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Original Article

Building a Healthier Iran: Effectiveness of Public Training on COVID-19 Awareness and Practices

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Abstract

Background: The COVID-19 pandemic has significantly impacted global health. This study aimed to assess the general population's knowledge, practices, and trust in information sources related to COVID-19 in East Azerbaijan province, Iran.

Methods: A cross-sectional study was conducted using an online questionnaire distributed through social media platforms. Participants aged 13 or older were included in this study. The questionnaire assessed socio-demographic characteristics, sources of information, knowledge, and practices regarding COVID-19.

Results: A total of 260 individuals participated in this study. Most of them demonstrated moderate knowledge and practice scores. The primary source of information was social media, while healthcare workers (HCWs) were considered the most trustworthy. Factors associated with better practices included female gender, urban residence, COVID-19 infection experience, and COVID-19 news follow-up.

Conclusion: The findings highlight the importance of reliable information sources and targeted interventions to improve knowledge and practices regarding COVID-19. Addressing misinformation and promoting evidence-based practices are crucial for effective public health responses to future pandemics.

Keywords: Knowledge, Practice, Public health, Social media, Misinformation

Introduction

COVID-19, a highly contagious viral disease caused by severe acute respiratory syndrome coronavirus 2, emerged in Wuhan, China, in late 2019.[1] The World Health Organization declared it a global pandemic in March 2020.[2,3] As of March 15, 2024, there were nearly 775 million confirmed cases worldwide and over 7 million deaths.[4] Iran reported its first case in February 2020.[3]

COVID-19 has a 4-14-day incubation period. Infected individuals, both symptomatic and asymptomatic, can transmit the virus through respiratory droplets.[5-8] While antibiotics are ineffective against COVID-19, and there is no definitive cure, certain treatments, such as montelukast, may offer potential benefits as adjunct therapies for reducing lung injury, inflammation, and symptoms.[9-11] Despite potential mild side effects, such as those observed with Sinopharm, vaccination remains the most effective strategy for substantially reducing morbidity and mortality associated with COVID-19.[12,13]

As of November 26, 2023, approximately 67% of the global population was fully vaccinated. Iran's vaccination rate was 70%, with 37% receiving booster doses, compared to Saudi Arabia's 73% and 46%, respectively.[4,14] These data indicate that Iran's vaccination efforts were insufficient, emphasizing the importance of preventive measures. Knowledge of COVID-19 transmission and adherence to practices such as wearing masks and avoiding crowded areas are crucial for disease control.[15,16]

Reliable information sources are crucial for accurate knowledge about COVID-19. Misinformation can lead to harmful practices and hinder effective responses.[17] While traditional media sources were once dominant, social media has become a primary source of health information.[18,19] Understanding the public's trust in these sources is essential for policymakers to guide effective communication strategies. This study aims to assess the general population's knowledge, practices, and trust in information sources related to COVID-19.

Methods

Study Setting

This cross-sectional study was conducted in East Azerbaijan province, Iran, from August 30, 2021, to February 13, 2022. Given the ongoing outbreak, convenience sampling was used to recruit the sample, and the questionnaire was distributed through various social media platforms (Telegram, WhatsApp, and Instagram).

Sample Size

Participants aged 13 or older who completed the questionnaire were included in the study. The study protocol was approved by the Maragheh University of Medical Sciences and followed the STROBE guidelines for reporting observational studies.[20]

Data Collection Tool

The online questionnaire consisted of four sections, namely, socio-demographic information (13 questions), sources of information (10), knowledge (14), and practices (5). Participants' consent to complete the questionnaire was obtained, and the questionnaire's validity and reliability were confirmed through expert review and Cronbach's alpha (knowledge: 0.80, practice: 0.70).

Socio-Demographic Characteristics

Participants provided demographic information, including gender, age, marital status, education level, occupation, healthcare affiliation, residence location, underlying health conditions, smoking status, COVID-19 infection history, and vaccination status.

Sources of Information

Participants were asked about their frequency of following COVID-19 news and their primary sources of information. They also rated their trust in these sources, allowing for an assessment of perceived reliability.

Knowledge and Practice

The knowledge and practice sections assessed participants' understanding of COVID-19 symptoms, transmission, prevention, and treatment. Knowledge scores were calculated using a 0-2 scale (2, 1, and 0 point(s) for correct, "I don't know", and incorrect answers, respectively), with a maximum score of 28. Practice questions were scored on a 5-point Likert-type scale (1-5), resulting in a total practice score range of 5-25.

Data Analysis

The Kolmogorov-Smirnov test was used to assess the normality of data distribution. Independent sample t-tests and one-way analysis of variance (ANOVA), along with their non-parametric equivalents, were employed to examine the relationships between knowledge, practice scores, and socio-demographic characteristics. All statistical analyses were performed using SPSS (version 26), with a significance level of $P < 0.05$.

Results

A total of 260 individuals (mean age: 28.4 ± 10 years) participated in this study. The samples were predominantly female (53.1%) and single (66.2%). Most participants had academic education (82.7%) and lived in urban areas (87.7%). University students comprised the largest group (37.7%), while less than half were employed in healthcare settings (44.2%). Most participants were non-smokers, had no history of COVID-19 infection, and were vaccinated (88.1%, 60.8%, and 73.1%, respectively, Table 1).

Source of Information

Participants obtained COVID-19 news from various sources based on accessibility and reliability. Social media was the most common source (66.5%), whereas healthcare workers (HCWs) were considered the most trustworthy (68.5%). Conversely, banners, billboards, and Ministry of Health messages were the least utilized sources (0.4-1.9%). Notably, foreign satellite channels and national radio-TV were among the least trusted sources (10-10.8%). No correlation was found between participants' knowledge, practice scores, and trust in information sources (Table 2).

Knowledge and Practice

Participants demonstrated moderate knowledge and practice scores, with an average of 23.42 ± 2.68 out of 26 for knowledge and 19.24 ± 3.48 out of 25 for practice. Based on the findings (Table 3), while knowledge of preventive measures was strong (97.7% correct for question K7), an understanding of surgical mask usage was lower (77.3% correct for questions K8 and K9). Adherence to mask-wearing was high (87.7%), but avoidance of crowded places was less common (36.9%). In addition, a weak positive correlation ($r = 0.152$, $P = 0.014$) was found between knowledge and practice (Table 4).

Univariate analysis revealed that females exhibited significantly higher knowledge and practice scores regarding COVID-19 compared to males ($P = 0.016$ and $P < 0.001$, respectively). Additionally, urban residents represented significantly better practices ($P < 0.001$). Individuals who had experienced COVID-19 infection during the study showed improved practices ($P = 0.021$). Finally, a significant difference in practice scores was observed between those who followed COVID-19 news and those who did not ($P < 0.001$, Table 5).

Discussion

This study assessed the general population's knowledge and practices regarding COVID-19 and identified influencing factors. A total of 260 individuals (mean age: 28.4 ± 10 years) participated in this study. The participants were predominantly female (53.1%) and single (66.2%). Most of them had academic education (82.7%) and lived in urban areas (87.7%). University students comprised the largest group (37.7%), while less than half were employed in healthcare settings (44.2%). The majority of them were

Table 1. Demographic Characteristics of Participants

Characteristics	n (%)
Age (mean ± SD)	28.4 ± 10
Gender	
Female	138 (53.1)
Male	122 (46.9)
Marriage status	
Single	172 (66.2)
Married	88 (33.8)
Education	
No academic education	45 (17.3)
Academic education	215 (82.7)
Occupation	
Student	98 (37.7)
Self-employment	66 (25.4)
Employee	60 (23.1)
Other	36 (13.8)
Type of occupation	
Related to medical science	115 (44.2)
Unrelated to medical science	145 (55.8)
Residence	
Urban	228 (87.7)
Rural	32 (12.3)
Underlying disease	
Diabetes	4 (1.5)
High blood pressure	9 (3.5)
Cardiac disease	1 (0.4)
Pulmonary disease	3 (1.2)
Obesity	18 (6.9)
Cancer	2 (0.8)
Smoking	
No	229 (88.1)
Yes	25 (9.6)
Not anymore	6 (2.3)
COVID-19 infection	
No	158 (60.8)
Yes	14 (5.4)
Not anymore	88 (33.8)
Vaccination	
Yes	190 (73.1)
No	70 (26.9)
How much do you follow COVID-19 news?	
I do not	85 (32.7)
Less than an hour	133 (51.2)
Between 1 and 2 hours	42 (16.2)

non-smokers, had no history of COVID-19 infection, and were vaccinated (88.1%, 60.8%, and 73.1%, respectively).

Participants demonstrated a high level of knowledge about COVID-19, particularly regarding the importance of avoiding crowded places (97.7% correct). However, this understanding could not always be translated into practice, as only 36.9% consistently avoided crowded areas. Similar findings were reported in a Chinese adult population, where the majority of them recognized the need to avoid crowded places (98.6%) but exhibited lower adherence (96.4%).[21] This discrepancy between knowledge and practice can be attributed to various socio-economic factors, individual perceptions, and external influences.

While participants generally understood the importance of preventive measures, knowledge gaps were evident in areas such as surgical mask usage (77.3% correct), suggesting that the general population may have reservations about the effectiveness of surgical masks, which conforms to the findings of a Saudi Arabian study on MERS.[22]

Despite reservations about surgical mask effectiveness, participants demonstrated high adherence to mask-wearing (87.7%), exceeding the average of 65% across 56 studies.[23] However, avoidance of crowded places was significantly lower than the global average (75%), indicating that while overall knowledge is strong, targeted education and awareness efforts are still necessary.[23]

Univariate analysis identified several factors associated with better COVID-19 practices. Females represented significantly higher knowledge and practice scores than males, although previous studies have shown contradictory results in this regard.[3, 23]

There was no significant difference in knowledge between urban and rural participants; contrary to the findings obtained from Ethiopia and Malawi, urban residents in this study exhibited better practices.[24,25] This aligns with the results of studies in these countries and China.[24-26] This could be attributed to higher education levels and greater access to information, such as the Internet, among urban residents.

Individuals who had experienced COVID-19 infection revealed improved practices, highlighting the impact of personal experience on behavior change, which corroborates the results of previous research by Mukhtar et al, indicating that personal experience with COVID-19 can lead to increased adoption of preventive measures.[27] Similarly, the findings of a study in China showed that HCWs with close contact with COVID-19 patients were more likely to take preventive measures, likely due to their firsthand understanding of the disease's severity.[28] Additionally, following COVID-19 news was associated with better practices, as discussed by Betsch et al.[29]

The primary source of information for participants was social media, which is in conformity with the results of a review study that reported an 87% increase in social media usage since the outbreak.[30] However, this led to the rapid spread of misinformation from unknown and unreliable sources. HCWs were recognized as the most reliable source of information, which is consistent with the findings of a study conducted in the United States.[31]

The significant association between vaccination and occupation ($P < 0.001$) suggests that HCWs' medical

Table 2. Association Between Information Source Reliance and Knowledge/Practice Scores

Sources of Information	n (%)	Reliability "Above Average"[a] n (%)	Knowledge (*P* Value)	Practice (*P* Value)
National radio-TV	76 (29.2)	28 (10.8)	0.841	0.713
Foreign satellite channels	14 (5.4)	26 (10)	0.554	0.495
Social media	173 (66.5)	58 (22.3)	0.710	0.855
Internet (e.g., official agencies)	45 (17.3)	70 (26.9)	0.813	0.417
Healthcare workers	33 (12.7)	178 (68.5)	-	0.599
Family and friends	31 (11.9)	56 (21.5)	0.295	0.832
Messages from Ministry[b]	5 (1.9)	55 (21.2)	0.347	0.147
Banners and billboards	1 (0.4)	41 (15.8)	-	-

[a] Indicates "High" and "Very high" responses.
[b] Ministry: The Ministry of Health and Medical Education.

Table 3. Participants' Knowledge Toward COVID-19

No.	Questions	Correct Answer n (%)
K1	Is it possible for a person with COVID-19 to have no symptoms?	251 (96.5)
K2	Are fever and cough the main symptoms of COVID-19?	239 (91.9)
K3	Are excessive fatigue and muscle soreness the main symptoms of COVID-19?	232 (89.2)
K4	Does rapid, hard breathing indicate an exacerbation of COVID-19 symptoms?	213 (81.9)
K5	The coronavirus is transmitted from person to person through respiratory droplets.	243 (93.5)
K6	If you are in contact with COVID-19 patients, you should be quarantined immediately. The quarantine period is generally 14 days.	232 (89.2)
K7	Avoiding crowded places, using masks, and washing hands are necessary preventive measures to prevent COVID-19.	254 (97.7)
K8	Ordinary people can use surgical masks.	201 (77.3)
K9	Ordinary people can use surgical masks for at least 2 days.	201 (77.3)
K10	There is no need for preventive activities by children and young people.	235 (90.4)
K11	There is currently no definitive cure for COVID-19.	206 (79.2)
K12	At present, vaccination is the only pharmacological way to prevent COVID-19.	205 (78.8)
K13	Older people with underlying and obese diseases are more likely to develop severe COVID-19.	233 (89.6)

Table 4. Participants' Preventive Measures Toward COVID-19

No.	Questions	"Always" and "Often"[a] n (%)
P1	Did you avoid being in crowded places?	96 (36.9)
P2	Do you wear a mask when you leave home?	228 (87.7)
P3	Did you avoid shaking hands with somebody or kissing them?	218 (83.8)
P4	Do you use hand sanitizers outside the home?	146 (56.1)
P5	Do you keep a distance of at least one meter with others?	171 (65.7)

[a] Other points are not indicated.

knowledge may protect them from conspiracy beliefs and increase vaccine acceptance.[13,32] Although HCWs have been reported as reliable sources, they may not have considerably influenced the vaccination attitudes of individuals outside the healthcare field. Foreign satellite channels and national radio-TV were perceived as the least reliable sources. Given the government oversight of national media in Iran, this low trust may reflect broader distrust in officials and the government, similar to the findings reported in the United States.[33] The influence of various information sources on public perceptions and reactions emphasizes the importance of reliable information in combating misinformation and ensuring effective public health responses.

A weak positive correlation was found between knowledge and practice, suggesting that while knowledge is essential, other factors such as personal experience, social influence, and environmental factors also influence behavior. These findings highlight the importance of reliable information sources, education, and awareness campaigns in promoting effective COVID-19 prevention. While HCWs are trusted sources, the overreliance on social media necessitates improved regulation and monitoring of online content to combat misinformation. The varying levels of adherence to preventive measures highlight the need for tailored interventions addressing specific factors that influence behavior. Strategies targeting males and non-urban residents could be beneficial. Additionally, the positive impact of personal experience with COVID-19 infection underscores the importance of direct experience and feedback in shaping behaviors. Future research can build upon these findings to develop more targeted interventions that enhance knowledge and practices regarding COVID-19.

Conclusion

This study has provided valuable insights into the

Table 5. Univariable Analysis

Variable	n (%)	Knowledge		Practice	
		Mean ± SD	*P* Value	Mean ± SD	*P* Value
Age (mean ± SD)	28.4 ± 10	23.42 ± 2.68	0.084	19.24 ± 3.48	0.065
Gender					
Female	138 (53.1)	23.80 ± 2.13	0.016[b]	20.20 ± 2.72	<0.001[b]
Male	122 (46.9)	22.98 ± 3.15		18.16 ± 3.90	
Marriage status					
Single	172 (66.2)	23.48 ± 2.51	0.630	18.97 ± 3.38	0.085
Married	88 (33.8)	23.31 ± 3.00		19.77 ± 3.61	
Education					
No academic education	45 (17.3)	22.73 ± 2.85	0.077	19.04 ± 3.57	0.682
Academic education	215 (82.7)	23.56 ± 2.63		19.28 + 3.46	
Occupation**					
Student	98 (37.7)	23.48 ± 2.57	0.318	19.11 ± 3.12	0.365
Self-employment	66 (25.4)	23.50 ± 2.38		18.85 ± 4.02	
Employee	60 (23.1)	23.68 ± 2.97		19.38 ± 3.48	
Other	36 (13.8)	22.67 ± 2.97		20.08 ± 3.29	
Type of occupation					
Related to medical science	115 (44.2)	23.61 ± 2.79	0.315	19.28 ± 3.19	0.880
Unrelated to medical science	145 (55.8)	23.27 ± 2.59		19.21 ± 3.69	
Residence					
Urban	228 (87.7)	23.51 ± 2.57	0.243	19.64 ± 3.28	<0.001[b]
Rural	32 (12.3)	22.78 ± 3.33		16.41 ± 3.59	
Underlying disease (positive answer)					
Diabetes	4 (1.5)	21.00 ± 5.60	0.005[b]	20.25 ± 0.96	0.857
High blood pressure	9 (3.5)	21.33 ± 3.61		20.11 ± 3.52	
Pulmonary disease	3 (1.2)	25.33 ± 1.56		20.67 ± 4.16	
Obesity	18 (6.9)	21.72 ± 3.61		19.89 ± 2.72	
Cancer	2 (0.8)	25.00 ± 1.41		19.00 ± 4.23	
Smoking**					
No	229 (88.1)	23.52 ± 2.47	0.196	19.32 ± 3.50	0.512
Yes	25 (9.6)	22.92 ± 3.74		18.48 ± 3.47	
Not anymore	6 (2.3)	21.83 ± 4.71		19.50 ± 2.59	
COVID-19 infection**					
No	158 (60.8)	23.27 ± 2.74	0.472	19.03 ± 3.65	0.021[b]
Yes	14 (5.4)	23.29 ± 2.27		21.71 ± 2.92	
Not anymore	88 (33.8)	23.70 ± 2.64		19.23 ± 3.09	
Vaccination					
Yes	190 (73.1)	23.54 ± 2.77	0.245	19.33 ± 3.33	0.522
No	70 (26.9)	23.10 ± 2.42		19.01 ± 3.85	
COVID-19 news follow-up (daily)**					
I do not	85 (32.7)	23.16 ± 3.12	0.558	17.55 ± 3.65	<0.001[b]
Less than an hour	133 (51.2)	23.56 ± 2.54		19.87 ± 3.12	
Between 1 and 2 hours	42 (16.2)	23.48 ± 2.13		20.67 ± 2.89	
Sources of information***					
National radio-TV	76 (29.2)	23.17 ± 2.42	0.961	19.62 ± 3.54	<0.001[b]
Foreign satellite channels	14 (5.4)	23.57 ± 1.74		20.93 ± 2.40	
Social media	173 (66.5)	23.14 ± 2.98		19.15 ± 3.48	
Internet (e.g., official agencies)	45 (17.3)	23.40 ± 2.37		19.71 ± 2.92	
Healthcare workers	33 (12.7)	23.70 ± 3.15		20.30 ± 2.56	
Family and friends	31 (11.9)	23.35 ± 3.01		17.84 ± 3.18	
Messages from Ministry[a]	5 (1.9)	23.20 ± 1.92		18.60 ± 3.29	
Banners and billboards	1 (0.4)	24		7	

[a] Ministry: The Ministry of Health and Medical Education. [b]Significant.
Note.: Standard deviation; ANOVA: Analysis of variance.
* *P* value based on t-test, ** based on one-way ANOVA, and *** based on linear regression.

knowledge, practices, and factors influencing COVID-19 prevention among a diverse population. Participants demonstrated moderate levels of knowledge and practice, with variations in understanding and adherence to preventive measures. While HCWs were perceived as reliable information sources, the overreliance on social media highlights the need for improved online content regulation. By addressing these challenges, it is possible to improve public health responses to future pandemics and protect communities from infectious diseases.

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Competing Interests

The authors declare that they have no conflict of interests.

Ethical Approval

The study was approved by the Ethics Committee of Maragheh University of Medical Sciences to ensure it adhered to ethical standards (IR.MARAGHEHPHC.REC.1402.018).

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Informed Consent

All participants provided informed consent by completing an online questionnaire.

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