

The First Pilgrimage after the COVID-19 Pandemic: Exploring Turkish Pilgrims' COVID-19 Concerns and Hygiene Behaviors

Betul Cakmak^{1*}, Bahar inkaya²

¹ Ankara Yildirim Beyazit University Faculty of Health Sciences Department of Nursing, Ankara.

*Corresponding Author: Betul Cakmak. PhD, Ankara Yildirim Beyazit University Faculty of Health Sciences Department of Nursing, Ankara. Email: Betulglchms@gmail.com, Phone: +903129061996

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Abstract

Introduction: The COVID-19 pandemic had a significant impact on the Hajj. People became more concerned about the pandemic and adopted more hygiene behaviors with the arrival of large numbers of pilgrims from all over the world.

Methods: This study adopted a cross-sectional research design. Data were collected using a demographic data form, the COVID-19 Anxiety Scale, and the COVID-19 Hygiene Scale. The data were collected through an online survey before the Hajj visit in May 2022 (n=283).

Results: Age, gender, education, and the fear of contracting COVID-19 affected participants' overall scores (p=0.029, p=0.000, p=0.000, p=0.002, respectively).

Conclusion: Although pilgrims take more precautions and prepare more for Hajj, they are still concerned about the pandemic and continue to exhibit hygiene behaviors before Hajj. Pilgrims require extra attention because COVID-19 is a respiratory disease. Therefore, nurses should be more involved in the process.

Keywords: Hajj; COVID-19 ; Hygiene Behaviors ; Concern; Nursing.

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Introduction

Saudi Arabia, which is visited by over two million people from more than 180 countries each year for pilgrimage, hosts one of the world's largest religious gatherings.¹ During the pilgrimage to Mecca (Hajj), which takes place at specific times of the year and lasts for approximately 40 days, pilgrims visit various sites to perform religious rituals.² Millions of people, mostly old adults, from diverse ethnic backgrounds and climatic conditions gather together to perform the Hajj, which causes the emergence of various health issues.²⁻⁴

The novel coronavirus (COVID-19) is a respiratory virus that started to spread at the beginning of 2020.⁵ The World Health Organization (WHO) declared it a pandemic in March 2020. Its most common symptoms were dry cough, fever, fatigue, headache, hemoptysis, and dyspnea.⁶ Most countries took preventive measures against the pandemic, such as long-lasting lockdowns, stay-at-home orders, school closures, etc., which

adversely impacted all aspects of life.⁷⁻⁹ The pandemic also affected religious events. The pilgrimage was suspended for foreign visitors in 2020 and only conducted with a limited number of 10.000 participants.^{1,10,11} As of October 2020, Saudi Arabia made numerous efforts to manage the pandemic.¹ Accommodation, transportation, isolation, vaccination, and various other aspects were reorganized in response to the pandemic.¹² Most governments developed web-based applications, making it mandatory for all citizens to register to provide them with access to information about vaccines, COVID-19 tests, health checks, medical appointments, and health records.¹³ With the weakening of the pandemic and a decline in the number of positive cases, Saudi Arabia eased some of its measures and allowed nearly one million pilgrims to visit the region to perform the Hajj.¹⁴ The pandemic caused significant behavioral changes.¹⁵ People adopted more and more hygiene behaviors to

protect themselves from the virus.¹⁶⁻²⁰ Research shows that people who performed the Hajj after the pandemic had an above-average knowledge and behavior regarding hand hygiene. In other words, those who knew more about hand hygiene washed their hands more often.^{21,22} However, there is no research into the hygiene behaviors of pilgrims in their homes, shopping, and social settings in relation to the pandemic. During the pandemic, people experienced fear and anxiety due to the risk of transmission. However, they also developed positive attitudes, such as optimism and awareness.^{23,24} Research indicates an association between the increase in hygiene behaviors and the influence of experienced negative emotions.^{25,26}

During the pandemic, pilgrims were considered a high-risk group due to several factors, such as their advanced age, multiple chronic illnesses, inadequate vaccination rates, and lower education levels. Moreover, they had different cultural backgrounds and were exposed to different climate conditions in a foreign country for an extended period.²⁷ This suggests that pilgrims may experience more anxiety related to the pandemic and adopt more hygiene practices.²⁸ Türkiye is one of the top three countries with the highest numbers of Hajj pilgrims.²⁷ In 2022, The Presidency of Religious Affairs in Türkiye announced that 37.770 pilgrims (18-65 years of age), who received two doses of the COVID-19 vaccine and tested negative for COVID-19 within the last 72 hours, were to participate in the first post-pandemic Hajj.^{29,30}

The Hajj has a significant impact on public health when pilgrims return to their home countries.³¹ Managing mass gatherings and investigating the risks associated with those events are crucial for regulating and safeguarding public health on a global scale. However, no researchers have focused on the first post-pandemic Hajj experience of Turkish pilgrims. Therefore, this study investigated the relationship between hygiene behaviors and anxiety levels related to COVID-19 among Turkish pilgrims who performed the Hajj after the pandemic

Method

Research Design

This study adopted a single-group prospective cross-sectional research design.

Ethical Consideration

The study was approved by an ethics committee (No: 30.07.2021-07). Permission was obtained from the Presidency of Religious Affairs. All pilgrims were briefed about the research purpose and procedure. Informed consent was obtained from all participants.

Participants and Recruitment

Participants were recruited using purposive sampling. Authorization was received from the Presidency of Religious Affairs of the Republic of Türkiye to identify prospective participants. The Presidency provided the researchers with information that prospective pilgrims were from Afyon, Burdur, Sinop, and Ankara. The sample consisted of 283 adult pilgrims who had received two doses of the COVID-19 vaccine and tested negative for COVID-19 within the last 72 hours,

Data Collection

Data were collected using a demographic characteristics form, the COVID-19 Anxiety Scale, and the COVID-19 Hygiene Scale. The demographic characteristics form consisted of an open-ended question that requested their views on services provided by healthcare professionals during the pilgrimage and their expectations.

The COVID-19 Anxiety Scale consisted of five items that assessed the individuals' experiences of anxiety related to COVID-19 over the past two weeks. Each question was scored on a scale of 0 to 4, where higher scores indicated greater COVID-19-related anxiety. The validity and reliability of the scale were evaluated on the Turkish population, and a Cronbach's alpha value of 0.80 was determined.^{32,33}

The COVID-19 Hygiene Scale consisted of 27 items (Cronbach's alpha: 0.908) that measured individuals' personal and general hygiene practices aimed at preventing the spread of the virus and minimizing transmission routes. The scale comprised six subscales: "Modified Hygiene Behaviours" (items 7, 11, 12, 14, 21, and 27), "Home Hygiene" (items 16, 18, 19, and 20), "Social Distance and Mask Usage" (items 1, 2, 3, and 25), "Shopping Hygiene" (items 15, 22, 23, 24, and 26), "Hand Hygiene" (items 4, 5, 6, 8, and 9), and "Hygiene When Coming Home from Outside" (items 10, 13, and 17). The total score ranges from 27 to 135. Higher scores (ranging from 1 - never to 5 - always) indicate that individuals consistently practice personal and general hygiene measures and attach a high level of importance to those precautions. The Cronbach's alpha value of the scale was determined to be 0.90.³⁴ In our study, the Cronbach's alpha values for the COVID-19 Anxiety Scale and COVID-19 Hygiene Scale were found to be 0.86 and 0.95, respectively.

The data were collected through an online survey one week before the prospective pilgrims' Hajj visit in May 2022. The Ankara, Afyon, Burdur, and Sinop Provincial Directorates of Religious Affairs sent a text message to the personal phone numbers of the prospective pilgrims, containing an explanation of the research's content, along with a link to the survey, which included the

questionnaire and the questions related to the scales. The prospective pilgrims were requested to fill out the survey.

Data Analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS v. 24). Frequencies and descriptive statistics were used for analysis. For normally distributed data, the "ANOVA" test (F-table value) was used to compare measurement values of three or more independent groups. Pairwise comparisons of variables with significant differences among three or more groups were performed using the "Tukey" method, considering the homogeneity of variances. For non-normally distributed data, non-parametric methods were used. The "Mann-Whitney U" test (Z-table value) was used to compare the measurement values of two independent groups, while the "Kruskal-Wallis H" test (χ^2 -table value) was used to compare the measurement values of three or more independent groups. Bonferroni correction was applied for pairwise comparisons of variables with significant differences among three or more groups. The "Spearman" correlation coefficient was utilized to examine the relationships between two quantitative variables when at least one of them did not have a normal distribution.

Limitations

The study has three limitations. First, the research was conducted in only four (4) provinces. Second, participation was restricted to individuals who use smartphones. Third, only individuals below the age of 65 were able to perform the Hajj according to the rules set by Saudi Arabia.

Results

Participants had a mean age of 55.83 ± 6.63 years, with 141 (49.8%) falling within the 50-59 age group. More than half of the participants were men ($n=175$; 61.8%). More than a quarter of the participants had a bachelor's degree ($n=104$; 36.7%). Most participants were non-smokers ($n=245$; 86.6%). More than half of the participants had no chronic diseases ($n=189$; 66.8%). Fifty-eight participants had one disease (61.7%). Most participants reported that COVID-19 affected their individual hygiene ($n=269$; 95.1%). More than half of the participants had a fear of contracting COVID-19 during the Hajj ($n=173$; 61.1%). The majority of the participants declared that they would adhere to all pre-Hajj precautions ($n=280$; 98.9%) (Table 1).

Table 1. Distribution of Research Findings.

| Variable (N=283) | | n | % |
|--|--------------------------|-----|------|
| Age Groups [$\bar{X} \pm S. D. \rightarrow 55.83 \pm 6.63$ (year)] | <50 | 48 | 17.0 |
| | 50-59 | 141 | 49.8 |
| | ≥ 60 | 94 | 33.2 |
| Gender | Female | 108 | 38.2 |
| | Male | 175 | 61.8 |
| Education Status | Primary/Secondary School | 95 | 33.6 |
| | High School | 71 | 25.1 |
| | University | 104 | 36.7 |
| | Master's/Ph.D. | 13 | 4.6 |
| Smoking | Yes | 38 | 13.4 |
| | No | 245 | 86.6 |
| Chronic Disease | Present | 94 | 33.2 |
| | Absent | 189 | 66.8 |
| Number of Chronic Diseases | 1 | 58 | 61.7 |
| | 2 | 24 | 25.5 |
| | ≥ 3 | 12 | 12.8 |
| Effect of COVID-19 on Hygiene | Yes | 269 | 95.1 |
| | No | 14 | 4.9 |
| Fear of COVID-19 Transmission During Pilgrimage | Yes | 110 | 38.9 |
| | No | 173 | 61.1 |
| Compliance with All Pre-Declared Precautions Before Pilgrimage | Yes | 280 | 98.9 |
| | No | 3 | 1.1 |

Participants had a mean COVID-19 Hygiene Scale score of 98.11 ± 21.85 , while they had a mean COVID-19 Anxiety Scale score of 0.49 ± 1.71 (Table 2).

Age affected participants' scores. Participants older than 50 had a significantly higher mean home hygiene score than those younger than 50 ($\chi^2=7.110$; $p=0.029$). Moreover, the ≥ 60 age group had a significantly higher mean total COVID-19 Hygiene Scale score than the <50

age group ($F=3.574$; $p=0.029$). There were significant differences in terms of social distancing and mask usage ($Z=-3.805$; $p=0.000$), hand hygiene ($Z=-5.017$; $p=0.000$), and overall scores ($Z=-2.698$; $p=0.007$) based on gender. Female participants had a significantly higher mean social distancing, mask usage, hand hygiene, and hygiene behavior when coming home, as well as overall scores, than their male counterparts ($p=0.000$).

Table 2. Distribution of Scores for the Scales.

| Scale (N=283) | Mean | Standard Deviation | Median | Min. | Max. |
|---|-------|--------------------|--------|------|-------|
| <i>Modified Hygiene Behaviors in Response to COVID-19</i> | 21.08 | 5.43 | 22.0 | 7.0 | 30.0 |
| <i>Home Hygiene</i> | 14.15 | 3.82 | 14.0 | 4.0 | 20.0 |
| <i>Social Distancing and Mask Usage</i> | 15.51 | 3.69 | 16.0 | 4.0 | 20.0 |
| COVID-19 Hygiene Scale <i>Hygiene Practices During Shopping</i> | 17.01 | 5.41 | 18.0 | 5.0 | 25.0 |
| <i>Hand Hygiene</i> | 20.70 | 4.13 | 22.0 | 5.0 | 25.0 |
| <i>Hygiene When Coming Home from Outside</i> | 9.66 | 3.19 | 10.0 | 3.0 | 15.0 |
| CHO – Total Score | 98.11 | 21.85 | 99.0 | 31.0 | 135.0 |
| COVID-19 Anxiety Scale | 0.49 | 1.71 | 0.0 | 0.0 | 20.0 |

Education affected participants' total score ($\chi^2=20.644$; $p=0.000$), modified hygiene behaviours ($\chi^2=7.110$; $p=0.029$), home hygiene ($\chi^2=24.508$; $p=0.000$), social distancing and mask usage ($\chi^2=15.737$; $p=0.001$), shopping hygiene ($\chi^2=15.737$; $p=0.001$), and hygiene behavior when coming home ($\chi^2=19.651$; $p=0.000$) scores. Participants with a primary/secondary school degree had significantly higher scores than those with at least a bachelor's degree (Table 3). Participants who reported changes in individual hygiene behaviours during COVID-19 had significantly higher COVID-19 hygiene scale scores in both the total score ($Z=-3.941$; $p=0.000$) and all subscale scores (Modified hygiene behaviours ($Z=-3.983$; $p=0.000$), Home hygiene ($Z=-3.869$; $p=0.000$), Social distancing and mask usage ($Z=-3.290$; $p=0.001$), Shopping hygiene ($Z=-2.490$; $p=0.013$), Hand hygiene ($Z=-3.161$; $p=0.002$), Hygiene behavior when coming home ($Z=-4.063$; $p=0.000$) than those who stated no changes in individual hygiene behaviours during COVID-19.

Statistically significant differences were found in terms of social distancing and mask usage ($Z=-3.042$; $p=0.002$) and shopping hygiene ($Z=-2.166$; $p=0.030$) based on the fear of contracting COVID-19 during the Hajj. Participants who were afraid of contracting COVID-19 during the Hajj had significantly higher scores on social distancing and mask usage, as well as shopping hygiene than those who were not. Statistically significant differences were observed in the total scores of the COVID-19 Anxiety Scale based on the fear of contracting COVID-19 during the Hajj ($Z=-2.398$; $p=0.016$). Participants who expressed fear of COVID-19 during the Hajj had a significantly higher COVID-19 Anxiety Scale total score than those who did not have such fear (Table 4).

Table 3. Comparative Analysis of Sub-Dimension Scores of the COVID-19 Hygiene Scale Based on the Findings.

| Variable (N=283) | | n | COVID-19 Hygiene Scale | | | | | | | |
|------------------------------|---|-----|----------------------------|--------------|--------------------|--------------|----------------------------------|--------------|-----------------------------------|--------------|
| | | | Modified Hygiene Behaviors | | Home Hygiene | | Social Distancing and Mask Usage | | Hygiene Practices During Shopping | |
| | | | $\bar{X} \pm S.D.$ | Median [IQR] | $\bar{X} \pm S.D.$ | Median [IQR] | $\bar{X} \pm S.D.$ | Median [IQR] | $\bar{X} \pm S.D.$ | Median [IQR] |
| Age Groups | <50 ⁽¹⁾ | 48 | 19.19±6.05 | 20.5 [10.0] | 12.60±4.33 | 13.0 [6.8] | 14.54±4.31 | 15.5 [6.0] | 15.52±5.49 | 17.0 [9.0] |
| | 50-59 ⁽²⁾ | 141 | 21.38±5.38 | 23.0 [7.5] | 14.42±3.71 | 15.0 [5.0] | 15.50±3.54 | 16.0 [4.0] | 17.21±5.41 | 18.0 [9.0] |
| | ≥60 ⁽³⁾ | 94 | 21.61±5.04 | 22.0 [7.5] | 14.54±3.58 | 14.0 [5.0] | 16.02±3.50 | 16.0 [5.0] | 17.45±5.31 | 18.0 [9.0] |
| Statistical Analysis* | | | $\chi^2=5.639$ | | $\chi^2=7.110$ | | $\chi^2=3.772$ | | $\chi^2=4.555$ | |
| Probability | | | p=0.060 | | p=0.029 | | p=0.152 | | p=0.103 | |
| Difference | | | | | [1-2.3] | | | | | |
| Gender | Female | 108 | 21.49±5.47 | 23.0 [8.8] | 14.68±3.70 | 15.0 [4.8] | 16.54±3.38 | 17.0 [4.0] | 17.49±5.27 | 18.0 [9.0] |
| | Male | 175 | 20.83±5.41 | 22.0 [8.0] | 13.83±3.88 | 14.0 [6.0] | 14.87±3.74 | 15.0 [6.0] | 16.71±5.49 | 17.0 [8.0] |
| Statistical Analysis | | | Z=-1.123 | | Z=-1.831 | | Z=-3.805 | | Z=-1.122 | |
| Probability | | | p=0.262 | | p=0.067 | | p=0.000 | | p=0.262 | |
| Education Status | Primary/Secondary School ⁽¹⁾ | 95 | 22.80±4.83 | 23.0 [6.0] | 15.53±3.31 | 16.0 [5.0] | 16.74±2.98 | 17.0 [6.0] | 18.52±5.41 | 19.0 [9.0] |
| | High School ⁽²⁾ | 71 | 21.39±5.59 | 22.0 [9.0] | 14.35±3.81 | 15.0 [5.0] | 15.09±4.36 | 16.0 [8.0] | 16.79±5.45 | 18.0 [9.0] |
| | University ⁽³⁾ | 104 | 19.63±5.39 | 20.5 [9.0] | 12.18±3.85 | 12.0 [6.0] | 14.11±3.42 | 14.0 [4.0] | 15.77±5.16 | 16.0 [7.8] |
| | Master's/Ph.D. ⁽⁴⁾ | 13 | 18.46±5.22 | 19.0 [7.0] | 12.98±4.03 | 13.0 [5.0] | 14.88±4.66 | 15.0 [6.5] | 17.08±5.16 | 17.0 [8.0] |
| Statistical Analysis | | | $\chi^2=19.514$ | | $\chi^2=24.508$ | | $\chi^2=15.737$ | | $\chi^2=13.864$ | |
| Probability | | | p=0.000 | | p=0.000 | | p=0.001 | | p=0.003 | |
| Difference | | | [1-3.4] | | [1-3.4] [2-3] | | [1-3] | | [1-3] | |
| Smoking | Yes | 38 | 21.16±5.42 | 22.5 [8.3] | 14.05±3.52 | 14.0 [4.3] | 15.11±3.45 | 16.0 [4.3] | 17.00±5.94 | 18.5 [9.3] |
| | No | 245 | 21.07±5.44 | 22.0 [8.0] | 14.17±3.88 | 14.0 [5.0] | 15.57±3.73 | 16.0 [6.0] | 17.01±5.34 | 17.0 [8.0] |
| Statistical Analysis | | | Z=-0.190 | | Z=-0.290 | | Z=-0.917 | | Z=-0.111 | |
| Probability | | | p=0.8439 | | p=0.772 | | p=0.359 | | p=0.912 | |

"Mann-Whitney U" test (Z-table value) was used for the comparison of measurement values of two independent groups with data not following a normal distribution. For the comparison of three or more independent groups, "Kruskal-Wallis H" test (χ^2 -table value) statistics were used.

Table 3. (continued) Comparative Analysis of Sub-Dimensions, Total Scores of the COVID-19 Hygiene Scale, and COVID-19 Anxiety Scale Scores Based on the Findings.

| Variable (N=283) | | n | COVID-19 Hygiene Scale | | | | | | | | |
|------------------------------|---|-----|------------------------|--------------|---------------------------------------|--------------|--------------------|--------------|------------------------|--------------|--|
| | | | Hand Hygiene | | Hygiene When Coming Home from Outside | | CHO – Total Score | | COVID-19 Anxiety Scale | | |
| | | | $\bar{X} \pm S.D.$ | Median [IQR] | $\bar{X} \pm S.D.$ | Median [IQR] | $\bar{X} \pm S.D.$ | Median [IQR] | $\bar{X} \pm S.D.$ | Median [IQR] | |
| Age Groups | <50 ⁽¹⁾ | 48 | 19.85±5.01 | 20.0 [7.0] | 9.00±3.28 | 9.0 [6.0] | 90.71±24.53 | 94.0 [40.0] | 0.29±1.61 | 0.0 [0.0] | |
| | 50-59 ⁽²⁾ | 141 | 20.67±3.90 | 22.0 [5.5] | 9.71±3.15 | 10.0 [5.0] | 98.89±21.47 | 101.0 [32.0] | 0.43±1.11 | 0.0 [0.0] | |
| | ≥60 ⁽³⁾ | 94 | 21.17±3.94 | 22.0 [6.0] | 9.91±3.18 | 10.0 [5.3] | 100.71±20.33 | 103.0 [28.8] | 0.68±2.38 | 0.0 [0.0] | |
| Statistical Analysis* | | | $\chi^2=2.600$ | | $\chi^2=2.222$ | | F=3.574 | | $\chi^2=4.097$ | | |
| Probability | | | p=0.273 | | p=0.329 | | p=0.029 | | p=0.129 | | |
| Difference | | | [1-3] | | | | | | | | |
| Gender | Female | 108 | 22.03±3.74 | 23.0 [4.8] | 10.23±3.21 | 10.0 [5.0] | 102.45±20.92 | 106.0 [29.5] | 0.22±0.73 | 0.0 [0.0] | |
| | Male | 175 | 19.88±4.15 | 21.0 [5.0] | 9.30±3.12 | 9.0 [4.0] | 95.42±22.03 | 96.0 [34.0] | 0.65±2.09 | 0.0 [0.0] | |
| Statistical Analysis | | | Z=-5.017 | | Z=-2.453 | | Z=-2.698 | | Z=-1.652 | | |
| Probability | | | p=0.000 | | p=0.014 | | p=0.007 | | p=0.099 | | |
| Education Status | Primary/Secondary School ⁽¹⁾ | 95 | 21.24±3.86 | 22.0 [7.0] | 10.77±3.19 | 11.0 [6.0] | 105.59±20.09 | 110.0 [31.0] | 0.73±2.53 | 0.0 [0.0] | |
| | High School ⁽²⁾ | 71 | 20.86±4.39 | 22.0 [5.0] | 9.65±3.08 | 10.0 [4.0] | 98.14±22.61 | 105.0 [34.0] | 0.48±1.33 | 0.0 [0.0] | |
| | University ⁽³⁾ | 104 | 20.18±3.97 | 21.0 [5.0] | 8.77±2.96 | 9.0 [5.0] | 92.13±20.64 | 92.0 [30.5] | 0.33±0.94 | 0.0 [0.0] | |
| | Master's/Ph.D. ⁽⁴⁾ | 13 | 20.00±5.58 | 20.0 [6.5] | 9.69±3.30 | 10.0 [6.5] | 94.00±24.73 | 94.0 [25.0] | 0.00±0.00 | 0.0 [0.0] | |
| Statistical Analysis | | | $\chi^2=4.929$ | | $\chi^2=19.651$ | | $\chi^2=20.644$ | | $\chi^2=2.781$ | | |
| Probability | | | p=0.177 | | p=0.000 | | p=0.000 | | p=0.427 | | |
| Difference | | | [1-3] | | | | | | [1-3] | | |
| Smoking | Yes | 38 | 20.66±3.41 | 21.0 [4.5] | 9.32±2.71 | 9.0 [4.3] | 97.29±19.74 | 104.0 [31.0] | 0.82±2.19 | 0.0 [0.0] | |
| | No | 245 | 20.71±4.24 | 22.0 [6.0] | 9.71±3.25 | 10.0 [5.0] | 98.24±22.19 | 99.0 [31.0] | 0.44±1.63 | 0.0 [0.0] | |
| Statistical Analysis | | | Z=-0.756 | | Z=-0.751 | | Z=-0.362 | | Z=-0.577 | | |
| Probability | | | p=0.450 | | p=0.453 | | p=0.717 | | p=0.564 | | |

* ANOVA" test (F-table value) statistics were utilized for the comparison of measurement values of three or more independent groups with data following a normal distribution. For data not adhering to a normal distribution, the "Mann-Whitney U" test (Z-table value) was employed for the comparison of measurement values of two independent groups, while the "Kruskal-Wallis H" test (χ^2 -table value) was used for the comparison of three or more independent groups.

Table 4. Comparison of Sub-Dimension Scores of the COVID-19 Hygiene Scale According to the Findings.

| Variable (N=283) | | n | COVID-19 Hygiene Scale | | | | | | | |
|---|---------|-----|----------------------------|--------------|---------------------|--------------|----------------------------------|--------------|-----------------------------------|--------------|
| | | | Modified Hygiene Behaviors | | Home Hygiene | | Social Distancing and Mask Usage | | Hygiene Practices During Shopping | |
| | | | $\bar{X} \pm S. D.$ | Median [IQR] | $\bar{X} \pm S. D.$ | Median [IQR] | $\bar{X} \pm S. D.$ | Median [IQR] | $\bar{X} \pm S. D.$ | Median [IQR] |
| Chronic Disease | Present | 94 | 21.97±4.61 | 22.5 [7.3] | 14.57±3.38 | 14.0 [5.0] | 15.63±3.28 | 16.0 [4.3] | 17.42±5.05 | 18.0 [8.0] |
| | Absent | 189 | 20.64±5.76 | 22.0 [9.0] | 13.94±4.02 | 14.0 [5.0] | 15.44±3.89 | 16.0 [6.0] | 16.79±5.59 | 17.0 [9.0] |
| Statistical Analysis* | | | Z=-1.627 | | Z=-0.905 | | Z=-0.033 | | Z=-0.822 | |
| Probability | | | p=0.104 | | p=0.365 | | p=0.973 | | p=0.411 | |
| Number of Diseases | 1 | 58 | 22.22±4.46 | 23.0 [7.3] | 14.59±3.54 | 14.5 [5.3] | 15.62±3.43 | 16.0 [4.3] | 17.52±5.13 | 18.5 [8.0] |
| | 2 | 24 | 21.88±4.55 | 22.5 [6.5] | 14.45±2.77 | 14.0 [5.0] | 15.42±3.03 | 15.5 [4.5] | 18.21±4.38 | 18.0 [5.8] |
| | ≥3 | 12 | 20.92±5.57 | 21.5 [7.5] | 14.75±3.98 | 16.0 [7.0] | 16.17±3.19 | 16.0 [5.8] | 15.42±5.79 | 14.5 [11.3] |
| Statistical Analysis | | | $\chi^2=0.526$ | | F=0.030 | | $\chi^2=0.332$ | | $\chi^2=1.632$ | |
| Probability | | | p=0.769 | | p=0.970 | | p=0.847 | | p=0.442 | |
| Effect of COVID-19 on Hygiene | Yes | 269 | 21.45±5.11 | 22.0 [7.0] | 14.39±3.63 | 15.0 [5.0] | 15.70±3.56 | 16.0 [5.0] | 17.21±5.29 | 18.0 [9.0] |
| | No | 14 | 14.07±6.73 | 12.0 [9.0] | 9.57±4.67 | 8.5 [3.5] | 11.79±4.42 | 12.0 [4.5] | 13.14±6.35 | 10.5 [11.0] |
| Statistical Analysis | | | Z=-3.983 | | Z=-3.869 | | Z=-3.290 | | Z=-2.490 | |
| Probability | | | p=0.000 | | p=0.000 | | p=0.001 | | p=0.013 | |
| Fear of COVID-19 Transmission During Pilgrimage | Yes | 110 | 21.87±4.51 | 22.5 [6.0] | 14.56±3.16 | 15.0 [5.0] | 16.41±3.22 | 17.0 [5.3] | 17.95±4.85 | 18.0 [8.0] |
| | No | 173 | 20.58±5.90 | 21.0 [9.0] | 13.89±4.19 | 14.0 [6.0] | 14.93±3.86 | 16.0 [6.0] | 16.40±5.67 | 17.0 [9.0] |
| Statistical Analysis | | | Z=-1.529 | | Z=-0.992 | | Z=-3.042 | | Z=-2.166 | |
| Probability | | | p=0.126 | | p=0.321 | | p=0.002 | | p=0.030 | |

* For data with a normal distribution, the "ANOVA" test (F-table value) was utilized for the comparison of measurement values of three or more independent groups. For data not adhering to a normal distribution, the "Mann-Whitney U" test (Z-table value) was employed for the comparison of measurement values of two independent groups, while the "Kruskal-Wallis H" test (χ^2 -table value) was used for the comparison of three or more independent groups.

Table 4. (continued) Comparative Analysis of Sub-Dimension Scores, Total COVID-19 Hygiene Scale Score, and COVID-19 Anxiety Scale Scores Based on the Findings.

| Variable (N=283) | n | COVID-19 Hygiene Scale | | | | | | COVID-19 Anxiety Scale | | |
|--|---------|---------------------------|----------------|---|--------------|---------------------------|--------------|---------------------------|----------------|-----------|
| | | <i>Hand Hygiene</i> | | <i>Hygiene When Coming Home Home from Outside</i> | | CHO – Total Score | | $\underline{X} \pm S. D.$ | Median [IQR] | |
| | | $\underline{X} \pm S. D.$ | Median [IQR] | $\underline{X} \pm S. D.$ | Median [IQR] | $\underline{X} \pm S. D.$ | Median [IQR] | | | |
| Chronic Disease | Present | 94 | 20.76±3.88 | 22.0 [5.3] | 9.78±3.08 | 9.5 [5.0] | 100.14±19.45 | 103.5 [26.0] | 0.46±1.26 | 0.0 [0.0] |
| | Absent | 189 | 20.67±4.27 | 22.0 [6.0] | 9.60±3.29 | 10.0 [5.0] | 97.09±22.93 | 97.0 [35.5] | 0.50±1.90 | 0.0 [0.0] |
| Statistical Analysis* | | | Z=-0.134 | | Z=-0.309 | | Z=-0.838 | | Z=-0.537 | |
| Probability | | | p=0.894 | | p=0.757 | | p=0.402 | | p=0.591 | |
| Number of Diseases | 1 | 58 | 20.67±4.05 | 22.0 [6.0] | 9.76±3.22 | 9.5 [6.0] | 100.38±19.80 | 105.0 [31.0] | 0.50±1.37 | 0.0 [0.0] |
| | 2 | 24 | 21.29±3.53 | 22.0 [5.9] | 9.79±2.62 | 9.5 [4.5] | 101.04±17.23 | 103.5 [22.8] | 0.42±1.18 | 0.0 [0.0] |
| | ≥3 | 12 | 20.08±3.87 | 21.0 [5.5] | 9.83±3.56 | 9.5 [4.8] | 97.17±23.14 | 97.5 [42.3] | 0.33±0.89 | 0.0 [0.0] |
| Statistical Analysis | | | $\chi^2=0.949$ | | F=0.003 | | F=0.167 | | $\chi^2=0.569$ | |
| Probability | | | p=0.622 | | p=0.997 | | p=0.846 | | p=0.752 | |
| Effect of COVID-19 on Hygiene | Yes | 269 | 20.92±3.91 | 22.0 [5.0] | 9.84±3.10 | 10.0 [4.0] | 99.51±20.66 | 101.0 [28.0] | 0.51±1.75 | 0.0 [0.0] |
| | No | 14 | 16.29±5.69 | 16.0 [9.3] | 6.14±2.71 | 6.0 [3.3] | 71.00±26.89 | 65.5 [25.3] | 0.07±0.26 | 0.0 [0.0] |
| Statistical Analysis | | | Z=-3.161 | | Z=-4.063 | | Z=-3.941 | | Z=-1.012 | |
| Probability | | | p=0.002 | | p=0.000 | | p=0.000 | | p=0.312 | |
| Fear of COVID-19 Transmission During Pilgrimage | Yes | 110 | 21.09±3.74 | 22.0 [5.0] | 10.00±2.89 | 10.0 [4.0] | 101.89±18.24 | 104.0 [26.3] | 0.72±1.40 | 0.0 [0.0] |
| | No | 173 | 20.45±4.35 | 21.0 [6.0] | 9.44±3.35 | 9.0 [5.0] | 95.70±23.59 | 97.0 [36.5] | 0.40±1.88 | 0.0 [0.0] |
| Statistical Analysis | | | Z=-0.987 | | Z=-1.351 | | Z=-1.901 | | Z=-2.398 | |
| Probability | | | p=0.323 | | p=0.177 | | p=0.057 | | p=0.016 | |

* For data with a normal distribution. "ANOVA" test (F-table value) statistics were employed for the comparison of measurement values of three or more independent groups. For data not adhering to a normal distribution, the "Mann-Whitney U" test (Z-table value) was used for the comparison of measurement values of two independent groups, while the "Kruskal-Wallis H" test (χ^2 -table value) was employed for the comparison of three or more independent groups.

There was no statistically significant relationship between the COVID-19 Anxiety Scale and the COVID-19 Hygiene

Scale total and subscale scores ($p>0.05$) (Table 5).

Table 5. Examination of Relationships Between Scales.

| Correlation* (N=283) | COVID-19 Anxiety Scale | |
|---|------------------------|-------|
| | r | P |
| <i>Modified Hygiene Behaviors in Response to COVID-19</i> | 0.035 | 0.554 |
| <i>Home Hygiene</i> | -0.008 | 0.888 |
| <i>Social Distancing and Mask Usage</i> | -0.041 | 0.491 |
| COVID-19 Hygiene Scale <i>Hygiene Practices During Shopping</i> | 0.057 | 0.342 |
| <i>Hand Hygiene</i> | -0.076 | 0.204 |
| <i>Hygiene When Coming Home from Outside</i> | 0.007 | 0.903 |
| CHO – Total Score | -0.005 | 0.939 |

*In cases where at least one of the two quantitative variables does not follow a normal distribution, the "Spearman" correlation coefficient was employed.

Seventy-six participants answered the open-ended question regarding their views of the services provided by healthcare professionals and their expectations during the pilgrimage. The responses with data saturation are as follows:

- Regular reminders from healthcare professionals about hygiene rules.
- Routine visits by healthcare professionals to the pilgrims.
- Easy access to healthcare facilities in case of experiencing any COVID-19 symptoms.
- Sufficient number of healthcare personnel and designated healthcare staff for each group.
- Assigning healthcare professionals who can be easily reached by pilgrims with chronic illnesses.
- Ensuring compliance with hygiene rules during transportation, accommodation, and meal services.

Discussion

This study investigated the COVID-19-related anxieties and hygiene behaviours of Turkish pilgrims who will be embarking on their first Hajj after the widespread impact of the pandemic. The COVID-19 pandemic affected the individual hygiene behaviours of almost all of humanity.²⁵ In line with the literature, most of our participants (95%) reported that their individual hygiene behaviours were influenced by the pandemic. Following the pandemic

declaration, numerous articles and guidelines have been published by various health organizations, including the WHO, on the protective measures that should be followed to prevent infection and transmission.³⁵⁻³⁷ Almost all our participants stated that they would adhere to the rules to protect themselves from COVID-19 during the pilgrimage (98%). The literature also indicates that healthy individuals generally comply with pandemic rules and adopt preventive behaviours.³⁸⁻⁴⁰ Therefore, in future Hajj events, it is believed that providing education, counseling, and systematic monitoring and evaluation mechanisms related to health promotion and protection for pilgrims, with active involvement of nurses, will contribute to the preservation and improvement of pilgrims' health.

Our participants had high hygiene behaviours related to COVID-19 and low anxiety levels before the Hajj pilgrimage. It is worth noting that there is limited research on this topic. However, it is reported that pilgrims would experience more anxiety and engage in more hygiene behaviours during the pandemic.²⁸ In this context, our research aligns with the literature by supporting the idea that the increase in hygiene behaviours related to COVID-19 would reduce the pilgrims' anxiety, thus yielding consistent results.

Age is reported as a risk factor for high levels of mortality due to COVID-19.⁴¹ In the literature, it has been reported that as age increases, individuals' hygiene behaviours

related to COVID-19 also increase.^{38,42,43} Our old participants (60 and above) had higher hygiene behaviours than those under 50 years of age. With increasing age, it is presumed that the perception of COVID-19 risk among pilgrims also increases, leading to an increase in hygiene behaviours. Our female participants had higher compliance with social distancing, mask usage, and hand hygiene behaviours related to COVID-19 than their male counterparts. Research shows that women experience higher levels of concern and fear towards COVID-19, possess higher levels of knowledge and awareness about COVID-19, and exhibit more problem-solving behaviours in pandemic-related protection.⁴⁴⁻⁴⁷ Our participants with lower education levels had higher COVID-19 hygiene behaviours than those with at least a bachelor's degree. While our findings do not align directly with the literature, different research results reporting the impact of education level on hygiene behaviours do exist.^{46, 48-50} The variation in research results regarding education level could be attributed to the possibility that individuals with lower education levels might have a higher perception of COVID-19 risk, the dominant influence of fate belief due to the religious nature of the Hajj, and the level of trust in the Hajj organization process.

Our participants who reported a change in individual hygiene behaviours had a higher level of individual hygiene practices. The majority of research conducted on this topic has shown that individuals have reported changes in hygiene behaviours towards protecting their own health and reducing transmission. Reasons supporting the improvement of hygiene behaviours include reducing transmission, increased risk perception, and trust in the government.⁵¹⁻⁵³ The pandemic, like in all areas, has been frequently addressed in the statements of religious leaders. The presence of large crowds in religious activities, the influence of religious leaders' opinions, individuals' increased compliance with the advice given to them, and the ability to manage the pilgrimage process more comfortably and happily through religious practices have been highlighted.^{54,55} It is believed that the education provided to pilgrims before the Hajj and the recommendations made by religious leaders also contribute to the development of pilgrims' individual hygiene behaviours. However, relying on personal statements for answers and questioning their absolute accuracy necessitate more precise results through observational research or in-depth questioning. Additionally, no other research on this topic among pilgrims has been encountered in the existing literature.

Our results showed that participants who experienced fear of contracting COVID-19 exhibited higher levels of

social distancing, mask-wearing, and shopping hygiene behaviours, as well as higher levels of COVID-19 anxiety, than those who did not experience such fear. Research shows that people in different sample groups frequently engage in protective behaviours to prevent COVID-19 and experience anxiety more often compared to other emotions.^{56,57} Throughout the COVID-19 pandemic, places of worship (mosques, churches, and synagogues) and other religious gathering sites have been identified as places with a high risk of transmission⁵⁸. Pilgrims who are aware of this risk are expected to experience greater fear of contracting COVID-19, which is likely to influence their anxiety levels and hygiene behaviours.

During the period in which this article was written, there is a wealth of scientific knowledge available in the literature regarding COVID-19. However, there remains a need for future research to explore the social and emotional effects of the pandemic and the necessary interventions that will emerge in the coming years. This study evaluated the behaviours of pilgrims experiencing their first pilgrimage after the pandemic in relation to an infectious virus. In this respect, the study is believed to make a significant contribution to the literature. As of May 2023, the World Health Organization (WHO) reports that the COVID-19 pandemic is at its least impactful stage in the past four years and aims to reduce mortality and morbidity, control the disease, and manage it more effectively by vaccinating and protecting high-risk groups.⁵⁹

Given that COVID-19 is fundamentally a respiratory disease and its susceptibility to age and underlying chronic conditions necessitates additional intervention, it is easily discernible that citizens embarking on the pilgrimage require extra attention. The active involvement of nurses becomes crucial. Recording the primary conditions of pilgrims before and during the pilgrimage by specialized internal medicine nurses, conducting routine visits for monitoring, and collaborating with the Presidency of Religious Affairs employees responsible for managing the pilgrimage process are deemed essential in ensuring comprehensive and continuous healthcare provision. It is believed that the engagement of nurses in these activities, including collaboration with the Presidency of Religious Affairs, holds significant importance in preserving the health of pilgrims. Further research in this domain will undoubtedly underscore the pivotal role of nursing interventions in safeguarding the health of pilgrims.

Highlights

What Is Already Known?

During the COVID-19 pandemic, pilgrimage candidates experienced various health and hygiene problems due to the risk of transmission, insufficient personal protective equipment, and inadequacies in cleaning and disinfection practices.

What Does This Study Add?

95% of pilgrims reported that their individual hygiene behaviors were affected by the impact of the COVID-19 pandemic. As the age increases, the individual hygiene behaviors of pilgrims also increase. It was determined that pilgrims who experience fear of contracting COVID-19 exhibit higher levels of social distancing, mask-wearing, and shopping hygiene behaviours, as well as higher levels of COVID-19 anxiety, compared to those who do not experience such fear.

Authors' Contributions

Betül Çakmak contributed to study conception and design and data analysis and interpretation. Bahar Inkaya contributed to design and critical revision of the article.

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Conflicts of Interest Disclosures

The author(s) declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethics approval

The study was approved by an ethics committee (No: 30.07.2021-07). Permission was obtained from the Presidency of Religious Affairs. All pilgrims were briefed about the research purpose and procedure. Informed consent was obtained from all participants.

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The extent of AI use

No artificial intelligence methods or products were used in this research.

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