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# Threat of mpox (Monkeypox) Outbreak after the COVID-19 Pandemic: Are Healthcare Professionals Ready for New Psychological Wars?

## COVID-19 Salgını Sonrası mpox (Maymun Çiçeği) Salgını Tehdidi: Sağlık Çalışanları Yeni Psikolojik Savaşlara Hazır Mı?

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## Abstract

**Aims**: In this study, it was aimed to evaluate the psychological status of healthcare professionals regarding the COVID-19 pandemic, and to examine their perspectives and knowledge levels regarding the mpox epidemic.

**Material and Method**: Having a cross-sectional design, the present study was carried out by using questions addressing sociodemographic characteristics of healthcare professionals, their experiences with the COVID-19 pandemic, and their knowledge and anxiety levels regarding mpox.

**Results**: 202 healthcare professionals were involved in the present study. Of the participants, 55% were female and the mean age was 35.0±7.7 years. The majority (63.4%) of the participants were midwives/nurses/medical assistants. Of the participants, 68.8% were infected by COVID-19 during the pandemic. Considering the questions addressing their level of knowledge about mpox, 44.1% of participants stated that they had never heard of this disease before. Participants were found to have mainly moderate levels of depression and anxiety and low level of stress, whereas the ratios of very severe depression and anxiety were 5.0% and 7.4%, respectively.

**Conclusion**: It was determined that almost half of the participants had no full knowledge of the disease before the increase in mpox cases. It was found that the participants varying levels of depression, anxiety, and stress about a new pandemic. We think that it is important to provide healthcare professionals with psychosocial support, make effort in order to determine and eliminate the sources of psychological negativities.

**Keywords**: Anxiety, COVID-19, depression, monkeypox, mpox

## Öz

**Amaç**: Bu çalışmada, sağlık çalışanlarının COVID-19 pandemisine ilişkin psikolojik durumlarının değerlendirilmesi, mpox salgınına bakış açılarının ve bilgi düzeylerinin incelenmesi amaçlandı.

**Gereç ve Yöntem** Kesitsel bir tasarıma sahip olan bu çalışma, sağlık çalışanlarının sosyodemografik özellikleri, COVID-19 pandemisi ile ilgili deneyimleri ve mpox'a ilişkin bilgi ve kaygı düzeylerini ele alan sorular kullanılarak gerçekleştirildi.

**Bulgular**: Çalışmaya 202 sağlık çalışanı dahil edildi. Araştırma kapsamına alınanların %55'i kadındı ve yaş ortalaması 35.0±7.7 yıldı. Katılımcıların büyük çoğunluğu (%63.4) ebe/hemşire/sağlık memuruydu. Katılımcıların %68.8'i pandemi sırasında COVID-19 ile enfekte oldu. Mpox ile ilgili bilgi düzeylerine yönelik yöneltilen sorularda katılımcıların %44.1'i (n=89) bu hastalığı daha önce hiç duymadıklarını ifade etti. Katılımcıların ağırlıklı olarak orta düzeyde depresyon ve anksiyete ile düşük düzeyde strese sahip olduğu, çok şiddetli depresyon ve anksiyete oranlarının ise sırasıyla %5.0 ve %7.4 olduğu bulundu.

**Sonuç**: Çalışmada katılımcıların neredeyse yarısının mpox vakalarındaki artıştan önce hastalık hakkında tam bilgiye sahip olmadığı belirlendi. Katılımcıların yeni bir pandemiye karşı farklı düzeylerde depresyon, kaygı ve stres yaşadıkları tespit edildi. Psikolojik olumsuzlukların kaynaklarının belirlenip ortadan kaldırılması için sağlık çalışanlarına psikososyal destek verilmesinin, çaba gösterilmesinin önemli olduğunu düşünüyoruz.

**Anahtar Kelimeler**: Anksiyete, COVID-19, depresyon, maymun çiçeği, mpox

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## INTRODUCTION

On 11 March 2020, coronavirus disease-2019 (COVID-19) was announced as a global pandemic by the World Health Organization (WHO).[1] The disease spread out to more than 220 countries worldwide. At the global scale, the number of cases reached 767 million and deaths to 6.9 million.[2] Developing due to SARS-CoV-2, COVID-19 is carried between humans through droplets. Healthcare professionals are at risk because of their contact with patients and social transmission.[3] It was reported that this increase in the risk to catch the virus for healthcare professionals during the pandemic increased the anxiety of becoming ill and might cause burnout for both these professionals and their families/friends.[4]

The new outbreak caused by the monkeypox virus (MPXV) while the world is still struggling with the COVID-19 pandemic increased the anxiety of healthcare officials that this disease might be a new threat.[5,6] Caused by MPXV, mpox (formerly known as monkeypox disease) is a zoonotic infection and is widely seen in Central and Western Africa. The first mpox case in humans was reported in Democratic Kongo Republic in the year 1970.[7,8] Contagion of MPXV to humans occurs via direct contact with an infected human or animal or through materials contaminated with the virus.[9]

Although MPXV has been in circulation for years where it is endemic, mpox studies have been ignored and the studies on this subject have not been funded sufficiently.[10] In May 2022, multiple mpox cases were detected in several non-endemic countries.[11] On 23 July 2022, WHO declared the mpox as a "Global Emergency".[12] As of the date 6 June 2023, 87,929 mpox cases and 146 deaths were reported from 111 countries worldwide. It is seen that the number of cases has decreased on a global scale since August 2022, and on May 10 2023, WHO declared mpox is no longer a global emergency.[13]

The increasing number of human mpox cases indicates the importance of protection from the disease, early diagnosis, and epidemic management. Besides that, in a report prepared by the WHO, it was reported that one of the difficulties in preventing the outbreak of mpox was the lack of information about mpox, especially among healthcare professionals.[7,14] In this study, it was aimed to evaluate the psychological status of healthcare professionals regarding the COVID-19 pandemic, and to examine their perspectives and knowledge levels regarding the mpox epidemic.

## MATERIAL AND METHOD

### Ethical Approval and Permissions

The study was carried out with the permission of Harran University Clinical Researches Ethics Committee (Date: 08.08.2022, Decision No: HRÜ/22.15.20). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

### Study Design and Subjects

The universe of this study consists of all the healthcare professionals working in different branches and at different positions in administration and service departments of Batman Training and Research Hospital. The data were collected between August 2022 and November 2022. Without using a sampling method, all the volunteer healthcare professionals were involved in this study. The present study was completed with 202 participants. The healthcare professionals (55 professionals), who were not volunteer in participating in the study, were excluded (Participation ratio: 78.6%).

### Data Collection Tools

The study data were collected using a survey that consists of 4 sections. The first section of the survey consists of 9 items addressing the sociodemographic characteristics and comorbidity, whereas the second section consists of 7 items examining their professional and personal experiences during the COVID-19 pandemic. While the third section consists of 19 items investigating their level of knowledge and anxiety about mpox, the fourth section consists of the "Depression, Anxiety, and Stress Scale-2021 (DASS-21)" developed in order to determine the depression, anxiety, and stress disorder levels of participants. Developed by Lovibond P. F. and Lovibond S. H., the Depression Anxiety Stress Scale (DASS) consists of 42 items.[15] It was revised into its 21-item short form (DASS-21) by Sarıçam H.[16] The scale includes 3 subdimensions, each of which consists of 7 items, addressing depression, anxiety, and stress. The scale is rated between 0 (never) and 3 (always) in order to determine the depression, anxiety, and stress levels in the last week. Cronbach's Alpha internal consistency coefficient of the scale was found to be 0.87 for depression, 0.85 for anxiety, and 0.81 for stress. In this study, the DASS-21 scale's internal consistency Cronbach alpha coefficient was found to be 0.85 for depression, 0.80 for anxiety, and 0.77 for stress and considered to be at a sufficient level.

### Statistical Methods

The data obtained were analyzed using IBM SPSS Statistics v.22.0 (IBM Corp.; Armonk, NY, USA) package software. During the statistical analyses, mean ± standard deviation and minimum-maximum values were used for continuous variables, whereas numbers and percentages were used for nominal variables. Continuous variables' fitness to normal distribution was tested using the Shapiro-Wilk test, normal distribution diagrams, and skewness and kurtosis coefficients. The significance of differences for continuous variables was examined using independent samples t-test and F-test (One-way ANOVA). The level and direction of relationships between two numerical variables were analyzed using Pearson's correlation analysis. For all the analyses, statistical significance was set at $p<0.05$.

## RESULTS

In total, 202 healthcare professionals were involved. Of the participants, 55.0% (n=111) were women and the mean age was found to be 35.0±7.7 (min-max=22-57) years. The portion of married participants was 67.3% (n=136) and the mean number of children was 2.4±1.3 (min-max=1-5). The highest portion of participants (63.4%, n=128) consisted of midwives /nurses/medical assistants, while the mean duration of employment was 11.8±7.6 (min-max=1-37) years. It was determined that 77.7% (n=157) of the participants have worked in departments, where COVID-19-related services were offered, during the pandemic (**Table 1**).

**Table 1. Participant's sociodemographic characteristics and their experiences with the COVID-19 pandemic**

| Characteristics | n (%) |
|---|---|
| Gender | |
| Female | 111 (55.0) |
| Male | 91 (45.0) |
| Age [Mean ±SD (Min-Max)] | 35.0±7.7 (22-57) |
| Marital status | |
| Non-married | 66 (32.7) |
| Married | 136 (67.3) |
| Number of children [Mean ±SD (Min-Max)] | 2.4±1.3 (1-5) |
| Position | |
| Specialist physician/Physician | 32 (15.8) |
| Midwife/Nurse/Medical assistant | 128 (63.4) |
| Other supporting medical personnel | 26 (12.9) |
| Administration and service personnel | 16 (7.9) |
| Professional employment time [Mean ±SD (Min-Max)] | 11.8±7.6 (1-37) |
| Active workplace during the pandemic | |
| Pandemic-related units | 157 (77.7) |
| Units that are not related with the pandemic | 45 (22.3) |
| Chronic physical disorder | |
| No | 174 (86.1) |
| Yes | 28 (13.9) |
| Chronic mental disorder | |
| No | 197 (97.5) |
| Yes | 5 (2.5) |
| Diagnosed with COVID-19 | |
| No | 63 (31.2) |
| Yes | 139 (68.8) |
| Family member diagnosed with COVID-19 | |
| No | 30 (14.9) |
| Yes | 172 (85.1) |
| Loss of a family member due to COVID-19 | |
| No | 183 (90.6) |
| Yes | 19 (9.4) |
| COVID-19 diagnosis in social circle | |
| No | 5 (2.5) |
| Yes | 197 (95.5) |
| Death by COVID-19 in social circle | |
| No | 50 (24.8) |
| Yes | 152 (75.2) |
| Colleague diagnosed with COVID-19 | |
| No | 3 (1.5) |
| Yes | 199 (98.5) |
| Loss of a colleague due to COVID-19 | |
| No | 144 (71.3) |
| Yes | 58 (28.7) |
| Vaccination against COVID-19 | |
| No | 23 (11.4) |
| Yes | 179 (88.6) |
| Number of COVID-19 vaccine doses [Mean ±SD (Min-Max)] | 2.8±1.4 (0-6) |
| Side effects after COVID-19 vaccine | |
| No | 150 (74.3) |
| Yes | 52 (25.7) |

The COVID-19 infection ratio among the participants during the pandemic was 68.8% (n=139), whereas the same ratio was found to be 85.1% (n=172), 95.5% (n=197), and 98.5% (n=199) for their family members (spouse, parents, children, etc.), social circle (relatives, friends, etc.), and colleagues, respectively. The ratios of COVID-19-related death were found to be 9.4%, 75.2%, and 28.7% for family members, social circle, and colleagues, respectively. The ratio of participants, who moved from the place they have been actively living before the pandemic during the pandemic period, was 26.2% (n=53). The ratio of participants that have been vaccinated for COVID-19 was 88.6% (n=179) (**Table 1**).

In questions addressing the level of knowledge about mpox, 44.1% (n=89) stated that they had never heard about this disease before. Of the participants, 46% (n=93) had accurate information about the cause of the disease, 54% (n=109) had accurate information about the infection pathway, and 35.6% (n=72) had accurate information about the places, where the disease is endemic to. While 24.3% (n=49) were informed about the smallpox vaccine, the response of 48.0% (n=97) of the participants to the question if the smallpox vaccine is protective against mpox was "yes" (**Table 2**).

**Table 2. Participant's knowledge and attitudes about mpox**

| Characteristics | n (%) |
|---|---|
| Having knowledge about mpox before the announcement of WHO* | |
| No | 89 (44.1) |
| Yes | 113 (55.9) |
| Having knowledge about the cause of mpox | |
| No information | 104 (51.5) |
| Wrong information | 5 (2.5) |
| Accurate information | 93 (46.0) |
| Having knowledge about the mode of transmission of mpox | |
| No information | 53 (26.2) |
| Wrong information | 40 (19.8) |
| Accurate information | 109 (54.0) |
| Having knowledge about risky contact time for mpox | |
| No knowledge | 174 (86.1) |
| Accurate knowledge | 28 (13.9) |
| Having knowledge about regions, where mpox is endemic | |
| No knowledge | 66 (32.7) |
| Wrong information | 64 (31.7) |
| Accurate information | 72 (35.6) |
| Having knowledge about protection measurements against mpox | |
| No information | 100 (49.5) |
| Accurate information | 102 (50.5) |
| Having knowledge about diagnosis methods for mpox | |
| No information | 9 (4.5) |
| Wrong information | 93 (46.0) |
| Accurate information | 100 (49.5) |
| Having knowledge about treatment methods for mpox | |
| No | 128 (63.4) |
| Yes | 74 (36.6) |
| Having knowledge about the Mpox vaccine | |
| Wrong information | 153 (75.7) |
| Accurate information | 49 (24.3) |
| Having knowledge about the protectiveness of the smallpox vaccine | |
| No | 105 (52.0) |
| Yes | 97 (48.0) |

*WHO: World Health Organization

DAS-21, a standard measurement tool, was used to determine the psychological state of healthcare workers trying to meet the increasing healthcare needs with the COVID-19 pandemic, in case of a possible new pandemic [16]. The mean total score of the scale was found to be 12.68±11.16 (min-max=0-46), whereas the mean scores in depression, anxiety, and stress subdimensions were 4.55±4.15 (min-max=0-19), 3.34±3.48 (min-max=0-14), and 4.79±4.07 (min-max=0-16), respectively. Besides that, the portions of participants in the regions, which were classified between mild to extremely severe by the developer, for depression, anxiety, and stress were 46.6%, 40.1%, and 22.7% (**Table 3**). It was determined that the participants generally had moderate level of depression and anxiety and mild level of stress, whereas the portions of participants having extremely severe depression and anxiety were 5.0% and 7.4%, respectively.

The distribution of participants' mean scores by their sociodemographic characteristics, their experiences with COVID-19 pandemic, and knowledge about mpox are presented in **Table 4**. The participants, who had a chronic psychological disorder, in the total scale and in all subdimensions were found to be statistically significantly higher mean scores ($p<0.05$). The COVID-19 vaccine caused a significant change in the mean scores ($p<0.05$). Those not having knowledge about the diagnosis and treatment of mpox were found to have significantly higher mean scores in the total scale and in all subdimensions ($p<0.05$).

**Table 3. Correlation analysis and categorical distribution of the participant's scores in the DASS-21 scale and its subdimensions**

| Variables | $\bar{x}$ ±SD (Min-Max) | 1 | 2 | 3 |
|---|---|---|---|---|
| 1 Depression | 4.55±4.15 (0-19) | 1 | 0.834 (<0.001) | 0.886 (<0.001) |
| 2 Anxiety | 3.34±3.48 (0-14) | | 1 | 0.871 (<0.001) |
| 3 Stress | 4.79±4.07 (0-16) | | | 1 |
| Total score | 12.68±11.16 (0-46) | 0.955 (<0.001) | 0.940 (<0.001) | 0.966 (<0.001) |

**Pearson's correlation analysis, r(p)**

| Category | Depression, n (%) | Anxiety, n (%) | Stress, n (%) |
|---|---|---|---|
| Normal | 108 (53.4) | 121 (59.9) | 156 (77.3) |
| Mild | 35 (17.3) | 25 (12.4) | 18 (8.9) |
| Moderate | 39 (19.3) | 26 (12.9) | 14 (6.9) |
| Severe | 10 (5.0) | 15 (7.4) | 14 (6.9) |
| Extremely severe | 10 (5.0) | 15 (7.4) | - |

**Table 4. Distribution of various characteristics of participants by the mean scores in DASS-21 total scale and subdimensions**

| Characteristics | DASS-21 Mean±SD | DASS-21D Mean±SD | DASS-21A Mean±SD | DASS-21S Mean±SD |
|---|---|---|---|---|
| Gender | | | | |
| Male | 10.43±10.54 | 4.03±4.02 | 2.48±3.29 | 3.91±3.80 |
| Female | 14.52±11.37 | 4.98±4.21 | 4.04±3.49 | 5.50±4.15 |
| t | -2.630 | -1.624 | -3.223 | -2.813 |
| p | 0.009 | 0.106 | 0.001 | 0.005 |
| Age groups | | | | |
| 20-29 years | 15.42±11.50 | 5.53±4.30 | 4.18±3.53 | 5.70±4.32 |
| 30-39 years | 11.69±11.17 | 4.23±4.09 | 2.98±3.56 | 4.49±4.08 |
| 40 years and older | 11.28±10.46 | 4.02±3.96 | 2.98±3.21 | 4.28±3.67 |
| F | 2.632 | 2.453 | 2.558 | 2.219 |
| P | 0.074 | 0.089 | 0.080 | 0.111 |
| Marital status | | | | |
| Non-married | 15.95±12.36 | 6.18±4.67 | 4.09±3.79 | 5.68±4.54 |
| Married | 11.09±10.21 | 3.76±3.63 | 2.97±3.27 | 4.35±3.76 |
| t | 2.960 | 4.027 | 2.162 | 2.196 |
| p | 0.003 | <0.001 | 0.032 | 0.029 |
| Having child | | | | |
| No | 15.90±11.44 | 5.94±4.15 | 4.17±3.54 | 5.79±4.42 |
| Yes | 10.65±10.53 | 3.69±3.92 | 2.81±3.36 | 4.15±3.71 |
| t | 3.330 | 3.881 | 2.727 | 2.839 |
| p | 0.001 | <0.001 | 0.007 | 0.005 |
| Active workplace during the pandemic | | | | |
| Pandemic-related units | 13.42±11.43 | 4.84±4.11 | 3.52±3.64 | 5.06±4.17 |
| Units that are not related to the pandemic | 10.09±9.88 | 3.56±4.15 | 2.69±2.81 | 3.84±3.57 |
| t | 1.774 | 1.842 | 1.418 | 1.771 |
| p | 0.078 | 0.067 | 0.158 | 0.078 |
| Chronic physical disorder | | | | |
| No | 12.01±10.89 | 4.36±4.03 | 3.12±4.43 | 4.53±3.92 |
| Yes | 16.82±12.14 | 5.75±4.69 | 4.68±3.52 | 6.39±4.63 |
| t | -2.134 | -1.649 | -2.217 | -2.272 |
| p | 0.034 | 0.101 | 0.028 | 0.024 |
| Chronic mental disorder | | | | |
| No | 12.18±10.66 | 4.38±4.01 | 3.17±3.29 | 4.63±3.91 |
| Yes | 32.40±13.95 | 11.40±3.84 | 10.00±4.63 | 11.00±5.78 |
| t | -4.157 | -3.862 | -4.535 | -3.554 |
| p | <0.001 | <0.001 | <0.001 | <0.001 |
| Infection diagnosis | | | | |
| No | 10.17±10.10 | 3.81±11.47 | 2.70±3.27 | 3.67±3.64 |
| Yes | 13.81±11.47 | 4.89±4.31 | 3.63±3.54 | 5.29±4.16 |
| t | -2.165 | -1.726 | -1.761 | -2.673 |
| p | 0.032 | 0.086 | 0.080 | 0.008 |

**Table 4. Distribution of various characteristics of participants by the mean scores in DASS-21 total scale and subdimensions**

| Characteristics | DASS-21 Mean±SD | DASS-21D Mean±SD | DASS-21A Mean±SD | DASS-21S Mean±SD |
|---|---|---|---|---|
| Infection diagnosis in the family | | | | |
| No | 11.07±11.45 | 4.33±4.07 | 2.93±3.68 | 3.80±4.11 |
| Yes | 12.96±11.12 | 4.59±4.17 | 3.41±3.45 | 4.96±4.05 |
| t | -0.856 | -0.316 | -0.686 | -1.443 |
| p | 0.393 | 0.753 | 0.493 | 0.151 |
| Loss of a family member due to the infection | | | | |
| No | 12.63±11.43 | 4.55±4.27 | 3.30±3.50 | 4.79±4.17 |
| Yes | 13.11±8.42 | 4.58±2.73 | 3.74±3.33 | 4.79±2.91 |
| t | -0.175 | -0.038 | -0.525 | -0.004 |
| p | 0.861 | 0.970 | 0.600 | 0.997 |
| Infection diagnosis in the social circle | | | | |
| No | 8.60±12.64 | 2.80±4.08 | 2.80±4.38 | 3.00±4.24 |
| Yes | 12.78±11.14 | 4.60±4.15 | 3.35±3.47 | 4.83±4.06 |
| t | -0.826 | -0.957 | -0.348 | -0.994 |
| p | 0.410 | 0.340 | 0.728 | 0.321 |
| Death caused by infection in the social circle | | | | |
| No | 12.38±11.77 | 4.42±4.34 | 3.28±3.78 | 4.68±4.20 |
| Yes | 12.78±11.00 | 4.60±4.09 | 3.36±3.39 | 4.83±4.04 |
| t | -0.217 | -0.263 | -0.132 | -0.214 |
| p | 0.828 | 0.792 | 0.895 | 0.831 |
| Infection diagnosis among colleagues | | | | |
| No | 18.33±18.03 | 6.00±6.24 | 5.67±6.65 | 6.67±5.85 |
| Yes | 12.59±11.08 | 4.53±4.13 | 3.30±3.43 | 4.76±4.05 |
| t | 0.883 | 0.607 | 1.168 | 0.805 |
| p | 0.378 | 0.545 | 0.244 | 0.422 |
| Loss of a colleague due to infection | | | | |
| No | 11.47±10.16 | 4.14±3.83 | 3.02±3.14 | 4.31±3.64 |
| Yes | 13.17±11.54 | 4.72±4.27 | 3.47±3.61 | 4.98±4.22 |
| t | -0.979 | -0.905 | -0.826 | -1.057 |
| p | 0.329 | 0.367 | 0.410 | 0.292 |
| Vaccinated for Covid-19 | | | | |
| No | 7.04±7.74 | 2.00±2.33 | 2.00±2.46 | 3.04±3.25 |
| Yes | 13.40±11.34 | 4.88±4.22 | 3.51±3.56 | 5.01±4.11 |
| t | -3.485 | -4.968 | -2.603 | -2.641 |
| p | 0.001 | <0.001 | 0.013 | 0.013 |
| Having knowledge about mpox before WHO's announcement | | | | |
| No | 11.74±10.94 | 4.27±4.14 | 2.98±3.44 | 4.49±3.86 |
| Yes | 13.42±11.33 | 4.78±4.15 | 3.62±3.50 | 5.02±4.23 |
| t | -1.058 | -0.865 | -1.302 | -0.907 |
| p | 0.291 | 0.388 | 0.194 | 0.366 |
| Having knowledge about the cause of mpox | | | | |
| No information | 13.18±11.31 | 4.74±4.19 | 3.46±3.62 | 4.98±3.98 |
| Wrong information | 12.40±9.81 | 4.20±3.56 | 4.20±3.56 | 4.00±2.91 |
| Accurate information | 12.13±11.15 | 4.37±4.15 | 3.15±3.34 | 4.61±4.23 |
| F | 0.218 | 0.217 | 0.351 | 0.294 |
| P | 0.804 | 0.805 | 0.705 | 0.745 |
| Having knowledge about mpox's mode of transmission | | | | |
| No information | 13.83±11.40 | 5.04±4.19 | 3.62±3.78 | 5.17±4.05 |
| Wrong information | 12.48±11.44 | 4.43±4.20 | 3.25±3.49 | 4.80±4.21 |
| Accurate information | 12.19±11.01 | 4.37±4.12 | 3.23±3.35 | 4.60±4.05 |
| F | 0.389 | 0.488 | 0.241 | 0.352 |
| P | 0.678 | 0.615 | 0.786 | 0.704 |
| Having knowledge about the regions mpox is endemic to | | | | |
| No information | 14.55±12.90 | 4.95±4.74 | 3.95±3.95 | 5.64±4.72 |
| Wrong information | 11.86±9.87 | 4.55±3.82 | 2.88±3.09 | 4.44±3.60 |
| Accurate information | 11.69±10.45 | 4.19±3.85 | 3.18±3.31 | 4.32±3.73 |
| F | 1.379 | 0.575 | 1.683 | 2.172 |
| p | 0.254 | 0.563 | 0.189 | 0.117 |
| Having knowledge about protective measurements against mpox | | | | |
| No information | 13.52±11.56 | 4.88±4.33 | 3.56±3.52 | 5.08±4.23 |
| Accurate information | 11.85±10.75 | 4.24±3.95 | 3.12±3.45 | 4.50±3.90 |
| t | 1.061 | 1.104 | 0.902 | 1.012 |
| p | 0.290 | 0.271 | 0.368 | 0.313 |
| Having knowledge about diagnosis methods for mpox | | | | |
| No information (1) | 22.44±14.80 | 7.67±5.09 | 6.33±5.12 | 8.44±5.50 |
| Wrong information (2) | 14.00±11.48 | 5.03±4.32 | 3.77±3.52 | 5.19±4.15 |
| Accurate information (3) | 10.57±9.90 | 3.83±3.72 | 2.66±3.09 | 4.08±3.64 |
| F | 6.177 | 4.850 | 6.256 | 5.875 |
| P | 0.002 | 0.009 | 0.002 | 0.003 |
| Post hoc test (Tukey HSD) | (1-3) | (1-3) | (1-3) | (1-2), (1-3) |
| Having knowledge about the protectiveness of the smallpox vaccine | | | | |
| No | 14.46±12.03 | 5.16±4.61 | 3.93±3.72 | 5.36±4.20 |
| Yes | 10.75 | 3.90±3.49 | 2.69±3.09 | 4.16±3.84 |
| t | 2.401 | 2.208 | 2.586 | 2.105 |
| p | 0.017 | 0.028 | 0.010 | 0.037 |

t: Independent sample t-test, F: One-Way ANOVA

Some potential and psychiatric variables for the participants after the introduction of mpox into WHO's agenda and the news about the increases in case numbers and the changes in total scale and subdimensions are presented in **Table 5**. The anxiety of transmitting the infection to the family-social circle caused a significant increase in the mean total score and in the mean scores of all subdimensions ($p<0.05$). Considering the period after learning about the increase in the number of cases, statistically significant increases were found in the mean scores in the anxiety subdimension for participants reporting a loss of appetite, in total scale, depression, and anxiety subscales for those reporting sleep problems, and in total scale and all subdimensions for those reporting stomach problems ($p<0.05$).

**Table 5. Distribution of participant's opinions about mpox by DASS-21 total scale and subdimensions**

| Characteristics | DASS-21 Mean±SD | DASS-21D Mean±SD | DASS-21A Mean±SD | DASS-21S Mean±SD |
|---|---|---|---|---|
| Anxiety of being infected | | | | |
| Never/Very rarely | 10.23±10.65 | 3.72±3.96 | 2.49±3.24 | 4.02±3.95 |
| Sometimes | 12.46±11.54 | 4.49±4.16 | 3.35±3.43 | 4.62±4.38 |
| Mostly | 14.87±10.88 | 5.30±4.20 | 4.00±3.62 | 5.58±3.72 |
| F | 2.327 | 3.024 | 2.452 | 2.807 |
| P | 0.100 | 0.051 | 0.089 | 0.063 |
| Anxiety of not being able to be treated | | | | |
| Never/Very rarely | 10.55±9.89 | 3.84±3.75 | 2.56±2.95 | 4.15±4.76 |
| Sometimes | 13.18±11.15 | 4.65±4.02 | 3.65±3.59 | 4.88±4.11 |
| Mostly | 14.77±12.39 | 5.35±4.67 | 3.93±3.83 | 5.49±4.33 |
| F | 2.437 | 2.985 | 1.775 | 2.190 |
| p | 0.090 | 0.053 | 0.172 | 0.115 |
| Anxiety of having contact with a foreign national | | | | |
| Never/Very rarely (1) | 7.78±9.31 | 2.81±3.45 | 1.88±2.77 | 3.09±3.55 |
| Sometimes (2) | 14.91±11.06 | 5.37±4.23 | 4.02±3.48 | 5.52±3.98 |
| Mostly (3) | 14.53±11.42 | 5.20±4.21 | 3.88±3.63 | 5.45±4.13 |
| F | 8.438 | 7.690 | 7.610 | 7.570 |
| P | <0.001 | <0.001 | <0.001 | <0.001 |
| Post hoc test (Tukey HSD) | (1-2), (1-3) | (1-2), (1-3) | (1-2), (1-3) | (1-2), (1-3) |
| Thinking that personal hygiene principles would not be enough | | | | |
| Never/Very rarely | 15.05±11.06 | 5.31±4.09 | 4.07±3.43 | 5.67±4.06 |
| Sometimes | 12.58±11.17 | 4.69±3.99 | 3.23±3.68 | 4.67±4.20 |
| Mostly | 11.83±11.17 | 4.21±4.23 | 3.11±3.41 | 4.51±4.00 |
| F | 1.273 | 1.097 | 1.202 | 1.266 |
| P | 0.282 | 0.336 | 0.303 | 0.284 |
| Anxiety of transmitting the infection to family/social circle | | | | |
| Never/Very rarely (1) | 8.47±9.32 | 3.25±3.79 | 2.08±2.70 | 3.15±3.39 |
| Sometimes (2) | 13.62±11.58 | 4.76±4.07 | 3.76±3.68 | 5.10±4.27 |
| Mostly (3) | 14.58±11.33 | 5.21±4.27 | 3.80±3.61 | 5.57±4.05 |
| F | 5.464 | 3.895 | 4.890 | 6.372 |
| p | 0.005 | 0.022 | 0.008 | 0.002 |
| Post hoc test (Tukey HSD) | (1-2), (1-3) | (1-3) | (1-2), (1-3) | (1-2), (1-3) |
| Loss of appetite after learning about the increase in the number of cases | | | | |
| Never/Very rarely (1) | 12.02±10.95 | 4.37±4.10 | 3.05±3.31 | 4.60±4.07 |
| Sometimes (2) | 17.59±11.27 | 6.00±4.25 | 5.27±3.80 | 6.32±3.67 |
| Mostly (3) | 13.67±14.29 | 4.50±4.72 | 4.50±5.08 | 4.67±5.00 |
| F | 2.488 | 1.508 | 4.459 | 1.760 |
| p | 0.086 | 0.224 | 0.013 | 0.175 |
| Post hoc test (Tukey HSD) | | | (1-2) | |
| Sleep problems after learning about the increase in the number of cases | | | | |
| Never/Very rarely (1) | 11.89±10.84 | 4.31±4.06 | 3.03±3.30 | 4.56±4.02 |
| Sometimes (2) | 18.69±10.26 | 6.44±3.65 | 5.44±3.28 | 6.81±3.71 |
| Mostly (3) | 20.33±16.69 | 7.00±6.29 | 7.00±5.65 | 6.33±5.20 |
| F | 4.313 | 3.075 | 7.368 | 2.751 |
| p | 0.015 | 0.048 | <0.001 | 0.066 |
| Post hoc test (Tukey HSD) | (1-2) | (1-2) | (1-2), (1-3) | |
| Stomach problems after learning about the increase in the number of cases | | | | |
| Never/Very rarely (1) | 11.24±10.38 | 4.12±3.93 | 2.76±3.05 | 4.35±3.95 |
| Sometimes (2) | 21.36±11.80 | 7.32±4.50 | 6.55±3.87 | 7.50±3.78 |
| Mostly (3) | 18.10±13.37 | 5.90±4.67 | 6.00±4.69 | 6.20±4.39 |
| F | 10.087 | 6.706 | 16.824 | 6.827 |
| p | <0.001 | 0.002 | <0.001 | 0.001 |
| Post hoc test (Tukey HSD) | (1-2) | (1-2) | (1-2), (1-3) | (1-2) |

t: Independent sample t-test, F: One-Way ANOVA

## DISCUSSION

It is known that healthcare professionals had remarkable stress during previous pandemics. It was reported that healthcare professionals were emotionally affected during the recent SARS pandemic.[17,18] Various studies showed that healthcare professionals were at risk of psychiatric disorders due to various reasons during the COVID-19 pandemic.[19-22] In a previous meta-analysis carried out by Mahmud et al.[23] the prevalence of depression, anxiety, stress, and sleeplessness among healthcare professionals was reported to be 37.1%, 41.4%, 44.9%, and 43.8%. In a meta-analysis by Li et al.[24] on 65 studies carried out on 97,333 healthcare professionals from 21 countries, the pooled prevalence of depression was found to be 21.7% and that of anxiety to be 22.1%. Of 202 healthcare professionals involved in the present study, it was determined that 77.7% have worked in departments offering services related to COVID-19, 68.8% were infected by COVID-19 during the pandemic, and infection and COVID-19-related death ratios of family members, social circle, and colleagues were reported to be (85.1%-9.4%), (95.5%-75.2%), and (98.5%-28.7%), respectively. In this study, the DASS-21 scale was used in determining the psychological conditions of healthcare professionals considering the possibility of a new pandemic. Accordingly, the ratios of participants found to have depression, anxiety, and stress were 46.6%, 40.1%, and 22.7%. The ratios of extremely severe depression and anxiety were calculated to be 5% and 7.4%. Among the participants, women had higher anxiety and stress levels in comparison to men (p=0.001-p=0.005). The participants, who worked in departments offering services related to COVID-19 during the pandemic, were found to have higher depression, anxiety, and stress levels but the difference was not statistically significant. In comparison to participants, who have not been diagnosed with COVID-19, the participants diagnosed with COVID-19 were found to have statistically significantly higher mean scores in the total scale (p=0.032) and in the stress subdimension (p=0.008). When compared to those not vaccinated for COVID-19, the participants vaccinated for COVID-19 had lower mean scores in the total scale (p<0.001). The participants having a chronic psychological disorder were found to have higher mean scores in the total scale and in all subdimensions (p<0.05). The participants having chronic physical disorders were determined to have higher mean scores in anxiety and stress subdimensions (p=0.034, p=0.028, p=0.024). In a study carried out on the psychosocial effects of COVID-19 on healthcare professionals in Italy, various factors such as female gender, working as a nurse, working in a hospital, and having contact with COVID-19 patients were found to be predictor determinants.[25] In a study carried out in China, it was observed that healthcare professionals working at the front line during the pandemic had more anxiety, sleeplessness, and general psychological disorders.[26] In the present study, the factors such as female gender, COVID-19 history, COVID-19 vaccination, and chronic psychologic and physical disorders were found to be the factors related with depression, anxiety, and stress.

In order to prevent disease transmission, healthcare professionals, especially physicians, should rapidly identify new cases, report them, and have knowledge about the clinical symptoms of mpox.[7] In some of previous studies, it was reported that healthcare professionals did not have sufficient information about mpox. In a survey study carried out on physicians, pharmacists, nurses, medical technicians, and dentists in Jordan, only 4 of 11 questions about mpox were answered accurately at a higher level than 70% and the knowledge level of physicians about mpox was found to be higher than other groups. In the same study, 33.3% of the participants stated that the smallpox vaccine might be protective against mpox and 58.7% stated that homosexuality was an important factor in the spread of the disease.[27] In another study carried out in Italy, 27% of the participants stated that they knew mpox before, whereas 58.6% thought that the smallpox vaccine was effective against mpox.[28] In a study carried out in Indonesia, it was reported that practicing physicians had a very low level of knowledge about mpox and only 10% of them had a sufficient level of knowledge.[7] In the present study, 44.1% of participants stated that they had never heard about mpox before the announcements of WHO, while 46% of participants had accurate information about the cause of the disease, 54% had accurate information about the infection pathway, and 35.6% had accurate information about the regions, where the disease is endemic. Moreover, 24.3% of the participants were aware of the smallpox vaccine, while the ratio of those thinking that the smallpox vaccine was protective against mpox was 48%. The data indicating the clinical efficiency of the smallpox vaccine against mpox (85%) were reported in surveillance studies on pandemics in Central Africa in the 1980s and in following years and these data were supported by animal studies.[29] The data obtained here showed that the healthcare professionals' knowledge of mpox before the pandemic was at very low level and this finding is consistent with the literature.

The declaration of a possible mpox outbreak by WHO during the COVID-19 pandemic created an uncertain anxiety state disorder. In a society-based study carried out in Saudi Arabia, it was shown that the participants infected by COVID-19 before had more anxiety about mpox.[30] In the present study, examining the somatic and psychiatric changes in participants in relation to declarations made by WHO and international media organs about the increase in mpox cases, it was found that anxiety of transmitting the disease to family members or social circle and anxiety of contacting with foreign nationals caused a significant increase in mean depression, anxiety, and stress scores, whereas there were significant increases in mean anxiety score among the participants reporting a loss of appetite, in mean depression and anxiety scores among those reporting sleeplessness, and mean depression, anxiety, and stress scores of those reporting stomach problems. Accordingly, it can be stated that an idea of a potential pandemic might have negative psychological and physiological effects on healthcare

professionals. Moreover, it was determined in the present study, regarding the subdimensions about information on mpox (having prior information about the disease, factors, mode of transmission, incubation period, endemic regions, etc.), there was no difference between the participants having information and those having no information. It might indicate that psychological and physiological effects occurred independently. In order to eliminate the negative effects of the idea of a potential pandemic after the COVID-19 pandemic, it might be useful to provide healthcare professionals with psychosocial support at specific intervals, make effort to eliminate the factors that might cause anxiety, stress, and depression, and use suitable motivation instruments. In in the past, it is important to keep the motivation of healthcare professionals, who will be at the front line in potential pandemics in the future, at maximum level.

The present study has also limitations. The main limitations are that the present study was carried out in a single hospital and that participants had limited capacity to present the universe. Moreover, since the predictable numbers couldn't be reached, no assessment could be made about profession-specific knowledge, experience, awareness, and psychology. Besides that, although it is a standard measurement instrument, there might be qualitative errors due to self-reported data since depression, anxiety, and stress conditions of healthcare professionals cannot be confirmed using a clinical assessment. Determining the potential changes in the medical labor force in order to meet the acute medical needs of a society in cases such as a pandemic. For this reason, it is thought that the results achieved here would be useful for policymakers.

## CONCLUSION

The COVID-19 pandemic created many negative results among healthcare professionals, from both physiological and psychological aspects. Various factors such as increasing workload during the pandemic, high potential of catching the disease, and anxiety of transmitting the infection to family members and social circle might cause negative effects on healthcare professionals. The increase in mpox cases between May and August of 2022 raise the question if healthcare professionals are physically and mentally ready for a new pandemic. It was determined that, after the increase in the number of mpox cases, almost half of the participants had no complete information about the disease at any dimension (diagnosis, transmission, treatment, protection, etc.). In the present study carried out aiming to determine the psychological condition in case of a new pandemic, it was determined that depression, anxiety, and stress levels of the participants were high. Many somatic and psychiatric changes were observed among healthcare professionals, such as anxiety of transmitting the infection to family members or social circle, contacting with foreign nationals, loss of appetite, sleep problems, and dyspeptic complaints. It is thought that providing healthcare professionals, who are at the front line in pandemics, with psychosocial support, make effort to determine and eliminate other factors causing negative psychological effects, and use suitable motivational instruments..

## ETHICAL DECLARATIONS

**Ethics Committee Approval**: The study was carried out with the permission of Harran University Clinical Researches Ethics Committee (Date: 08.08.2022, Decision No: HRÜ/22.15.20).

**Informed Consent**: All patients signed the free and informed consent form.

**Referee Evaluation Process**: Externally peer-reviewed.

**Conflict of Interest Statement**: The authors have no conflicts of interest to declare.

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**Author Contributions**: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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