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Article *in* SSRN Electronic Journal · January 2022

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A Multinational Cross-Sectional Study on the Awareness and Concerns of Healthcare Providers Toward Monkeypox and the Promotion of the Monkeypox Vaccination

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Abstract

Background*:* The outbreak of monkeypox was recognized as a worldwide health emergency by the World Health Organization on July 18, 2022. Previous studies in low-income nations indicated that healthcare staffs have inadequate awareness of the monkeypox virus. The goal of this study is to explore vaccination advocacy among Arab medical experts and their worries about the monkeypox virus in order to create effective solutions to manage this disease. ***Methods****:* An online cross-sectional research was conducted in many Arabic countries (Egypt, Saudi Arabia, Yemen, Syria, Libya, Algeria, Tunisia, Iraq, Palestine, Jordan, and Sudan) from 2 August to 28 December, 202 to evaluate HCWs' concerns and worries about the monkeypox virus and to examine HCWs' support for vaccination. This questionnaire was designed based on a prior Saudi Arabian cross-sectional survey that included verified scales. The inclusion criteria were healthcare personnel from Arab nations, including doctors, nurses, pharmacists, and medical students. Forty-four questions are grouped into five categories: sociodemographic variables, HCWs' monkeypox knowledge, and healthcare professionals' worries regarding the monkeypox virus. The fourth portion assesses HCWs' knowledge of monkeypox infection, GAD-7 items to assess HCWs' anxiety over monkeypox. ***Results****:* We inquired 3,856 health care providers in our cross sectional study, and 56.3 % of the 3856 participants were female, and 78 % were between 21 and 30 years old. About 82% of respondents felt the need to acquire further information. The acceptability of the vaccine against monkeypox has been indicated by more than half of the participants (54.5%). Social media (58.1%), the WHO and CDC websites (31.1%), and the internet (30.2%) were mentioned as sources of monkeypox information. Concerns from monkeypox virus among participants were becoming infected themselves or their family

(61.7%), cases escalating to the point of a national lockdown (54.6%), or a worldwide pandemic (45.9%). As well, wed define that 45% of the participants are knowledgeable about the monkeypox virus, and 53.1% of people who have never had COVID-19 before are more worried about COVID-19 than monkeypox. Respondents with more than five years of work experience were less worried about monkeypox than COVID-19 (OR=0.59) (P-value< 0.05) compared to those with less than five years of work experience. Participants diagnosed with COVID-19 were 0.63 times less likely to worry about monkeypox than those who had not. A greater willingness to get the monkeypox vaccination was seen among those ages 21 to 30 (42.4%) compared to other age groups. Previous infection with COVID-19 was related to a lower chance of supporting vaccinations against monkeypox (OR=0.64, p-value<0.05) compared to no prior infection with COVID-19, and Participants with anxiety were 1.48 times more likely than those without anxiety to support vaccinations against monkeypox. Participants who disagreed that healthcare professionals should implement more stringent infection control measures were predicted to have a reduced chance of monkeypox understanding (OR = 0.38, P-value<0.05) lower than participants who agreed. ***Conclusion***: It was shown that HCWs in the Arab world is less concerned about the monkeypox virus than the COVID-19 virus. The majority of healthcare professionals have a moderate knowledge of the monkeypox virus. In addition to having a low willingness to get the vaccination against the monkeypox virus, it was evident that healthcare workers had negative attitudes toward adherence to monkeypox virus prevention methods. Setting laws for the medical staff and taking precautionary measures is crucial. It is suggested that adequate awareness programs be conducted for medical staff to clarify the dangers of underestimating the all features of monkeypox, and it is crucial to establish regulations for medical staff and take preventative measures toward monkeypox.

Keywords: Monkeypox, COVID-19, Anxiety, Vaccination, Multi-national Cross-Sectional Study

Background

Health experts are worried about the arrival of a new epidemic caused by the monkeypox virus, which they believe may pose a new threat when the world seems to be in the late stages of the coronavirus disease 2019 (COVID-19) pandemic. [1-15]. Monkeypox virus is a DNA virus with two strands that belong to the genus orthopoxviruses, which also contains variola, cowpox (CPX), and vaccinia viruses [2]. Since the Democratic Republic of the Congo (DRC) reported the first human cases of monkeypox in 1970, the disease has spread to other parts of Africa and, more recently, instances outside of Africa [3]. According to the World Health Organization (WHO), there were more than 13,069 instances of monkeypox worldwide as of July 18, 2022, with 80% of those cases occurring in the European Union [4]. Sexual transmission has been identified as a major factor in the current epidemic, particularly among males who identify as homosexual, or bisexual. Additionally, the virus may be spread via sharing beds or clothes and coming into close touch with infected sores, scabs, or bodily fluids. Compared to smallpox, the symptoms are comparable but less severe and it includes fever, rash, and lymphadenopathy characterize the clinical condition [5]. On the other hand, it is characterized by many complications the most important of which are secondary bacterial infections, keratitis that

threatens vision, encephalitis, and pneumonitis. As of late May, many cases of monkeypox have been discovered in various Middle Eastern nations. As a result of the extraordinary success achieved by the World Health Organization (WHO) in Smallpox eradication forty years ago, smallpox vaccination is no longer used, with about 70% of the population worldwide not vaccinated. Monkeypox virus can be a preventable disease when the smallpox vaccine is given due to its ability to protect from orthopox infections. Most cases of monkeypox infection have occurred in non-vaccinated individuals [6]. Healthcare workers are at high risk of contracting infectious diseases like the monkeypox virus. That increased risk stems from close contact between infected patients and healthcare staff, especially when personal protective equipment is unavailable. The third generation of the smallpox vaccine has shown high efficacy in healthcare workers' vaccination [7]. Healthcare workers may decline vaccination based on emotional and personal considerations rather than scientific knowledge of this particular situation, and if they are affected by vaccine hesitancy, they may convey this attitude to the patients they care for [8]. Healthcare workers must deal with the growing number of human monkeypox virus cases worldwide through early detection, management, and prevention. According to the WHO statement, one of the reasons for the resurgence of the infection was poor knowledge of monkeypox among healthcare workers [9]. Before the virus spreads further, it is necessary to renovate healthcare facilities and prepare for future epidemics, particularly in low-income countries with limited healthcare systems [10]. COVID-19 and monkeypox may coexist even though their viral families are different, and when this occurs, the risk of mortality is increased since the body& immunity is inadequate. During the current COVID-19 pandemic, middle-and, low-income courtiers have more to worry about due to their lower socioeconomic level and limited access to healthcare. As a consequence, they are unprepared to cope with another outbreak [11]. In Syria, the outbreak of COVID-19 as a global pandemic added fuel to the fire, putting the country's inhabitants in improbable circumstances to face the pandemic and the catastrophic effects of warfare [12]. In Jordan, a previous study found that healthcare workers had limited knowledge of the monkeypox virus, confirmed that practitioners lacked confidence in their abilities to diagnose and treat infected patients, and reported that health education programs among healthcare staff are required to raise the level of awareness [13]. The monkeypox virus has been a source of rising worry among scientists for various circumstances,

including the fact that the disease does not have a definitive treatment or vaccine until now, and the current management depends on improving symptoms and preventing complications. Succeeding the outbreak of monkeypox in many countries, concerns about the possibility of virus phenotype changing by different mutations have increased. These mutations could increase the transmission, therefore an additional burden on the already exhausted medical sector, and all of these facts contribute to increasing fears [14]. The objective of this study is to assess the concerns of healthcare workers in the Arab world about the monkeypox virus and to examine vaccine advocacy among them to create effective methods to face the disease.

Methods

Study design and setting

An online cross-sectional study was conducted from 2 August to 28 December, 2022 to assess worries and concerns among healthcare workers (HCWs) toward the monkeypox virus and examine vaccine advocacy among them. The inclusion criteria were healthcare workers from Arab countries, including physicians, nurses, pharmacists, as well as undergraduate medical students. The countries involved in this study were Egypt, Saudi Arabia, Yemen, Syria, Libya, Algeria, Tunisia, Iraq, Palestine, Jordan and Sudan. All participants were informed of the aims of the study, the work team identity, their right to withdraw from the study, and the total confidentiality of their personal information. This questionnaire was developed based on a previous cross-sectional study conducted in Arabic country “Saudi Arabia”, which includes validated scales [16]. Then the survey was translated from English into Arabic by a professional translator to ensure the total comprehension of the questions. For performing professional and nonbiased data collection process as possible, we perfumed Convenience and snowball strategies. We collected the data by creating a Google form survey and sent it to respondents through social media platforms like Facebook, WhatsApp, and Telegram. Many collaborators from each inquired Arabic country in our study were responsible on the data gathering process, and there was a lead collaborator in each involved study as local investigator to monitor the data collection and investigate if there were any random, multi-auto or illogical responses

on the online questions, and check the right current job of each respondent to avoid including any person from no-medical staff.

Sample Size Calculation

The minimal sample size was computed by interrupting a single proportion of the population formula [n = [(Zα/2)2. P (1-P)]/d2], with 95% of confidence level, (Zα/2 = 1.96), a 5% margin of error, P = the proportion of healthcare workers who were more concerned about Monkeypox disease compared to COVID-19(35.7%), and the proportion of healthcare workers who accept the vaccination(67.7%) [16]. A sample size of 385 was required, according the formula. The survey sent to 3902 participants of the Google form website; however, 41 of them chose not to participate, bringing the total number of responses to 3,856.

2.2. Measures:

The questionnaire consists of 44 questions divided into five domains. The first section contains information about the participant's sociodemographic variables. The second portion evaluates HCWs' knowledge of the monkeypox virus and their sources of information. The third section examines the perceptions and concerns of healthcare workers about the monkeypox virus. The forth section addressed questions regarding knowledge of HCWs monkeypox infection. The final section of the questionnaire included questions adapted from the Generalized Anxiety Disorder-7 (GAD-7) to assess HCWs' anxiety about the monkeypox virus.

2.2.1. Sociodemographic variables and professional characteristics:

This section includes 14 questions about the participant's demographic characteristics, including their age, country of origin, gender, marital status, place of residence, chronic disease, number of family members, economic status, and educational background (including whether they are physicians, nurses, pharmacists, or medical students and their academic year). Participants were also questioned about their working hospital type (primary, secondary, or tertiary healthcare centres). Additional information includes years of experience and the respondent's workplace within the hospital if they work in the hospital pharmacy, intensive care units, isolation departments, or elsewhere. The last question in this section investigated whether the

respondent had ever been diagnosed with a COVID-19

2.2.2. Healthcare workers' awareness and sources of information about monkeypox disease:

This section consists of 4 questions about participants' awareness of the monkeypox virus, including whether respondents had previously visited a monkeypox-endemic nation (West or Central Africa, Europe, North America, UAE, and Australia). Participants were demanded to evaluate their current awareness of the Monkeypox disease (low, high, or moderate). They also asked how informed about monkeypox disease (international health websites, social media platforms, or scientific journals) and whether they needed to read more about monkeypox following the questionnaire.

2.2.3. Perceptions and worries of healthcare workers about monkeypox disease:

This domain consists of 8 questions designed to measure the concerns and perceptions of healthcare workers, including whether respondents are concerned that the monkeypox virus will cause a global pandemic similar to COVID-19 and whether they believe that the monkeypox infection causes a more severe disease than monkeypox. They were asked to identify the cause of their monkeypox worries (their fear of being affected by the disease, concerns about developing another worldwide pandemic, or worries about national lockdown). Respondents were questioned on their acceptance of vaccination and their perceptions of which category should get the monkeypox vaccine first (elderly, children, college students, etc.).

2.2.4. Knowledge of the monkeypox virus among healthcare workers:

Regarding assessing HCMs knowledge of the monkeypox virus, we adopted questionnaire items from a study about knowledge of human monkeypox among students in Jordanian health schools [17]. In this section, with 11 questions about monkeypox, participants were asked: Is monkeypox common in the Middle East? Is monkeypox common in Western and Central Africa? Is there a global epidemic of human monkeypox? Is monkeypox caused by a virus or another pathogen? Is spreading the disease from person to person a risk? Participants were also asked whether human monkeypox could be treated with antibiotics, whether diarrhea is one of the signs or symptoms of human monkeypox, whether pustules are one of the signs or symptoms of infection, whether skin rash is one of the signs or symptoms of human

monkeypox, whether monkeypox has similar signs and symptoms to smallpox, and whether vaccination is available to prevent human monkeypox. To each knowledge item, the following were the possible answers: (yes, no, and I do not know). Correct replies were given a score of 1, wrong responses were assigned a score of -1, and "I do not know" was given a score of 0. The total of these scores represented the participant's monkeypox knowledge score (MPX K-score). Adequate degree of knowledge per question and overall was determined as a score of 70% correct replies or above as we depended on the published paper.

2.2.5. Generalized Anxiety Disorder toward monkeypox:

The seven validated items in this scale measure participants' general anxiety (GAD) about being infected with the monkeypox virus [17, 18]. In this tool, participants were asked to rate how often they had felt symptoms like worry, concern, restlessness, impatience, and dread over the past two weeks. We assigned values from 0 to 3 for the four frequency levels of never, sometimes, often, and very frequently. There were four levels of severity determined by the GAD7 score: minimum (1-4), mild (5-9), moderate (10-14), and severe (0–14). (15-21)

2.3. Pilot study

In order to make sure the survey's questions were clear before launching the frightening online survey on social media platforms, we sent it to 45 randomly selected Arabic health care providers from specific countries, then we have made the modifying depending on the feedbacks and suggested adjustments. Although, we have taken the scales from published study in Arabic country, we ran a pilot study in which we sent the questionnaire to 50 volunteers who health care providers from involved countries in our study to confirm the reliability of the used scales, which we determined the Cronbach's alpha for each involved scale. Then, we confirm that the scales we used in our cross-sectional study had high levels of internal consistency (the values of the Cronbach's alpha were above 7.0).

2.4. Ethical Consideration

The Syrian Ethical Society for Scientific Research in Aleppo University, Syria provided the ethical approval for conducting the study (IRB: SA-1087), in addition we ordered at least one

printed ethical approval from the lead collaborator from each inquired country in our study, that were given by the clinical educational institutions (Hospitals, Medical Colleges). For confirming that the participating in our study was voluntary, the first question at the online survey was about acceptance the respondent to complete the survey. As well, we make sure that all methods in our online cross sectional were according to the WMA Declaration of Helsinki. The survey takes 5 to 12 minutes to complete, and for security purposes, all data is saved in an online database.

2.5. Statistical Analysis

The data was examined by utilizing the Statistical Package for the Social Sciences (IBM SPSS V. 28.0). Statistical significance was defined as a P-value of less than or equal to 0.05. The quantitative data were given with a mean and standard deviation, while the categorical data were presented with frequency and percentages. After validating that the data's distribution was non-parametric and using the Shapiro-Wilk test, we used the Kruskal-Wallis test to compare how much each subgroup differed from the others in terms of their awareness of monkeypox, desiring to vaccinate their themselves against monkeypox, and the worrying toward the newly pandemic toward monekypox. Finally, using the cutoff points from the Saudi research [19], we conducted a binary logistic regression to calculate the odds ratios between the dependent variable (awareness of monkeypox, desiring to vaccinate their themselves against monkeypox) and independent variable (sociodemographic factors) for having an appropriate awareness of monkeypox, desiring to vaccinate their themselves against monkeypox.

4. Results:

4.1. Demographic characteristics of the study sample:

The questionnaire was provided to 3856 participants, however 41 declined to proceed, resulting in a final sample size of 3856. The majority of research participants were between the ages of 21 and 30 (n=3006, 78%), and more than half were female (n=2171, 56.3%). More than three-quarters of participants were city citizens (n=3172, 82.3%), and the majority had a moderate or good financial condition (50.2%), (34.8%), respectively. There were a total of 1932 (50.1%) students and 1183 (30.7%) practitioners in the sample.

The majority (63.6%) of participants were employed by the hospital's central wards, while 16.5% worked in the outpatient department and 12.1% were employed by the hospital's pharmacy or laboratory. (**Table1**)

Statement		Frequency	Percentage
Country	Jordan	602	15.6%
	United Arab Emirates	14	0.4%
	Algeria	23	0.6%
	Kingdom of Saudi Arabia	264	6.8%
	Sudan	555	14.4%
	Somalia	9	0.2%
	Iraq	93	2.4%
	Kuwait	10	0.3%
	Morocco	8	0.2%
	Yemen	1041	27.0%
	Tunisia	56	1.5%
	Oman	3	0.1%
	Syria	351	9.1%
	Palestine	40	1.0%
	Qatar	10	0.3%
	Lebanon	6	0.25
	Libya	79	2.0%
	Egypt	692	17.9%
Sex	Female	2171	56.3%
	Male	1685	43.7%
Age	20>	451	11.7%
	21-30	3006	78.0%
	31-40	260	6.7%
	41-50	102	2.6%
	51-60	26	0.7%
	60<	9	0.2%
Marital state	Never married	3107	80.6%
	Married	749	19.4%
Households (family) size —members	1—3 members	466	12.1%
	4—6 persons	1873	48.6%
	7—10 persons	1299	33.7%
	more than 10 persons	218	5.7%
Households' monthly income	Bad	248	6.4%
	Moderate	1937	50.2%
	Good	1341	34.8%
	Excellent	330	8.6%
Working hospital type	Primary healthcare center	1569	40.7%
	Secondary—care hospital	1134	29.4%
	Tertiary hospital	1153	29.9%
Clinical Role	Medical student	1932	50.1%
	Technicians/Lab workers and Pharmacists	404	10.5%
	Nurses	337	8.7%
	Physicians	1183	30.7%
Study year	First Year	100	4.6%
	Second Year	224	10.2%
	Third Year	339	15.4%
	Fourth Year	445	20.3%
	Fifth Year	554	25.2%
	Sixth Year	533	24.3%
Experience duration	Less than 5 years	2054	84.7%
	More than 5 years	372	15.3%
Living Place	Village	684	17.7%
	City	3172	82.3%
Chromic Disease	Don't have	3559	92.3%
	Have	297	7.7%
Hospital Working area/ covering service	Pharmacy and laboratory	468	12.1%
	Critical care units	221	5.7%
	Infectious Disease / Isolation wards	81	2.1%
	General wards	2451	63.6%
	OPD	635	16.5%

Table—1: Participants'' baseline sociodemographic and professional characteristic

4.2. HCW's monkeypox disease perceptions and COVID-19 status

A total of (n=1375) participants had a history of COVID-19 diagnosis (35.7%). As well, 8.8% of participants were concerned that monkeypox might generate an epidemic similar to that of COVID-19, whereas (43.5%) of participants were uncertain about the severity of monkeypox compared to smallpox. 18.1% of respondents are more concerned about monkeypox than COVID-19; however, after reading the survey, 82.3% of respondents felt they needed to learn more about it. More than half of the participants (54.5%) have demonstrated acceptance of the vaccination against monkeypox. As a source of information about the monkeypox virus, respondents relied on social media (58.1%), the websites of the WHO and CDC (31.1%), and the internet (30.2%). (**Table 2**)

Statement		Frequency	Percentage
Have you been previously diagnosed with COVID19?	Yes	1375	35.7%
	No	2481	64.3%
Have you travelled in the last month to a country where Monkeypox was recently reported?	I don't travel	3665	95.0%
	Europe, North America and Australia	54	1.4%
	UAE	63	1.6%
	West or Central Africa	24	0.6%
	Other (far Asia, India, Spain, France, and middle eastern countries)	50	1.3%
How would you rate your awareness about Monkeypox at the meantime?	Low	2019	52.4%
	Moderate	1656	42.9%
	High	181	4.7%
How worried are you that Monkeypox can cause worldwide pandemic similar to COVID-19?	None/little worried	1991	51.6%
	Moderate worry	1526	39.6%
	Worried a lot	339	8.8%
Do you think Monkeypox causes more severe disease compared to Smallpox?	Disagree	666	17.3%
	Unsure	1679	43.5%
	Agree	1511	39.2%
Which is more worrisome to you, COVID-19 or Monkeypox disease?	Unsure / Equally worried	1492	38.7%
	I am more worried about COVID-19	1665	43.2%
	I am more worried about Monkeypox	699	18.1%
Healthcare workers should apply more infection control measures than the current ones, With the new Monkeypox outbreaks	Agree	3069	79.6%
	Neither agree nor disagree	536	13.9%
	Disagree	251	6.5%
Please rate your worry level about traveling abroad with the new Monkeypox outbreaks in some countries	Not worried at all	1375	35.7%
	Somewhat worried	2124	55.1%
	Extremely worried	357	9.3%
After Receiving this survey, did you perceive need to read more about Monkeypox disease?	No	682	17.7%
	Yes	3174	82.3%
Your sources of Information about Monkeypox disease	Official local statements	1163	30.1%
	International health authorities' websites (WHO or CDC)	1202	31.1%
	Social media	2244	58.1%
	Scientific journals	652	16.9%
	Other Internet based sources	1166	30.2%
Do you want to receive Monkeypox vaccine	No	1754	45.5%
	Yes	2102	54.5%

Table-2: Descriptive analysis of the HCW's Monkeypox disease perceptions and COVID-19 status

4.3. HCWs' sources of worries from monkeypox disease:

We found that 61.7% of participants were concerned about being infected themselves or their family, 54.6% were worried about the number of monkeypox cases increasing to the point of a national lockdown, and 45.9% were anxious about the sickness progressing to the point of a global pandemic. (**Table 3**)

	Statement	Frequency	Percent
	Worried Monkeypox might surge to cause national lock-down	2107	54.6
	Me or my family being affected by the Monkeypox	2383	61.7
	Another worldwide pandemic	1774	45.9
	International flight suspension	515	13.3
	Other	399	10.3

Table-3: HCWs' sources of worries from Monkeypox disease.

4.4. The level of human monkeypox knowledge among HCW:

Around half of the participants (55%) were unaware of the monkeypox virus (**Figure1**), and 23.8% of respondents believe that the monkeypox virus is expected in the Arab world. In comparison, 35.3% do not know whether there is a global epidemic of monkeypox. In terms of the resemblance of symptoms between monkeypox and smallpox, 58.4% of participants thought that the symptoms were similar. 23.3% of participants agreed that antibiotics might be used to treat monkeypox. Only 27.1% of respondents believe that monkeypox immunization is available. (**Table 4**)

Human Monkeypox Knowledge Item	Response	Frequency	Percent
Monkeypox is prevalent in the Arab world	Incorrect	970	25.2
	Do not know	1967	51.0
	Correct	919	23.8
Monkeypox is prevalent in south eastren Asia	Incorrect	368	9.5
	Do not know	2201	57.1
	Correct	1287	33.4
There is an outbreak of human monkeypox in the world	Incorrect	824	21.4
	Do not know	1363	35.3
	Correct	1669	43.3
Monkeypox is caused by a virus	Incorrect	175	4.5
	Do not know	908	23.5
	Correct	2773	71.9
Human-to-human transmission of monkeypox occurs easily	Incorrect	778	20.2
	Do not know	1346	34.9
	Correct	1732	44.9
Monkeypox and smallpox have similar signs and symptoms	Incorrect	284	7.4
	Do not know	1319	34.2
	Correct	2253	58.4
Skin rash is one of the signs or symptoms of human monkeypox	Incorrect	193	5.0
	Do not know	917	23.8
	Correct	2746	71.2
Pustule is one of the signs or symptoms of human monkeypox	Incorrect	252	6.5
	Do not know	1630	42.3
	Correct	1974	51.2
Antibiotics are used to treat human monkeypox	Incorrect	1362	35.3
	Do not know	1595	41.4
	Correct	899	23.3
Diarrhea is one of the signs or symptoms of human monkeypox	Incorrect	554	14.4
	Do not know	2310	59.9
	Correct	992	25.7
Vaccination is available to prevent human monkeypox	Incorrect	876	22.7
	Do not know	1936	50.2
	Correct	1044	27.1

Table-4: The level of human monkeypox knowledge among HCW

4.5. HCW's odds of high worry from Monkeypox compared to COVID-19:

Females are more concerned about COVID-19 (44,6%) than monkeypox (11.7%). 53.1% of participants with no prior COVID-19 diagnosis are more concerned about COVID-19 than monkeypox. Among respondents who felt that monkeypox symptoms are similar

to smallpox, 10.8% are more concerned about monkeypox than COVID-19. Among anxious individuals, 18.4% are more concerned about COVID-19 than the monkeypox virus. Seven out of fifteen predictor factors were significantly linked with greater worry from monkeypox than COVID-19 (P-value< 0.05). Participants with more than five years of work experience were less likely to be concerned about monkeypox than COVID-19 (OR=0.59 times), comparable to those with less than five years of work experience. participants who had been diagnosed with COVID-19 were less likely to worry about monkeypox (OR = 0.63 times) than those who hadn't. A higher propensity of worrying about monkeypox than COVID-19 was anticipated among participants who worried more about monkeypox causing a widespread epidemic like COVID-19 (OR=2.87 times). Concern about monkeypox was expected to be higher than COVID-19 (OR=4.47 times) among participants who believed that monkeypox produces more severe symptoms compared to smallpox. (**Table 5**)

Variables	Categories	High worry from Monkeypox compared to COVID-19				P-value	Non-adjusted Odds Ratio (COR)	Lower	Upper	P-value	Multivariate adjusted Odds Ratio (AOR)	Lower	Upper
		Worry more from Covid19 or equal worrying		Worry from Monkeypox									
		Frequency	Percentage	Frequency	Percentage								
Age	20>	348	9.0%	103	2.7%	1							
	21-30	2453	63.6%	553	14.3%	.025	.762	.600	.967	.190	1.309	.876	1.956
	31-40	226	5.9%	34	0.9%	.002	.508	.333	.775	.547	1.225	.633	2.370
	41-50	98	2.5%	4	0.1%	.000	.138	.050	.384	.236	.475	.138	1.629
	51-60	24	0.6%	2	0.1%	.089	.282	.065	1.211	.967	.965	.184	5.074
	60<	7	0.2%	2	0.1%	.965	.965	.197	4.718	.351	2.266	.406	12.639
Sex	Female	1720	44.6%	451	11.7%	1							
	Male	1437	37.3%	248	6.4%	.000	.658	.555	.780	.216	.859	.676	1.093
Marital state	Not married	2515	65.2%	592	15.4%	1							
	Married	642	16.6%	107	2.8%	.000	.658	.555	.780	.781	1.049	.748	1.472
Households (family) size — members	1—3 members	392	10.2%	74	1.9%	1							
	4—6 persons	1551	40.2%	322	8.4%	.499	1.100	.835	1.449	.277	1.235	.844	1.809
	7—10 persons	1036	26.9%	263	6.8%	.040	1.345	1.013	1.784	.024	1.581	1.063	2.351
	more than 10 persons	178	4.6%	40	1.0%	.420	1.190	.779	1.818	.571	1.174	.674	2.043
Clinical Role	Medical student	1566	40.6%	366	9.5%	1							
	Technicians/Lab workers and Pharmacists	323	8.4%	81	2.1%	.608	1.073	.820	1.404	.234	1.276	.854	1.906
	Nurses	282	7.3%	55	1.4%	.253	.834	.612	1.138	.674	.897	.540	1.489
	Physicians	986	25.6%	197	5.1%	.107	.855	.706	1.034	.411	1.120	.855	1.468
Experience duration	Less than 5 years	1669	68.8%	385	15.9%	1							
	More than 5 years	333	13.7%	39	1.6%	.000	.508	.358	.720	.024	.590	.374	.931
Chromic	Don't have	2916	75.6%	643	16.7%	1							
	Have	241	6.3%	56	1.5%	.73	1.054	.778	1.4	.24	1.272	.852	1.89

Disease						5			27	0			8
Have you been previously diagnosed with COVID 19?	Yes	1109	28.8%	266	6.9%								
	No	2048	53.1%	433	11.2%	.144	.881	.744	1.044	.000	.635	.500	.807
Have you travelled in the last month to a country where Monkey pox was recently reported?	I didn't travel	2995	77.7%	670	17.4%	1							
	Europe, North America and Australia	43	1.1%	11	0.3%	.694	1.144	.587	2.229	.480	.692	.249	1.922
	UAE	56	1.5%	7	0.2%	.149	.559	.254	1.231	.110	.437	.158	1.207
	West or Central Africa	21	0.5%	3	0.1%	.469	.639	.190	2.147	.672	.752	.201	2.813
	Other (far Asia, India, Spain, France, and middle eastern countries)	42	1.1%	8	0.2%	.679	.851	.398	1.822	.537	.705	.232	2.139
How would you rate your awareness about Monkey pox at the meantime?	Low	1641	42.6%	378	9.8%	1							
	Moderate	1374	35.6%	282	7.3%	.183	.891	.752	1.056	.024	.757	.595	.963
	High	142	3.7%	39	1.0%	.353	1.192	.822	1.729	.720	1.100	.653	1.853
How worried are you that Monkey pox can cause worldwide pandemic similar to COVID-19?	Unsure / Equally worried	1778	46.1%	213	5.5%	1							
	I am more worried about COVID-19	1173	30.4%	353	9.2%	.000	2.512	2.087	3.024	.000	1.706	1.311	2.221
	I am more worried about Monkeypox	206	5.3%	133	3.4%	.000	5.389	4.154	6.991	.000	2.875	1.962	4.212
Do you think Monkey pox causes more severe disease compared to Smallpox?	Disagree	627	16.3%	39	1.0%	1							
	Unsure	1436	37.2%	243	6.3%	.000	2.721	1.915	3.864	.002	2.094	1.322	3.318
	Agree	1094	28.4%	417	10.8%	.000	6.128	4.351	8.632	.000	4.475	2.852	7.020
Healthc	Agree	2444	63.4%	625	16.2%	1							

are workers should apply more infection control measures than the current ones, With the new Monkey pox outbreaks	Neither agree nor disagree	485	12.6%	51	1.3%	.000	.411	.304	.556	.016	.576	.367	.903
	Disagree	228	5.9%	23	0.6%	.000	.394	.255	.611	.198	.689	.391	1.215
Please rate your worry level about traveling abroad with the new Monkey pox outbreaks in some countries	Not worried at all	1215	31.5%	160	4.1%	1							
	Somewhat worried	1705	44.2%	419	10.9%	.000	1.866	1.533	2.271	.097	1.270	.957	1.686
	Extremely worried	237	6.1%	120	3.1%	.000	3.845	2.922	5.060	.007	1.753	1.169	2.628
Gad7	Don’t have	2448	63.5%	432	11.2%	1							
	Have anxiety	709	18.4%	267	6.9%	.000	2.134	1.793	2.540	.004	1.452	1.130	1.865

Table-5: Multivariate Binary Logistic Regression Analysis of the HCW's odds of high worry from Monkeypox compared to COVID-19. The logistic regression model was statistically significant, X2(31) = 284.591, p-value= 0.000. Hosmer and lemeshow test 5.712 (P-value= 0.679). The model explained 18.3%(Nagelkerke R Square) of factors associated with high worry from monkeypox compared to COVID-19.

4.6. HCW's odds of supporting vaccinations against monkeypox disease:

Females have shown stronger acceptability of getting monkeypox vaccination (n=1133, 29.4%) than men, and participants aged 21 to 30 years showed greater acceptance of receiving monkeypox vaccine (n=1634, 42.4%) than other age groups. There is a significant drop in vaccination acceptability among participants with more than five years of job experience (n=209, 8.6%) compared to those with fewer than five years of work experience. A higher acceptance for the monkeypox vaccine was shown by the participant who was not diagnosed with COVID-19 previously (n=1268, 32.9%) than others who were diagnosed with the previous COVID-19. Seven of the fifteen predictor factors were substantially correlated with HCWs' support for immunizations against monkeypox (P-value <0.05). Males were projected to be more likely to favor immunizations against monkeypox (OR = 1.3) compared to females. Support for monkeypox vaccines was most likely found among participants aged 21–30 (OR=2.36 times higher than other age groups). Previous infection with COVID-19 was associated with a lower probability of supporting immunizations against monkeypox (OR=0.64 times) than infection with COVID-19. Support for monkeypox vaccines was projected to be higher among respondents who felt they needed more knowledge on the disease after reading the survey (OR=3.06 times) than those who felt they already had enough information. As

measured by the GAD 7 scale, participants with anxiety were more likely to endorse immunizations against monkeypox (OR = 1.48 times) than those without anxiety. (**Table 6**)

		Do you want to receive Monkeypox vaccine										95% C.I.for EXP(B)	
		No		Yes		P-	Non-adjusted Odds			P-	Multivariate adjusted Odds		
		Frequency	Percentage	Frequency	Percentage	value	Ratio (OR)	Lower	Upper	value	Ratio (OR)	Lower	Upper
Sex	Female	1038	26.9%	1133	29.4%								
	Male	716	18.6%	969	25.1%	.001	1.240	1.091	1.409	.000	1.396	1.168	1.668
Age	20>	189	4.9%	262	6.8%	.008				.004			
	21-30	1372	35.6%	1634	42.4%	.137	.859	.703	1.050	.173	.807	.593	1.098
	31-40	140	3.6%	120	3.1%	.002	.618	.455	.841	.130	.689	.426	1.115
	41-50	34	0.9%	68	1.8%	.112	1.443	.918	2.268	.021	2.362	1.136	4.911
	51-60	13	0.3%	13	0.3%	.418	.721	.327	1.591	.602	.764	.277	2.103
	60<	4	0.1%	5	0.1%	.879	.902	.239	3.403	.729	.777	.187	3.224
Marital state	Not married	1409	36.5%	1698	44.0%								
	Married	345	8.9%	404	10.5%	.725	.972	.828	1.140	.382	.901	.713	1.139
Working hospital type	Primary healthcare center	711	18.4%	858	22.3%	.950				.449			
	Secondary—care hospital	514	13.3%	620	16.1%	.996	1.000	.857	1.165	.962	1.005	.816	1.238
	Tertiary hospital	529	13.7%	624	16.2%	.770	.977	.839	1.139	.272	.889	.722	1.096
Experience duration	less than 5 years	928	38.3%	1126	46.4%								
	More than 5 years	163	6.7%	209	8.6%	.627	1.057	.846	1.320	.522	.901	.655	1.240
Have you been previously diagnosed with COVID19?	yes	541	14.0%	834	21.6%								
	No	1213	31.5%	1268	32.9%	.000	.678	.593	.775	.000	.642	.534	.773
Healthcare workers should apply more infection control measures than the current ones, With the new Monkeypox outbreaks	Agree	1296	33.6%	1773	46.0%	.000				.000			
	Neither agree nor disagree	293	7.6%	243	6.3%	.000	.606	.504	.729	.001	.627	.479	.820
	Disagree	165	4.3%	86	2.2%	.000	.381	.291	.499	.000	.408	.288	.579
Households' monthly income	Bad	130	3.4%	118	3.1%	.000				.003			
	Moderate	944	24.5%	993	25.8%	.275	1.159	.889	1.510	.096	1.348	.948	1.917
	Good	530	13.7%	811	21.0%	.000	1.686	1.284	2.213	.013	1.586	1.102	2.283
	Excellent	150	3.9%	180	4.7%	.098	1.322	.950	1.839	.001	2.121	1.359	3.311
After Receiving this survey, did you perceive need to read more about Monkeypox disease?	No	466	12.1%	216	5.6%								
	Yes	1288	33.4%	1886	48.9%	.000	3.159	2.649	3.768	.000	3.068	2.427	3.877
Gad7	Don't have	1360	35.3%	1520	39.4%								
	Have anxiety	394	10.2%	582	15.1%	.000	1.322	1.141	1.531	.000	1.482	1.222	1.797
Your sources of Information about Monkeypox disease	Official local statements	112	2.9%	116	3.0%	.000				.073			
	International health authorities' websites (WHO or CDC)	122	3.2%	154	4.0%	.271	1.219	.857	1.733	.565	1.138	.733	1.765
	International health authorities' websites (WHO or CDC)	602	15.6%	570	14.8%	.536	.914	.688	1.214	.169	.777	.543	1.113
	Scientific journals	38	1.0%	48	1.2%	.435	1.220	.741	2.008	.958	1.017	.545	1.897
	Other Internet based sources	207	5.4%	215	5.6%	.986	1.003	.727	1.384	.687	.919	.609	1.386
	more than one source	673	17.5%	999	25.9%	.011	1.433	1.086	1.891	.788	1.049	.739	1.489
Constant										.043	.537		

Table 6: Multivariate Binary Logistic Regression Analysis of the HCW's odds of supporting vaccinations against monkeypox disease. The logistic regression model was statistically significant, X2(23)= 254.087 , p-value= 0.000. Hosmer and lemeshow test 8.258(P-value= 0.408). The model explained 13.3%(Nagelkerke R Square) of factors associated with supporting vaccinations against monkeypox disease.

4.7. HCW's odds of supporting Implementation of tighter infection control measures against monkeypox compared to the currently applied:

Females had lower adherence to monkeypox disease control measures (n=2071, 53.7%), while respondents aged 21 to 30 had higher adherence (n=189, 4.9%). Participants with fewer than five years of work experience were less likely to adhere to control measures (n=1912, 78.88%), while participants with anxiety (n=909, 23.6%) showed no adherence to control measures for monkeypox illness. Five of the fourteen predictor factors were substantially linked to HCWs' probability of backing more stringent infection control measures against monkeypox (P-value <0.05). The probability that a health care worker (HCW) would back up increased infection control measures to combat monkeypox was anticipated to be greater among males (OR=1.67) than among females. Participants with anxiety were expected to have 1.79 times the likelihood of HCWs supporting the adoption of greater infection control measures against

monkeypox compared to participants without anxiety. Worry about COVID-19 was associated with a greater chance that HCWs' willingness to support stronger infection control measures against monkeypox (OR=1.64 times) compared to participants who expressed equal concern about both illnesses. Healthcare workers' propensity to back stricter infection control measures against monkeypox was projected to be lower among individuals who believed that monkeypox produces more severe illness than smallpox (OR=0.22 times) than those who disagreed. (**Table 7**)

Variable	Sub-groups	Tighter infection control measures				P-value	Non-adjusted Odds Ratio (OR)	Lower	Upper	P-value	Multivariate adjusted Odds Ratio (OR)	Lower	Upper
		Not doing		Doing tighter control measures									
		Frequency	Percentage	Frequency	Percentage								
Sex	Female	2071	53.7%	100	2.6%								
	Male	1534	39.8%	151	3.9%	.000	2.039	1.570	2.647	.002	1.678	1.200	2.347
Age	20>	432	11.2%	19	0.5%	.002				.716			
	21-30	2817	73.1%	189	4.9%	.086	1.525	.942	2.471	.282	1.487	.721	3.066
	31-40	229	5.9%	31	0.8%	.000	3.078	1.701	5.570	.318	1.659	.614	4.479
	41-50	94	2.4%	8	0.2%	.131	1.935	.822	4.553	.968	.972	.244	3.866
	51-60	22	0.6%	4	0.1%	.017	4.134	1.296	13.190	.591	.516	.046	5.749
	60<	9	0.2%	0	0.0%	.999	.000	.000	.	.999	.000	.000	.
Marital state	Not married	2914	75.6%	193	5.0%								
	Married	691	17.9%	58	1.5%	.128	1.267	.934	1.719	.448	.824	.499	1.359
Experience duration	Less than 5 years	1912	78.8%	142	5.9%								
	More than 5 years	335	13.8%	37	1.5%	.041	1.487	1.017	2.175	.084	1.642	.936	2.882
After Receiving this survey, did you perceive need to read more about Monkey pox disease?	No	570	14.8%	112	2.9%								
	Yes	3035	78.7%	139	3.6%	.000	.233	.179	.304	.000	.360	.253	.513
Gad7	Don’t have	2696	69.9%	184	4.8%								
	Have anxiety	909	23.6%	67	1.7%	.603	1.080	.808	1.443	.003	1.791	1.218	2.633
Your sources of Information about Monkey pox disease	Official local statements	203	5.3%	25	0.6%	.000				.031			
	International health authorities’ websites (WHO or CDC)	242	6.3%	34	0.9%	.638	1.141	.659	1.975	.077	1.883	.933	3.798
	International health authorities’	1117	29.0%	55	1.4%	.000	.400	.244	.656	.560	.831	.445	1.550

	websites (WHO or CDC)												
	Scientific journals	79	2.0%	7	0.2%	.462	.719	.299	1.730	.999	1.000	.345	2.899
	Other Internet based sources	392	10.2%	30	0.8%	.094	.621	.356	1.085	.835	.925	.446	1.922
	more than one source	1572	40.8%	100	2.6%	.005	.517	.325	.820	.352	.753	.415	1.367
Clinical Role	Medical student	1822	47.3%	110	2.9%	.010				.232			
	Technicians/Lab workers and Pharmacists	386	10.0%	18	0.5%	.321	.772	.464	1.287	.105	.499	.215	1.155
	Nurses	307	8.0%	30	0.8%	.025	1.619	1.062	2.467	.553	1.224	.628	2.387
	Physicians	1090	28.3%	93	2.4%	.018	1.413	1.062	1.881	.277	.809	.552	1.185
Chromic Disease	No	3334	86.5%	225	5.8%								
	Have	271	7.0%	26	0.7%	.104	1.422	.930	2.173	.967	1.011	.584	1.751
How worried are you that Monkey pox can cause worldwide pandemic similar to COVID-19?	None/little worried	1833	47.5%	158	4.1%	.000				.862			
	Moderate worry	1444	37.4%	82	2.1%	.003	.659	.500	.868	.697	.928	.637	1.352
	Worried a lot	328	8.5%	11	0.3%	.003	.389	.209	.725	.802	1.099	.525	2.300
Please rate your worry level about traveling abroad with the new Monkey pox outbreaks in some countries	Not worried at all	1241	32.2%	134	3.5%	.000				.303			
	Somewhat worried	2020	52.4%	104	2.7%	.000	.477	.366	.622	.143	.761	.528	1.097
	Extremely worried	344	8.9%	13	0.3%	.000	.350	.196	.626	.344	.685	.313	1.499
Which is more worrisome to you, COVID-19 or Monkey pox	Unsure / Equally worried	1429	37.1%	63	1.6%	.000				.022			
	I am more worried about COVID-19	1500	38.9%	165	4.3%	.000	2.495	1.850	3.365	.010	1.642	1.124	2.397
	I am more worried	676	17.5%	23	0.6%	.296	.772	.475	1.255	.947	1.021	.551	1.891

disease?	about Monkeypox												
Do you think Monkey pox causes more severe disease compared to Smallpox?	Disagree	544	14.1%	122	3.2%	.000				.000			
	Unsure	1599	41.5%	80	2.1%	.000	.223	.166	.301	.000	.315	.215	.463
	Agree	1462	37.9%	49	1.3%	.000	.149	.106	.211	.000	.224	.141	.357
Households (family) size — members	1—3 members	435	11.3%	31	0.8%	.880				.995			
	4—6 persons	1753	45.5%	120	3.1%	.847	.961	.638	1.445	.850	1.051	.627	1.761
	7—10 persons	1216	31.5%	83	2.2%	.843	.958	.625	1.468	.989	1.004	.582	1.731
	more than 10 persons	201	5.2%	17	0.4%	.585	1.187	.642	2.194	.929	1.035	.485	2.211

Table-7: Multivariate Binary Logistic Regression Analysis of the HCW's odds of supporting Implementation of tighter infection control measures against Monkeypox compared to the currently applied. The logistic regression model was statistically significant, X2(30) = 200.97, p-value= 0.000. Hosmer and lemeshow test 3.89(P-value= 0.866). The model explained 19.4% (Nagelkerke R Square) of factors associated with supporting Implementation of tighter infection control measures against Monkeypox compared to the currently applied.

4.8. HCW's odds of monkeypox knowledge score:

Good knowledge of the monkeypox virus was shown by 25.4% of females and 34.8% of individuals aged 21–30. However, only 21.3% of medical students and 7.7% of clinicians with more than five years of experience show adequate knowledge of monkeypox. 22.2% of participants agreed that monkeypox develops a more severe illness than smallpox, and 27.6% of respondents who agreed to receive the monkeypox vaccination had a good knowledge of monkeypox. Only 12.1% of individuals with anxiety disorders have a good understanding of monkeypox. In a multivariate logistic regression analysis, we found that family size, study year, participants' ratings of their awareness of monkeypox, participants' worry that monkeypox will cause a pandemic like COVID-19, and whether healthcare workers should apply more infection control measures were all significantly associated with HCWs' odds of knowing about monkeypox (P-value< 0.05). It was predicted that individuals concerned a lot about monkeypox developing a comparable pandemic to COVID-19 would be more knowledgeable about monkeypox (OR=1.82 times) than those who did not worry about it. Participants who disagreed that healthcare staff should use greater infection control methods were expected to have a lower likelihood of monkeypox knowledge (OR = 0.38 times) than those who agreed. (**Table 8**)

Variable	Sub-groups	Monkeypox Knowledge				P-value	Non-adjusted Odds Ratio (OR)	Lower	Upper	P-value	Multivariate adjusted Odds Ratio (OR)		
		Don't have		Have									
		Frequency	Percentage	Frequency	Percentage								
Sex	Female	1191	30.9%	980	25.4%	1							
	Male	923	23.9%	762	19.8%	.959	1.003	.883	1.140	.127	.807	.613	1.063
Age	20>	258	6.7%	193	5.0%	1							
	21-30	1664	43.2%	1342	34.8%	.461	1.078	.883	1.317	.558	1.154	.715	1.861
	31-40	142	3.7%	118	3.1%	.502	1.111	.817	1.510	.755	1.219	.351	4.233
	41-50	30	0.8%	72	1.9%	.000	3.208	2.015	5.107	1.000	.000	.000	.
	51-60	16	0.4%	10	0.3%	.66	.835	.37	1.88	1.0	.000	.00	.

						4		1	2	00		0	
	60<	3	0.1%	6	0.2%	.168	2.674	.6600	10.8225	.999	.000	.0000	.
Marital state	Not married	1764	45.7%	1343	34.8%	1							
	Married	350	9.1%	399	10.3%	.000	1.497	1.276	1.757	.183	1.410	.851	2.337
Households (family) size — members	1—3 members	260	6.7%	206	5.3%	1							
	4—6 persons	1013	26.3%	860	22.3%	.507	1.072	.874	1.314	.292	1.293	.802	2.087
	7—10 persons	739	19.2%	560	14.5%	.682	.956	.773	1.184	.230	1.352	.826	2.212
	more than 10 persons	102	2.6%	116	3.0%	.028	1.435	1.039	1.982	.011	2.220	1.197	4.118
Working hospital type	Primary healthcare center	861	22.3%	708	18.4%	1							
	Secondary —care hospital	591	15.3%	543	14.1%	.156	1.117	.959	1.302	.460	.886	.644	1.220
	Tertiary hospital	662	17.2%	491	12.7%	.187	.902	.774	1.051	.527	.896	.638	1.259
Clinical Role	Medical student	1111	28.8%	821	21.3%	1							
	Technicians/Lab workers and Pharmacists	204	5.3%	200	5.2%	.010	1.327	1.070	1.645	.533	.813	.425	1.557
	Nurses	172	4.5%	165	4.3%	.027	1.298	1.030	1.637	.150	1.452	.873	2.414
	Physicians	627	16.3%	556	14.4%	.014	1.200	1.037	1.388	.572	.853	.491	1.481
Study year	First Year	56	2.6%	44	2.0%	1							
	Second Year	119	5.4%	105	4.8%	.632	1.123	.699	1.804	.770	1.110	.550	2.240
	Third Year	206	9.4%	133	6.1%	.393	.822	.523	1.290	.088	.548	.274	1.094
	Fourth Year	256	11.7%	189	8.6%	.780	.940	.607	1.455	.140	.572	.272	1.202
	Fifth Year	365	16.6%	189	8.6%	.059	.659	.428	1.015	.012	.383	.181	.812
	Sixth Year	284	12.9%	249	11.3%	.617	1.116	.726	1.715	.392	.721	.340	1.526
Experience duration	Less than 5 years	1122	46.2%	932	38.4%	1							
	More than 5 years	185	7.6%	187	7.7%	.082	1.217	.976	1.518	.121	.645	.371	1.122
Chromic Disease	Don’t have	1940	50.3%	1619	42.0%	1							
	Have	174	4.5%	123	3.2%	.175	.847	.666	1.077	.723	1.088	.683	1.734
Hospital Working area/ covering service	Pharmacy and laboratory	253	6.6%	215	5.6%	1							
	Critical care units	129	3.3%	92	2.4%	.288	.839	.607	1.160	.369	.698	.318	1.530
	Infectious Disease / Isolation wards	32	0.8%	49	1.3%	.016	1.802	1.114	2.915	.688	1.291	.371	4.489
	General wards	1356	35.2%	1095	28.4%	.614	.950	.779	1.159	.549	1.182	.684	2.041
	OPD	344	8.9%	291	7.5%	.970	.995	.783	1.265	.651	.863	.457	1.632
Have	Yes	709	18.4%	666	17.3%	1							

you been previously diagnosed with COVID 19?	No	1405	36.4%	1076	27.9%	.002	.815	.714	.931	.456	1.121	.830	1.516
Have you travelled in the last month to a country where Monkey pox was recently reported?	I didn't travel	1988	51.6%	1677	43.5%	1							
	Europe, North America and Australia	37	1.0%	17	0.4%	.039	.545	.306	.971	.062	.213	.042	1.082
	UAE	42	1.1%	21	0.5%	.052	.593	.350	1.005	.060	.365	.128	1.044
	West or Central Africa	19	0.5%	5	0.1%	.021	.312	.116	.837	.435	.558	.129	2.414
	Other (far Asia, India, Spain, France, and middle eastern countries)	28	0.7%	22	0.6%	.804	.931	.531	1.634	.766	1.169	.418	3.273
How would you rate your awareness about Monkey pox at the meantime?	Low	1290	33.5%	729	18.9%	1							
	Moderate	722	18.7%	934	24.2%	.000	2.289	2.004	2.615	.000	1.828	1.390	2.405
	High	102	2.6%	79	2.0%	.045	1.371	1.008	1.864	.924	.969	.508	1.849
How worried are you that Monkey pox can cause worldwide pandemic similar to COVID-19?	None/little worried	1198	31.1%	793	20.6%	1							
	Moderate worry	749	19.4%	777	20.2%	.000	1.567	1.370	1.793	.003	1.577	1.171	2.124
	Worried a lot	167	4.3%	172	4.5%	.000	1.556	1.235	1.960	.047	1.627	1.006	2.632
Do you think Monkey pox causes more severe disease compared to Smallpox?	Disagree	399	10.3%	267	6.9%	1							
	Unsure	1059	27.5%	620	16.1%	.154	.875	.728	1.052	.626	.903	.600	1.360
	Agree	656	17.0%	855	22.2%	.000	1.948	1.618	2.344	.299	1.254	.818	1.921
Which is more worriso	Unsure / Equally worried	858	22.3%	634	16.4%	1							

me to you, COVID-19 or Monkey pox disease?	I am more worried about COVID-19	898	23.3%	767	19.9%	.044	1.156	1.004	1.331	.138	1.256	.929	1.699
	I am more worried about Monkeypox	358	9.3%	341	8.8%	.006	1.289	1.076	1.544	.509	1.132	.783	1.636
Healthcare workers should apply more infection control measures than the current ones, With the new Monkey pox outbreaks	Agree	1605	41.6%	1464	38.0%	1							
	Neither agree nor disagree	332	8.6%	204	5.3%	.000	.674	.558	.813	.002	.464	.289	.746
	Disagree	177	4.6%	74	1.9%	.000	.458	.346	.607	.001	.389	.220	.689
Please rate your worry level about traveling abroad with the new Monkey pox outbreaks in some countries	Not worried at all	894	23.2%	481	12.5%	1							
	Somewhat worried	1053	27.3%	1071	27.8%	.000	1.890	1.644	2.174	.720	.945	.695	1.286
	Extremely worried	167	4.3%	190	4.9%	.000	2.115	1.671	2.676	.280	.764	.469	1.245
Do you want to receive Monkey pox vaccine	No	1078	28.0%	676	17.5%	1							
	Yes	1036	26.9%	1066	27.6%	.000	1.641	1.443	1.866	.370	1.133	.862	1.488
Gad7	Don’t have	1605	41.6%	1275	33.1%	1							
	Have anxiety	509	13.2%	467	12.1%	.052	1.155	.999	1.336	.172	.813	.605	1.094

Table-8: Multivariate Binary Logistic Regression Analysis of the HCW's odds of Monkeypox knowledge score. The logistic regression model was statistically significant, X2(45) = 147.186, p-value=0.000. Hosmer and lemeshow test 5.554 (P-value= 0.697). The model explained 16.8%(Nagelkerke R Square) of factors associated with Monkeypox knowledge score

Discussion

Monkeypox is an infectious disease caused by an orthopoxvirus that is characterized by a rash that may be isolated or preceded or accompanied by fever or lymph nodes [20]. Since May 14, 2022, confirmed cases of the virus have been reported or confirmed in

several countries in Europe and North America, and the situation is evolving rapidly. In the United Kingdom, 16 cases of infection have been detected (as of May 17), and with the exception of the first infected person, who was returning from Nigeria, all appear to have been infected in the United Kingdom, according to the local health safety agency [21]. For fear of a possible new pandemic, health authorities worldwide have therefore boosted their efforts to ensure the control of its spread by relying on the study of the means of transmission and early clinical signs. During the current increasing of the reported infected cases with monkypox, the knowledge, concern and perception of the available vaccines are very interesting factors, especially among health care providers and medical staff persons [22]. Our study was conducted in MENA region with a final sample size of 3856 participants of which 1375 of them had a history of Covid-19 diagnosis. Results reported that about 9% of participants consider that monkeypox might generate an epidemic and a tremendous burden similar to that of COVID-19, while 51.6% had no to little worry about that. These findings are similarly found in a Saudi Arabia study conducted by Fadi and al., where only 25.3% of study population were very worried and 48.7% had no to little worries about a further Monkeypox pandemic [19]. Also, almost the quarter 18.1% of participants were concerned about Monkeypox more than Covid-19. These findings are also concomitant with another Saudi Arabia study published in August 2022 and conducted by Mohamad and al. among the general population where results reported a higher worry 62% about Covid-19 than Monkeypox [23]. Concerning HCW's sources of worries toward monkepox disease, the majority 61.7% of participants were concerned about being infected themselves or their relatives and slightly more than half 54% were afraid of a possible future lockdown. Similarly, these findings are concomitant with results found in the Saudi study by Mohamad and al. [23].

About Monkeypox knowledge level, slightly more than half 55% of participants were unaware of monkepox virus and had no sufficient information about it, and 58.4% of respondents couldn't make a difference between monkepox and smallpox symptoms. Also, only 27.1% of participants reported positively that monkeypox immunization is already available. Knowledge Findings were concomitant in its overall with an Indonesian research conducted by Harapan and al. where monkepox knowledge level was evaluated low 63.5% and clearly insufficient among 432 general practitioners [9].

Male HCW's in MENA region were less predicted to worry about Monkeypox than females (6.4% and 11.7%), which was also reported toward Covid-19 worries. This was similarly found in the Saudi Arabia paper published by Fadi and al. [19]. In addition, results reported that participants who had been diagnosed with COVID-19 were less likely to worry about monkeypox (OR = 0.63 times) than those who hadn't. Findings also reported higher acceptance for the monkeypox vaccine by participants who were not diagnosed with COVID-19 previously (n=1268, 32.9%) than others who were diagnosed with the previous COVID-19. This incomprehensible and unpredictable finding could only be justified by a drop in healthcare workers' confidence in vaccines protection after Covid-19 infection following vaccines receiving. This should be adjusted and corrected as approved vaccines have proven to be effective in preventing fatal complications of Corona virus 2019 infection and reducing the number of people hospitalized and admitted to the intensive care unit, as well as reducing the number of infections without preventing it definitely [24].

The knowledge of Monkepox infection, attitude toward its possible spread among healthcare practitioners in MENA region and vaccince advocacy must be improved urgently. This will allow to prevent a possible pandemic because the good knowledge of the symptoms, confidence in diagnosis, means of transmission, physiopathology and comorbiditied will help to avoid the maximum number of cases. Also, it will allow in case of a further pandemic to control the situation with efficiency and professionalism, based on the previous Covid-19 experience [11]. These Human Monkeypox concerns among arabic healthcare professionals can be corrected and improved through several approaches and by multiple means such as [25-28]: a) Continuing medical education and scientific improvement on the infection process which makes it less contagious than Covid-19 and thus, same rapid spread and sudden pandemic is not very expected. b) More data about available vaccines and their efficiency: actually, only two vaccines are available which are

ACAM2000 vaccine and JYNNEOS vaccine known as Imvanex. c) Involvement in research and International monkepox network and patients' sensitivity and education on preventive measures.

Limitations and Strengths

In order to examine the present degree of opinions of the healthcare professionals concerning the characteristics of the monkepox epidemic after COVID19, our international cross-sectional survey includes a large sample size from various countries in the Arabic region. Additionally, we utilized scales that were getting better and better, developed by Arabic scholars, and we checked their validity to make sure the questions they were using were accurate representations of the subject being investigated. Nevertheless, despite the fact that a cross-sectional research may be carried out in a short amount of time and at no cost, it does not take into account the specific and true causal link nor the generality. In addition, with respect to the online cross-sectional research, it is difficult to get answers from those who do not have spare time, internet access, a mobile phone, or who are having trouble completing the survey due to technical challenges. This is particularly the case with regards to elderly individuals who are not familiar with the use of mobile phones.

Conclusion

Our results showed that healthcare professionals in Arabic countries appear less concerned about the monkeypox virus in comparison to the COVID-19. A moderate knowledge of the monkeypox virus was noticed, as well as less tendencay to receive vaccination against the monkeypox virus. In addition, negative attitudes towards prevention methods of monkeypox virus were observed. As a result, we recommend further regulations for the medical staff and precautionary measures. We believe that adequate awareness programs should be implemented for medical staff to teach them about the risks of monkeypox infection.

Acknowledgments

No one other than the listed authors contributed to this work.

Data availability statement

The data are available upon request.

Funding

No funding was received for the conduction/publication of this study.

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