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Health protocol compliance in the prevention of COVID-19: Comparison of healthcare workers and ordinary people groups

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Abstract

Coronavirus disease 2019 (COVID-19) is a type of acute respiratory syndrome that due to its high prevalence, mortality, and the lack of appropriate treatment; health protocol compliance has the most important role in controlling this disease. Therefore, this study aimed to compare the frequency of health protocol compliance in the prevention of COVID-19 in two groups of healthcare workers and ordinary people. In this cross-sectional study, individuals were randomly selected from two groups of healthcare workers and ordinary people in the community. Information was completed in the form of an online questionnaire and in-person interview. A total number of 246 ordinary people and 216 healthcare workers were studied. The mean age of ordinary people was 35.53±10.16, and the mean age of healthcare workers was 34.16±8.74 years. The effect of age, gender, education level, occupation, contact with a suspected individual in the group of ordinary people, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection among family members and relatives in the group of healthcare workers, and travel history in both groups on the score of health protocol compliance was significant. The effect of habitat, underlying disease, medication history, history of SARS-COV-2, family member infection, or death, was not significant. Healthcare workers were more knowledgeable, had more positive attitudes, and their higher sense of total well-being was seen to be more critical to enhancing compliance.

Keywords: COVID-19, SARS-CoV-2, Prevention, Health protocol compliance, Healthcare workers

1. Introduction

Coronaviruses are a great family of viruses with four types (α-coronavirus, β-coronavirus, δ-coronavirus, γ-coronavirus), and various sub types and species [1]. Human coronaviruses were first identified in the mid of 1960s. Among 40 different species of the coronavirus family, seven of them have been identified that can transmit to human cells and cause diseases such as colds. Sometimes some coronaviruses attack the respiratory system and sometimes they show their symptoms in the intestines and stomachs of people. Symptoms of coronavirus in the lungs usually appear in common colds and a secretory infection called pneumonia, which is usually associated with a mild cold in most individuals. Four coronaviruses have been detected in this category, which cause infections of the respiratory system in children and adults [1-3]. Although, other types of the virus are associated with more severe symptoms; severe acute respiratory syndrome coronavirus (SARS-CoV), which consider transmitted by bats in China, caused a global severe acute respiratory syndrome (SARS) epidemic in 2002 that led to 800 known death. SARS, scientifically known as SARS-

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CoV, caused acute and severe respiratory syndrome in patients [4]. Another one is Middle East respiratory syndrome coronavirus (MERS-CoV); a newer strain of the virus was discovered in September 2012 in a 60-year-old man in Saudi Arabia resulting in patient death. The man had traveled to Dubai a few days earlier and the second case was in a 49-year-old man in Qatar who also died. The virus was first discovered in the Health Protection Agency Laboratory in London. This coronavirus is known as the MERS-CoV and leads to 858 death in Middle East [5]. The last but not least, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2); is a coronavirus that causes the coronavirus disease 2019 (COVID-19) pandemic in 2020 till now [6].

Symptoms can range from the common cold to fever, cough, fatigue, myalgia, headaches, loss of taste or smell, sore throat, and acute respiratory problems. The patient may also have a cough for several days, apparently for no apparent reason. Acute gastrointestinal problems such as diarrhea, acute respiratory failure, coagulation disorders, and renal failure have also been reported, which may require hemodialysis [7, 8]. Characteristics of this disease such as incubation period, asymptomatic few days, rapid transmission, and lack of response to treatment in some patients have forced health systems to face complex challenges [9]. COVID-19 symptoms usually begin a few days after infection. But in some patients, the symptoms may appear a little later. According to several studies, symptoms include fever, dry cough, dyspnea, fatigue, myalgia, and diarrhea. The incubation period is 2-14 days and with an average of 4 days. Ground-Glass Opacity is seen in 56.4% of patients' chest computed tomography (CT) scans. 17.9% of patients with non-severe symptoms and 8.9% of patients with severe symptoms showed any problems in their radiology or CT scan result. Lymphocytopenia or a decrease in the number of circulating lymphocytes was observed in 83.2% of patients at the time of admission [10, 11]. COVID-19 symptoms are various from none to severe, which result in serious problems such as pneumonia, lack of oxygen, and even death. These symptoms are more common in people with underlying diseases [12]. The common way of coronavirus transmission is by respiratory drop. Aerosol transmission can occur under certain conditions, especially in closed, crowded, and inadequately ventilated areas. The virus can be spread through the mouth or nose of an infected person in small liquid particles when coughing, sneezing, talking, or breathing heavily [13, 14]. Simultaneously with the official announcement of the spread of SARS-CoV-2 in Iran, a large number of people paid attention to the observance of hygienic principles and regular handwashing with soap and water and other disinfectants [15]. After China and several other Asian countries, Iran was one of the first countries to be exposed to this deadly virus. According to official Iranian news, the first case of COVID-19 was reported in Qom on February 20, 2020, then in Guilan and several other cities. Guilan province was one of the first provinces to be affected by this virus in the country [16]. Due to the lack of appropriate treatment for SARS-CoV-2 infection, this study was designed to compare the prevalence of compliance to the health protocol in the prevention of COVID-19 among two groups of healthcare workers and ordinary people.

2. Methods

2.1 Participants

In this cross-sectional study, 462 individuals were selected randomly among the ordinary people group and healthcare workers in healthcare centers in Guilan, Iran, July-December 2020. To determine the sample size, the formula is proportional to the difference between the mean of the two communities and the health protocol variable. Considering the statistical power of 80%, the error level of 0.05 and the standard deviation were 2.71 (healthcare workers) and 2.60 (ordinary people group). The questionnaire was designed; the validity was confirmed based on the Lavashe table, and the reliability was checked by Cronbach's alpha. The information according to the questionnaire was collected through online and in-person methods. All the participants gave their informed consent to participate in the study. The study design was approved by the ethical committee of Guilan University of Medical Sciences [IR.GUMS.REC.1399.486].

2.2 Statistical method

Statistical methods including, mean and standard deviation, frequency and percentage have been used to describe the obtained data in this study. Also, to investigate the normality of the studied data, the Shapiro–Wilk test, and Kurtosis and Skewness indices were used. Then, the homogeneity of variance of the

studied groups was evaluated by Levon's test. To analyze the research data, independent T test, ANOVA, Pearson correlation, Mann Whitney test, Kruskal Wallis, Mann-Whitney test with Bonferroni correction, Spearman correlation test, and linear regression were performed through SPSS.24. The significance level in all tests is considered 0.05.

3. Results

In this investigation, 246 ordinary people group and 216 healthcare workers were studied. The mean age of the ordinary people group was 35.53 ±10.16 and in healthcare workers was 34.16 ± 8.74 years. In the ordinary people group and healthcare workers 149 (69%), 177 (72%) were female; and 196 (79.7%), 194(89.8%) were urban, respectively. The frequency of education levels and occupations in the two groups is illustrated in Table 1. In the ordinary people group, a significant relationship was observed between age (P <0.001), gender (P = 0.019), level of education (P <0.001), occupation (P <0.001) with health protocol compliance. In neither group, there was no significant relationship between habitat and health protocol compliance (P >0.05), Table 2. Correspondingly, the frequency of clinical characteristics (underlying disease, medication history, travel history, history of SARS-CoV-2 infection, SARS-CoV-2 infection among family members and relatives, death outcome of SARS-CoV-2 infection, contact with suspected individuals) illustrated in ordinary people group and healthcare workers in Table 1. Based on the results in ordinary people group and healthcare workers no significant relationship was observed between the underlying diseases, history of medication, history of SARS-CoV-2 infection, and death outcome of SARS-COV-2 infection with the score of health protocol compliance (P >0.05) Table 2. In both groups, a significant relationship was observed between travel history and health protocol compliance score (P <0.019 and P <0.022). So that the average score of health protocol compliance was lower in people with a history of travel to suspicious areas. The score of health protocol compliance was lower in healthcare workers than among family members and relatives who had SARS-COV-2 infection (P = 0.012). The score of health protocol compliance was lower in the ordinary people group who had contact with suspected individuals (P = 0.005). The comparison of other variables in the two groups is demonstrated in Table 2.

3.1 Determining the synchronized effect of variables on the score of health protocol compliance

As with Table 3, the relationship between age (P = 0.001), gender (P = 0.040), education (P = 0.007), and group (P <0.001) was significant with the score of health protocol compliance. Based on demographic variables, between the two groups, the ordinary people group had a higher score in health protocol compliance (P <0.001) and was most associated with age (P = 0.001). There was the highest correlation between age and health protocol compliance score (P = 0.001), so increasing age, increases the score of health protocol compliance. Likewise, the effect of travel history (P = 0.003), Contact with suspected individuals (P = 0.005), and group (P = 0.004) on the score of health protocol was significant. People with a history of travel and contacting suspected individuals had a lower score of health protocol compliance. Also based on clinical variables healthcare workers had a higher score than the ordinary people group (P = 0.003), Table 3.

4. Discussion

Due to our study, healthcare workers exhibited a significantly higher score of healthcare protocol compliance compared to the ordinary people group (*P* = 0.014), this is also in line with previous studies [17, 18]. This indicates that healthcare workers pay more attention to healthcare protocol compliance than ordinary people group. Also, our findings indicated that upper age was associated with healthcare protocol compliance (r=0.244, *P* <0.001), which is similar to previous studies [19, 20], while, this association was not significant among healthcare workers (*P* = 0.104), this can be justified by the constant and close contact of healthcare workers with patients. The female gender represented a higher score for health protocol compliance, compared to the male gender in the ordinary people group (*P* <0.001, Table 2). This could be due to behavioral differences between females and males. Females are more likely to stay home than males, leaving homeless, regular hand washing, and surface cleaning, while, this relationship was not significant in healthcare workers (*P* = 0.307). Padidar et al. reported that females are more cooperating with public health protocol than males (*P*<0.001), particularly with protecting themselves from COVID-19 [21].

Table 1. Characteristics of two studied groups

Variables	Healthcare workers (216) N (%)	Ordinary people (246) N (%)
Gender		
Male	67 (31)	69 (28)
Female	146 (69)	177 (72)
Age Mean ± SD	34.16±8.74	35.53±10.16
Habitat		
Urban	194 (89.9)	196 (79.7)
Rural	22 (10.2)	50 (20.3)
Education		
Elementary	0 (0)	10 (4.1)
M school	0 (0)	6 (2.4)
Diploma	10 (4.6)	34 (13.8)
Upper diploma	18 (8.3)	15 (6.1)
Bachelor	79 (36.6)	101 (41.1)
Master	36 (16.7)	52 (21.1)
PhD	73 (33.8)	28 (11.4)
Occupation		
Self-employee	-	54 (22)
Clerk	-	72 (29.3)
Housewife	-	67 (27.2)
Unemployed	-	10 (4.1)
Student	-	43 (17.5)
Travel history		
No	136 (63)	100 (40.7)
Yes	80 (37)	146 (59.3)
Underlying disease		
No	184 (85.2)	218 (88.6)
Yes	32 (14.8)	28 (11.4)
Medication history		
NO	140 (64.8)	163 (66.3)
Yes	76 (35.2)	83 (33.7)
History of SARS-CoV-2 infection		
No	137 (63.4)	204 (82.9)
Yes	79 (36.6)	42 (17.1)
SARS-CoV-2 infection among family members and relatives		
No	84 (38.9)	117 (47.6)
Yes	132 (61.1)	129 (52.4)
Death outcome of SARS-CoV-2 infection		
No	197 (91.2)	232 (94.3)
Yes	19 (8.8)	14 (5.7)
Contact with suspected individuals		
No	69 (31.9)	164 (66.7)
Yes	147 (68.1)	82 (33.3)

Table 2. Comparison of the demographic and clinical variables in healthcare workers and ordinary people groups

Study groups	**Variable**							***P* value**
Relationship between gender and health protocol compliance score								
	Male				Female			
Ordinary people	21.57±4.06				22.83±2.52			0.019
Healthcare workers	22.85±2.89				23.26±2.44			0.307
Relationship between habitat and health protocol compliance score								
	Urban				Rural			
Ordinary people	22.29±3.20				23.24±2.42			0.052
Healthcare workers	23.19±2.46				22.63±3.57			0.919
Relationship between education and health protocol compliance score								
	Elementary	Middle school	Diploma	Upper diploma	Bachelor	Master	PhD	
Ordinary people	23.60±2.27	22.66±5.24	23.11±2.3	22.00±2.32	22.98±2.87	22.34±3.24	20.00±3.22	<0.001
Healthcare workers	-	-	23.80±2.44	24.11±1.45	23.20±2.46	22.88±2.61	22.86±2.92	0.408
Relationship between occupation and health protocol compliance score								
	Self-employee n=54		Clerk n=72	Housewife n=67	Unemployed n=10		Student n=43	
Ordinary people	22.35±3.47		22.73±2.94	23.47±1.97	22.40±2.41		20.69±3.63	<0.001
Relationship between underlying disease and health protocol compliance score								
	No				Yes			
Ordinary people	22.53±2.86				22.10±4.45			0.826
Healthcare workers	23.29±2.46				22.21±3.12			0.071
Relationship between medication history and health protocol compliance score								
	No				Yes			
Ordinary people	22.74±2.67				21.97±3.72			0.098
Healthcare workers	23.03±2.70				23.32±2.39			0.429
Relationship between travel history and health protocol compliance score								
	No				Yes			
Ordinary people	23.01±2.49				22.12±3.38			0.019
Healthcare workers	23.44±2.28				22.61±2.99			0.022
Relationship between SARS-CoV-2 infection and health protocol compliance score								
	No				Yes			
Ordinary people	22.69± 2.72				21.47± 4.34			0.087
Healthcare workers	23.15± 2.53				23.11± 2.72			0.915

Study groups	Variable		*P* value
Relationship between an infected family member and health protocol compliance score			
	No	Yes	
Ordinary people	22.82±2.86	22.17±3.24	0.094
Healthcare workers	23.65±1.98	22.81±2.87	0.012
Relationship between the death of a family member and health protocol compliance score			
	No	Yes	
Ordinary people	22.54± 3.07	21.50± 3.15	0.219
Healthcare workers	23.14± 2.59	23.05± 2.67	0.903
Relationship between contacting suspected individuals and health protocol compliance score			
	No	Yes	
Ordinary people	22.91±2.64	21.62±3.67	0.005
Healthcare workers	23.56±2.09	22.93±2.78	0.068

Table 3. Determining the synchronized effect of variables on the score of health protocol compliance

	Variables	P value	B	SD	Beta
Demographic	Age	0.001	0.04	0.01	0.14
	Gender	0.040	0.59	0.29	0.09
	Habitat	0.893	0.05	0.40	0.007
	Education	0.007	-0.30	0.11	-0.14
	Group	<0.001	0.97	0.27	0.16
Clinical	Travel history	0.003	-0.81	0.27	-0.14
	Underlying disease	0.143	-0.59	0.40	-0.07
	Medication history	0.831	0.06	0.29	-0.01
	SARS-CoV-2 infection	0.898	-0.04	0.32	-0.006
	Family member infected	0.096	-0.47	0.28	-0.08
	Death of a family member	0.970	0.02	0.52	0.002
	Contacting suspected individuals	0.005	-0.82	0.29	-0.14
	Group	0.004	0.82	0.28	0.14

The ordinary people group with a PhD degree showed the highest scores of disobediences among the other levels of educational groups (P<0.001). This relationship probably depends on the type of different occupations according to the level of education in ordinary people group. That is, due to the increase in the level of education, the type of occupation was such that they were less exposed to the SARS-CoV-2 virus, and as a result, they followed the healthcare protocol less. Therefore, due to the low-risk and high-risk occupation environments in relation to COVID-19, compliance health protocol has been lower in people with higher education. Data from an ongoing cohort study in Zurich, Switzerland on 737 individuals, has indicated that compliance with COVID-19 public health protocol was lower among males, those with a higher education level [22]. Contradictory to this, other studies showed that people with high education showed the highest scores of adherence to quarantine restrictions [17, 23]. Among the ordinary people group, students showed a significantly lower scale of health protocol compliance compared to employees (P<0.004) and housewives (P=0.004). Lack of awareness denied the importance of health protocols, and more desire to return to normal life, are some of the reasons that can decrease the tendency to follow health protocols, which is consistent with the findings of a previous study [17, 24] . In general, there was no significant relationship between the two groups for health protocol compliance scores in terms of habitat, since almost everyone's access to global media and news related to health protocols in the prevention of COVID-19. Yue et al. have indicated that urban and rural residents had a positive attitude toward COVID-19. They found that all the respondents had recognized the seriousness of the disease and were concerned about the deterioration of the epidemic. The great majority of the residents believed that preventive

measures could prevent the infection of COVID-19 and thought that people should immediately report or cut off contact with people around them returning from Wuhan or its surrounding areas [25]. On the contrary, Callaghan et al. have studied rural and urban different scores in COVID-19 prevention behaviors. they found no statistically significant differences based on rural status for staying 6 feet apart, washing hands, and canceling social events [26]. Neither in the healthcare workers group, nor ordinary people group, there was no significant relationship between underlying disease and medication history in terms of health protocol compliance. As one study concluded that people with mental health problems have lower adherence to precautionary measures against COVID-19 [27]. The score of health protocol compliance was lower in people with a history of travel to suspicious areas. Some reasons such as, not observing a safe distance, not finding a suitable place to wash hands during the trip, not having enough disinfectants, masks and, gloves, using public vehicles, etc., can reduce health protocol compliance, which has been observed in both health workers and ordinary people group. The health protocol compliance score was not related to a person's history of coronavirus infection, but was lower in healthcare workers whose families and acquaintances were infected with the coronavirus (P=0.012). Infection of family members may be related to a group of healthcare workers who were less likely to follow a health protocol at home or thought they would be permanently protected against future coronavirus infections. The attitude toward the history of SARS-COV-2 infection in friends or family members and compliance with COVID-19 preventive measures was similar amongst healthcare professionals and non-healthcare professionals, likely due to the fear of infection [18]. In the group of ordinary people, the health protocol compliance score was lower in the case of contact with suspected individuals (P= 0.005). This can be justified in the group of ordinary people compared to healthcare workers due to less exposure and lack of knowledge about how the virus is transmitted from person to person. Many studies and surveys are being carried out by countries to understand people's attitudes and perceptions of COVID-19 and their association with knowledge, protective behaviors and practices[18, 28]. However, very few studies and surveys have been conducted at a global level to understand the factors related to compliance towards various public health measures and differences in perceptions and practices between those that work in health services compared to other sectors.

Because of the compliance of health protocol in the ordinary people group, including students, males lower than females, it is possible to reduce the severity of this pandemic to some extent by providing more education and emphasizing compliance with health protocol. The control of responsible agencies in the continuation of travel restrictions and unnecessary traffic, due to the reduction of health protocol during the travel, can to some extent interrupt the chain transmission of the SARS-COV-2.

5. Conclusion

Healthcare workers were more knowledgeable, and had more positive attitudes, their higher sense of total well-being was seen to be more critical in enhancing compliance. Therefore, focusing on the well-being of the general population would help to enhance their compliance with the preventive measures for COVID-19. Besides, given the charged partisan discourse surrounding COVID-19, having conservative voices encourage humans about the importance of health protocols and other preventive behaviors could help change behavior and slow the COVID-19 pandemic.

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Authors' contributions

Concept and Study design: NN, SZ. Methods, data collection and experimental work: SA, NN, SZ. Results analysis and conclusions: SA, TZ, NF. Manuscript preparation and editing: TZ, NF. All authors read and approved the final version of manuscript.

Conflict of interests

The authors declare no competing interests.

Ethical declarations

All subjects gave their informed consent to participate in the study, which was approved by the ethical committee at the Guilan University of Medical Science [IR.GUMS.REC.1399.486].

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