Jurnal Keperawatan Indonesia, 2024, 27 (3), 146–157
DOI: 10.7454/jki.v27i3.1239
Received December 2023; Accepted November 2024

pISSN 1410-4490; eISSN 2354-9203

Assessing Knowledge and Preventive Practices Regarding Infectious Diseases Among Healthcare Workers in Hail City, Saudi Arabia

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Abstract

Studies suggest that there may be gaps in knowledge and compliance with infection control measures among healthcare workers in Saudi Arabia. This study aimed to determine the knowledge of, and preventive measures employed by the healthcare workers in Hail City, Saudi Arabia, regarding infectious diseases. A cross-sectional design was employed, and the study participants were 265 healthcare workers aged 18 or older who were currently employed at government hospitals, involved in patient care or essential healthcare services, and fluent in English. Healthcare workers on leave, with cognitive impairments, with language barriers, or who refused to participate in the study were excluded. Data collection took place between November and December 2022. Overall, there was a high percentage of correct responses During the surge of the highly infectious disease known as coronavirus disease 2019 (COVID-19), which reached pandemic levels, most of the participants wore gloves while at work and wore masks when leaving the house. None of the participants went to crowded places (100%). Of note, the participants' educational attainment ($p < .000$) and education on COVID-19 ($p = .001$) were found to have significant relationships with their knowledge. Accordingly, sex ($p < .000$), educational attainment ($p < .000$), occupation ($p = .001$), and education on COVID-19 ($p < .000$) were found to have significant relationships with employment of COVID-19 preventive measures. The healthcare workers in this study have a good understanding of COVID-19 and are taking appropriate preventive measures to protect themselves and others from it. However, ongoing education and training are crucial to ensure that all healthcare workers possess the necessary knowledge and skills to respond effectively to future health crises.

Keywords: COVID-19, healthcare workers, impact, pandemic, precautionary health behaviors

Abstrak

Menilai Pengetahuan dan Praktik Pencegahan Penyakit Menular pada Petugas Kesehatan di Kota Hail, Arab Saudi*. Studi menunjukkan bahwa mungkin ada kesenjangan dalam pengetahuan dan kepatuhan terhadap langkah-langkah pengendalian infeksi pada petugas kesehatan di Arab Saudi. Studi ini bertujuan untuk menelaah pengetahuan dan langkah-langkah pencegahan penyakit menular yang dipraktikan oleh petugas kesehatan di Kota Hail, Arab Saudi. Desain studi menggunakan* cross-sectional *dengan peserta studi sebanyak 265 petugas kesehatan, berusia 18 tahun atau lebih yang saat ini bekerja di rumah sakit pemerintah, terlibat dalam perawatan pasien atau layanan kesehatan penting, dan fasih berbahasa Inggris. Petugas kesehatan yang sedang cuti, memiliki gangguan kognitif, memiliki kendala bahasa, atau menolak untuk berpartisipasi dalam penelitian ini dikecualikan. Pengumpulan data dilakukan antara November dan Desember 2022. Secara keseuruhan, ditemukan persentase tinggi pada rata-rata keseluruhan tanggapan yang benar. Selama pandemi COVID-19, sebagian besar peserta mengenakan sarung tangan saat bekerja dan semuanya mengenakan masker saat meninggalkan rumah. Tidak ada peserta yang pergi ke tempat ramai (100%). Sebagai catatan, pencapaian pendidikan peserta ($p < .000$) dan pendidikan tentang COVID-19 ($p = .001$) memiliki hubungan yang signifikan dengan pengetahuan mereka. Dengan demikian, jenis kelamin ($p < .000$), pencapaian pendidikan ($p < .000$), pekerjaan ($p = .001$), dan pendidikan tentang COVID-19 ($p < .000$) memiliki hubungan yang signifikan dengan penerapan tindakan pencegahan COVID-19. Para pekerja layanan kesehatan, dalam penelitian ini, memiliki pemahaman yang baik tentang COVID-19 dan mengambil tindakan pencegahan yang tepat untuk melindungi diri mereka sendiri dan orang lain disekitarnya. Namun, pendidikan dan pelatihan lebih lanjut sangatlah diperlukan untuk memastikan bahwa semua pekerja layanan kesehatan memiliki pengetahuan dan keterampilan yang dibutuhkan untuk menanggunlangi krisis kesehatan lainnya secara efektif di masa yang akan datang.*

Kata Kunci: *COVID-19, dampak, pandemi, perilaku pencegahan, petugas kesehatan*

Introduction

To manage outbreaks of infectious diseases such as coronavirus disease 2019 (COVID-19), which have a negative influence on healthcare services, healthcare facilities must take precautions, as demonstrated by the 2003 severe acute respiratory syndrome (SARS) pandemic. During this pandemic, healthcare workers (HCWs) took preventive measures to safeguard both themselves and their patients, highlighting the importance of readiness and alertness in the face of possible health risks (Sanghera et al., 2020). Thus, in the event of an infectious disease surge, it is vital to protect HCWs (Arslanca et al., 2021). The failure to do this will reduce the effectiveness of the healthcare system's response to the disease surge and will create an uncontrolled increase in the disease's incidence rate. According to Hussain et al. (2021), it is critical to increase HCWs' awareness of the disease to reduce their fear of acquiring it. To do this, it is important to first determine HCWs' present levels of knowledge, preventive practices, and risk perceptions regarding the disease.

Taking preventive measures during an infectious disease outbreak in Hail Region, Saudi Arabia, can have significant epidemiological and economic repercussions. Examples of these measures include avoiding public transportation and gathering places. These steps can slow down the disease's transmission, as evidenced by the 2003 SARS pandemic, but they also have limitations (Bruin et al., 2020). This held true for the COVID-19 pandemic, which affected many people across the world, prompting the World Health Organization (2020) to declare a public health emergency of worldwide significance. HCWs experienced stress due to the increasing number of cases. To avoid stress in similar situations, preventive steps, beneficial health behaviors, and positive reinforcement may be required. Precautionary measures must also be put in place to protect nurses and other HCWs from becoming ill as a result of their exposure to diseases at work (Pasay-An, 2020). Most HCWs claim that protecting their own physical health is the most important priority during a pandemic (Aoyagi et al., 2015). However, individual reactions may vary depending on intrapersonal risk perception and resilience as well as workplace environmental and organizational factors, such as training, availability, and use of personal protective equipment (PPE) (Dionne et al., 2018). People with psychiatric problems want evidence-based care that works to heal and maintain their well-being. A thorough and nuanced understanding of psychiatric diseases and the variables that influence their development is necessary to provide this kind of support. Biological, psychological, social, and cultural factors that contribute to the development of these diseases must be taken into account. Furthermore, as every person experiences psychological problems differently, effective support must be customized to meet people's unique needs. To provide appropriate support, it is imperative to identify risk factors and make an accurate diagnosis. A multifaceted and nuanced approach must be used when offering evidence-based support to individuals for psychological problems (Aoyagi et al., 2015; Xiang et al., 2020).

When the COVID-19 pandemic broke out, the literature on the disease was generally lacking, both locally and internationally, making it difficult to assess the differences in the perceived risks and threats of and precautionary measures for COVID-19 among HCWs. According to Girma et al. (2020), HCWs' lack of understanding and risk perception of the disease may result in delayed detection and treatment, allowing the infection to spread quickly. Earlier studies, such as the study by Wu et al. (2020), presumed that if HCWs are not adequately protected with PPE or have insufficient supplies, their physical health will be unquestionably jeopardized by an increase in the actual and perceived risk of infection when they work with confirmed or suspected cases.

Pasay-An (2020) emphasized that because of a

lack of resources for protective gear and the nature of their profession, HCWs are at risk from COVID-19. They are also at an increased risk of developing anxiety and depression—mental health disorders that can have a significant impact on a person's well-being—due to the nature of their work. Lam et al. (2020) conducted a study that investigated the psychological impact of COVID-19 on HCWs. They found that HCWs who had close patient contact and did not receive adequate physical protection, such as PPE and infection control training, were likely to experience symptoms of anxiety and depression. This suggests that feeling vulnerable to COVID-19 can contribute to the development of these mental health disorders. To address such problems, Albaqawi et al. (2021) suggest the implementation of tailor-fitted guidelines, such as establishing an infection control system that enables real-time monitoring and immediate corrective actions for nurses.

Numerous studies have been carried out to evaluate the knowledge, attitudes, and behaviors of Saudi Arabian HCWs in relation to COVID-19 and other infectious diseases. Alshammari et al. (2020) found that the HCWs in Hail Region, Saudi Arabia, had enough awareness of the prevention and transmission of COVID-19 but an insufficient understanding of the use of PPE and infection control measures. Alreshidi et al. (2020) found the same for the Saudi hospital staff in general. The same results were found in other parts of Saudi Arabia (Aluneizi & Alosaimi, 2022).

Al-Dossary et al. (2020) found that while a high proportion of [specific group, e.g., healthcare workers, general public] demonstrated a good understanding of COVID-19 prevention and treatment, a small number had limited knowledge of disease prevention measures. In addition, Paul et al. (2020) found that the HCWs in the Aseer region of Saudi Arabia had better knowledge, behavior, and attitudes in relation to healthcare-associated infections and infection control methods. Thus, the researchers concluded that although the HCWs in Saudi Arabia have a decent understanding of COVID-19 and other infectious diseases, there are still gaps in their understanding of the proper use of PPE and infection control measures.

The present study was significant because it determined individual risk perceptions regarding COVID-19, a recent pandemic, which is an important determinant of the spread of infectious diseases. Examining the risks posed by such pandemics can guide policymakers in designing interventions for healthcare workers to prevent future outbreaks.

Methods

Setting/Sampling. The present study was conducted at government hospitals in Hail City, specifically hospitals A, B, C, and D. Convenience sampling was employed to recruit HCWs serving as frontline staff from these participating hospitals. The sample included 265 HCWs comprising staff nurses, physicians, pharmacists, and radiologists. The study included current employees at hospitals A, B, C, and D who were directly involved in patient care or other essential healthcare services. The participants were required to be over 18 years old and fluent in English to ensure effective communication and understanding of the survey instruments. Individuals on leave of absence, maternity leave, or other temporary absences that would prevent participation in the study were excluded. Additionally, individuals with cognitive impairments that significantly impaired their cognitive function or understanding, with language barriers that prevented effective communication in English, or who declined to participate were not included in the study.

Data Collection. The present study was conducted after obtaining approval from the Institutional Review Board of the University of Hail and the hospital directors of each participating hospital. It employed descriptive correlation. A Google survey form was sent to prospective participants with the assistance of department heads. Informed consent was obtained from the

participants prior to their completion of the questionnaire. All collected data were treated with strict confidentiality. The data collection took place between November and December 2022. The survey questionnaire was accesssible online 24/7 for a period of three weeks, allowing the participants to complete it at their convenience. The potential participants received an initial email invitation with a unique survey link and a brief explanation of the study. Reminder emails were sent to nonrespondents after one week to encourage their participation. Technical assistance was provided upon request to address the participants' questions or any issues they encountered while completing the survey.

Questionnaire. The survey questionnaire used in the present study was adapted from Brug et al. (2004), with modifications made to assess the respondents' levels of risk perception and precautionary behaviors in relation to COVID-19. The original questionnaire was open access, eliminating the need to obtain formal permission from the developer to use it. The first part of the questionnaire collected demographic information (i.e., sex, educational attainment, occupation, and education on COVID-19). The second part assessed knowledge and preventive behaviors regarding COVID-19, adapting items from Arslanca et al. (2021) with modifications. The knowledge section consisted of 29 items with yes/no responses, with higher percentages of correct answers indicating better knowledge. The preventive-behavior section included three items related to glove use, mask wearing, and avoiding crowded places, also with yes/no responses. To ensure content validity, a panel of experts in public health and infectious diseases, including two professors from the University of Hail, reviewed the adapted questionnaire. The experts rated each item on a scale of 1–5 (1 = not relevant, 5 = highly relevant). The overall content validity index for the questionnaire was 0.92, indicating excellent content validity.

The Cronbach's alpha coefficient for the questionnaire was calculated to evaluate its internal consistency. The results revealed a Cronbach's alpha of 0.87, which is considered good to excellent, suggesting that the questionnaire was reliable and measured a single underlying construct.

Data Analysis. The data analysis was conducted using SPSS version 21. Descriptive statistics (i.e., frequency and percentage distributions) were employed to summarize the respondents' demographic characteristics. To evaluate the statistical significance of associations between variables, multiple regression analysis was performed at a significance level of 0.05.

Table 1. Demographic Characteristics of the Healthcare Workers in the Current Study (N = 265)

Characteristics	n	%
Sex		
Male	124	46.8
Female	141	53.2
Educational attainment		
Diploma	85	32.1
Bachelor's degree	136	51.3
Master's degree	32	12.1
Doctoral degree	12	4.5
Occupation		
Staff nurse	208	78.5
Physician	28	10.6
Pharmacist	19	7.2
Radiologist	10	3.8
Education on COVID-19		
Yes	234	88.3
No	31	11.7

Results

Table 1 presents the demographic characteristics of the 265 study participants. There were more participants who were female (53.2%), had a bachelor's degree (51.3%), worked as staff nurses (78.5%), and had received education on COVID-19 (88.3%).

Table 2 presents the overall average percentage of the participants correct responses. Table 3 presents the preventive measures employed by the participants to protect themselves from COVID-19. Most of them wore gloves while at work and all of them wore masks when leaving the house.None of the participants went to crowded places during the COVID-19 surge.

Table 2. Knowledge on COVID-19 (N = 265)

Knowledge Statement	Correct Answer (n)	%
I have heard of COVID-19.	265	100
COVID-19 occurs as a virus.	220	83.0
COVID-19 is transmitted by respiratory droplets.	230	86.8
COVID-19 can be transmitted while talking.	219	82.6
COVID-19 can be transmitted by shaking hands.	256	97
COVID-19 can be transmitted from animals to humans.	251	94.7
Diarrhea can also appear in COVID-19 cases.	176	66.4
COVID-19 can lead to death.	216	81.5
The incubation period for the virus is 4–6 days.	245	92.4
COVID-19 patients can recover completely.	224	84.5
A COVID-19 patient can have no complaints or symptoms.	205	77.4
The COVID-19 contamination risk can increase in crowded places.	233	87.9
The COVID-19 virus can live on surfaces, such as door handles and tables, for a long time.	242	91.3
Hand washing can protect against the COVID-19 virus.	188	70.9
Using a mask protects against the virus.	207	78.1
The main symptoms of COVID-19 are fever, cough, shortness of breath, weakness, and muscle pain.	229	86.4
A runny nose, nasal congestion, and sneezing are less frequent in COVID-19 infections.	224	84.5
There is currently no effective treatment for COVID-19.	205	77.4
A large proportion of COVID-19 infections can be resolved without hospitalization.	233	87.9
COVID-19 can be transmitted through close contact with, or by eating, wild animals.	242	91.3
COVID-19 is transmitted from the infected patient via the respiratory tract.	188	70.9
The purpose of the mask worn by non-hospital workers is to prevent them from getting infected with COVID-19.	207	78.1
To avoid COVID-19 infection, crowded areas and public transportation should not be used.	219	82.6
Isolating patients with COVID-19 is effective for preventing the spread of the virus.	224	84.5
The observation period of a patient with COVID-19 is 14 days.	205	77.4
Older adults with chronic lung disease and obese people can have a more serious case of the disease.	233	88
Other people will not be infected if a COVID-19-infected person does not have a fever.	223	84.1
Young people and children do not need to take precautions to prevent infection.	177	66.8
There is an available COVID-19 vaccine.	207	78.1
Average percentage of correct responses		83.18

Table 3. Preventive Measures Employed by the Participants

Preventive Measures	Yes	No
	n (%)	n (%)
I wear gloves at work.	232 (87.5)	33 (12.45)
I wear a mask when leaving the house.	265 (100)	0
I still go to crowded places.	0	265 (100)

Table 4. Relationship between the Participants' Demographics and Knowledge

Model	B	Std. Error	t	Sig.	Lower Bound	Upper Bound
(Constant)	1.355	.053	25.653	.000	1.251	1.459
Sex	-.025	.021	-1.176	.241	-.066	.017
Educational attainment	-.055	.014	-4.008	.000	-.082	-.028
Occupation	-.002	.011	-.204	.838	-.025	.020
Education on COVID-19	.120	.036	3.385	.001	.050	.190

Table 5. Relationship between the Participants' Demographics and Preventive Behaviors

Model	B	Std. Error	Beta		Sig.	Lower Bound	Upper Bound
(Constant)	1.771	.073		24.393	.000	1.628	1.914
Sex	-.128	.029	-.269	-4.448	.000	-.185	-.071
Educational attainment	-.073	.019	-.240	-3.853	.000	-.110	-.036
Occupation	-.052	.016	-.233	-3.307	.001	-.083	-.021
Education on COVID-19	.203	.049	.274	4.150	.000	.106	.299

Table 4 presents the relationship between the participants' demographics and knowledge. Educational attainment and education on COVID-19 were found to have significant relationships with knowledge ($p < .000$ and $p = .001$, respectively).

Table 5 illustrates the relationship between the participants' demographics and preventive behaviors. Sex, educational attainment, occupation, and education on COVID-19 were found to have significant relationships with preventive measures ($p < .000$, $p < .000$, $p = .001$, and $p < .000$, respectively). The results indicate that being female is associated with lower levels of preventive behavior compared to being male, with each unit increase in the sex variable leading to a decrease of $\beta = 0.128$ units in preventive behavior. In addition, higher educational attainment is linked to lower levels of preventive behavior, with a decrease of $\beta = 0.073$ units for each unit increase in education. While the specific impact of occupation on preventive behavior may vary, it is statistically significant, with a decrease of $\beta = 0.052$ units for each unit increase in the occupation variable. Conversely, individuals who have received education on COVID-19 are likelier to engage in preventive behaviors than those who have not, with an increase of 0.203 units for each unit increase in education on COVID-19.

Discussion

In the present study, the enhanced knowledge of HCWs regarding COVID-19 can be attributed to their substantial experience in treating infectious diseases. This experience has equipped them with a deeper understanding of the pathophysiology of various infections and their transmission dynamics, enabling them to implement appropriate interventions. The literature indicates that HCWs with a background in infectious diseases are better prepared to manage outbreaks because they possess a comprehensive understanding of the epidemiological

principles that govern the spread of infections (Meyer et al., 2018).

Research conducted in Saudi hospitals during the early stages of the COVID-19 pandemic found that medical professionals had a reasonable understanding of the illness but lacked knowledge regarding the proper use of PPE and infection control measures (Alshammari et al., 2021). While the present study was conducted during a period of declining COVID-19 cases, it is essential to ensure that healthcare professsionals keep abreast of the latest recommendations and guidelines. Frequent training and education are crucial to maintaining a high level of preparedness and addressing the evolving nature of infectious diseases.

The data concerning protective behaviors exercised by the participants during the COVID-19 pandemic, especially the high indices of mask and glove wearing, along with total avoidance of crowded areas, are indicative of considerable adherence to health recommendations. Such compliance is important, as it was during the pandemic, when everybody was required to join the efforts to stop the infection from spreading. It is acknowledged in the literature that commitment to protective measures, such as wearing masks and maintaining social distance, is crucial in reducing the spread of infectious diseases, including COVID-19.

Existing evidence remains consistent with the claim that physical separation and donning face masks decrease the transmission of infectious diseases, including COVID-19. For instance, Kwon et al. (2021) found that increased adherence to social distancing and mask usage correlated greatly with reduced COVID-19 incidence and mortality across various regions in the United States. Likewise, it was discovered that of all the ways to control the transmission of COVID-19, wearing a mask was the most important, as was proven during the outbreak of COVID-19 (Zhou et al., 2023). It was also noted in studies that social distancing practices, if obeyed, could definitely reduce the chances of having an almost viral pandemic, as proven by Tran et al. (2021), who reported that social distancing was associated with a lowering of the rate of spread of COVID-19.

The present study's finding that being female is associated with lower levels of preventive behavior aligns with what is stated in a growing body of literature exploring gender differences in health-related behaviors among HCWs. Understanding these differences is crucial because they can significantly impact the effectiveness of health interventions and public health outcomes. Research has shown that gender can influence health behaviors and attitudes among HCWs. For instance, Zinonos et al. (2016) found that gender, along with age and marital status, significantly affects the smoking behaviors of HCWs, suggesting that male HCWs exhibit health behaviors different from those exhibited by their female counterparts. This aligns with the notion that gender norms and societal expectations may shape the preventive behaviors adopted by HCWs, potentially leading to discrepancies in health promotion practices.

Moreover, Keyworth et al. (2018) highlighted that HCWs often do not strictly adhere to public health policies, influenced by their perceptions of patient needs and their own confidence in delivering behavior change interventions. This poor compliance with public health policies can be exacerbated by gender dynamics, in which female HCWs may feel less empowered to initiate preventive measures compared to their male colleagues. The literature suggests that gender-based health inequities are prevalent, with female HCWs often facing barriers that hinder their ability to implement preventive health measures effectively (Horgan et al., 2019).

The connection between education level and preventive behavior among HCWs during the COVID-19 crisis had a different dimension. In the present study, some healthcare professionals who had undergone mere training and had

only a little knowledge of COVID-19 demonstrated inconsistent preventive measures toward the disease, showing a gap between knowledge and preventive practice (Wahed et al., 2020). However, the highly educated HCWs also tended to demonstrate a relatively low level of preventive behavior, perhaps because they had a comprehensive understanding of the disease and of the mechanisms of its dissemination, which made them feel safer and hence less protective of themselves. It can also be said that even HCWs who are well educated about COVID-19 still harbor fear and anxiety regarding it, which can impact their compliance with adequate preventive measures. Hence, there is a risk that knowledge will not lead to the corresponding practice (Malik et al., 2021). On the other hand, there is evidence that educational measures can boost preventive behaviors. For example, Sulistyono et al. (2021) demonstrated that technology-based health education significantly improved the knowledge, attitudes, and practices of community members in relation to COVID-19, stating that such educational endeavors could encourage proper health behaviors. These observations imply that, while higher education may be associated with better compliance, targeted educational programs can be implemented to improve compliance among those with lower levels of education.

While the specific impact of occupation on preventive behavior may vary, the analysis results indicate a statistically significant negative association. This suggests that individuals in certain occupations may be less likely to engage in preventive health behaviors. Such observations have been noted in specific studies in literature because some occupational aspects are likely to alter health behaviors, especially during a pandemic. For example, the most obvious reason for this trend is the psychological damage and emotional fatigue brought about by post-traumatic stress over the years. Research has highlighted that owing to the protracted duration of the pandemic, coupled with high work volume and high demand for environmental resources, HCWs experienced emotional exhaustion and anxiety, which could have compromised their adherence to preventive strategies (Muchtar & Basrowi, 2021). This psychological stress could have led to the normalization of the COVID-19 scenario, gradually withering away positive compliance with preventive measures.

On the other hand, preparedness and awareness have been emphasized as important elements in effective infection control among HCWs. Elhadi et al. (2020) found that many HCWs in low-resource settings demonstrate low levels of preparedness, which accentuates the importance of frequently holding educational or training programs to improve adherence to preventive measures. This implies that even though occupational factors may contribute to lower participation in preventive behaviors, such negative effects could be reduced by carefully designed educational measures regarding adherence to health rules and highlighting the need for such rules.

HCWs who have received education on COVID-19 are likelier to engage in preventive behaviors than those who have not, which shows that awareness does affect health-seeking behaviors. Thus, education about COVID-19 in relation to adhering to preventive measures is of great importance, primarily to HCWs, as has been proven by numerous studies. For example, Ashinyo et al. (2021) found that HCWs' compliance with infection prevention and control was positively associated with their education level and training related to COVID-19. Moreover, research has established that while there was a high level of education resulting in high-level knowledge among the respondents, such knowledge could not be translated into a universal desire to comply with COVID-19 preventive measures (Elhadi et al., 2020). This demonstrates a common misconception that education is the only factor influencing behavior. This limited perspective can hinder the development of effective policies that address the multifaceted nature of these problems.

The study results have implications for nursing

practice and education related to COVID-19 preventive measures among HCWs. Nurses can be key players in stopping the spread of COVID-19. They can impart accurate and current knowledge on COVID-19, instruct medical personnel on preventive measures, and motivate them to adhere to guidelines. However, nurses should first receive education on the principles and procedures for preventing the transmission of infectious agents. This emphasizes the value of infection prevention and control training for nurses, which can enhance compliance with advised procedures and decrease the transfer of infectious organisms in hospital settings.

The study might have introduced selection bias because it did not include HCWs who were on leave. It also used self-reported data, which might have introduced measurement errors and a self-reporting bias. Another drawback is that the study evaluated only HCWs' knowledge of and adherence to preventive measures, not their actual behaviors. Finally, because the study was conducted during a specific phase of the COVID-19 pandemic, its findings may not be directly applicable to regions with different epidemiological patterns, healthcare systems, or cultural contexts.

Conclusion

The HCWs in the present study had good levels of knowledge and preventive behaviors regarding COVID-19. Educational attainment and education on COVID-19 had significant relationships with knowledge regarding the disease, while sex, educational attainment, occupation, and education on COVID-19 had significant relationships with preventive behaviors. These findings suggest that HCWs have a good understanding of COVID-19 and are taking appropriate preventive measures to protect themselves and others from the disease. However, ongoing education and training are crucial to ensure that all healthcare workers possess the necessary knowledge and skills to respond effectively to future health crises.

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