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Health literacy and preventive behaviors among healthcare workers in southeastern Iran during COVID-19: a web-based survey analysis

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Abstract

This study examines health literacy and preventive behaviors during COVID-19 among healthcare workers in southeastern Iran. Health literacy, which encompasses skills like reading, listening, and decision-making in health contexts, significantly influences personal health responsibility and attitudes. The study used a descriptive-analytical approach, surveying 400 healthcare workers through an online questionnaire. The questionnaire addressed demographics, preventive behaviors based on guidelines from the Iranian Ministry of Health and the World Health Organization, and COVID-19 health literacy. Analysis in SPSS V. 21 revealed that avoiding hugging and kissing (32%) and wearing masks (28.7%) were the most common preventive behaviors. Among participants, 54% had sufficient health literacy, 32% were borderline, and 16% were insufficient. Female workers showed higher compliance with preventive measures, and 75.3% had received the COVID-19 vaccine. A significant link was found between health literacy levels and adherence to preventive behaviors ($p<0.001$). The results highlight that insufficient health literacy often hinders effective COVID-19 preventive behaviors among these workers. Consequently, targeted interventions are necessary to enhance health literacy and support better preventive practices in this group.

Introduction

Over the last two decades, the spread of severe acute respiratory infections has been considered one of the most serious global risks and challenges for public health.[1] Among these are coronaviruses, RNA viruses with the largest genomes, which often exist in animal populations in the form of epidemics, causing severe respiratory and digestive infections in animals during the cold seasons of the year. The interaction between wild animals and humans has turned these viruses into a common source of infection, leading to the spread of diseases such as severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV) among humans.[2]

The coronavirus detected in Wuhan City, Hubei Province, China, in late 2019 is a new strain known as COVID-19, which belongs to the coronavirus family and the β coronavirus genus.[3,4] This disease has a high prevalence and can quickly infect many people. Therefore, it is necessary for governments to implement emergency measures such as treating patients, quarantining suspected and confirmed cases, protecting healthcare workers, and enforcing public health measures.[5] Controlling the coronavirus in a community requires identifying, treating, and isolating infected individuals,

as well as tracking and quarantining those who have had close contact with patients. This increases the risk of healthcare workers becoming involved with the disease.[6] Therefore, it is crucial for healthcare workers to take preventive measures for personal protection against this disease, as it is one of the most important and necessary strategies in the prevention and control program for respiratory viral diseases.[7,8]

Healthcare workers are in direct contact with both patients infected with the coronavirus and healthy individuals. Therefore, ensuring the safety of healthcare workers is crucial not only for protecting them from the virus but also for preventing its spread in society.[9] Various studies have reported inadequate protective behaviors against diseases and injuries in the work environment among healthcare workers.[9,10] A study in Iran indicated that the rate of performing protective behaviors against COVID-19 is at a relatively favorable level. To identify preventive measures and control viral diseases, it is essential to determine the factors affecting the preventive behaviors related to respiratory viral diseases.[11]

One of the effective indicators that can significantly impact disease prevention interventions is health literacy.[12] Health literacy encompasses a set of skills, including reading, listening, analysis, decision-making, and the ability to apply these skills in health-related situations, which are not necessarily linked to years of education or general reading ability.[13] It is defined as the ability of individuals to obtain, analyze, and understand basic health information and services, enabling them to think critically about their health issues and make informed decisions.[14] Health literacy can be acquired through mass media, the internet, newspapers, and television. In light of the COVID-19 pandemic, preventive behaviors to control infectious diseases are essential from both public and individual perspectives. Authorities and public health organizations should implement various preventive measures, including pharmaceutical and non-pharmacological interventions, to prevent the spread of epidemics. These measures include vaccination, preventive medicine, health precautions, patient isolation, and distancing patients from other community members.[15] COVID-19 can be transmitted from one person to another because carriers of the virus may not exhibit any symptoms and are a primary factor in the disease's spread.[16] The virus can be transmitted through inhalation of droplets and direct contact with an infected person; therefore, using personal protective equipment can help control its spread.[17] Self-initiated preventive measures can influence the severity of infection spread within the population. For a long time, mass media (*e.g.*, the internet, television, radio, and newspapers) have been recognized as an important strategy for health promotion.[18] For example, a social media campaign increased physical activity, produced positive changes, and prevented negative changes in health-related behaviors.[19]

Some studies have suggested that health literacy is effective in promoting personal responsibility for maintaining health and in changing attitudes towards health. This effect is evident in the acquisition, understanding, processing, and interpretation of medical and health information, as well as in decision-making and the use of this information. Moreover, health literacy can influence preventive behaviors.[14] Various studies have shown that a low level of health literacy is associated with a high rate of hospitalization, lower preventive care, and higher health costs.[6,7] Therefore, considering the role of health literacy in the adoption of preventive behaviors,[12] the essential role of healthcare workers in the fight against the COVID-19 epidemic as the front line of the health sector,[9] and the contradictory results regarding the extent of compliance with preventive behaviors by healthcare workers,[10,11] the present study was conducted to determine the role of health literacy in the preventive behaviors related to COVID-19 among healthcare workers in southeastern Iran.

Materials and Methods

Study design, settings, and procedure

This analytical cross-sectional study was conducted among healthcare workers in southeastern Iran. To prevent the spread of COVID-19 through contact, data were collected *via* a web-based survey. This survey was conducted online using common platforms utilized by healthcare workers. The review can be accessed through "Porsline.com" at https://survey.porsline.ir/#/survey/56871/build. The inclusion criteria required participants to work in the healthcare sector and be willing to complete the electronic questionnaire. Participants completed the questionnaire anonymously. The study took place from May 22, 2021, to June 22, 2021. All participants answered sociodemographic questions and items related to COVID-19 health literacy and preventive behaviors against COVID-19. Participation in the questionnaire was entirely voluntary. The questionnaire was viewed by 650 people, and a total of 400 people completed it.

Measurements

The research questionnaire consisted of three parts.

Sociodemographic characteristics

The first part contained demographic information, such as gender (male, female), age (years), marital status (single, married), level of education (high school diploma, associate degree, Bachelor of Arts, Master of Arts Master of Arts, PhD), workplace (health, treatment), economic status (good, average, bad), health status (very good, good, average, bad), residence (rural, urban), and vaccination status (yes, no).

Preventive behaviors against COVID-19 questionnaire

The second part of the questionnaire included items related to preventive behavior, which were designed by health education experts based on the preventive guidelines provided by the Iranian Ministry of Health and the World Health Organization.[20] This section of the questionnaire comprised 12 items, including wearing gloves, wearing masks, general hand disinfection, surface disinfection, frequent hand washing with soap and water, maintaining proper social distance, avoiding kissing and shaking hands, not participating in gatherings, using a shield, *etc*. The response options were yes (score 1) and no (score 0). The range of scores varied from 0 to 12, with a higher score indicating better preventive behavior. To determine face and content validity, the questionnaire was reviewed by an expert panel of 10 relevant experts (in health education, epidemiology, and infectious disease), and their feedback was incorporated. The validity of the questionnaire was determined to be 0.93. The reliability of the questionnaire was calculated using internal consistency and Cronbach's α, resulting in a correlation coefficient value of 0.92.

COVID-19 health literacy

The third part of the questionnaire included items on COVID-19 health literacy. The health literacy questionnaire consisted of 22 items across four areas: access (6 items), understanding (6 items), evaluation (5 items), and use of health information and services (5 items). The response options were very easy (score 4), easy (score 3), difficult (score 2), and very difficult (score 1), resulting in a score range from 22 to 88. A score equal to or lower than 50 was considered insufficient health literacy; a score greater than 50 but lower than 60

was considered borderline health literacy; and a score equal to or greater than 60 was considered sufficient health literacy.[21] To determine face and content validity, this questionnaire was also reviewed by an expert panel of 10 relevant experts, and their feedback was incorporated. The validity of this questionnaire was determined to be 0.95, and its reliability was calculated using internal consistency and Cronbach's α, resulting in a correlation coefficient of 0.94.

Data analysis

SPSS software version 21 was used for statistical analysis. The mean and standard deviation were used to describe quantitative variables, while frequency and percentage were used for qualitative variables. A multiple linear regression test was conducted to identify the factors affecting the preventive behaviors related to COVID-19. To determine the likelihood of preventive behaviors, a logistic regression test was used. The significance level in this study was set at less than 5%.

Ethical consideration

The code of ethics for this study is IR.ZAUMS.REC.1400.007, as approved by the Research Ethics Committee of Zahedan University of Medical Sciences.

Results

The findings showed that an equal number of participants from each health and treatment group participated in this survey, and they were in the age range of 20 to 50 years. Most participants were aged 20-30 years (38.8%), and the majority were women (59.8%). Regarding marital status, most participants were married (60.5%), and in terms of education, most had a bachelor's degree (64%). The majority of participants resided in urban areas (84.5%), and most had been vaccinated with the COVID-19 vaccine (75.3%). As observed in Table 1, there is a significant relationship between vaccination and marital status (p=0.001). There is also a significant relationship between the level of health literacy and receiving the COVID-19 vaccine (p<0.001), as well as between preventive behaviors for COVID-19 and marital status (p<0.001).

Table 2 shows the frequency (percentage) of healthcare workers reporting "always" regarding preventive behaviors. The highest frequency is related to "avoiding hugging and kissing", followed by "wearing a mask". The lowest frequency is related to "using a shield", followed by "wearing gloves".

Table 3 indicates that among the research variables, only health literacy and economic status can predict preventive behaviors against COVID-19. Health literacy has the greatest impact on preventive behaviors against COVID-19 (odds ratio: 9.261).

Table 4 reports the effect of independent variables on preventive behaviors against COVID-19 analyzed using logistic regression.

Discussion

Health literacy encompasses a set of skills, including reading, listening, analysis, and decision-making, as well as the ability to apply these skills in health-related situations. These skills are not necessarily linked to years of education or general reading ability.[13] Health literacy can be acquired through mass media, the Internet, newspapers, and television. In light of the COVID-19 epidemic, preventive behaviors to control infectious diseases are essential from both public and individual perspectives. Authorities and public health organizations should implement various preven-

Table 1. Health literacy and preventive behaviors of COVID-19 and factors affecting healthcare workers in southeastern Iran.

Variable			Preventive behaviors			Insufficient health literacy			Borderline health literacy			Sufficient health literacy		
		n (%)	Mean (SD)	Test	p	n (%)	Mean (SD)	Test	p	n (%)	Mean (SD)	Test	p	n (%)	Mean (SD)	Test	p
Gender	Female	239 (59.8)	30.27 (6.20)	*	0.51	31 (13)	48.58 (1.22)	*	0.27	160 (66.9)	57.93 (4.37)	*	0.10	48 (20.1)	75.94 (6.47)	*	0.15
	Male	161 (40.3)	30.68 (6.28)			17 (10.6)	47.32 (4.59)			110 (68.3)	57.05 (4.4)			34 (21.1)	74.75 (6.53)		
Age	30-20	155 (38.8)	30.98 (6.99)	**	0.39	16 (33.3)	46.37 (5.89)	**	0.25	103 (38.1)	57.66 (4.70)	**	0.11	36 (43.9)	75 (6.71)	**	0.42
	40-31	124 (31)	30.37 (5.99)			15 (31.3)	48.06 (2.21)			84 (31.1)	57.69 (4.40)			25 (30.5)	75.08 (6.86)		
	50-41	86 (21.5)	29.53 (5.66)			12 (25)	49.25 (0.96)			60 (22.2)	56.23 (4.17)			14 (17.1)	76 (6.28)		
	≥50	35 (8.8)	30.48 (4.57)			5 (10.4)	47.80 (2.04)			23 (8.5)	58.30 (3.49)			7 (8.5)	73 (6.70)		
Marital status	Single	158 (39.5)	31.24 (6.03)	*	0.03	17 (35.4)	47.11 (2.78)	*	0.38	108 (40)	57.19 (4.56)	*	0.51	33 (40.2)	75.93 (6.30)	*	0.84
	Married	242 (60.5)	29.90 (6.31)			31 (64.6)	48.12 (4.24)			162 (60)	57.57 (4.34)			49 (59.8)	74.77 (6.83)		
Education level	High school	45 (11.3)	30.60 (10.39)	**	0.73	6 (12.5)	44.16 (8.75)	**	0.03	23 (8.5)	59.39 (4.4)	**	0.005	16 (19.5)	74.62 (6.59)	**	0.016
	Associate degree	61 (15.3)	31.36 (5.40)			5 (10.4)	46.20 (4.14)			47 (17.4)	57.70 (4.79)			9 (11)	75.88 (8.41)		
	BA	256 (64)	30.24 (5.46)			31 (64.6)	48.67 (1.77)			181 (67)	56.85 (4.20)			45 (54.9)	75.54 (6.46)		
	MA	38 (9.6)	30.1 (6.01)			6 (12.5)	48 (1.67)			19 (7)	59.63 (4.47)			12 (14.6)	74.25 (6.67)		
Workplace	Hospital	200 (50)	30.31 (6.35)	*	0.68	22 (45.8)	47.45 (5.10)	*	0.60	145 (53.7)	56.60 (4)	*	0.001	32 (39)	73.65 (5.82)	*	<0.001
	Healthcare	200 (50)	30.56 (6.12)			26 (54.2)	48.03 (2.23)			125 (46.3)	58.34 (4.72)			50 (61)	76.26 (6.93)		
Economic status	Good	44 (11)	30.84 (5.57)	**	0.90	2 (4.2)	46.35 (5.80)	**	0.04	30 (11.1)	57.32 (4.47)	**	0.57	13 (15.8)	76.93 (7.50)	**	0.76
	Average	195 (48.8)	30.38 (5.73)			29 (60.4)	48.82 (1.25)			128 (47.4)	57.64 (4.35)			38 (46.3)	74.55 (5.47)		
	Bad	161 (40.3)	30.41 (6.99)			17 (35.4)	44.5 (4.63)			112 (41.5)	56.73 (4.63)			31 (37.8)	73.75 (6.98)		
Residence	Urban area	338 (84.5)	30.42 (6.33)	*	0.89	38 (79.2)	47.78 (4.04)	*	0.94	233 (86.3)	57.36 (4.50)	*	0.66	67 (81.7)	75.14 (6.60)	*	0.70
	Rural area	62 (15.6)	30.54 (5.71)			10 (20.8)	47.70 (2.83)			37 (13.7)	57.70 (3.98)			14 (17.1)	76.28 (6.64)		
Vaccination	Yes	301 (75.3)	29.99 (5.69)	*	0.01	35 (72.9)	48.17 (3.93)	*	0.23	215 (79.6)	57.11 (4.34)	*	0.04	51 (62.2)	74.11 (6.50)	*	< 0.001
	No	99 (24.8)	31.73 (7.55)			13 (27.1)	46.69 (3.27)			55 (20.4)	58.48 (4.55)			31 (37.8)	77.09 (6.46)		

BA, Bachelor of Arts; MA, Master of Arts. *Independent t-test; **one-way analysis of variance.

tive measures, including pharmaceutical and non-pharmacological interventions, to prevent the spread of epidemics. These measures include vaccination, preventive medicine, health precautions, patient isolation, and maintaining distance between patients and other community members.[15]

The present study aimed to investigate health literacy and preventive behaviors against COVID-19, as well as the factors affecting healthcare workers in southeastern Iran. This was a web-based survey with two objectives: first, to explore preventive behaviors during the COVID-19 pandemic, and second, to examine the role of health literacy in preventive adjustments among healthcare workers. Governments and executive organizations have generally utilized mass media and social media as effective tools to monitor and prevent the epidemic. According to the results of this study, the use of social media (frequency) has positively influenced public preventive behaviors during the COVID-19 epidemic among healthcare workers, aligning with the findings of Li *et al*.[22] The highest scores for adherence to preventive measures were observed among women, consistent with the findings of the study by Taghrir *et al*.,[11] which was conducted among medical students. This may be attributed to women's sensitivity and their role as mothers, leading them to adopt more preventive measures compared to men.

In terms of preventive behaviors, the most common actions were avoiding hugging and kissing (32%) and wearing a mask (28.7%), followed by frequent hand washing with soap and water. In the study by Khazaee-Pool *et al*.,[23] washing hands with soap and water was identified as the most important measure, followed by avoiding hugging, kissing, and shaking hands when greeting. The least common preventive behaviors were using a face shield (8%), wearing gloves (10.8%), and avoiding taking the mobile phone out of the pocket at work unless necessary (12.8%). In the study by Khazaee-Pool *et al*.,[23] wearing a mask when going out was the least frequent measure. In this study, due to the widespread use of masks and the lack of access to or need for aerosolizing measures, face shields were the least used. In the study by Firozbakht *et al*.,[24] it was shown that more than 50% of people did not take seriously the three preventive behaviors of washing hands, wearing masks, and wearing gloves, which is not consistent with the present study, except for wearing gloves. In the study by Nakhaeizadeh *et al*.,[25] covering the mouth and nose while sneezing and coughing and washing hands or disinfecting purchased items were observed more frequently than other behaviors, while maintaining physical distance, wearing a mask in public places, not participating in parties and gatherings, and not leaving the house unless necessary were less observed, which is not consistent with the present study. Contrary to the findings of the present study, a study in Myanmar indicated that only 22% of the general public's preventive behaviors were at an acceptable level, with 45% regularly washing their hands, 47% always covering their mouth and nose when sneezing or coughing, and only 44% refraining from traveling. The low level of preventive behavior in Myanmar compared to the current study may be due to a lack of public awareness and reduced awareness compared to healthcare work-

Table 2. The frequency (percentage) of healthcare workers reporting "always" in relation to preventive behaviors.

Number	Items	n (%)
1	wearing gloves	43 (10.8)
2	wearing a mask	115 (28.7)
3	Hand disinfection	76 (19)
4	Frequent hand washing with soap and water	79 (19.8)
5	Observance of appropriate social distance	55 (13.8)
6	Avoiding hugging and kissing	128 (32)
7	Using the shield	32 (8)
8	Avoiding shaking hand	100 (25)
9	Avoiding touching the face	54 (13.5)
10	Avoiding taking the phone out of the pocket at work except when necessary	51 (12.8)
11	Non-participation in gatherings except for emergencies	78 (19.5)
12	Using surface disinfection solution regularly	56 (14)

Table 3. Adjusted linear regression results were used to predict preventive behaviors against COVID-19.

Variables	Preventive behaviors against COVID-19		
	β	t	p
Constant	-	6.09	< 0.001
Health literacy	0.17	5.61	< 0.001
Economic status	-0.08	-0.17	< 0.001

Table 4. The effect of independent variables on preventive behaviors against COVID-19 was analyzed using logistic regression.

Variables	Preventive behaviors against COVID-19			
	Odd ratio	95% confidence interval		p
		Upper limit	Lower limit	
Health literacy	9.261	19.38	4.42	<0.001
Economic status	3.483	7.03	1.72	<0.001

ers.[26] This study showed that higher health literacy levels are associated with more observed preventive behaviors, which is significant ($p<0.001$). Additionally, a high economic level can directly affect health literacy and preventive behaviors, increasing its significance level ($p<0.001$). In the study by Li *et al*.,[22] it was indicated that among women, older age, higher monthly income, and favorable health status were associated with higher levels of health literacy and greater use of preventive measures against COVID-19, which aligns with our study. In the current study, women aged 20-30 years with a bachelor's degree and a good income level had high health literacy levels. In the study by Zareban *et al*. on women's health literacy in Baluchistan,[27] it was shown that women with higher education and income levels had higher health literacy compared to those with lower education, younger age, and no income, which is consistent with the present study. However, in the current study, all participants were men and women working in health and treatment fields, where higher health literacy can be attributed to higher education and income levels. In the study by Naghibi *et al*.,[28] it was shown that higher levels of education correlate with higher health literacy, which aligns with the findings of the present study. Other studies in the field of health have indicated that insufficient health literacy is more common among older individuals, those with less education, lower income, and women.[29,30] However, in our study, it was more prevalent among men than women. The results of the present study showed that 54% of healthcare workers had sufficient health literacy, 32% had borderline health literacy, and 16% had insufficient health literacy. In the study by Naghibi *et al*.,[28] it was found that 60% of participants had insufficient health literacy, while only 14.4% had excellent health literacy. Additionally, in the study by Zareban *et al*.,[27] the percentage of borderline and insufficient health literacy among urban women in Baluchistan was very high, which is not consistent with the present study. It can be stated that the high level of health literacy among participants in the current study is due to increased levels of education and income.

Limitations

One significant limitation of the study is its reliance on online sampling. Although online surveys provide a convenient and efficient means of data collection, they may not fully capture the diversity of the target population. This method often excludes individuals without internet access or those who are less technologically savvy, potentially skewing the results towards a more digitally literate demographic. As a result, the findings may not be entirely representative of all healthcare workers in southeastern Iran. Moreover, self-reported data, which is common in online surveys, can introduce bias. Participants might overestimate their health literacy levels or adherence to preventive behaviors due to social desirability bias or misunderstanding of survey questions. This limitation suggests that future studies should consider incorporating objective measures of health literacy and direct observations of preventive behaviors where feasible. Another limitation is the cross-sectional design of the study. This approach captures a snapshot in time but does not account for changes over time or establish causality between health literacy and preventive behaviors. Longitudinal studies would be beneficial to track changes in these variables as the pandemic evolves and to assess whether improvements in health literacy led to sustained changes in behavior.

Future research directions

In terms of future research directions, expanding the geographical scope beyond southeastern Iran would provide a more comprehensive understanding of how cultural, economic, and infrastructural differences impact health literacy and preventive behaviors among healthcare workers across different regions. Additionally, comparative studies between urban and rural settings could shed light on how location influences access to information and resources necessary for effective disease prevention. Further research could also explore interventions aimed at enhancing health literacy among healthcare workers. Developing tailored educational programs that address specific gaps identified in initial assessments could lead to more effective communication strategies and better compliance with recommended preventive measures. Lastly, integrating qualitative methods such as interviews or focus groups could enrich quantitative findings by providing deeper insights into personal experiences and perceptions regarding health literacy and preventive practices during pandemics.

Clinical implications

The clinical implications of these findings are multifaceted. Firstly, enhancing health literacy among healthcare workers can lead to improved adherence to infection control protocols, thereby reducing transmission rates within healthcare settings. This can be achieved through targeted educational programs and training sessions that focus on increasing understanding of COVID-19 transmission dynamics and effective prevention strategies. Secondly, the study underscores the need for healthcare institutions to prioritize the dissemination of clear, accurate, and timely information about COVID-19 and related preventive measures. Ensuring that all healthcare workers have access to reliable resources can help bridge gaps in knowledge and empower them to take proactive steps in protecting themselves and their patients. Furthermore, by fostering an environment that supports continuous learning and adaptation, healthcare facilities can enhance their overall preparedness for current and future public health emergencies. This involves not only investing in training but also encouraging a culture of open communication where staff feel comfortable seeking clarification or additional information when needed.

Conclusions

The higher the level of education, the greater the impact on health literacy and the greater the adherence to preventive behaviors against COVID-19. Health literacy among women is higher than among men, which may be due to their use of mass media, health system networks, or internet resources related to health and treatment. Additionally, women are more sensitive than men to preventive measures against COVID-19. Furthermore, the economic situation significantly impacts health literacy, possibly due to the stable and higher income of this social class, which allows for more time, better equipment, and greater use of mass media, especially the Internet and social networks. This leads to increased health literacy and the use of preventive measures and tools against infectious diseases, particularly COVID-19. The results of this study confirmed the predictive role of health literacy in COVID-19 preventive behaviors. Additionally, insufficient and borderline health literacy regarding COVID-19 was a common problem among healthcare workers in southeastern Iran, reducing the likelihood of performing COVID-19 preventive behaviors. These findings show that improving health literacy among healthcare workers is essential for promoting effective preventive behaviors during pandemics like COVID-19. By implementing strategic educational initiatives and ensuring access to trustworthy information, healthcare systems can enhance their response capabilities and safeguard both frontline workers and patients against infectious diseases.

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