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The relationship between fear of COVID-19 and adherence to personal protective measures in a sample of Iranian healthcare providers: a cross-sectional study

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Abstract

Background Studies have been conducted worldwide to investigate the level of adherence to personal protective measures or fear of COVID-19 among healthcare providers. However, few studies have examined the relationship between adherence to personal protective measures and fear of COVID-19. There is also a need for more information on this topic from Iran. This study investigated the relationship between adherence to personal protective measures against COVID-19 and fear of COVID-19 in the healthcare providers at Pastor Hospital of Bam, Iran, in 2022.

Methods This cross-sectional study was conducted in August and September 2022 with 199 healthcare providers of Pastor Hospital of Bam, Iran. The study included medical, nursing, and paramedical staff at Pastor Hospital at the time of the study. Incomplete responses and failure to return the questionnaire to the researcher were exclusion criteria. The fear of COVID-19 scale and a checklist of personal protective measures were used to collect data. Descriptive statistics, t-tests, analysis of variance, and Pearson's correlation coefficient were used to analyze the data.

Results Of the 199 participants, 67.3% were female, and their mean age was 31 ± 4.55 years. The mean score for adherence to personal protective measures was 14.46 ± 3.39 (out of 23), and the mean score for fear of COVID-19 was 17.04 ± 4.58 (out of 35). Adherence to personal protective measures was higher among females than males (14.96 ± 2.99 vs. 13.43 ± 3.92, $p = 0.003$), in individuals who had attended infection control courses than in those who had not (15.57 ± 2.88 vs. 13.30 ± 3.50, $p < 0.001$), and in those working in intensive care units than those in other wards ($p = 0.009$). A positive correlation was found between fear of COVID-19 and adherence to personal protective measures ($r = 0.16$, $p = 0.03$).

Conclusions Healthcare providers demonstrated average levels of adherence to the personal protective measures and fear of COVID-19. Fear scores were also positively correlated with adherence scores. Specific workshops are necessary to familiarize all healthcare workers with personal protective measures against COVID-19 and universal precautions.

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Keywords Personal protective measures, Fear, COVID-19, Adherence

Background

Healthcare workers play a crucial role in the fight against pandemics such as COVID-19, as they are responsible for treating and caring for patients, while also being at a higher risk of exposure to the virus. As a result, they must adhere to strict protective measures [1, 2] recommended by organizations such as the World Health Organization [3, 4] and the Ministry of Health and Medical Education in Iran [5].

A study has shown that adherence to personal protective measures (PPM) can reduce COVID-19 cases by up to 90% [6]. There are some studies from Saudi Arabia [2, 7], Jordan [8], Iraq [9], and Germany [10] on the extent to which healthcare providers adhere to PPM against COVID-19, but we know very little about this issue from Iran. A study in Saudi Arabia surveyed 214 healthcare professionals, including doctors, nurses, technicians, physiotherapists, paramedics, and other healthcare workers, and reported that 18% of those surveyed had been infected with COVID-19 at least once. However, the rates of wearing gloves, gowns, and face shields were 95%, 85% and 68%, respectively. One-third of people reused masks, only 10% used N95 masks, and 8% used cloth masks. Adherence to the PPM was also lower among physicians than other healthcare providers [7]. In a study in Germany, 87 nurses, 22 physicians, and 18 other healthcare workers were repeatedly observed. The results showed that adherence to PPM in COVID-19 wards varied from 100% (for the correct disposal of contaminated items) to 38% (for the correct use of masks and personal protective equipment). The same measures varied from 100 to 5% in the non-COVID wards. In addition, adherence to hand hygiene measures was 82% and 65% in COVID and non-COVID wards, respectively [10].

Several factors may influence adherence to PPM related to COVID-19. A study of the general population in Ethiopia found that age, literacy, occupation, and knowledge of COVID-19 were among the factors influencing adherence to PPM [11]. However, a study of Saudi Arabian physicians found no association between adherence to PPM and physicians' age and gender [12]. Another study found that healthcare workers with better social and financial status were more likely to adhere to PPM [13]. In reviewing previous studies, Kar et al. (2023) concluded that factors such as individual's demographics, socioeconomic status, personal experiences, level of perceived risk and demands, their sense of civic duty, trust in institutions such as the healthcare system and national governments, trust in science and the medical profession, information received from the media, and fear-inducing communications have a significant impact on COVID-appropriate behavior. The same study, which surveyed 551 Indians, also found that those who had not suffered from COVID or had someone close who suffered from COVID-19, women, those with higher education, unmarried people, people from higher income groups, those who lived in moderately crowded areas, and those who did not share their living space demonstrated more COVID-appropriate behavior. It was also found that higher levels of trust in their inner group and health professionals, distrust in general, and distrust in social influencers, were also likely to improve COVID-appropriate behavior [14]. A review study also found that the workplace and the supervision level influenced the health professionals' adherence level to PPM [15].

Fear of COVID-19 affects not only how healthcare providers care for patients with COVID-19 [16] and their motivation to care for these patients [17] but is also one of the factors that may affect adherence to PPM. A study in Singapore reported that fear and worry about contracting the disease were directly related to increased adherence to PPM among healthcare workers [18]. However, a study in Shiraz, Iran, examining medical students' knowledge and attitudes about COVID-19 prevention methods and their self-reported fears, reported that adherence to PPM was not correlated with their knowledge or fear of COVID-19 disease [19]. Most previous studies have examined adherence to PPM through self-report, and only a few studies have directly observed adherence to PPM among healthcare workers. Also, very few studies have examined the relationship between the fear of COVID-19 and the level of adherence to PPM among healthcare workers in Iran. Therefore, the present study aimed to investigate the relationship between adherence to PPM and fear of COVID-19 among healthcare providers in Pastor Hospital in Bam, Iran, in 2022. Although the COVID-19 pandemic has now ended, with the dynamic development of global health, an outbreak may occur in the future. Therefore, the results of this study will be useful for several reasons. First, although the pandemic has ended, it is crucial to learn from the experiences and challenges faced during the COVID-19 pandemic to better prepare for future public health crises. Our study provides valuable insights into the factors that influenced the behavior of healthcare providers during the pandemic, which can inform future strategies to promote adherence to protective measures. Second, our study was conducted in Bam, a deprived city in eastern Iran, near the border with Afghanistan and with many Afghan immigrants. By focusing on this specific location, our study sheds light on the experiences of healthcare providers in underserved areas, which are often

overlooked in research on pandemics. Our findings can help raise awareness about the importance of studying the impact of fear on the behavior of healthcare providers during public health emergencies. This can contribute to the global dialogue on how to effectively support and protect healthcare workers during crises. Sharing our findings can also help identify areas for improvement in healthcare systems, both in Bam and more broadly. By understanding the factors that influence healthcare providers' adherence to protective measures, we can work towards strengthening healthcare infrastructure, enhancing training programs, and promoting a culture of safety and preparedness in healthcare settings.

Methods

Study design and participants

This cross-sectional study was conducted in August and September 2022 (coinciding with the seventh outbreak of COVID-19 in Iran) among healthcare workers at Pastor Teaching Hospital in Bam, Iran. This is the only hospital in Bam city and is affiliated with the Bam University of Medical Sciences. The inclusion criteria were being part of the medical, nursing, and paramedical staff at Pastor Hospital at the time of the study. As medical interns are the forefront of the medical staff in Iran's teaching hospitals, they were included in this study. The exclusion criteria were incomplete response and failure to return the questionnaire to the researcher.

In a previous study, healthcare providers adhered to the PPM in 85% of cases [10]. Therefore, based on $p=0.85$, the estimated sample size was 197 people, and the study ultimately included 199 samples. A list of eligible health care provides working in the different wards of the hospital was first prepared from the hospital's managerial department. Stratified random sampling was then conducted to ensure the representativeness of the sample. To achieve this goal, the researcher first estimated the number of samples needed from each group of health professionals (i.e. nurses, midwives, physicians, medical interns, and paramedical staff such as nursing assistants, patient transporters, and ward secretaries) according to the ratio between the number of health professionals in a given group and the total sample size required. The required number of samples from each hospital department was then calculated based on the number of individuals in each group present in that department. Subsequently, a table of random numbers and lists of healthcare workers from different departments were employed to select the requisite number of samples from each group and department.

Data collection instruments

The data collection instruments included the Fear of COVID-19 scale (FCV-19S) [20], a checklist for evaluating the adherence to PPM, and questions about the participants' expertise, age, gender, type of ward, work experience, and completion of an infection control course. The FCV-19S, developed by Ahorsu et al. in Iran, consists of seven items rated on a 5-point Likert scale ranging from 'Strongly disagree=1' to 'Strongly agree=5', with a total score ranging between 7 and 35. Higher scores indicate higher fear of COVID-19. Ahorsu et al. examined the validity and reliability of this scale. They used the concurrent validity method (correlation of its scores with hospital anxiety questionnaire scores) to evaluate the validity of the scale, and the scores of the two questionnaires were correlated (r=0.51). They also examined the reliability of the FCV-19S using the internal consistency method, and the overall Cronbach's alpha was 0.82 [20]. Several studies around the world have examined the psychometric properties of the FCV-19S and confirmed its validity and reliability [21–24]. A systematic review of the studies using the FCV-19S has also concluded that the FCV-19S is a strong and valid instrument for assessing fear across different nations [25].

For this study, the researchers developed the checklist based on a previous study [9] and the guidelines for the second step of the fight against COVID-19 issued by the Ministry of Health and Medical Education [5]. This dual-reference approach ensured that the checklist was not only grounded in contemporary research but also adhered to national healthcare policies and recommendations specific to the COVID-19 pandemic. The initial draft of the checklist included 33 items. To validate the checklist, we passed the initial draft to a panel of experts. The experts included an infectious disease specialist, seven nurses with frontline experience, and two nursing professors with extensive academic and practical expertise in infection prevention. This multidisciplinary validation process ensured the checklist's comprehensive coverage of essential PPM practices and its relevance to the current healthcare environment. The experts were asked to comment on the wording, readability, ambiguity, relevance, and necessity of each item. At this stage, eight items were revised, four were merged into two due to overlaps, and two were deleted. After their amendments were applied, the experts were again invited to rate the remaining 29 items as either "necessary," "useful but not necessary," or "unnecessary." The CVR of each item was then calculated using the following formula: $CVR = (Ne - N/2)/(N/2)$, where Ne is the number of experts selecting an item as "essential" and N is the total number of experts. According to Lawshe, when the number of experts is ten, a $CVR \geq 0.62$ is acceptable [26]. To calculate the CVI, the experts were asked to determine the relevance of each item in the checklist by rating it as "not relevant," "somewhat relevant," "fairly relevant," or "very relevant." The CVI was then calculated by dividing the

number of experts who rated an item 3 or 4 by the total number of experts. Items with CVIs < 0.70 were removed, items with CVIs > 0.79 were accepted, and those with CVIs between 0.70–0.79 were revised [27]. In this phase, five items with a CVR less than 0.62 were removed. The CVR of the remaining items ranged between 0.9 and 0.98. Also, one item was removed due to CVIs < 0.70, and one item with a CVI of 0.78 was revised [27]. The CVI values of the remaining 23 items ranged from 0.9 to 0.99. The reliability of the 23-item checklist was checked using the inter-rater agreement method. For this purpose, the first and third researchers independently observed ten nurses and medical interns for adherence to PPM. The percent agreement coefficient [28] was then calculated to be 89%. The final checklist (please see the supplementary file) contains 23 items that healthcare professionals should follow in the workplace to protect themselves and others from COVID-19 (e.g., keeping at least 1 meter away from others, preventing and refraining from gathering in the workroom, locker room, examination room, consultation room, etc., washing hands up to the elbows for 20 seconds or using medical sanitizers before and after examining patients, using masks and gloves when caring for and approaching patients, disinfecting hands after removing and discarding gown, gloves and mask, avoiding eating in public places, disinfecting frequently used work surfaces). Each item is answered with either 'yes = 1' or 'no = 0'. Items that are not applicable to a specific case are marked in the corresponding column. The total score ranges between 7 and 35, with higher scores indicating better adherence to PPM.

Data collection methods

Before starting the data collection, a list of eligible healthcare service providers, including nurses, physicians, medical interns, and paramedical staff, was prepared. Quotas for each group were calculated based on their respective numbers within the total sample size. The required number of participants from each group was then conveniently selected and observed in various wards. At the time of the study, there were 313 nurses, 77 midwives, 91 physicians (10 general practitioners and 81 specialists), 55 interns, and 116 paramedical staff (including nurse's assistants, patient transporters, and ward secretaries). Then, 29 physicians, 96 nurses, 15 medical interns, 24 midwives, and 35 people from paramedical staff were included in the study. The first researcher visited various wards to observe the healthcare workers during care and completed a checklist for each individual. Each person was observed once without knowing they were being observed. Following each observation, participants were given a Fear of COVID-19 questionnaire and an informed consent form to complete in a private and quiet environment and return to the researcher. Since the observer was present on the wards as a medical intern in the departments during the study, his presence did not affect the participants' adherence to the PPM.

Ethical considerations

The Ethics Committee of Bam University of Medical Sciences approved this study (approval code: IR.MUBAM.REC.1401.069). The hospital officials granted permission for data collection. All participants received and signed a written informed consent and were informed of the study's purpose. The researcher guaranteed voluntary participation, anonymity, and the right to withdraw from the study.

Data analysis

Data analysis was performed using SPSS v. 16. Before entering the data into the statistical software, we carefully reviewed the collected data for any missing values or inconsistencies. No missing data were found in this study. Any data entry errors were also identified and corrected through a thorough data cleaning process. Descriptive and analytical statistics were used to analyze the data. The mean and standard deviation of the compliance scores with PPM and the mean and standard deviation of the scores of fear of COVID-19 were calculated. The t-tests and analysis of variance were used to compare the mean scores of adherence to PPM and fear of COVID-19 between the subgroups of participants. Pearson's correlation coefficient was used to check the association between fear scores and adherence to PPM. Regression analysis was also performed to detect the factors influencing adherence to PPM (as a dependent variable). Fear of COVID-19 and other personal variables entered into the regression as independent variables. The categorical variables were first converted into dummy variables to represent subgroups of the participants. A backward model was then run with a removal criterion of $P > 0.20$. All remaining variables with $P < 0.20$ were re-entered into the model and analyzed using the forward method. The level of statistical significance was considered at < 0.05.

Results

Of the 652 eligible health care workers, we recruited 199 ones and the data from all of them were finally analyzed. Of the 199 participants, 48.2% were nurses, 14.6% were doctors, and the rest were from paramedical staff. Additionally, 16.1% of the participants worked in the surgical department, 14.6% in the emergency department, and the rest worked in different departments. Most participants (67.3%) were female, and only 50.8% had completed an infection control course (Table 1).

The mean adherence to the PPM was 15.25 ± 3.38 for nurses and 12.00 ± 3.05 for paramedical staff ($p < 0.001$). The mean adherence to PPM was also 15.57 ± 2.88 for

Table 1 The participants' demographic characteristics

Variables		*n* (%)
Expertise		
	Nurse	96 (48.2)
	Physician	29 (14.6)
	Midwife	24 (12.1)
	medical interns	15 (7.5)
	Paramedical staff	35 (17.6)
Sex		
	Female	134 (67.3)
	Male	65 (32.7)
Ward		
	CCU, ICU, NICU	40 (20.1)
	Surgical	32 (16.1)
	Emergency department	29 (14.6)
	Gynecological	29 (14.6)
	Pediatrics	22 (11.1)
	Medical	35 (7.6)
	Other	12 (6)
Participation in infection control courses		
	Yes	101 (50.8)
	No	98 (49.2)
Work experience, Mean ± SD (years)		7.19 ± 6.11

those who had attended infection control courses, while it was 13.30 ± 3.50 for those who had not participated in these courses ($p < 0.001$) (Table 2). The mean fear of COVID-19 was also higher in those who had attended infection control courses than in those who had not (17.75 ± 4.80 vs. 16.23 ± 4.28, $p = 0.027$) (Table 2).

The total score for fear of COVID-19 was 17.04 ± 4.58, and the mean score for adherence to PPM was 14.46 ± 3.39. A weak positive correlation was found between fear of COVID-19 and adherence to PPM ($r = 0.160$, $p = 0.03$).

Among the variables entered in the regression analysis, only being of paramedical staff (Beta= -0.342, $p = 0.001$) and attending infection control courses (Beta = 0.281, $p = 0.001$) were associated with adherence to PPM (Table 3).

Discussion

The findings of our study enrich the existing literature by delving into the relationship between fear of COVID-19 and adherence to PPM in depth. Particularly, the results demonstrating the significant impact of fear of COVID-19 on adherence to PPM not only contribute to fill the knowledge gaps in this field but also hold the potential to guide future research endeavors. Studies

Table 2 Comparison of mean scores of adherence to personal preventive measures and fear of COVID-19 between the participants' subgroups

Variables		Adherence to with personal preventive measures	Fear of COVID-19
Expertise			
	Nurse	15.25 ± 3.38	17.18 ± 4.69
	Physician	14.65 ± 2.14	18.16 ± 3.30
	Midwife	14.86 ± 4.17	16.56 ± 4.90
	Medical interns	14.20 ± 2.33	16.40 ± 2.44
	Paramedical staff	12.00 ± 3.05	16.33 ± 5.98
	*P value**	< 0.001	0.618
Sex			
	Female	14.96 ± 2.99	16.96 ± 4.82
	Male	13.43 ± 3.92	17.22 ± 4.04
	*P value***	0.003	0.716
Ward			
	CCU, ICU, NICU	15.62 ± 3.13	16.34 ± 4.65
	Surgical	13.53 ± 3.14	16.53 ± 3.21
	Emergency department	14.68 ± 3.19	18.27 ± 4.99
	Gynecological	15.10 ± 3.45	15.93 ± 5.38
	Pediatrics	14.04 ± 2.81	16.86 ± 3.77
	Medical	14.54 ± 3.10	18.40 ± 4.64
	Other	11.33 ± 4.94	16.44 ± 4.90
	*P value**	0.009	0.246
Participation in infection control courses			
	Yes	15.57 ± 2.88	17.75 ± 4.80
	No	13.30 ± 3.50	16.23 ± 4.28
	*P value***	< 0.001	0.027

* Analysis of variance, ** t-test

Table 3 Results of regression analysis to detect the factors associated with adherence to personal protective measures

Variable (reference category)	Unstandardized Coefficients		Standardized Coefficients	*P* value	Adjusted R Square
	B	Std. Error	Beta		
(Constant)	14.114	0.387		< 0.001	0.191
Paramedical staff (Medical interns)	-3.092	0.643	-0.342	< 0.001	
Participation in infection control courses	1.959	0.496	0.281	< 0.001	

have reported mixed results on the relationship between fear of COVID-19 and adherence to PPM. Additionally, research has demonstrated that this association differs between the general public and healthcare workers. A study in Turkey compared the fear of COVID-19 and the level of adherence to PPM between community service workers and health personnel. The study reported that although the fear scores of the two groups did not differ significantly, there was a significant correlation between the fear scores of health personnel and their adherence to PPM. However, this was different in public service sector employees [29]. Another study in Turkey has also discovered a direct and significant correlation between fear of COVID-19 scores and the adherence of medical personnel to PPM [30]. However, a study conducted on nurses in Qazvin, Iran, reported an inverse relationship between fear of COVID-19 and adherence to PPM. In other words, individuals who experienced higher levels of anxiety and fear related to COVID-19 were less likely to follow PPMs [31]. High levels of fear appear to impair people's decision-making power and negatively affect adherence to PPM. However, moderate fear can motivate people to adhere to PPM.

Furthermore, our study identified some specific factors associated with fear of COVID-19 and adherence to PPM. Regarding the fear of COVID-19, we found that among all variables, only participation in infection control courses was significantly associated with fear of COVID-19. A study reported that healthcare professionals' knowledge and attitudes toward COVID-19 were directly related to their fear of the disease [32]. However, another study among medical students found that those with higher levels of health literacy were less fearful of COVID-19 [33]. Research results on the impact of other personal characteristics on the fear of COVID-19 are mixed. For example, a study conducted in Canada found no significant difference in fear of COVID-19 between female and male healthcare workers [34]. However, some studies have reported that COVID-19 has caused more psychological problems [35] and fear in women [36]. Concerning the workplace, a study found that fear of COVID-19 was highest in emergency department staff and lowest in surgical departments [37]. However, in another study, the highest levels of fear were found in staff working in pulmonology, intensive care, medical, and emergency departments, respectively [38]. The variations between the studies can be attributed to the characteristics of different wards, such as the type of patients, workloads, and staff mix.

On the other hand, we found that adherence to PPM was significantly higher among females, those who had completed the infection control course, individuals working in special care units, and nurses than in other groups. Nonetheless, among the variables we entered in the regression analysis, only being of paramedical staff and attending infection control courses were associated with adherence to PPM. Research results in this area are also mixed. For example, a study of healthcare workers in Bahrain found no significant differences between men and women in adherence to PPM [39]. At the same time, some studies in Ethiopia [40] and Israel [41] reported that men followed preventive protocols more than women. The study conducted in Bahrain also reported no significant difference in adherence to PPM between hospital wards [39]. In Malaysian hospitals, however, the highest adherence to PPM related to COVID-19 was observed in intensive care units, while the lowest adherence was observed in emergency departments and community health departments [42]. Regarding expertise, studies consistently report that nurses adhere to PPM more than physicians and other care providers [10, 32, 39, 42]. The variations between the studies can again be attributed to the characteristics of different wards, such as the type of patients, workloads, and staff mix. Although differences in adherence to PPM in different groups of our participants may also be explained by workload, direct patient contact, and knowledge about COVID-19 transmission and prevention methods, targeted interventions and training programs aimed at improving infection control practices could be effective in enhancing adherence to PPM among healthcare providers. Furthermore, further research is needed into the factors influencing adherence to PPMs, as there are differences between studies.

The study found that healthcare workers had suboptimal adherence to PPM and moderate fear of COVID-19. Previous studies have also shown low adherence to PPM among healthcare workers [40]. Studies on fear of COVID-19 have also reported varying results. In Singapore, healthcare providers had a mean fear score of 18.65, similar to our findings [29]. However, in Bangladesh, doctors had a significantly higher fear score of 19.39 [43]. In contrast, a study in Egypt found that only 16.5% of doctors experienced severe fear, with 78.1% experiencing moderate fear [38]. These varying results suggest that

the level of fear of COVID-19 among healthcare workers may be influenced by factors such as cultural differences, healthcare systems, and the severity of the pandemic in each region.

While fear can encourage adherence to PPM, excessive fear can impede healthcare workers' daily lives care practices. Our findings suggest that healthcare workers have managed to overcome the fear of COVID-19, taking into account their professional and social responsibilities, as well as their knowledge of the nature of the disease, to be able to fulfill their responsibilities. Enhancing healthcare workers' resilience and existential well-being can also help them cope more effectively. Existential well-being refers to an individual's relationship with oneself, others, and the environment and reflects perceptions of meaning, purpose, and satisfaction in life. An individual with good existential well-being would be able to overcome their fears, endure problematic situations, and have the strength and ability to succeed in difficult situations such as the COVID-19 pandemic [44]. Some coping strategies such as active coping, instrumental support, and good planning can significantly improve an individual's existential well-being [45]. Healthcare managers can promote such coping strategies by creating a supportive work environment, providing access to resources, and offering training in stress management.

In the current study, we tried to minimize potential sources of bias. To address selection bias, we used a stratified random sampling, which helped reduce the possibility of systematic bias in participant selection. To minimize measurement bias, we used a well-established and validated questionnaire to measure fear of COVID-19. In contrast to some previous studies that used self-reports to assess PPM, we used the observation method for this porpoise. We also used meticulous methods to validate the checklist utilized to assess adherence to PPM, although further research using this checklist is needed to reaffirm its validity and reliability. To mitigate the risk of information bias, the researcher responsible for data collection underwent rigorous training to ensure consistency and accuracy in administering the questionnaire and checklist. Clear instructions were also provided to participants to encourage honest and unbiased responses to the fear of COVID-19 questionnaire. Nevertheless, despite our efforts, there are still some limitations to consider. First, the study was conducted at a single hospital in Bam, Iran, which may limit the generalizability of the results to other settings. Additionally, the study design was cross-sectional, which restricts our ability to establish causality between fear of COVID-19 and adherence to PPM. Moreover, despite our best efforts to ensure confidentiality, as with any questionnaire-based study, there is the potential for social desirability bias. Additionally, although we considered the potential confounding effects of demographics in the data analysis, the effects of unmeasured or unknown confounders cannot be completely ruled out. For instance, severity of the COVID-19 condition, individuals' religious beliefs and work environment culture may influence people's fear and adherence to PPM. Furthermore, some people were initially hesitant to participate in the study. Although we assured them of data confidentiality and the use of anonymous questionnaires, however, such a condition may influence the participants' responses to the questionnaire and this was beyond the researchers' control.

Conclusion

In this study, healthcare providers demonstrated average levels of adherence to the PPM and fear of COVID-19. Furthermore, a correlation was found between the scores of fear of COVID-19 and adherence to PPM. Since our participants observed PPM at an average level and about half of them had yet to pass the infection control course, it is necessary to hold special workshops to familiarize all staff with PPM. Periodic repetition of such training programs can keep healthcare providers prepared and help prevent the spread of COVID-19 and other outbreaks.

Abbreviations

PPM Personal protective measures

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12879-024-09719-w.

Supplementary Material 1

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Author contributions

Mohammad-Ehsan Adib (MEA) studied conception, data gathering, data analysis, writing the first draft of the manuscript, and performing revisions. Ali Radfar (AR), the study supervisor, and helping to interpret the data. Mojtaba Jafari (MJ) study conception and design, study supervision, helped in data analysis. All authors read and approved the final manuscript.

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This study was the thesis of the first author and received no found.

Data availability

The datasets generated and analyzed during the study are not publicly available but are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Committee of Bam University of Medical Sciences (approval code: IR.MUBAM.REC.1401.069). Written informed consent was obtained from all of the participants. The study protocol was performed in accordance with the Declaration of Helsinki.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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