RESEARCH ARTICLE

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Knowledge, Attitudes and Perspectives on Monkeypox Disease and Vaccination

ABSTRACT

Objective: This study aims to examine the knowledge, attitudes, and perspectives toward vaccination related to monkeypox (Mpox) disease, which is defined as an urgent public health crisis by the World Health Organization (WHO), in both healthcare workers and other segments of society to raise awareness.

Method: This is a cross-sectional study conducted between 01.10.2024 and 01.11.2024 with 684 participants residing in Karabük province. A 27-question survey was used to collect data on sociodemographic characteristics, as well as knowledge and attitudes about Mpox disease. The participants demographic characteristics were presented as frequency and percentage. Chi-square analysis was used to assess categorical data, with a significance level of $p \leq 0.05$.

Results: The average age of the participants was 31.98. Significant differences were found in terms of age, marital status, and employment status regarding knowledge of the approved Mpox vaccine and the intention to get vaccinated. The internet was the most common source of information about Mpox. 44.9% of participants expressed concern about Mpox, with women being significantly more concerned than men.

Conclusions: The knowledge, attitude, and participation of all segments of society are crucial in the fight against infectious diseases. Preparing for Mpox, which poses a significant global risk, and raising public awareness will contribute to public health. It was emphasized that online sources are the main source of information, and measures to mitigate the negative effects of infodemics were thought to be beneficial.

Keywords: Monkeypox, Knowledge, Vaccination.

Maymun Çiçeği Hastalığı Hakkındaki Bilgi, Tutum ve Aşılamaya Yönelik Bakış Açıları

ÖZET

Amaç: Bu çalışmanın amacı hem sağlık çalışanları hem de toplumun diğer kesiminde Dünya Sağlık Örgütü (DSÖ) tarafından acil halk sağlığı krizi olarak tanımlanan maymun çiçeği (Mpox) hastalığına farkındalık yaratmak için bilgi, tutum ve aşıya yönelik bakış açılarını incelemektir.

Yöntem: Bu çalışma kesitsel bir çalışmadır. 01.10.2024-01.11.2024 tarihleri arasında Karabük ilinde ikamet eden 684 kişinin katılımı ile çalışma yürütüldü. Verilerin toplanması için sosyodemografik özellikler ile Mpox hastalığı hakkında bilgi ve tutumun sorgulandığı 27 soruluk anket formu kullanıldı. Kişilerin tanıtıcı özelikleri, frekans ve yüzde ile ifade edilmiştir. Kategorik verilerin değerlendirilmesindeki-kare analizi uygulanmıştır. İstatistiksel analizlerde anlamlılık düzeyi $p \leq 0.05$ olarak kabul edildi.

Bulgular: Katılımcıların yaş ortalaması 31.98 yıldı. Çalışmada Mpox onaylı aşısı olduğunu bilme durumu ile Mpox aşısını yaptırma düşüncesine baktığımızda yaş, medeni durum ve çalışma durumuna göre anlamlı farklılıklar bulunmuştur. Mpox hastalığı hakkında en fazla bilgi edinme yerinin internet olduğu görülmüştür. Katılımcıların %44.9'u Mpox'tan endişelendiğini ifade etmiştir. Kadınlar erkeklerden anlamlı düzeyde daha fazla endişelenmektedir.

Sonuç: Bulaşıcı hastalıklar ile mücadelede halkın her kesimin bilgisi, tutumu ve katılımı son derece önem arz etmektedir. Son dönemlerde dünya geneli için büyük risk oluşturan Mpox için hazırlıkların yapılması ve toplumun bilinçlendirilmesi halk sağlığına katkıda bulunacaktır. Bu konuda günümüzde bilgi ediniminin en çok olduğu yerin çevrimiçi kaynaklar olduğuna dikkat çekilerek infodeminin olumsuz etkilerinin önüne geçmek için alınacak önlemlerin fayda sağlayacağı düşünülmüştür.

Anahtar Kelimeler: Maymun Çiçeği, Bilgi, Aşılama.

INTRODUCTION

Monkeypox (Mpox) disease is a viral disease caused by Mpox virus, a member of the genus Orthopoxvirus in the poxviridae family (1). It is a zoonotic disease with an undefined primary host and pathogenic in animals and humans (2). It is known that smallpox caused by Variola virus (Smallpox), with which it is closely related, was eradicated from the world in 1980 with vaccination studies (1, 3).

Mpox was first detected in 1958 in an outbreak in non-human primates kept in a laboratory in Denmark (4, 5). The first human case was reported in 1970 after detailed epidemiologic studies in a 9-month-old child living in the Democratic Republic of Congo whose clinical symptoms were similar to smallpox (6). Although the natural reservoirs of Mpox are not known for certain, it is thought to be small mammals such as squirrels, rodents and Gambian possums (7).

The virus has two different classes. After smallpox was eradicated, Mpox continued to occur sporadically in Central and East Africa in clade I (subclades Ia and Ib) and in West Africa in clade II (subclades IIa and IIb) (8). Clade I is known to be more contagious, clinically more severe and fatal (7). The first outbreak of Mpox outside Africa was observed in 2003 in the USA due to animals imported from Africa (5). In the following years, it continued to be endemic in Africa, with hundreds of cases reported each year. By May 2022, it was first reported in the United Kingdom and new cases were seen in 110 countries around the world, with European and American countries in the center (9, 10).

Mpox can be transmitted from animals to humans by contact with blood and other body fluids of infected animals, skin and mucosal lesions, consumption of raw or undercooked infected animals, scratches and bites of infected animals (11). Human-to-human transmission can occur through respiratory droplets, close sexual contact, skin contact with a person with Mpox rash, wounds or scabs, contact with contaminated fabrics, objects or surfaces (such as clothing, bedding or towels), vertical transmission from mother to newborn (12, 13).

Common early symptoms of Mpox virus infection include pain, fever, fatigue and lymphadenopathy(14). After fever and lymphadenopathy, rashes begin to appear on the head and face and gradually spread throughout the body. The rashes may vary from macules to papules, vesicles to pustules. The skin rash usually lasts 2-3 weeks (15). The rash heals by forming a crust, leaving behind a scar. The average incubation period is usually 7-10 days after exposure(16). Children, the elderly and immunocompromised people are more prone to experience symptoms that cause the disease to be more severe (9).

Since the signs and symptoms of Mpox are similar to other diseases, the diagnosis may not be easy. Many diseases such as smallpox, varicella, measles, bacterial skin infections, sexually transmitted infections, allergic skin reactions should be kept in mind in the differential diagnosis (17). The best and definitive diagnostic method is demonstration of viral DNA by polymerase chain reaction performed on a swab taken from skin lesions. If there is no skin lesion, swabs can also be taken from other mucosal areas. Although it does not lead to a definite diagnosis, laboratory techniques such as ELISA, electron microscopy, immunofluorescent antibody tests and virus isolation may also help in the diagnosis (18). There is no specific treatment for Mpox. In most patients, the main approach in treatment is symptomatic and supportive treatment (19).

There is a vaccine for Mpox and vaccination should be considered together with other public health preventive measures. The control and prevention of Mpox depends on increasing social awareness, effective operation of public health interventions and training of healthcare workers on measures to prevent the spread of infection (8). Therefore, in this article, we discussed the knowledge, attitudes and vaccination perspectives of both healthcare workers and other segments of the society towards Mpox.

MATERIAL AND METHODS

Type and Purpose of the Study: This study is a cross-sectional study. The study was conducted to raise awareness about Mpox disease, which is defined as an urgent public health crisis by World Health Organization (WHO) (8).

Place and Time of the Study: Between October 1, 2024 and November 1, 2024, it was conducted online in Karabük province.

Population and Sample of the Study: The population of the study consisted of people residing in Karabük province. As a result of the sample size analysis, the smallest sample size to be reached to ensure 80% power and 95% confidence interval was 425 people. The questionnaire was administered to people who could read and complete it independently. Fourteen people who left the questionnaire unfinished and four people under the age of 18 were excluded from the study. The study was completed with a total of 684 participants, a number above the adequate sample size.

Data Collection: A web-based online survey platform was used to reach the participants and create the questionnaire. Participants were invited through links on various social media platforms such as WhatsApp, Instagram, Twitter, Facebook. This method was preferred because it is fast and efficient. Since there was a wide range of responses to the employment status question, the answers were categorized.

Participants were informed about the subject, content and purpose of the study. The questionnaire was administered on a completely voluntary basis to the people involved in the study. Responses were guaranteed to remain confidential. It was made clear to the participants that they could withdraw from the survey at any time without explaining the reasons for withdrawal and that there would be no consequences for withdrawal.

Data Collection Tools: The questionnaire was designed and developed after a comprehensive search in the literature. The questionnaire consists of 27 questions in total. In the first section, various sociodemographic characteristics of the participants such as age, gender, occupation, income, education level, and place of residence were questioned. The second and third sections consisted of questions about their knowledge and attitudes about Mpox.

Data Analysis: The data obtained in this study were analyzed using the SPSS package program. The descriptive characteristics of the participants were expressed as frequencies and percentages. Chi-square analysis was applied in the evaluation of categorical data. The significance level was accepted as $p \leq 0.05$ when interpreting the results.

Ethics Committee Approval: Approval for the study was obtained from the Non-Interventional Ethics Committee of Karabük University Faculty of Medicine**.**

RESULTS

The mean age of the participants was 31.98 years (SD=12.833) and 55.1% were between 18-30 years old. 57.0% of the participants were female and 55.1% were single. In the study, 71.1% of the participants had a bachelor's degree and 73.5% of them had an income equal to their expenses (Table 1).

Table 1. Sociodemographic Characteristics

		n	%
Gender	Male	294	43,0
	Female	390	57.0
Age	18-30	377	55.1
	30-50	239	34.9
	50-80	68	9.9
Residence	District	92	13.5
	Village	18	2.6
	Province	574	83.9
Marital Status	Single	377	55.1
	Married	307	44.9
Level of Education	Primary-High School	98	14.3
	Undergraduate	486	71.1
	Graduate	100	14.6
Employment Status	Health Worker	93	13.6
	University Student	277	40.5
	Other	314	45.9
Economic Status	Income Exceeds Expenses	141	20.6
	Income Equals Expenses	503	73.5
	Income Less than Expenses	40	5.8

When the participants were asked about the symptoms of Mpox, 78.9% said they knew fever, 75% rash, 45.5% headache, 43.6% fatigue, 41.2% myalgia, 36.4% LAP, 26.2% cough, 22.1% diarrhea-vomiting, 16.7% eye problems.

Among the transmission routes of Mpox, 74.7% of the participants knew that it was transmitted by contact with rash, 45.3% by contaminated objects, 45.5% by droplet, 35.4% by sexual contact, 28.4% by animal bite, and 14.8% by placenta.

When asked about their thoughts on the outbreak of Mpox, 32.9% of the participants said that it was an epidemic that could be like other epidemics that occurred throughout human history, 15.5% said that it was a disease that had already existed for years, 13.6% said that it was created for biological warfare, 12.6% said that vaccine and pharmaceutical companies created it to make money, 11.5% said it was a project to reduce the world's population, 8.2% said it was transmitted to humans through the consumption of various animals, 4.5% said it was leaked from a laboratory where viruses were experimented on, and 1.2% thought it might have been created by the Creator to punish humanity.

18.9% of the participants knew that there was an approved vaccine for Mpox and the majority of those who knew were in the 18-30 age group. According to study status, the majority of those who knew that there was an approved vaccine for Mpox were university students, while in terms of marital status, the majority were single participants. In the comparison between the groups, significant differences were found in terms of age, marital status ($p<0.001$) and employment status ($p=0.002$) (Table 2). No significant differences were found in the statistical analysis according to gender, place of residence, educational level and economic status.

Only 19.2% of the people in the study had the intention to be vaccinated against Mpox and the majority were in the 18-30 age group. The majority of those who were considering Mpox vaccination were university students and single participants. In the analysis, significant differences were found in terms of age, marital status and employment status groups ($p<0.001$) (Table 2). There were no differences according to gender, place of residence, educational level and economic status.

Among the participants in the study, 61.2% stated that they did not want to be vaccinated because they were afraid of the complications of the vaccine, 33.6% stated that the vaccines were not sufficiently tested and 5.2% stated that they did not want to be vaccinated because they thought that the vaccines were ineffective.

Table 2. Knowledge of Mpox Approved Vaccine and Consideration of Vaccination Against Mpox According to Age, Marital Status, Occupational Characteristics

			Age				Marital status			Working Status			
			18-30	30-50	50-80	Total	Single	Married	Total	Health Worker	University Student	Other	Total
Total		n	377	239	68	684	377	307	684	93	277	314	684
		%	55.1	34.9	9.9	100	55.1	44.9	100	13.6	40.5	45.9	100
Is there an approved vaccine for Mpox?	exist	n	90_a	28_b	$11_{a,b}$	129	90	39	129	$18_{a,b}$	69_b	42_a	129
		%	13.2	4.1	1.6	18.9	13.2	5.7	18.9	2.6	10.1	6.1	18.9
	absent	n	287_a	211_b	$57_{a,b}$	555	287	268	555	$75_{a,b}$	208_b	272_a	555
		%	42.0	30.8	8.3	81.1	42.0	39.2	81.1	11.0	30.4	39.8	81.1
X^2 testi			p value: <0.001				p value: <0.001			p value =0.002			
Are you considering getting vaccinated against Mpox?	yes	n	106_a	19_b	6_b	131	101	30	131	23_a	75_a	33_b	131
		%	15.5	2.8	0.9	19.2	14.8	4.4	19.2	3.4	11.0	4.8	19.2
	no	n	153_a	188_b	52_b	393	160	233	393	44_a	111_a	238_b	393
		%	22.4	27.5	7.6	57.5	23.4	34.1	57.5	6.4	16.2	34.8	57.5
	undecided	n	118_a	32_b	10_b	160	116	44	160	26_a	91_a	43_b	160
		%	17.3	4.7	1.5	23.4	17.0	6.4	23.4	3.8	13.3	6.3	23.4
Pearson Chi-Square Testi			p değeri: <0.001				p değeri: <0.001			p değeri: <0.001			

a,b: the difference between the groups that do not have the same letter in each line is significant. (p<0.05)

The most common source of information about Mpox was the internet (62.7%), and this rate was higher among the 18-30 age group (41.7%), singles (41.5%) and university students (31.0%). In the analyses, there was a significant difference between the sources of information and age group, marital status and employment status (p <0.001) (Table 3). No significant difference was found in the statistical analysis conducted according to gender, place of residence, education level and economic status.

While 44.9% of the participants stated that they were worried about Mpox news, this rate was higher among women (29.1%) and those whose economic status was equal to their income (p<0.001, p=0.017, respectively) (Table 4).

Table 3. Where Mpox was learned according to age, marital status, and profession characteristics

			Age				Marital status			Working Status			
			18-30	30-50	50-80	Total	Single	Married	Total	Health Worker	University Student	Other	Total
Total		n	377	239	68	684	377	307	684	93	277	314	684
		%	55.1	34.9	9.9	100.0	55.1	44.9	100.0	13.6	40.5	45.9	100.0
People Around		n	38_a	5_b	$2_{a,b}$	45	37	8	45	8_a	30_a	7_b	45
		%	5.6	0.7	0.3	6.6%	5.4	1.2	6.6	1.2	4.4	1.0	6.6
Internet		n	285_a	123_b	21_c	429	284	145	429	57_a	212_b	160_a	429
		%	41.7	18.0	3.1	62.7	41.5	21.2	62.7	8.3	31.0	23.4	62.7
Television		n	54_a	111_b	45_c	210	56	154	210	28_a	35_b	147_c	210
		%	7.9	16.2	6.6	30.7	8.2	22.5	30.7	4.1	5.1	21.5	30.7
Pearson Chi-Square Testi			p değeri: <0.001				p değeri: <0.001			p değeri: <0.001			

a,b,c: the difference between the groups that do not have the same letter in each line is significant. (p<0.05)

Table 4. Mpox concerns according to gender and economic status characteristics

			Are you worried about Mpox?			Total	p vakue
			Yes	No	Undecided		
Total		n	307	269	108	684	
		%	44.9	39.3	15.8	100.0	
Gender	male	n	108	147	39	294	p<0.001
		%	15.8	21.5	5.7	43.0	
	female	n	199	122	69	390	
		%	29.1	17.8	10.1	57.0	
Economic status	Income exceeds expenses	n	46_a	71_b	$24_{a,b}$	141	p=0.017
		%	6.7	10.4	3.5	20.6	
	Income equals Expenses	n	240_a	184_b	$79_{a,b}$	503	
		%	35.1	26.9	11.5	73.5	
	Income less than expenses	n	21_a	14_a	5_a	40	
		%	3.1	2.0	0.7	5.8	

a,b: the difference between the groups that do not have the same letter in each line is significant. (p<0.05)

DISCUSSION

In this study, we found that most of the participants were concerned about Mpox disease. Most of those who were concerned were women and those whose economic status was equal to their income. Similarly, in the study conducted by Wang et al. in China, most of those who were concerned were women, but there was no relationship with economic status (20). This may have resulted from the difference in the socioeconomic status of the groups in which the studies were conducted. In another study conducted in Saudi Arabia, 37.4% of the general population were more concerned about Mpox than COVID-19 (21). On the other hand, in the studies conducted by Meo and Wang, the majority of participants were not concerned about Mpox (22, 23). These differences may vary depending on how countries were affected by the outbreak during the COVID-19 pandemic, how they managed the outbreak, and their preparedness in case of any new outbreak.

In the survey, 57.5% of the participants stated that they would not get vaccinated against Mpox. This situation may have resulted from the possible complications of vaccines, the idea that vaccines are put on the market without sufficient testing, the discourses in the media about anti-vaccination, and the prejudice that vaccines are ineffective. In a study conducted by Şahin et al. on physicians, similar to our study, 68.5% of the participants were not willing to be vaccinated (24). On the other hand, in a study conducted by Elhafeez et al. on medical students in 27 countries, 76.0% of the students and in another study conducted in Pakistan, 67.7% of the students accepted Mpox vaccination (25, 26). This difference may have resulted from the sociodemographic characteristics of the countries where the studies were conducted. The impact of the recent COVID-19 pandemic on the countries and the negative media news about vaccines during this period may have positively or negatively affected the idea of vaccination. However, in both studies, the majority of those who agreed to be vaccinated were individuals between the ages of 18-30 and those with a marital status of single. The fact that young people and singles are more likely to be vaccinated may suggest that young individuals have more confidence in science and technology.

62.7% of the participants obtained information about Mpox from the internet. This rate was significantly higher among 18-30 year-olds, singles and university students.

In another cross-sectional study conducted on resident physicians in Saudi Arabia, similar to our study, the internet and social media were the most common means of obtaining information (27). Another study conducted in India also showed that online sources were mostly utilized(28). This similarity may be due to the fact that the internet is the most practical and easy method of accessing information in today's age.

The majority of the participants in our study thought that Mpox was caused by various conspiracy theories such as the project to reduce the world population, biological warfare, and the greed of vaccine-pharmaceutical companies to make money. In a study conducted on the general population in Saudi Arabia, 26.7% of the participants thought that Mpox was caused by various conspiracy theories and bioterrorism (29). In another study conducted on healthcare workers in Egypt, 58.4% of the participants said that the disease was created as a biological weapon and that the official authorities' statements were a hoax (30).

Considering the increasing use of social media in recent years and the increase in information pollution in these environments, we can assume that various conspiracy theories have emerged. In the study conducted by Zenone and Caulfield using real-time data with the hashtag #monkeypox on TikTok application, 46.4% of the videos analyzed were on the theme that Mpox was deliberately released and 33.3% were on the theme that Mpox was created as an excuse for the administration of vaccines (31). The above study, which shows that social media tools are used as a tool to spread various conspiracy theories and distort accurate information, also supports this situation.

In our study, most of the participants were not aware of the Mpox vaccine. Knowledge of the Mpox vaccine was also significant in favor of individuals between the ages of 18-30, singles and university students. In a study conducted by Nath et al. in Bangladesh in 2022, the majority of the participants did not know about the Mpox vaccine (32). Similarly, in another cross-sectional study conducted by Wang et al. in China, most of the participants were not informed about the existence of a Mpox vaccine (23). This may be due to the fact that Mpox has not yet turned into a global epidemic and therefore is not taken into consideration by people.

In a study conducted among physicians in Turkey, participants over the age of 30 were more knowledgeable about the Mpox vaccine than those between the ages of 18 and 30(24). This difference may be thought to be due to differences in the occupation, educational status and location of the study.

Limitations Our study has limitations. Since the study was conducted only in Karabük province, it cannot be generalized to the population. Another limitation is that although Mpox has been declared as a global emergency by the WHO, it has not yet turned into a pandemic, which may have affected the participants' thoughts about vaccination.

CONCLUSION

In this study, we examined the sociodemographic characteristics of people in

Karabük province and their knowledge and attitudes towards Mpox disease. We found that the majority of the participants did not have sufficient knowledge, especially about the Mpox vaccine, which made us think that the importance given to preventive health services is not sufficient. In general, the results were in favor of young people, students and singles. The group most concerned about Mpox was women and those with poor economic status. The internet was the most common means of obtaining information in all groups, especially in young people and students.

The knowledge and attitudes of all segments of society are critical for combating infectious diseases. Raising public awareness about Mpox and making preparations for possible future outbreaks is of great importance for public health.

Considering that online environments and social media content have recently been used to obtain information, it may be useful to increase inspections and control to prevent information pollution, especially on health issues.

In addition, with the support of the state, it can be thought that both public service announcements and public health trainings will provide positive benefits in terms of preventive measures and vaccination in a possible Mpox epidemic.

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