Work 73 (2022) 809–818
DOI:10.3233/WOR-220194
IOS Press

The relationships between knowledge levels, health-protective practices, and anxiety in nurses in the workplace during the COVID-19 pandemic

Ayfer Bayindir Cevik[a,*] and Elcin Sabahat Kasapoglu[b]
[a]*Department of Nursing, Health Science Faculty, Bartin University, Bartin, Turkey*
[b]*Health Services Vocational School, Bartin University, Bartin, Turkey*

Received 3 April 2022
Accepted 30 June 2022

Abstract.
BACKGROUND: It is important to determine nurses' levels of knowledge, health-protective practices for work and social life, and mental health states at the beginning of the COVID-19 pandemic to combat the pandemic and minimize further problems.
OBJECTIVES: To determine the relationships between knowledge levels, health-protective practices, and anxiety among nurses during the COVID-19 pandemic.
METHODS: This cross-sectional study was carried out with the online participation of 605 nurses in Turkey. The researchers prepared a questionnaire form to evaluate the participants' knowledge of COVID-19 and their awareness and health-protective behaviours in work and social life. The mental health statuses of the participants were assessed with the Generalized Anxiety Disorder (GAD-7) questionnaire.
RESULTS: Most of the participants (87.8%) had high levels of knowledge of COVID-19, while 28.8% had severe levels of anxiety disorder. The use of alcohol-based hand disinfectants (88.2%) and the use of N95 or N99 masks (88.5%) were the least frequently practiced protective behaviours at work, while in social life, a healthy and balanced diet (61.6%), social distancing (72.8%), and paying attention to one's sleep pattern (77.3%) were the least frequently practiced protective behaviours. Older age (41–50 years), higher education (master's degree) and having a work experience of 10 years or more were determined to increase the knowledge levels of the participants about COVID-19 ($p < 0.001$). Anxiety levels were higher in those with a history of mental illness ($p < 0.001$).
CONCLUSIONS: Determining the knowledge levels, health-protective practices, and anxiety levels of nurses who are struggling in the frontlines in the field of health during the pandemic period can make a great contribution to the management of different current epidemics and pandemics and future ones by showing the areas in which nurses need to be empowered.

Keywords: Healthcare worker, nurses, pandemic, COVID-19 knowledge level, personal protective practices, COVID-19, work life

1. Introduction

In addition to global public health, the novel coronavirus disease 2019 (COVID-19) pandemic has also affected the economy, as well as the work and social lives of individuals [1, 2]. Like many other sectors,

*Address for correspondence: Assc. Prof. Ayfer Bayindir Cevik, PhD., Department of Nursing, Health Science Faculty, Bartin University, Bartin, Turkey. E-mail: ayferbayindir@hotmail.com.tr.

ISSN 1051-9815/$35.00 © 2022 – IOS Press. All rights reserved.

the health sector was initially unprepared for such a health crisis [1]. In the USA, 22% of nurses and 20% of physicians over the age of 55 were infected with (COVID-19) in 2020 [3], while 57.4% of healthcare workers in Turkey contracted COVID-19 in just two months, between December 2020 and January 2021. Globally, one in every 74 people who have died due to COVID-19 is a healthcare worker [4], although the rate is much higher in Turkey than the global average.

In the first three months of the pandemic, the infection and mortality rates among nurses were very low in Turkey. In the next 12 months, there were significant increases in these rates. The reason for this was that the causes of death of nurses were not studied well in the early days of the pandemic, and the necessary precautions were not taken [5]. Additionally, since the vaccination of most nurses had not been completed in December 2020, the number of COVID-19 infections and mortalities due to COVID-19 may have increased in 2021. The low number of nurses and heavy working conditions were among the other factors affecting the infection and death rates [6, 7]. Because nurses have been at the forefront of the struggle against this infectious disease, they have faced a higher risk of infection compared to the general population [7]. Moreover, the insufficient level of knowledge of healthcare professionals about COVID-19, misperceptions, and attitudes towards COVID-19 in the early period may also have caused delayed diagnoses, failure to effectively control the infection, and the spread of the disease [8]. Additionally, the rapid increase in cases and deaths, as well as uncertainties about treatment and vaccination complicated efforts to prevent the spread of the disease initially and increased the anxiety of nurses due to workplace risks [3, 4, 7].

Again, at the beginning of the pandemic, the unclear treatment of COVID-19, the lack of a vaccine, and uncertainties about the disease caused greater fear and anxiety among nurses. This fear often facilitates the development of anxiety, insomnia, depression, and disappointment [9, 10]. A systematic review and meta-analysis of the prevalence of depression, anxiety, and stress during the pandemic concluded that almost one-third of nurses had developed depression, anxiety, and stress [8, 9].

For these reasons, COVID-19 has been a traumatic experience among nurses in Turkey. Depression and anxiety were associated with several work-related factors, including high work demands, low job control, effort-reward imbalance, and the high risk of exposure to diseases [8].

Given these issues, nurses providing fare for COVID-19 patients closely must have sufficient knowledge about COVID-19 [11]. Nurses who lack knowledge and do not exhibit protective behaviours regarding COVID-19 may develop misconceptions and incompatible attitudes, delay their diagnoses, fail to control their infection, and enable the disease to spread even further [8]. Many studies in the literature have evaluated the COVID-19-related knowledge levels of nurses and their mental health statuses, especially anxiety levels [11–13]. However, no studies have yet examined the relationship between knowledge and anxiety, as well as the health-protective behaviours of nurses at the workplace and in their social lives.

To reduce the anxiety that they experience at work and in social life, all nurses must have up-to-date knowledge about the diagnostic process of COVID-19, recommended treatments, and health-protective behaviours. Considering the current uncertainties, the prolongation of the pandemic, and the possibility of new and different epidemics and pandemics today, nurses need to be empowered in terms of knowledge, emotions, and protective behaviours. For this reason, it is important to determine the COVID-19 knowledge levels of nurses working at the forefront in the fight against the pandemic, their health-protective practices in work and social life, and the anxiety they experience at work. Additionally, determining the impact of the COVID-19 on the work and social lives of nurses, understanding the sources of this impact, and developing strategic actions for this will increase the strength of the nursing workforce in fighting the COVID-19 pandemic [8, 12, 13] and the management of the COVID-19 pandemic. In this context, this study aimed to determine the knowledge levels of nurses early in the pandemic period, their mental health statuses, their health-protective behaviours in their work and social lives, and other factors associated with knowledge and anxiety. Additionally, the study aimed to contribute to the literature by recommending strategies for supporting nurses in various epidemic-pandemic and crisis periods.

2. Methods

2.1. Study design

This cross-sectional study was conducted with a sample of healthcare workers working in either public or private healthcare settings in Turkey who were

selected using the convenience sampling method. As of 2020, there were 198,465 nurses working across Turkey's 81 provinces [14]. This study sampled 605 nurses from 48 provinces (59.25%) who were working during the study period. The survey was conducted online between April 15 and June 15, 2020. Since all questions were answered, there was no missing data. Nurses who were not actively working in the period of data collection were excluded from the study. The selection criteria of the sample were being a nurse and working in a private/public institution. The exclusion criteria were being a healthcare worker other than a nurse and not actively working as a nurse in any institution while participating in the study. Furthermore, the mental illness history of the participants was asked, and those who had a history of mental illness were not excluded from the study.

2.2. Instruments

The data collection instruments included two forms: a Personal Information Form and the Generalized Anxiety Disorder (GAD-7) Scale [1–16].

2.2.1. Personal information form

The form had two parts. The first part collected data on the participants' gender, age, educational status, work experience, institution type (private/public), workplace type (pandemic unit/ non-pandemic unit), specific unit (service/intensive care), and COVID-19 cases among their acquaintances.

The second part assessed the participants' knowledge of COVID-19, and behavioral changes in their nursing practices, work, and social lives using the COVID-19 Knowledge Scale, which was created by the researchers after reviewing the relevant literature [1–17]. This part included questions about COVID-19 symptoms, incubation time, modes of transmission, effective protection methods, at-risk groups, and treatment methods. Two questions were inversely coded. The participants could score a minimum of 0 and a maximum of 31 points. A score of 0–15 was assessed as "insufficient knowledge level", and a score of 16–31 points was considered "sufficient knowledge level" [1–15].

2.2.2. The Generalized Anxiety Disorder (GAD-7) Scale

The impact of the COVID-19 pandemic on the participants' mental health was assessed using GAD-7. GAD-7 is a short, seven-item self-report questionnaire developed by Spitzer et al. in accordance with the DSM-IV-TR criteria to assess state anxiety [14]. The scale measures how frequently the respondent has experienced anxiety symptoms during the last two weeks. The responses are given on a four-point Likert-type scale (0 = not at all, 1 = several days, 2 = more than half the days, 3 = nearly every day). Total scores of 0–4, 5–9, 10–14, and 15 or higher represent minimal, mild, moderate, and severe anxiety, respectively. It is necessary to investigate and confirm the GAD diagnosis of respondents with a total score of 10 or higher [16, 17]. For the present study, minimal and mild anxiety levels were defined as normal and "no anxiety disorder", and moderate and severe anxiety levels were defined as "having anxiety disorder". The validity and reliability of the Turkish version of the scale were evaluated by Konkan et al., who reported a Cronbach's α coefficient of 0. 85 [17], whereas this coefficient was found as 0.91 in the present study.

2.3. Ethical considerations

The required institutional permits and approval from the Bartin University Ethics Committee (Decision number: 2020-SBB-0051) were obtained before conducting the study. Permission to use GAD-7 was obtained from the authors. All participants gave their informed consent at the beginning of the survey. It was assumed that nurses who responded to the survey agreed to participate. The survey collected no identifying information. The research protocol conformed to the principles outlined in the Declaration of Helsinki [18].

2.4. Data analysis

Data analysis was carried out using the IBM SPSS 25.00 statistics program. Sociodemographic characteristics and descriptive data were defined using frequencies and percentages. The normality of the distributions of the data was examined by visual (histogram and probability plots) and analytical (Shapiro-Wilk test) methods. Frequencies, percentages, means, and standard deviations were used as descriptive statistics, while *t*-tests, one-way ANOVA, and Tukey's HSD tests were used in independent groups to compare continuous data. $p < 0.05$ was considered statistically significant.

Table 1
Sociodemographic and work-related characteristics of the participants

Variable	*n*	%
Gender		
Male	75	12.4
Female	530	87.6
Age		
<30 years	265	43.8
31–40 years	166	27.4
41–50 years	174	28.8
Educational status		
High school	85	14.0
Bachelor's degree	419	69.3
Master's degree	90	14.9
Doctorate degree	11	1.8
Work experience		
1–5 years	228	37.7
6–10 years	104	17.2
11–15 years	88	14.5
16 years or longer	185	30.6
Work institution		
Private	127	21.0
Public	478	79.0
Status of work institution		
Pandemic	428	70.7
Non-pandemic	177	29.3
Work unit		
Service	438	72.4
Intensive care	167	27.6
Status of work unit		
Pandemic	300	49.6
Non-pandemic	305	50.4
Presence of acquaintances with COVID-19 infection		
Yes	250	41.3
No	355	58.7

3. Results

As Table 1 shows, 87.6% of the 605 participants were women, 43.8% were under the age of 30, and 69.3% had a bachelor's degree. About one-third of the participants (37.7%) had 1–5 years of work experience, and most (79%) worked in public institutions. Most participants worked in a pandemic institution (70.7%), with about half of these working in a pandemic unit (49.6%). Approximately half knew people around them diagnosed with COVID-19 (41.3%).

Table 2 presents the knowledge levels of the participants regarding COVID-19 and their mental health statuses. More than half of the participants had taken part in institutional training on COVID-19 (63.3%). Nearly two-thirds believed that their knowledge of COVID-19 was high (61.3%), while most believed that the pandemic had negatively affected their mental health (84.5%). Over two-fifths had experienced a high level of anxiety due to the pandemic (42.5%). Anxiety had a high level of effect on the daily lives of over one-third of the participants (38.7%), while 39.2% viewed their experience as 'phobia'.

As seen in Table 3, the large majority of the participants reported that they had increased health-protective practices in both work and social life, including the use of N95 or N99 masks (88.59%) and hand sanitizers (88.26%), increased frequency and duration of handwashing in all nursing practices (94.54%), paying more attention to hygiene rules (90.90%), and following social distancing measures (72.89%). The participants had also increased their use of immune-enhancing drugs, herbal supplements, and fluid intake (80%), and they paid more attention to sleep patterns (77.35%) and a healthy diet (61.65%).

Table 4 shows that there were significant differences in the knowledge and anxiety disorder levels based on the participants' sociodemographic and other related variables. First, the participants who believed they had insufficient knowledge about COVID-19 had significantly lower COVID-19

Table 2
Knowledge of COVID-19 and mental health

Variable	*n*	%
Participation in COVID-19 training		
Yes	383	63.3
No	222	36.7
Information sources*		
Social media	600	97.1
Colleagues/Friends	586	96.8
Family	369	61.0
TV	588	97.1
Ministry of Health or health association websites	152	25.1
Training provided by the institution	383	63.3
COVID-19 knowledge level		
None	8	1.3
Low	43	7.1
High	371	61.3
Very high	183	30.2
Negative impact of COVID-19 on mental health		
Yes	511	84.5
No	94	15.5
Level of anxiety due to COVID-19		
None	16	2.6
Low	211	34.9
High	257	42.5
Very high	121	20.0
Impact of anxiety due to COVID-19 on daily life		
No effect at all	28	4.6
Affected slightly	235	38.8
Affected highly	234	38.7
Affected completely	208	17.9
Defining the effect of anxiety on daily life as "phobia"		
Yes	237	39.2
No	368	60.8
Having a previously diagnosed mental illness		
Yes	61	10.1
No	544	89.9
Self-reported knowledge level		
Insufficient	352	58.2
Sufficient	253	41.8
Proportion of COVID-19 knowledge levels		
Insufficient	74	12.2
Sufficient	531	87.8
Mean COVID-19 knowledge score	24.33 ± 2.60 (Min: 17; Max: 30)	
Mean GAD-7 score	13.12 ± 5.096	
Proportion of GAD-7 levels		
Mild	164	27.1
Moderate	267	44.1
Severe	174	28.8

*Multiple options were allowed.

Knowledge Scale scores (22.43 ± 1.27) than those who believed they had sufficient knowledge (26.98 ± 1.36) (*t*: –41.995, $p < 0.001$). Second, the participants working in pandemic units had significantly higher GAD-7 scores (13.565 ± 5.25) than other participants (12.695 ± 4.90) (t: 2.093, $p < 0.05$). Third, the participants who considered the effect of anxiety on their daily lives as "phobia" had higher GAD-7 scores (16.38 ± 5.4) than others (11.02 ± 3.5) (t: 14.70, $p < 0.001$). Fourth, the participants with a history of mental disorders based on their self-reports had significantly higher GAD-7 scores (15.96 ± 5.69) than those who did not report such a history (12.80 ± 4.92, $p < 0.001$).

4. Discussion

It is important to determine the knowledge levels of nurses regarding COVID-19, their anxiety status

Table 3
Health-protective practices in work and social life

	Yes *n*	%
Protective practices in work life		
Continuous use of medical masks	592	97.85
Use of N95/FFP2 or N99/FFP3 masks	536	88.59
Use of protective gloves when necessary	575	95.04
Use of goggles when necessary	573	94.71
Use of hairnets	562	92.89
Use of alcohol-based hand sanitisers	534	88.26
Use of gowns	550	90.90
Paying attention to shorter stay with patients	549	90.74
Increasing time and frequency of hand washing in all nursing practices	572	94.54
Protective practices in social life		
Paying more attention to hygiene rules when sneezing and coughing	550	90.90
Use of masks	585	96.69
Increasing time and frequency of hand washing	553	91.40
Use of alcohol-based hand sanitisers	589	97.35
Avoiding crowded places	496	81.98
Paying attention to social distancing	441	72.89
Paying more attention to a healthy, balanced diet	373	61.65
Paying more attention to sleep patterns	468	77.35
Receiving supportive care	484	80.00

*Multiple options were allowed.

and levels, and their health-protective behaviours in the workplace to overcome this pandemic and prevent future epidemics and pandemics [19–21]. Given the inherent uncertainty of a pandemic and its prolongation with the emergence of new variants, success in fighting this pandemic, as well as future epidemics or pandemics, depends on strengthening the knowledge, emotional states, and health-protective practices of nurses [22, 23]. Therefore, this study investigated the knowledge levels of nurses about COVID-19 in the pandemic's early stage, their mental health status, their health-protective practices for work and social life, and other factors associated with their knowledge levels and anxiety statuses.

In this study, similar to studies conducted with Chinese, Lebanese, and Filipino nurses [24, 25], it was seen that the participants under the age of 30, those with less than 10 years of work experience, and those with undergraduate education were at the forefront of the fight against the pandemic. In the literature, it has been reported that young healthcare professionals are on the front lines in the COVID-19 struggle. Again, in this study, about half of the participants were found to have encountered COVID-19 infection cases among people they knew. Additionally, in the literature, it has been reported that sociodemographic characteristics are effective in the development of stress, anxiety, and depression experienced during the pandemic period [23], and nurses with relatives diagnosed with COVID-19 experience more anxiety [22].

In an epidemic-pandemic encountered for the first time, it is important to obtain accurate information about the disease and the management of the epidemic-pandemic period [25]. In Turkey, to receive information, nurses resort more to the websites of the Ministry of Health and associations such as the Turkish Medical Association, as well as associations established for intensive care nursing and nursing in general. Additionally, they rely on social media, colleagues, friends, and TV. Thus, social media have been used more frequently to spread information about COVID-19 during this period [8]. Our finding that these nurses had satisfactory knowledge levels even in the early phase of the pandemic showed that their knowledge sources were reliable. Similarly, in the literature, as it was stated that Lebanese and Filipino nurses got information about COVID-19 mostly from social media, TV, and radio, although their levels of trust in these information sources were low [24, 25].

Most nurses (87.8%) who participated in this study had high levels of knowledge of COVID-19. This rate was lower than that reported in China (90%) [19], but it was higher than that reported for nurses in Uganda (85%) [13] and for healthcare professionals in Vietnam, the majority of whom were nurses (81.7%) [20]. While nurses in Lebanon reported satisfactory levels of knowledge [25], knowledge of Ebola among nurses in Gabon was insufficient [26]. Considering the relationship of sociodemographic characteristics with COVID-19 knowledge levels among the participants

Table 4
Relationships between sociodemographic and other variables of the participants and their knowledge levels and anxiety disorder statuses

	COVID-19 knowledge score					GAD-7 score		
Characteristics	*n*	%	Mean (Sd)	Test value	P	Mean (Sd)	Test value	*P*
Age								
[1]< 30 years	265	43.8	23.36 ± 2.40[#]	F: 36.21	0.000	13.22 ± 4.94	F: 1.646	0.194
[2]31–40 years	166	27.4	25.12 ± 2.56			12.54 ± 5.03		
[3]41–50 years	174	28.8	25.43 ± 1.84			13.52 ± 5.09		
Post Hoc	3 > 2, 3 > 1; 2 > 1, 3 > 1 ($p < 0.05$)							
Male	75	12.4	24.16 ± 2.86	t: –0.618	0.537	12.49 ± 4.90	t: –1.145	0.253
Female	530	87.6	24.35 ± 2.56			13.31 ± 5.34		
Educational status[#]								
[1]High school	85	14.0	23.69 ± 2.43	F: 6.366	0.000	13.45 ± 4.98	F: 1.506	0.212
[2]Bachelor's degree	419	69.3	24.24 ± 2.64			13.27 ± 5.08		
[3]Master's degree	90	14.9	25.31 ± 2.42			12.33 ± 5.31		
[4]Doctorate degree	11	1.8	24.72 ± 2.76			11.18 ± 3.97		
Post Hoc	3 > 2, 3 > 1; 2 > 1;4 > 2, 4 > 1 ($p < 0.05$)							
Work experience								
0–10 years	332	54.87	23.68 ± 2.49	t: –7.012	0.000	13.20 ± 5.00	t: 0.446	0.656
10 years or longer	273	45,13	25.12 ± 2.51			13.02 ± 5.21		
Work unit								
Pandemic	300	49.58	24.15 ± 2.58	t: –1.727	0.085	13.56 ± 5.25	t: 2.093	0.037
Non-pandemic	305	50.42	24.51 ± 2.61			12.69 ± 4.90		
Participation in COVID-19 training								
Yes	383	63.30	24.26 ± 2.63	t: 0.904	0.366	13.01 ± 5.06	t: –0.686	0.493
No	222	36.70	24.45 ± 2.53			13.31 ± 5.15		
Self-assessed COVID-19 knowledge level								
Insufficient	352	58.2	22.43 ± 1.27	t: –41.995	0.000	12.98 ± 14.14	t: –0.770	0.244
Sufficient	253	41.8	26.98 ± 1.36			6.30 ± 5.67		
Impact on mental health								
Yes	511	84.46	24.37 ± 2.56	t: 0.879	0.380	13.96 ± 5.00	t: 10.188	0.000
No	94	15.54	24.11 ± 2.81			8.57 ± 2.54		
Level of anxiety								
[1]None	16	2.65	22.00 ± 1.89	F = 5.376	0.001			
[2]Low	211	34.87	24.40 ± 2.70					
[3]High	257	42.48	24.54 ± 2.50					
[4]Very high	121	20.00	24.33 ± 2.60					
Post Hoc	3 > 1, 3 > 2, 3 > 4, 2 > 1, 2 > 2 ($p < 0.05$)							
Defining anxiety in daily life as "phobia"								
Yes	237	39.17	24.40 ± 2.66	t: 0.508	0.603	16.38 ± 5.4	t: 14.70	0.000
No	368	60.83	24.29 ± 2.56			11.02 ± 3.5		
Having a previously diagnosed mental illness								
Yes	61	10.08	24.57 ± 2.98	t: 0.759	0.448	15.96 ± 5.69	t: 4.674	0.000
No	544	89.92	24.30 ± 2.55			12.80 ± 4.92		

F: ANOVA test; t: Independent-samples *t*-test; *Post Hoc*: Tukey's HSD.

in this study, it was found that older nurses (between 41–50 ages) and nurses with master's degrees had higher knowledge levels. Additionally, having a professional experience of 10 years or more increased the knowledge levels of the participants about COVID-19. These findings are important because ending the COVID-19 pandemic depends on nurses' knowledge levels about COVID-19 and their health-protective practices.

During the COVID pandemic, nurses must provide individualised care to infected patients. However, over 60% of nurses in Lebanon feared being infected with COVID-19 while 90% feared infecting family members due to occupational exposure [25]. In this study, nearly half of the participants had acquaintances who had contracted COVID-19 (41.3%).

Nurses who experience fear and anxiety due to the pandemic may suffer a deterioration in their mental health [26]. In this study, most participants reported that the pandemic had impaired their mental health (84.5%). Again, many participants showed moderate to severe levels of generalised anxiety disorder (72.9%) during the pandemic period, which supported other results in the literature [26, 27]. In this study, a significant portion of those who had

experienced anxiety (38.7%) described this anxiety as "phobia". The participants in this study with high anxiety levels had more knowledge of COVID-19, presumably because those who are more anxious about infection improve their knowledge of COVID-19 to protect themselves and provide the best care to their patients. These findings were consistent with studies conducted in Vietnam and Taiwan [24, 26]. Additionally, the participants of this study were more likely to report anxiety disorders if they worked in pandemic units, experience COVID-19 phobia in their daily lives, and have a history of mental illness diagnoses. Similarly, a study of the mental health of healthcare professionals in India during the pandemic period, of whom 24% were nurses, reported deterioration in mental health and the presence of depressive and/or anxiety symptoms [26]. Overall, these findings have shown that nurses, who are the healthcare professionals that most frequently contact COVID-19 patients, should be mentally supported during the pandemic, with urgent measures to protect their mental health. With the knowledge they have gained during the pandemic, nurses have developed health-protective practices to reduce their anxiety in their work and social lives [28, 29]. The use of alcohol-based hand disinfectants and the use of N95 or N99 masks are the least frequently performed protective practices at work, whereas common protective practices that had become routine in social life included social distancing, use of masks, more frequent hand washing, and paying attention to hygiene rules. Ng et al. confirmed that these measures were considered appropriate [30], although Olum et al. found that healthcare professionals did not believe that wearing a mask is protective [13]. The nurses who participated in our study reported various protective behaviours, including the continuous use of medical masks in hospital practices, N95/FFP2 or N99/FFP3 masks for droplet path-related operations, protective face shields, goggles, alcohol-based hand sanitisers, non-sterile gowns, shorter stays with patients, and longer and more frequent hand washing in all nursing practices. Indeed, most nurses always follow standard precautions when in contact with patients [26]. Almost all nurses (between 94.71% and 88.59%) follow WHO's recommendations to use goggles and masks (N95 and N99 type) when in contact with patients [15]. In contrast, more than 40% of nurses in Lebanon did not use protective equipment [25]. Accordingly, it may be stated that the basic measures for protection in the health system are provided to nurses.

On the other hand, a healthy and balanced diet, social distancing, and paying attention to sleep patterns were the least frequently applied protective practices in the social lives of the participants of this study. Besides, unbalanced diets [31–32] and insomnia were found to reduce immunity and increase depression/anxiety during the pandemic [2]. Thus, nurses have adopted personal health-protective practices such as consuming vitamins, immune-enhancing herbal supplements and medications, and paying more attention to their fluid intake, sleep patterns, and diet. Although few studies have clearly determined the relationship between nutrition and immunity in the case of COVID-19, it is still recommended to maintain a balanced diet, take vitamins (B, E), carotenoids, and minerals (Fe, Zn, Cu, Mg, Se), and ensure sufficient fluid intake [29, 30]. In this study, most participants had taken necessary measures to protect both their patients and themselves since the early stages of the pandemic in their work and social lives. Knowledge of COVID-19 and experience of anxiety encourage the frequent use of these measures.

5. Conclusion

The findings of this study demonstrated that nurses have increased their use of general and personal health-protective behaviours for both their work practices and social lives, based on their levels of knowledge during the COVID pandemic. However, the pandemic's uncertainty and the increasing numbers of cases have caused moderate to severe anxiety disorder. This study focused on the need to constantly evaluate the current level of COVID-19 knowledge of nurses to empower them during the pandemic. The study also highlighted the pandemic's effects on the mental health of nurses and emphasised that urgent measures should be taken to support them and protect or treat their mental health, both at work and in their social lives. Given the importance of nursing practices, general and personal health-protective practices should be increased to ensure that they continue working. The health system for fighting the pandemic can be strengthened by determining the COVID-19 knowledge levels of nurses, their health-protective practices, and anxiety levels during the pandemic, which may be prolonged with the emergence of different variants. Further studies are recommended to re-evaluate these variables in the later stages of the pandemic.

6. Limitations

Several limitations need to be highlighted. First, the study collected data using an online survey under COVID-19 pandemic conditions. Thus, it relied on nurses' self-reporting of anxiety and knowledge levels. Second, the survey prepared by the researchers in line with the literature to evaluate knowledge levels was not tested for validity and reliability. Nevertheless, the Cronbach's alpha value of GAD-7 was high, and previous studies have evaluated only knowledge or mental health alone, while this study investigated these together, which shows the strength of this study.

Conflict of interest

The authors declare that they have no conflict of interest.

Acknowledgments

The authors thank all participants.

Funding

The authors report no funding.

References

[1] Gupta M, Abdelmaksoud A, Jafferany M, Lotti T, Sadoughifar R, Goldust M. COVID-19 and economy. Dermatol Ther. 2020;33(4):e13329.

[2] McKibbin WJ, Fernando R. The global macroeconomic ımpacts of COVID-19: Seven Scenarios. 2020; CAMA Working Paper No. 19/2020;1-45.

[3] Gouda D, Singh PM, Gouda P, Goudra B. An overview of health care worker reported deaths during the COVID-19 pandemic. J Am Board Fam Med. 2021;34(Suppl):S244-6.

[4] Turkish Thoracic Society. 2020. [https://www.toraks.org.tr/en/]. COVID 19 Opinion Group. [updated 21 Marc, 2021; cited 2022 Marc 10]. Available from: https://www.toraks.org.tr/site/community/library/hwn_i___MRxa7A5h

[5] Nasır N, Bahadır A, Karcıoğlu Ö. What the health professional death states in Turkey during the pandemic process. Pandemi Sürecinde Türkiye'de sağlık çalışanı ölümlerinin anlattığı. April 2022, ISBN 978-605-9665-76-6. p. 1-25. https://www.ttb.org.tr/905yj2p (in Turkish)

[6] Zhan M, Qin Y, Xue X, Zhu S. Death from COVID-19 of 23 health care workers in China. N Engl J Med. 2020;382(23):2267-8.

[7] Şahin MK, Aker S, Şahin G, Karabekiroğlu A. Prevalence of depression, anxiety, distress and insomnia and related factors in healthcare workers during COVID-19 pandemic in Turkey. J Community Health. 2020;45(6):1168-77.

[8] Türktemiz H, Ünal Ö A, Bingöl D. Assessment of healthcare professionals' perceptions and attitudes towards the COVID-19 pandemic in Turkey'. Work. 2021;69(4):1163-70.

[9] Nemati M, Ebrahimi B, Nemati F. Assessment of Iranian nurses' knowledge and anxiety toward COVID-19 during the current outbreak in Iran. Arch Clin Infect Dis 15(COVID-19). 2020;e102848.

[10] Nadeem F, Sadiq A, Raziq A, et al. Depression, anxiety, and stress among nurses during the COVID-19 wave III: Results of a cross-sectional assessment. J Multidiscip Healthc. 2021;6(14):3093-101.

[11] Lu W, Wang H, Lin Y, Li L. Mental status of medical workforce during the COVID-19 pandemic: A cross-sectional study. Psychiatry Res. 2020;288:112936.

[12] Hesaraki M, Akbarizadeh M, Ahmadidarrehsima S, Moghadam MP, Izadpanah F. Knowledge, attitude, practice and clinical recommendations of health care workers towards COVID-19: A systematic review. Reviews on Environmental Health. 2020;1-13.

[13] Olum R, Chekwech G, Wekha G, Nassozi DR, Bongomin F. Coronavirus Disease-2019: Knowledge, attitude, and practices of health care workers at Makerere University teaching hospitals, Uganda. Front Public Health. 2020;8:181.

[14] OECD Data. [https://data.oecd.org/]. Nurses. [updated 2022 Marc 2; cited 2022 Marc 26]. Available from: https://data.oecd.org/healthres/nurses.htm.

[15] World Health Organization. [https://www.who.int/]. Rational use of personal protective equipment for coronavirus disease 2019 (COVID-19). [updated 2022 Marc 23; cited 2022 Marc 23]. Available from: https://www.who.int/publications/i/item/rational-use-of-personal-protective-equipment-for-coronavirus-disease-(COVID-19)-and-considerations-during-severe-shortages

[16] Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: The GAD-7. Arch Intern Med. 2006;166(10):1092-7.

[17] Konkan R, Şenormanci Ö, Güçlü O, Aydin E, Sungur MZ, Osman M. Generalized anxiety disorder-7 (gad-7) test Turkish version, validity and reliability. Arch of Neuropsychiatry. 2013;50(1):53-8. (In Turkish)

[18] Medical Association. Declaration of Helsinki. Br Med J. 1964;2:177.

[19] Zhong BL, Luo W, Li HM, et al. Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: A quick online cross-sectional survey. Int J Biol Sci. 2020;16(10):1745-52.

[20] Huynh G, Nguyen TN, Tran VK, Vo KN, Vo VT, Pham LA. Knowledge and attitude toward COVID-19 among healthcare workers at district 2 hospital, Ho Chi Minh City. Asian Pac J Trop Med. 2020;3:260-5.

[21] Mohd SSH, Azman N, Nik JNR, et al. Health anxiety and ıts correlations with self-perceived risk and attitude on COVID-19 among Malaysian healthcare workers during the pandemic. Int J Environ Res Public Health. 2021;18(9):4879.

[22] Zhang M, Zhang P, Liu Y, et al. Influence of perceived stress and workload on work engagement in front-line nurses during COVID-19 pandemic. J Clin Nurs. 2021;30(11-12):1584-95.

[23] Zhu Z, Xu S, Wang H, et al. COVID-19 in Wuhan: Sociodemographic characteristics and hospital support

measures associated with the immediate psychological impact on healthcare workers. EClinical Medicine. 2020;24;24:100443.

[24] Denney BM, Joanna CASJ, Codera K, et al. Assessment of selected Filipino nurses level of knowledge, attitudes, practices and willingness to provide care to patients with COVID-19 in Cebu City, Philippines. Int J Environ Res Public Health. 2022;6:082-103.

[25] Saadeh D, Sacre H, Hallit S, et al. Knowledge, attitudes, and practices toward the coronavirus disease 2019 (COVID-19) among nurses in Lebanon. Perspect Psychiatr Care. 2021;57(3):1212-21.

[26] Rehman H, Ghani M, Rehman M. Effectiveness of basic training session regarding the awareness of Ebola virus disease among nurses of public tertiary care hospitals of Lahore. J Pak Med Assoc. 2020;70(3):477-81.

[27] Schwartz J, King CC, Yen MY. Protecting healthcare workers during the coronavirus disease 2019 (COVID-19) outbreak: Lessons from Taiwan's severe acute respiratory syndrome response. Clin Infect Dis. 2020;71(15):858-60.

[28] Cook TM. Personal protective equipment during the coronavirus disease (COVID) 2019 pandemic- a narrative review. Anaesthesia. 2020;75(7):920-7.

[29] Zheng R, Zhou Y, Fu Y, et al. Prevalence and associated factors of depression and anxiety among nurses during the outbreak of COVID-19 in China: A cross-sectional study. Int J Nurs Stud. 2021;114:103809.

[30] Ng K, Poon BH, Kiat Puar TH, et al. COVID-19 and the risk to health care workers: A case report. Ann Intern Med. 2020;172(11):766-7.

[31] Diabetes (India), National Diabetes Obesity and Cholesterol Foundation (NDOC), and Nutrition Expert Group, India. Balanced nutrition is needed in times of COVID19 epidemic in India: A call for action for all nutritionists and physicians. Diabetes and Metab Syndr 2020;14(6):1747-50.

[32] Misra, A. Balanced nutrition is needed in times of COVID19 epidemic in India: A call for action for all nutritionists and physicians. Diabetes and Metab Syndr. 2020;14(6): 1747-50.