uptake of the COVID-19 booster dose in Saudi Arabia.[13] Early studies suggest that when it comes to MPX, there is a lack of sufficient knowledge about the disease in the general population and healthcare workers. Even though the public health threat posed by MPX remains moderately high.[14] Apart from the global spread of MPX and vaccine hesitancy, other significant causes for concern in Saudi are tourism within the nation and neighboring countries and major events like the upcoming FIFA World Cup 2022 in Qatar.[15] Similarly, a threat is posed by the people visiting the gulf nations, especially from South Asia. Data shows that UAE and Saudi Arabia are among the most common destinations for South Asians, and identification of MPX in these nations cannot be neglected.[16] Hence, there is a need to introduce MPX vaccination to Saudi healthcare workers. Additionally, based on early experience, understanding the willingness to receive the MPX vaccine and identifying the factors affecting vaccine acceptability are the need of the hour. Thus, this study explores how ready are Saudi healthcare workers to receive the MPX vaccine.

Materials and Methods

Study Design and Participants

This study adopted the cross-sectional method and conducted an online survey from September 13th, 2022, to November 13th, 2022. Using Google forms, the online questionnaire was distributed

among healthcare workers in the kingdom of Saudi Arabia. Healthcare workers of age >20 from primary healthcare, secondary healthcare, tertiary healthcare (Hospitals), and private clinics from all regions in Saudi Arabia were invited to participate in the questionnaire. Participants outside the specialty and with uncompleted forms were excluded from the study. Similarly, those providing delayed responses were excluded.

Sample size estimation

A Chinese cross-sectional study done in 2022 formed the basis for calculating sample size, assuming that 96.0% of healthcare workers (HCWs) are willing to receive MPX vaccines.[17] The sample size was calculated based on the formula: $n = Z^2_{1-\alpha/2} P (1 - P)/e^2$ (n = the minimum number of respondents required; $Z^2 = (1.96)2$ relative to the 95% confidence interval; P = the prevalence rate estimated in the previous study; e = the required accuracy (4%); and the estimated non-response rate for this study was 5%). The minimum sample size of n for this study was calculated at 97 HCWs.

Ethical Approval

The study was ethically approved by the committee of medical ethics at the Security Forces Hospital Program in Makkah (HAP-0 2-K-052). Consent was taken from all participants at the beginning of the survey after conveying the study's objective, research method, and their rights. Participants' confidentiality was protected at all times of the study. Study questions were designed to ensure scientific validity. Since it is a self-reported survey, thus favorable risk-benefit ratio was established. In addition, researchers ensured that the study followed ethical guidelines set forth by the Declaration of Helsinki (2000).

Questionnaire survey

An anonymous self-report survey was applied to investigate respondents' attitudes and acceptance of the MPX vaccines. The survey questionnaire was retrieved from the previous studies done in China and Indonesia and thus was regarded to have been validated.[17], [18] It was written in English and divided into three main sections. (1) Demographical data, which includes the participant's age, gender, residence, education level, occupation, department, hospital level, working years, monthly income, and chronic diseases. (2) Next, the participant's attitude towards MPX vaccines. To assess the participant's acceptance, the following questions were asked. "Do you think MPX vaccination will reduce the risk of MPXV infection and its complications? Do you think vaccination is necessary to control MPXV infection? Are you worried about the possible side effects of MPX vaccines? Are you concerned about the effectiveness of MPX vaccines? Are you concerned about the safety of MPX vaccines? Are you worried about the defects of MPX vaccines? Are you willing to receive the MPX vaccine only with enough information available? Do you think MPX vaccination should be made compulsory? and would you encourage your parents and friends to receive MPX vaccination?" (3) It was concluded with the survey to measure participants' willingness to accept MPX vaccination with the choices of 'yes and know.' Out of all participants, those who chose yes were believed to belong to the "vaccine acceptance" group. On the other hand, those who chose no were thought to belong to the "vaccine hesitancy" group. Additionally, the survey also included infodemic-related questions like what sources of information they trust, like MOH, CDC, religious leaders, and others.

Statistical analysis

The statistical analysis was performed using the SPSS version 21.0 (Chicago, Illinois, USA). Numbers and percentages were used to convey participants' demographical characteristics and responses.

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The chi-square test was used to evaluate the relationships between independent variables (demographical and sociological characteristics in addition to their attitudes toward MPX vaccines) and dependent variables (participants' willingness to receive the MPXV vaccines). $P < 0.05$ was considered statistically significant. Variables with $P < 0.05$ in univariate analysis were evaluated via multivariate logistic regression analysis to estimate the factors that affect their decision of willingness to take MPX vaccines, where the variables were described using odds ratio (OR) and 95% confidence interval (CI).

Results

Demographic characteristics of HCWs and willingness to receive MPX vaccine

The invitation was sent to 800 HCWs; out of them, 23 did not respond or refused to participate in the study, and another 34 did not complete the survey. Thus, 743 responses were included in the study. It means that survey had a response rate of 92.9%. The participation of males and females was almost equal. Among the respondents, 68% were Saudi nationals, and the rest non-Saudi. Further, there was equal participation from respondents from urban and rural areas. 40% of the respondents were physicians, 28.5% were nurses, and the rest were pharmacists and other HCWs.

Out of the respondents, 392 (52.7%) were willing to receive the MPX vaccine, and 351 (47.3%) were unwilling. It appears that the age of HCWs did not influence the willingness to receive the vaccine, with close to 50% willing to receive the vaccine in various age groups. However, those older than 56 years were more willing (61.9%) (Table 1). Similarly, gender, marital status, and nationality did not significantly influence willingness to get vaccinated. However, those with lower education, that is, below diploma level, were more willing (58.1%) than PhD or equivalent (39.7%).

Table 1 Relationship between willingness to receive the vaccine and sociodemographic factors

Characteristic			Willingness to receive the (MPXV) vaccine		Total (743)	P value
			No 351 (47.3%)	Yes 392 (52.7%)		
Age	<25	N	173	205	378	0.781
		%	45.8%	54.2%	100.0%	
	26-35	N	121	125	246	
		%	49.2%	50.8%	100.0%	
	36-45	N	32	33	65	
		%	49.2%	50.8%	100.0%	
	46-55	N	17	16	33	
		%	51.5%	48.5%	100.0%	
	>=56	N	8	13	21	

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		%	38.1%	61.9%	100.0%	
Gender	Female	N	178	200	378	0.933
		%	47.1%	52.9%	100.0%	
	Male	N	173	192	365	
		%	47.4%	52.6%	100.0%	
Marital status	Single	N	191	224	415	0.428
		%	46.0%	54.0%	100.0%	
	Married	N	141	154	295	
		%	47.8%	52.2%	100.0%	
	Divorced/Widowed	N	19	14	33	
		%	57.6%	42.4%	100.0%	
Nationality	Non-Saudi	N	111	127	238	0.821
		%	46.6%	53.4%	100.0%	
	Saudi	N	240	265	505	
		%	47.5%	52.5%	100.0%	
Education level	Below diploma	N	26	36	62	0.083
		%	41.9%	58.1%	100.0%	
	Diploma	N	29	28	57	
		%	50.9%	49.1%	100.0%	
	Bachelor's	N	220	272	492	
		%	44.7%	55.3%	100.0%	
	Master's	N	41	33	74	
		%	55.4%	44.6%	100.0%	
	PhD or equivalent	N	35	23	58	
		%	60.3%	39.7%	100.0%	

Practice-related characteristics of HCWs and willingness to receive the MPX vaccine

The study found that physicians and pharmacists were more willing (57.5% and 56.1%) than nurses (46.7%). There was also an association between vaccine acceptability and professional experience,

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with those with experience of fewer than 5 years more willing (53%) than HCWs with experience exceeding 10 years (46.6%). However, when it comes to the nature of work, those working in hospitals were less likely (44.7%) to opt for the vaccine than primary healthcare workers (57.9%).

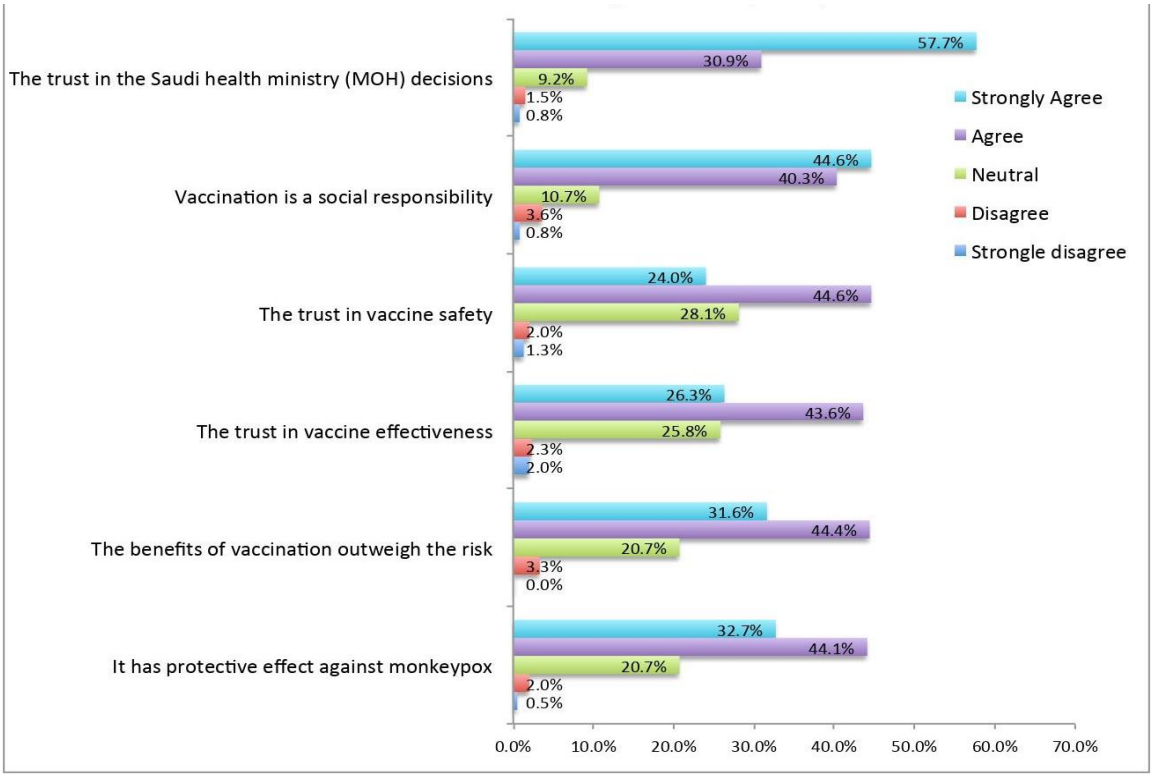
Attitudes to other vaccines and willingness to receive the MPX vaccine

Data shows that those who got the influenza vaccine annually were more willing to get vaccinated (61.6%) than those who never got an influenza shot (49.4%). Those who were concerned about monkeypox infection were more likely to get vaccinated than those not concerned (69.2% vs. 43.2%). If a person knew someone who became ill due to monkeypox, it significantly increased their willingness to get vaccinated (70.3%). Those who received the COVID-19 vaccine were significantly more likely to opt for the vaccine (54.1%) than those who did not receive the vaccine (33.3%).

Reasons for willingness to receive the vaccine

Those who were willing to receive the vaccine said that the main reason is their trust in the Saudi Health Ministry (MOH) (57.7%) and their understanding that the vaccine is a social responsibility (44.6%). Other reasons to get vaccinated were trusted in vaccine safety, effectiveness, benefits outweigh the risk, and confidence that it is protective against monkeypox (Figure 1).

Table 2: Reasons to receive MPX vaccine



Further, 74.7% of respondents said they were motivated (Figure 2) by the need to protect their health, family and friends. Another 60%-62.8% were motivated by the reason to protect patients and the community. Protecting the health of co-workers was also a significant motivating factor.

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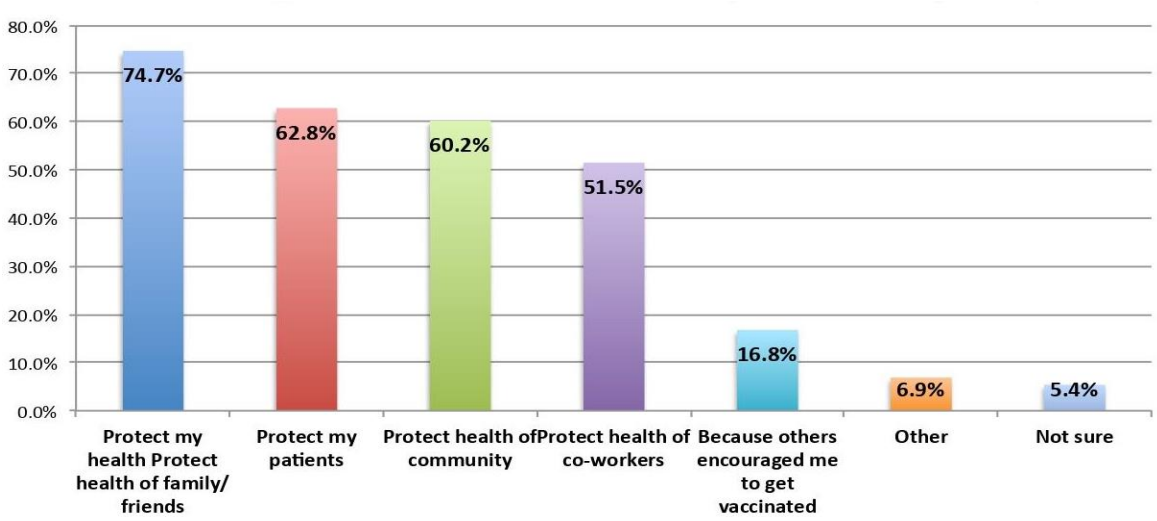
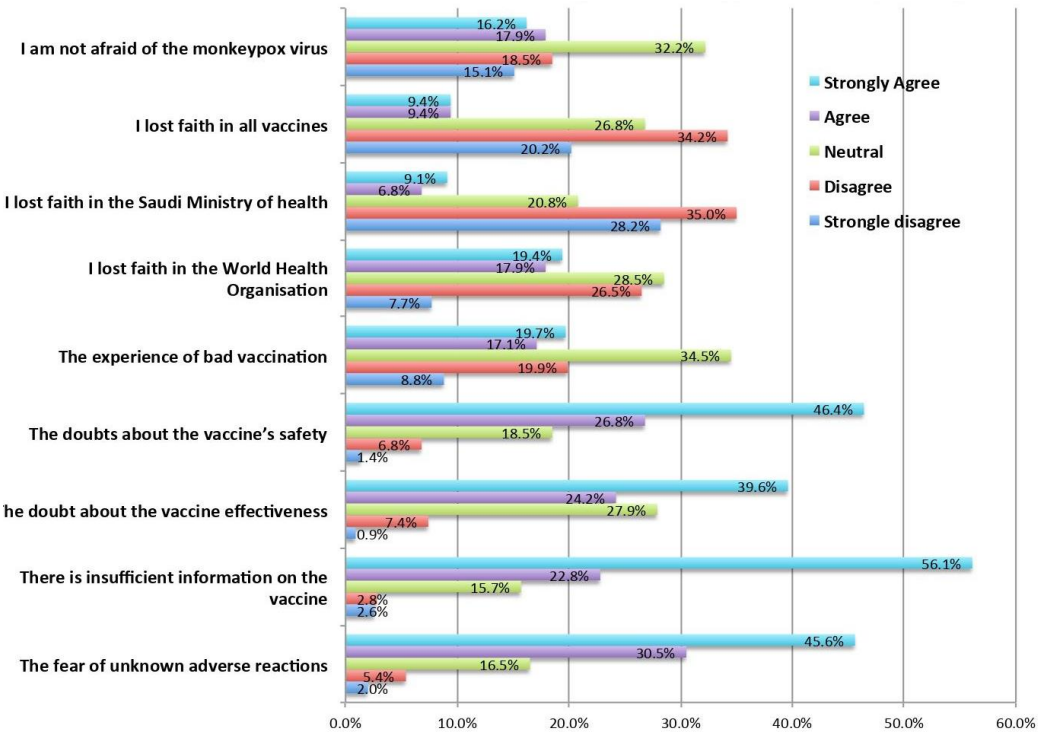
Table 3 Motivating factors for receiving MPX vaccine



Reasons why unwilling to receive the MPX vaccine

When it comes to identifying the reasons for unwillingness, the most common reason was insufficient vaccine information, fear of unknown adverse reactions, and doubts over vaccine effectiveness and safety (Figure 3).

Table 4 Reasons for unwillingness to receive MPX vaccine



Discussion

MPX has been endemic in parts of Africa, mainly in western Africa, with sporadic and self-limiting outbreaks outside the continent. However, the present outbreak differs; it is the first major outbreak with cases reported from 110 nations.[4] This has led to the WHO calling it a global public health emergency.[3] There are reasons for raised concerns, as the virus is adapting to the human body and

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undergoing mutations. Hence, there is a risk that infection may become more widespread.[19] Hence, it is essential to stop the spread of the infection in its early stages. Since the world is better interconnected, the only way to prevent global pandemics is by ensuring that each nation takes adequate and timely measures. At present, very few cases have been reported in Saudi, and they have been imported. However, there are chances of under-reporting. Additionally, there is a significant risk that many more cases might be imported to Saudi, resulting in human-to-human disease transmission. Since healthcare workers (HCWs) are at the greatest risk of exposure, any vaccination effort must begin with them. Fortunately, smallpox vaccines are highly effective in providing sufficient immunity against the infection. If such a need arises, understanding the attitudes of HCWs towards the vaccines may help device better policies in initiating vaccine campaign focused on the general population. This is first cross-sectional study in the Saudi HCWs exploring their willingness to receive monkeypox vaccines. The study had many interesting findings.

Significant willingness to get vaccinated

Considering that only a few cases of monkeypox have been reported in Saudi, a moderate number of HCWs, yet a significant number of them, are willing to get vaccinated. More than half of the respondents (52.7%) are willing to receive the monkeypox vaccine. These numbers are significant considering that less than 10 cases have been ever reported in Saudi.[9], [10] Interestingly enough, the study did not find a significant relationship between vaccine willingness and various sociodemographic factors. Thus, age, gender, marital status, and education had a moderate influence. Nonetheless, the study found that older HCWs, that is 56 years or above, were more willing to receive vaccines, which may be explained by the higher risk of health-related complications in this age group. Interestingly enough, highly educated HCWs with PhD or above were significantly less willing (39.7%) than those with below bachelor-level education (58.1%). This could be because of a smaller number of reported cases in Saudi, and thus many highly trained HCWs still do not regard monkeypox as a significant health threat.

Experience with early vaccines rather than professional characteristics matters

The study found that though professional characteristics like current role as a physician or nurse, income level, and administrative or clinical jobs matter, but such characteristics have minimal impact on willingness to receive the vaccine. Interestingly, highly experienced professionals with experience exceeding 10 years were less willing to receive vaccines than less experienced professionals (46.6% vs. 53%). However, early experience with vaccines like influenza and COVID-19 vaccine had a significant impact. For example, 61.6% who regularly received the influenza vaccine were willing to receive the MPX vaccine, compared to just 49.4% who never got the influenza vaccine. Other significant factors influencing vaccine willingness were concerns about getting infected with MPX (69.2%) and worry that they might be putting others at risk (70.3%).

Greater information from official sources may help alleviate the fears

Some of the most significant reasons for not getting vaccinated were lack of sufficient information (56.1% strongly agreed), fear of unknown side effects (45.6% strongly agreed), and doubts about vaccine effectiveness (46.4% strongly agreed and 26.8% agreed). However, more than half of the respondents strongly agreed that they trusted official information from the Saudi Health Ministry (MOH), which underlines the importance of disseminating vaccine-related information. As expected, HCWs realized that they have a social responsibility to get vaccinated. From the above finding, it is evident that MOH and other government bodies must be more active in spreading the word and

raising awareness about the vaccine. MOH should also be faster at providing approvals for the vaccines, as this would result in greater confidence in the vaccines.

Study limitations

Though the findings of the study are applicable to HCWs, however, they might not be a perfect representation of the general population. HCWs are more knowledgeable about the risks posed by specific infectious agents, and they are also aware of the benefits of vaccines. Therefore, additional studies might be needed to understand the general population's attitude toward the MPX vaccine. Additionally, it is worth keeping in mind that the study was done when there were fewer than 10 confirmed MPX cases in Saudi. However, if the number of cases arises, then the willingness to receive vaccines would change considerably.

Conclusion

This is the first study to explore the willingness to receive the MPX vaccine in Saudi HCWs. The study found that more than half of the respondents (52.7%) were willing to get vaccinated. Though there are significant concerns regarding the lack of information about the MPX vaccine's safety and efficacy, it appears that early experience with influenza and the COVID-19 vaccine has made people less hesitant towards the MPX vaccine. However, the study showed that the lack of sufficient information about the vaccine's safety and efficacy was one of the most significant concerns in HCWs. Based on the outcomes of this study, it is highly recommended to focus on increasing MPX vaccine-related awareness and disseminating greater information to reduce fears.

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