Original Article

Access this article online

Quick Response Code:

Website:
www.jehp.net

DOI:
10.4103/jehp.jehp_308_22

# Knowledge, Anxiety, and practice during the COVID-19 crisis among HCWs in Saudi Arabia

**Salah Alshagrawi, Sultan Alhowti**

**Abstract:**

**BACKGROUND:** The rapid and widespread of COVID-19 has caused distress and havoc among people in all walks of life. Such impact has been more pronounced among HCWs. We sought to examine how health care workers (HCWs) knowledge about COVID-19 and perceived anxiety can influence preventive practices.

**MATERIALS AND METHODS:** In this cross-sectional study a multiple regression analysis was applied to examine the relationship between knowledge, anxiety, and preventive practices among 267 participants work in different settings in a variety of health care organizations in different regions in Saudi Arabia. To estimate potential associations, a multiple regression analysis was applied. Standardized beta-coefficients and their 95% confidence intervals were estimated to examine the outcome variable and the predictors' associations.

**RESULTS:** Our findings shows that HCWs had high levels of knowledge about COVID-19, perceived anxiety, and preventive practices. In examining the relation between HCWs characteristics and their knowledge about COVID-19, older HCWs have been shown to have higher knowledge compared to younger HCWs. Finally, the model to estimate the impact of knowledge about COVID-19 and perceived anxiety on preventive practice showed that both have a significant impact.

**CONCLUSIONS:** HCWs tendency to adhere to preventive practices is related to their levels of knowledge and perceived anxiety. Such a relationship can inform administrators and policymakers in the health care field to design health promotion campaigns to ensure all HCWs are aware of the nature of communicable diseases and the risk they might entail.

**Keywords:**

Anxiety, attitude, COVID19, health care workers, knowledge, practice, Saudi Arabia

## Introduction

The coronavirus disease 2019 (COVID-19) pandemic has challenged the world by unprecedented circumstances becoming a substantial concern for governments and their populations due its significant economic, social, and psychological ramifications exerted on people from all backgrounds.[1] In Saudi Arabia, to contain such a detrimental impact of the pandemic, the government responded quickly with strict measures to curb the spread of the disease by implementing policies to wear face masks, adhere to social distancing, mandate quarantine for the infected and those with close contact of a confirmed case, and closure of airports and schools.[2] Despite the effectiveness of such measures in minimizing the spread of the disease, the severe and wide disruptions in people's lives lead to new norm of living.

The strict COVID-19 preventive measures and their prolonged period posed further stress to an already strained population. Psychological symptoms such as stress, depression, anxiety, and confusion have increased significantly even among people with no history of mental illness.[3] In a

*Public Health Department, Saudi Electronic University, Riyadh, Saudi Arabia*

**Address for correspondence:**
Dr. Salah Alshagrawi, Public Health Department, Saudi Electronic University, Riyadh, Saudi Arabia.
E-mail: s.alshagrawi@seu.edu.sa

Received: 24-02-2022
Accepted: 04-08-2022
Published: 26-11-2022



**How to cite this article:** Alshagrawi S, Alhowti S. Knowledge, Anxiety, and practice during the COVID-19 crisis among HCWs in Saudi Arabia. J Edu Health Promot 2022;11:384.

national survey of American adults, it was estimated that almost half of the population has had higher rates of mental health problems because of excessive stress and anxiety.[4] Another large study in China showed a significant increase in stress symptoms such as poor sleep, anxiety, and depression.[5] Researchers in other countries have reported similar results confirming the real psychological burden of the disease on a global scale. However, such a burden was not distributed equally among people. One segment of the society that endured an overwhelming burden during the pandemic was health care workers (HCWs) who were confronting the disease on several fronts.

From the onset of the pandemic, HCWs have been working in the frontline to care for the infected, vaccinate the population, and protect themselves from contracting the disease.[6] Additionally, being at the center of the battle against a fast-spreading disease and with the reported shortage of required resources, HCWs are handling a twofold burden of excessive anxiety of becoming infected and the fear of transmitting the virus to their loved ones due to the increased risk of their job.[7] Compared to the general population, HCWs have been shown, in a systematic review, to have higher levels of anxiety and stress.[8] In China, frontline HCWs reported a high level of depression (50%), anxiety (45%), and insomnia (34%).[5] Similar results have been reported among HCWs in other countries.[9] Despite the increasing research on the prevalence of stress among HCWs, few studies have attempted to evaluate knowledge of COVID-19 and anxiety levels and assess their impact on preventive practice. Thus, in this study, we aim to measure the knowledge of COVID-19 and level of anxiety among HCWs and its association with HCWs preventive practice in Saudi Arabia in the period before the development of the COVID-19 vaccine.

## Materials and Methods

### Study design and setting

This cross-sectional study was conducted from 8th to 15th July 2020, five months after the first COVID-19 confirmed case in Saudi Arabia, at a large public university in Riyadh, Saudi Arabia. This multi-branch university hosts around 28 thousand bachelor and master's program students studying in 11 cities in different regions.

### Study participants and sampling

We targeted HCWs who are studying their master's program at the university. Thus, an email was sent with information about the purpose of the study to all targeted participants. Incentives were not offered for participants, and personally, identifiable information was not collected. The online questionnaire invitation was sent to 320 HCWs from whom 267 completed the questionnaire (response rate = 83.45%).

### Data collection tool and technique

An online self-administered questionnaire was utilized to collect the data. To enhance the response rate, multiple invitation emails were sent. Emails provided detailed information about the study's background, objectives, procedures, the time required to complete the survey, researcher's contact information, privacy and confidently confirmations, and the consent and the right to opt-out statement. The questionnaire consists of 24 items measuring variables in several domains: demographics (age, sex, nationality, social status, profession, years of experience, monthly family income, and region), knowledge about COVID-19, perceived anxiety, and preventive practice.

Knowledge about COVID-19 was assessed using four items: I received a sufficient amount of information about COVID-19, I paid attention to information received about COVID-19, all information about COVID-19 was from a reliable source, and information about COVID-19 from the public health sector was sufficient. Each item was measured on a five-point Likert scale, 1 = "Not at all", 2 = "Rarely", 3 = "Sometimes", 4 = "Usually", and 5 = "Always". The total score of the variable was the sum of the four items, ranging from 4 to 20. A higher total score demonstrates a greater knowledge about COVID-19. The internal consistency (reliability) of the construct was estimated by using Cronbach's alpha and was moderate at 76.2.

Perceived anxiety was measured using five items: I feel worried about COVID-19, I really fear COVID-19, I think constantly about COVID-19, I am afraid of getting COVID-19 infection from work, I am worried about transmitting the COVID-19 to a relative. Responses for each item was rated on a five-point Likert scale, 1 = "Not at all", 2 = "Rarely", 3 = "Sometimes", 4 = "Usually", and 5 = "Always". The total score of the scale was obtained by summing the five items, ranging from 5 to 25. A higher total score reflects greater perceived anxiety for the participant. The perceived anxiety construct had moderate internal consistency (reliability) with Cronbach's alpha of 67.5.

Preventive practice was measured using seven items: I always stay away from crowded places, I always practice good hygiene measures, I always avoid areas/persons with the COVID-19, I always wear a face mask, I always seek medical advice with the onset of flu symptoms, I take over-the-counter antiviral medication, and I take vitamin or herbal supplements. Responses for each item was rated on a five-point Likert scale, 1 = "Not at all", 2 = "Rarely", 3 = "Sometimes", 4 = "Usually", and

5 = "Always". The total score of the scale was the sum of the five items, ranging from 7 to 35. A higher total score reflects a greater preventive practice by the participant. The preventive practice construct had high internal consistency (reliability) with Cronbach's alpha of 80.3.

The online questionnaire was administered using the SurveyMonkey platform (San Mateo, CA). All data were then exported to SPSS 23.0 for data cleaning and data analysis (SPSS Inc, Chicago, Illinois).[10] The initial analysis aimed to obtain data descriptive statistics such as frequencies, proportions, and mean scores for all variables. For the Likert-scale variables, all responses were summed and analyzed as continuous variables. To estimate potential associations, a multiple regression analysis was applied after ensuring the test prerequisites. Standardized beta-coefficients and their 95% confidence intervals were estimated to examine the outcome variable and the predictors' associations. An alpha level of $P < 0.05$ was used to identify statistical significance.

### Ethical consideration

The approval to conduct the study was obtained from the Saudi Electronic University Research Ethics Committee. We maintained all the protocols for all the procedures involving human participants in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

## Results

The online questionnaire invitation was sent to 320 HCWs from whom 267 completed the questionnaire (response rate = 83.45%). Participants were female (55%), mostly young adults between 18 and 34 years (77%), Saudi nationals (85%), live in the central region (50%), married (61%), with no experience (40%), hold a clinical position (77.3%), and earn between 10 to 20 thousand Saudi Arabia Riyals (SAR) (64%).

Participants showed average knowledge about COVID-19 with a mean score of 15 (SD = 3.51). Most of the participants (56%) have a sufficient amount of information about COVID-19. Half of the participants stated that they usually or always thought information about COVID-19 from the public health sector was sufficient. Only 44% of the participants always sought information about COVID-19 from a reliable source.

The mean score of the perceived anxiety composite was 14.98 (SD = 3.78). Most of the Participants showed moderate to high fear from the disease itself as 83% and 68% stated that they always or sometimes worry about COVID-19, or always or sometimes fear of COVID-19. In asking the participants if they are thinking about the disease in their day-to-day life, a smaller proportion stated that they usually or always think about COVID-19 (19%). 40% of the participants mentioned that they usually or always fear getting infected from work. A higher proportion mentioned that they usually or always worry about transmitting the disease to a relative (71%).

The mean score of the preventive practice composite was 16.61 (SD = 4.73). Most participants have always or usual kept away from crowded places (76.4%), practiced good hygiene measures (89%), avoided areas/persons with COVID-19 (82%), and wore a face mask (91%). In questions related to proactive measures, participants showed varying responses. In seeking medical help with the onset of the flu symptom, only 19% reported they rarely or not at all going to seek medical help, and most participants (76%) reported not taking antiviral drugs. In taking vitamins or herbal supplements, 26% of the participant reported they always take vitamins or herbal supplements [Table 1].

### Regression of Knowledge about COVID-19 with demographic variables

We used Multiple linear regression with knowledge about COVID-19 as the response variable and age, sex, nationality, region, social status, profession, years of experience, and income as the predictor variables. The designed model showed an appropriate fit [$F$ (15, 272) = 1.71, $P < 0.05$] with ($R^2 = 0.091$), indicating that the proposed model explains 9.1% of the knowledge about COVID-19 variance. The only significant finding is the age group 35 years and up. Such group had higher knowledge about COVID-19 compared to the age group between 18 – 24 years ($\beta = 1.98$, $P < 0.05$) which indicates HCWs who are 35 years and up have an approximately two-point increase in their average level of knowledge of COVID-19 compared to those between 18-24 years [Table 2].

### Regression of perceived anxiety with demographic variables

Multiple linear regression was utilized with perceived anxiety as the response variable and age, sex, nationality, region, social status, profession, years of experience, and income as the predictor variables. The designed model showed an appropriate fit [$F$ (15, 272) = 1.18, $P < 0.05$] with ($R^2 = 0.065$), indicating that the proposed model explains 6.5% of the perceived anxiety variance. The regression model showed only HCWs profession to be a significant predictor of perceived anxiety ($\beta = 1.62$, $P < 0.05$) with HCWs working in the clinical settings having an estimated 1.62 increase in their perceived anxiety compared to HCWs in non-clinical settings [Table 3].

**Table 1: Participants responses in measuring knowledge, perceived anxiety, and preventive variables**

| Variable | Not at all (%) | Rarely (%) | Sometimes (%) | Usually (%) | Always (%) |
|---|---|---|---|---|---|
| Knowledge about COVID-19 | | | | | |
| I received a sufficient amount of information about COVID-19 | 4.50 | 0.40 | 38.60 | 9.70 | 46.80 |
| I paid attention to information received about COVID-19 | 10.50 | 0.80 | 45.70 | 6.40 | 36.70 |
| All information about COVID-19 was from a reliable source | 10.20 | 2.30 | 38.50 | 5.30 | 43.80 |
| Information about COVID-19 from the public health sector sufficient | 6.70 | 1.90 | 41.60 | 7.10 | 42.70 |
| Perceived anxiety about COVID-19 | | | | | |
| I feel Worried about COVID-19 | 15.00 | 2.30 | 54.30 | 3.80 | 24.70 |
| I really Fear COVID-19 | 27.90 | 5.30 | 41.90 | 3.40 | 21.50 |
| I think constantly about COVID-19 | 19.90 | 6.40 | 55.10 | 2.60 | 16.10 |
| I am afraid of getting COVID-19 infection from work | 17.20 | 3.80 | 39.00 | 4.10 | 36.00 |
| I am worried about transmitting the COVID-19 to a relative | 4.50 | 1.10 | 24.20 | 3.80 | 66.40 |
| Preventive practice | | | | | |
| I always stay away from crowded places | 0.80 | 0.40 | 22.50 | 6.40 | 70.00 |
| I always practice good hygiene measures | 0.00 | 0.40 | 10.90 | 3.00 | 85.80 |
| I always avoid areas/persons with the COVID-19 | 5.60 | 0.00 | 12.40 | 3.40 | 78.70 |
| I always wear a face mask | 2.60 | 0.40 | 6.70 | 4.90 | 85.40 |
| I always seek medical advice with the onset of flu symptoms | 17.60 | 1.50 | 22.90 | 4.50 | 53.60 |
| I take over-the-counter antiviral medication | 76.40 | 1.90 | 14.60 | 0.40 | 6.70 |
| I take vitamin or herbal supplements | 33.00 | 2.60 | 36.70 | 2.30 | 25.50 |

**Table 2: Regression of Knowledge about COVID-19 with demographic variables**

| Variables | β (95% CI) | SE | *P* |
|---|---|---|---|
| Sex (female) | 0.236 (−0.739, 1.211) | 0.495 | 0.634 |
| Age group (years) | | | |
| 25-34 years | 1.119 (−0.318, 2.556) | 0.730 | 0.126 |
| ≥35 years | 1.998 (0.115, 3.880) | 0.956 | 0.038 |
| Nationality (Saudi) | −0.620 (−2.114, 0.874) | 0.759 | 0.414 |
| Region | | | |
| Eastern | 0.498 (−0.626, 1.622) | 0.571 | 0.384 |
| Northern | −0.372 (−3.564, 2.820) | 1.621 | 0.819 |
| Southern | 0.399 (−1.259, 2.057) | 0.842 | 0.636 |
| Western | −0.581 (−1.855, 0.693) | 0.647 | 0.370 |
| Social status (Married) | 0.160 (−1.000, 1.319) | 0.589 | 0.786 |
| Profession (Clinical position) | −0.772 (−1.776, 0.232) | 0.510 | 0.131 |
| Work experience | | | |
| 1-3 years | −0.323 (−1.713, 1.066) | 0.706 | 0.647 |
| 4-6 years | −0.342 (−3.625, 2.830) | 1.721 | 0.792 |
| ≥7 Years | −0.202 (−1.994, 1.591) | 0.910 | 0.825 |
| Income | | | |
| 5,001-10,000 SAR | 1.128 (−0.276, 2.533) | 0.713 | 0.115 |
| 10,001-20,000 SAR | 1.032 (−0.382, 2.445) | 0.718 | 0.152 |
| >20,000 SAR | 1.399 (−0.195, 2.993) | 0.810 | 0.085 |

## Regression of preventive practice with demographic variables

To estimate the impact on preventive practice, a multiple linear regression was modeled with preventive practice as the response variable and age, sex, nationality, region, social status, profession, years of experience, and income as the predictor variables. The designed model showed an appropriate fit [F (15, 272) = 2.04, $P < 0.05$] with ($R^2 = 0.11$), indicating that the proposed model explains 11% of the preventive practice variance. The regression model showed Only HCWs located in the southern region to have higher preventive practice tendency compared to HCWs in the central region (β = −2.1, $P < 0.05$) with HCWs working in the southern region having an estimated 2.1 decrease in their preventive practice compared to HCWs working in the central region [Table 4].

## Impact of knowledge about COVID-19 and perceived anxiety on preventive practice

Multiple linear regression was modeled with preventive practice as the response variable and knowledge about COVID-19, perceived anxiety, age, sex, nationality, region, social status, profession, years of experience, and income as the predictor variables. The designed model showed an appropriate fit [F (17, 272) = 3.05, $P < 0.05$] with ($R^2 = 0.17$), indicating that the proposed model explains 17% of the preventive practice variance. The regression model showed knowledge about COVID-19 and perceived anxiety to be statically significant predictors (β =2.46, $P < 0.05$) and (β = 1.04, $P < 0.05$), respectively. Based on standardized beta coefficients results, knowledge about COVID-19 had a stronger impact (0.23) on preventive practice compared to perceived anxiety (0.13) [Table 5].

## Discussion

In the study, most HCWs reported high levels of knowledge about COVID-19, perceived anxiety, and preventive practices. These findings echoed the results of other studies.[11-13] The detrimental effect of high levels of anxiety among HCWs has propelled researchers to determine sources of anxiety to help design targeted interventions. Prominent sources of anxiety during

**Table 3: Regression of perceived anxiety with demographic variables**

| Variables | β (95% CI) | SE | *P* |
|---|---|---|---|
| Sex (female) | 0.720 (−0.618, 2.058) | 0.679 | 0.290 |
| Age group (years) | | | |
| 25-34 years | 0.271 (−1.700, 2.242) | 1.001 | 0.787 |
| ≥35 years | 0.146 (−2.436, 2.728) | 1.311 | 0.912 |
| Nationality (Saudi) | 1.284 (−0.766, 3.333) | 1.041 | 0.218 |
| Region | | | |
| Eastern | 0.941 (−0.601, 2.482) | 0.783 | 0.231 |
| Northern | −0.330 (−4.709, 4.048) | 2.223 | 0.882 |
| Southern | −0.444 (−2.719, 1.830) | 1.155 | 0.701 |
| Western | 0.056 (−1.691, 1.803) | 0.887 | 0.950 |
| Social status (Married) | −1.079 (−2.669, 0.512) | 0.808 | 0.183 |
| Profession (Clinical position) | 1.592 (0.215, 2.969) | 0.699 | 0.024 |
| Work experience | | | |
| 1-3 years | −0.153 (−2.060, 1.753) | 0.968 | 0.874 |
| 4-6 years | −0.731 (−1.786, 0.292) | 0.580 | 0.141 |
| ≥7 Years | 0.807 (−1.652, 3.265) | 1.249 | 0.519 |
| Income | | | |
| 5,001-10,000 SAR | 0.665 (−1.261, 2.591) | 0.978 | 0.497 |
| 10,001-20,000 SAR | 0.676 (−1.264, 2.615) | 0.985 | 0.493 |
| >20,000 SAR | −0.070 (−2.256, 2.117) | 1.110 | 0.950 |

**Table 4: Regression of preventive practice with demographic variables**

| Variables | β (95% CI) | SE | *P* |
|---|---|---|---|
| Sex (female) | 0.866 (−0.178, 1.910) | 0.530 | 0.104 |
| Age group (years) | | | |
| 25-34 years | −0.822 (−2.361, 0.716) | 0.781 | 0.294 |
| ≥35 years | −0.111 (−2.127, 1.905) | 1.024 | 0.914 |
| Nationality (Saudi) | −0.822 (−2.422, 0.778) | 0.813 | 0.312 |
| Region | | | |
| Eastern | −0.417 (−1.621, 0.786) | 0.611 | 0.495 |
| Northern | −2.153 (−5.571, 1.266) | 1.736 | 0.216 |
| Southern | −2.055 (−3.830, 0.279) | 0.902 | 0.023 |
| Western | 0.108 (−1.256, 1.472) | 0.693 | 0.876 |
| Social status (Married) | 0.634 (−0.608, 1.875) | 0.630 | 0.316 |
| Profession (Clinical position) | 0.300 (−0.775, 1.375) | 0.546 | 0.583 |
| Work experience | | | |
| 1-3 years | 0.656 (−0.833, 2.144) | 0.756 | 0.386 |
| 4-6 years | 0.687 (−1.241, 2.571) | 0.896 | 0.587 |
| ≥7 Years | 0.297 (−1.623, 2.216) | 0.975 | 0.761 |
| Income | | | |
| 5,001-10,000 SAR | 1.329 (−0.175, 2.832) | 0.764 | 0.083 |
| 10,001-20,000 SAR | −0.248 (−1.762, 1.266) | 0.769 | 0.747 |
| >20,000 SAR | −0.224 (−1.931, 1.483) | 0.867 | 0.796 |

the pandemic included limited access to appropriate personal protective equipment, transmitting the infection to family, unable to have rapid testing for COVID-19, and lack of updated information about COVID-19).[14] The last-mentioned source of anxiety was highlighted in our findings as a significant proportion of HCWs in our study sought information about COVID-19 from an unreliable sources and thought information provided by public health agencies was insufficient. This is likely due to the uncertainty around the nature of the disease at the beginning of the pandemic and to the large amount of conflicting information about the disease. Such perceptions with HCWs have also been reported in the literature (Brondani *et al*., 2021).[14] Similarly, most of the participants reported they have a high fear of contracting the disease and their biggest worry is to transmit the disease to their relatives. Such fear has been documented in several studies around the world.[16]

In examining the relation between HCWs characteristics and their knowledge about COVID-19, Older HCWs have been shown to have higher knowledge compared to younger HCWs. Such a gap in knowledge could be attributed to the fact that older HCWs maintain higher positions in their organization and are more abreast about information related to the disease. As for the relationship between HCWs characteristics and perceived anxiety, HCWs in the clinical settings presented a higher score of anxiety of the disease compared to HCWs in non-clinical settings. This was paralleled in the literature.[17,18] In assessing the relation between HCWs characteristics and preventive practice, HCWs in the southern region have a lower score of preventive practice compared to HCWs in the central region. A possible reason is the degree of the impact the disease has on the region with the southern region being the least impacted by the disease.

The model to estimate the impact of knowledge about COVID-19 and perceived anxiety on preventive practice showed that both have a significant impact. Such findings are supported by the literature.[19] Our results showed that knowledge about COVID-19 had a larger effect on preventive practice than perceived anxiety. Despite the difference in their impact, the significance of the influence of knowledge about COVID-19 and perceived anxiety on preventive practice can help guide strategies and plans to increase HCWs adherence to preventive practice.

Despite the invaluable contribution of our findings, the study has some limitations. First, due to the convenience sampling strategy, the findings cannot be generalizable to the whole population of HCWs in Saudi Arabia. Second, the cross-sectional methodology inhibited the possibility to draw conclusions about causality. Third, the utilization of the self-administered electronic questionnaire might contribute to the chances of recall bias.

## Conclusions

The findings of this study reflect the importance of early interventions to raise levels of knowledge about COVID-19, perceived anxiety, and preventive practices among HCWs. The results can be used as a reference for

**Table 5: Impact of knowledge about COVID-19 and perceived anxiety on preventive practice**

| Variables | β (95% CI) | SE | *P* |
|---|---|---|---|
| Sex (female) | 0.733 (−0.280, 1.747) | 0.515 | 0.156 |
| Age group (years) | | | |
| 25-34 years | −1.126 (−2.623, 0.371) | 0.760 | 0.140 |
| ≥35 years | −0.618 (−2.586, 1.350) | 0.999 | 0.537 |
| Nationality (Saudi) | −0.803 (−2.359, 0.752) | 0.790 | 0.310 |
| Region | | | |
| Eastern | −0.638 (−1.808, 0.533) | 0.594 | 0.284 |
| Northern | −2.027 (−5.336, 1.283) | 1.681 | 0.229 |
| Southern | −2.107 (−3.827, −0.387) | 0.874 | 0.017 |
| Western | 0.246 (−1.077, 1.568) | 0.672 | 0.715 |
| Social status (Married) | 0.706 (−0.500, 1.913) | 0.613 | 0.250 |
| Profession (Clinical position) | 0.325 (−0.731, 1.381) | 0.536 | 0.545 |
| Work experience | | | |
| 1-3 years | 0.751 (−0.690, 2.193) | 0.732 | 0.306 |
| 4-6 years | 0.536 (−0.833, 2.144) | 0.846 | 0.428 |
| ≥7 Years | 0.262 (−1.598, 2.122) | 0.944 | 0.781 |
| Income | | | |
| 5,001-10,000 SAR | 0.982 (−0.482, 2.446) | 0.743 | 0.188 |
| 10,001-20,000 SAR | −0.573 (−2.046, 0.900) | 0.748 | 0.445 |
| >20,000 SAR | −0.561 (−2.224, 1.101) | 0.844 | 0.506 |
| Knowledge about COVID-19 | 0.246 (0.119, 0.374) | 0.065 | <0.001 |
| Perceived anxiety | 0.104 (0.011, 0.197) | 0.047 | 0.028 |

future research. Additionally, the identified association between levels of knowledge about COVID-19, perceived anxiety, and preventive practices can inform future intervention plans and help tailor the proper message for HCWs to ensure they have a health and productive working environment.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## References

1. Yang P, Wang X. COVID-19: A new challenge for human beings. Cell Mol Immunol 2020;17:555-7.
2. Alshagrawi S. Knowledge about COVID-19 during its initial outbreak among university students and staff in Saudi Arabia. Majmaah J Health Sci 2020;9:55-64.
3. Shigemura J, Kurosawa M. Mental health impact of the COVID-19 pandemic in Japan. Psychol Trauma 2020;12:478-9.
4. Vahratian A, Blumberg SJ, Terlizzi EP, Schiller JS. Symptoms of anxiety or depressive disorder and use of mental health care among adults during the COVID-19 pandemic—United States, August 2020–February 2021. Morb Mortal Wkly Rep 2021;70:490-4.
5. Badahdah A, Khamis F, Al Mahyijari N, Al Balushi M, Al Hatmi H, Al Salmi I, *et al*. The mental health of health care workers in Oman during the COVID-19 pandemic. Int J Soc Psychiatry 2021;67:90-5.
6. Greenberg N, Docherty M, Gnanapragasam S, Wessely S. Managing mental health challenges faced by healthcare workers during covid-19 pandemic. BMJ 2020;368. doi: https://doi.org/10.1136/bmj.m1211.
7. Ho CS, Chee CY, Ho RC. Mental health strategies to combat the psychological impact of COVID-19 beyond paranoia and panic. Ann Acad Med Singapore 2020;49:1-3.
8. Pappa S, Ntella V, Giannakas T, Giannakoulis VG, Papoutsi E, Katsaounou P. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. Brain Behav Immun 2020;88:901-7.
9. Krammer S, Augstburger R, Haeck M, Maercker A. Adjustment disorder, depression, stress symptoms, Corona related anxieties and coping strategies during the Corona pandemic (COVID-19) in Swiss medical staff. Psychother Psychosom Med Psychol 2020;70:272-82.
10. Maraqa B, Nazzal Z, Zink T. Palestinian health care workers' stress and stressors during COVID-19 pandemic: A cross-sectional study. J Prim Care Community Health 2020;11:2150132720955026. doi: 10.1177/2150132720955026.
11. Alenazi TH, BinDhim NF, Alenazi MH, Tamim H, Almagrabi RS, Aljohani SM, *et al*. Prevalence and predictors of anxiety among healthcare workers in Saudi Arabia during the COVID-19 pandemic. J Infect Public Health 2020;13:1645-51.
12. Abdel Wahed WY, Hefzy EM, Ahmed MI, Hamed NS. Assessment of knowledge, attitudes, and perception of health care workers regarding COVID-19, a cross-sectional study from Egypt. J Community Health 2020;45:1242-51.
13. Shanafelt T, Ripp J, Trockel M. Understanding and addressing sources of anxiety among health care professionals during the COVID-19 pandemic. JAMA 2020;323:2133-4.
14. Brondani M, Almeida F, Cua D, Maragha T, Mathu-Muju K, Shayanfar M, *et al*. Uncertainties around COVID-19 from the perspectives of oral health care workers during the first wave of SARS-CoV-2 infections in British Columbia, Canada. PLoS One 2021;16:e0249186.
15. Deressa W, Worku A, Abebe W, Gizaw M, Amogne W. Risk perceptions and preventive practices of COVID-19 among healthcare professionals in public hospitals in Addis Ababa, Ethiopia. PLoS One 2021;16:e0242471.
16. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, *et al*. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. JAMA Netw Open 2020;3:e203976.
17. Cabarkapa S, Nadjidai SE, Murgier J, Ng CH. The psychological impact of COVID-19 and other viral epidemics on frontline healthcare workers and ways to address it: A rapid systematic review. Brain Behav Immun Health 2020;8:100144. doi: 10.1016/j.bbih.2020.100144.
18. Alrubaiee GG, Al-Qalah TA, Al-Aawar MS. Knowledge, attitudes, anxiety, and preventive behaviours towards COVID-19 among health care providers in Yemen: An online cross-sectional survey. BMC Public Health 2020;20:1541.
19. Lasheras, Isabel, *et al*. "Prevalence of anxiety in medical students during the COVID-19 pandemic: a rapid systematic review with meta-analysis." International journal of environmental research and public health 17.18 (2020): 6603.