Public Knowledge, attitude, and practice towards COVID-19 in Iran

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May 19, 2020

Abstract

The first cases of novel coronavirus disease (COVID-19) were reported in late December 2019 in Wuhan City, Hubei Province of China. It has spread rapidly around the world. Taking preventive measures by the public plays the most important role in infection prevention and control of the COVID-19. One of the major challenges in preventing and controlling COVID-19 has been the proliferation of misinformation on social media. In such a special epidemic, assessment of knowledge and attitude of the public will help to reduce the uncoordinated social behavior arising from misinformation. The purpose of this cross-sectional online survey was to determine the level of knowledge, attitude and practice (KAP) of Iranian population toward outbreak of COVID-19. Data were collected by self-administrated questionnaire. Analytical statistics were performed on the results. The mean scores of respondents' KAP were 87.7, 59.3, and 89.6, respectively. Married and females participants, who work in healthcare systems, participants in the age group of 36 to 45 years with a higher level of education, and those who studied in the fields related to health gained significantly higher knowledge scores. Most respondents (63.7%) had a negative attitude towards the observance of appointed prevention principles by others. Also, the results showed a statistically significant positive correlation between all sections of KAP. Our findings suggest that despite the rapid dissemination of reliable and unreliable information about COVID-19 through cyberspace, the Iranian people have sufficient knowledge to deal with COVID-19 outbreak.

INTRODUCTION

According to the WHO report, the first cases of novel pneumonia with unknown etiology were reported in late December 2019 in Wuhan City, Hubei Province of China. One week later, Chinese authorities identified a new type of coronavirus as causal agent of the disease (WHO, 2019). This novel coronavirus disease 2019 (COVID-19) has spread rapidly around the world. On 11 March 2020, WHO declared the outbreak a global pandemic (CDC, 2020b; WHO, 2020c). The first cases of infection were identified in Iran on 19 February 2020(WHO, 2020b). After that, the rate of the disease has increased rapidly in the country, so that on 18 May 2020, over 122,000 cases of the disease and about 7000 deaths have been reported(Worldmeters.info, 2020).

The disease can mainly transmit through contact with respiratory and saliva droplets and also objects and surfaces contaminated to the droplets. According to the transmission routes, implementing the basic preventive measures by the public plays the most important role in infection prevention and control of the COVID-19 (Peng et al., 2020; WHO, 2020d). Effective public awareness of correct information on the COVID-19 outbreak through a variety of media is crucial to achieve a suitable practice of the protective

measures by the public. On the other hand, one of the major challenges in preventing and controlling COVID-19 has been the proliferation of misinformation on social media (Frenkel, Alba, & Zhong, 2020; Pennycook, McPhetres, Zhang, & Rand, 2020). Propagation of this misinformation via popular messengers among the community has confused the public in adopting the correct preventive measures and has plagued the scientific community (Mian & Khan, 2020). Kouzy et al. provided the definition of misinformation as a "claim of fact that is currently false due to lack of scientific evidence (Kouzy et al., 2020). The lack of evidence and unproven results of some studies have also led to controversy among the public and even scientific community about disease-related issues such as the use of masks, the type and concentration of disinfectants, and transmission rout which ultimately may change the public behavior (Eikenberry et al., 2020; Huynh, 2020).

In recent years, the number of Internet users in Iran has grown (over 80% penetration rate). According to datareportal.com (Digital-2019- Iran), more than 47 million of Iranian (57%) are active users of social networks (Kemp, 2019). Hence, Iranian users are known as one of the biggest users of social networks in the world (Honari, 2015). Undoubtedly, one of the main ways to obtain information and knowledge about health issues like COVID-19 has been social networks. Assessment of knowledge and attitude of the public will help to prevent or reduce the uncoordinated social behavior in such special conditions as COVID-19 epidemic. Generally, different aspects of knowledge, attitude, and practices (KAP) affect Health-related behavior in any kind of society (Launiala, 2009).

Several KAP surveys have been conducted regarding various viral disease outbreaks around the world, such as the Studies on Ebola Virus Disease (EVD) in Nigeria (Iliyasu et al., 2015), Sudan (Alfaki, Salih, Elhuda, & Egail, 2016), and Iran (Holakouie-Naieni et al., 2015), on Middle East Respiratory Syndrome Corona Virus (MERS-CoV) in Saudi Arabia (Al-Hazmi, Gosadi, Somily, Alsubaie, & Saeed, 2018; Nour, Babilghith, Natto, Al-Amin, & Alawneh, 2015), on Severe Acute Respiratory Syndrome (SARS) in Qatar (Bener & Al-Khal, 2004) and Singapore (Vijaya et al., 2004) and also on Avian Influenza in China(Xiang et al., 2010) and Influenza A in India (Kamate et al., 2010). This kind of survey will help the decision-makers and health authorities to upgrade their educational programs in combating the crisis of outbreaks.

The purpose of this survey was to determine the level of knowledge, attitude, and practice of Iranian population toward the outbreak of COVID-19. Also, using this study, we tried to assess the efficiency of public education by measuring their knowledge. In another word, we aspired to find out which one would be the winner: misinformation through invalid sources or scientific training by official media?

METHODS

A cross-sectional online survey was conducted in March 2020(three weeks after the onset of outbreak in country) to assess the knowledge, attitude, and practices (KAP) about COVID-19 among Iranians. Data were collected by a self-administrated questionnaire, which was developed based on validated questionnaires used in recent study by Zhong *et al* . (Zhong et al., 2020), country instruction for novel Coronavirus(MOHME, 2020), and also current issues come up. Since sampling was not possible in the whole country and also due to concurrence of the Iranian New Year holidays with the beginning of home quarantines, the best way to achieve an unbiased sample was sending randomly the questionnaire link to the groups and channels of popular messengers in Iran such as WhatsApp, Telegram and one internal messenger. Prior to the response, all potential participants were provided adequate information about the survey and only those who click on the satisfaction button were included in the study. During the two weeks that the questionnaire was available, 2986 individuals visited it, and finally, 1628 individuals completed it. It should be noted that the sample was fairly similar to the Iranian public on age, gender, education, and also pattern of their distribution.

The content validity of the questionnaire was confirmed by a panel of experts consisting of 3 environmental and occupational health specialists, 1 epidemiologist, 1 public health expert, and 1 infectious diseases specialist. After checking the applicability of the questions, the suggestions provided by experts were incorporated and the questionnaire was piloted with 10 participants to check relevance, clarity and ambiguity of questions and estimate the time required to complete the questionnaire. Afterward, an online platform of

the questionnaire was made using *Porsline.ir* , an Iranian web-based questionnaire and survey form builder.

The questionnaire had 29 questions/items and divided into 4 sections. The first section solicited 8 demographic variables (first column of Table 2). The knowledge, attitude and practice sections had 13, 4, and 4 questions/items, respectively. The KAP questions/ items (Table 1) covered issues such as clinical symptoms of the disease, treatment protocol, transmission routes, and prevention/control measures including physical distancing, disinfection, home quarantine, and etc.

Table 1- Questions/Items used in each section of the questionnaire

Knowledge questions with correct responses were scored 1 and wrong and "I don't know" responses were scored 0. Grading of correctness (5 points Likert scale) was used for responding to attitude and practice questions, and they were scored from 0 to 4 depending on the options. According to this grading system, the lowest and highest score of knowledge section were 0 and 13, respectively, and the lowest and highest score of both attitude and practice sections were 0 and 16, respectively. In order to have a unique scale, all scores were transformed to a scale of 0 to 100 using equation 1.

$SS_n = 100 \times SQ_n - S_{min} / [S_{max} - Smin]$

Where SS_n is scaled score of question n, SQ_n is the obtained score of question n and S_{max} and S_{min} are highest and lowest score of section that the question n is in it.

The statistical analyses were carried out using SPSS version 16.0. Also, significance was assessed by the T-test and ANOVA. A P value $<.05$ was considered to indicate statistical significance.

RESULTS

The first three columns of Table 2 depict frequency distributions of the participants' demographic characteristics. Similar to the country's demographic pattern, 67 percent of participants were between the ages of 26 and 45. Due to the nationwide home quarantine, the majority of respondents were male and also married (about 56 and 69 percent, respectively). A large proportion of participants had degrees of bachelor or master, and about 26 percent of university-educated respondents studied in health sciences. Less than 10 % work in healthcare systems and about 37% of the participants were employees. Only 3.8% of the participants live in villages.

Table 2 also shows the mean scores of knowledge, attitude, and practice and their standard deviation for different demographics groups of participants. The mean, minimum, and maximum knowledge scores of total participants were 87.7, 15, and 100, respectively. Based on the P-values obtained from ANOVAs and T-tests, the mean scores of knowledge among all demographic groups were significantly different except for the urban and rural residents (Table 2). Married and females participants, respondents who work in healthcare systems, participants in the age group of 36 to 45 years with a higher level of education, and those who studied in the fields related to health gained significantly higher knowledge scores.

The mean, minimum, and maximum attitude scores of all participants were 59.3, 13, and 100, respectively. Based on statistical analysis, there was no significant difference between the mean scores of participants' attitudes in gender, education levels, and place of residence groups. Married participants, aged between 46 and 55, and those who worked and studied in the health field received the highest attitude scores (Table 2). The mean, minimum, and maximum practice scores of all participants were 89.6, 38, and 100, respectively. The results showed that there was no significant difference between the mean practice scores of respondents in different groups of the three demographic variables of marital status, level of education, and place of residence. In general, females and participants over the age of 46 and those who worked and studied in the health field had higher practice scores than others. Surprisingly, the 18- to 25-year-olds had the lowest scores in all three sections. Although married participants showed a slightly higher level of knowledge and practice than singles, their attitude was significantly more positive. Moreover, the higher the level of education, the higher the scores of knowledge and practice and the lower the attitude score.

Table 2- Demographic characteristics of respondents and KAP scores by demographic variable

The participants' knowledge of COVID-19 was assessed in terms of preventive measures, disease control, treatment, clinical symptoms, and transmission routes. The main categories of knowledge questions and the average response status are presented in Table 3.

Table 3- Main categories of knowledge questions and average responses to each option

Besides, Figure 1 shows the responses of participants to knowledge questions regarding preventive measures. Except for the using masks in all places, the respondents' knowledge about preventive measures was pretty near perfect. These findings show that public knowledge regarding preventive measures was promoted to an optimal level because of the proper public education provided by health authorities.

Figure 1- Knowledge level of participants regarding preventive measures questions

Table 4 indicates how people answer different questions in the attitude section. Most respondents (63.7%) had a negative attitude towards the observance of appointed prevention principles by others, while the majority believed in their own knowledge about the prevention measures.

Table 4 -Attitude of respondents toward prevention and control of COVID-19

The participants' responses to the questions of the practice section are also shown in Table 5. According to the results, most people have behaved well during COVID-19 outbreak. Although this is a very common and important event during the New Year holidays in Iran, more than 80% of the respondents had never visited their relatives.

Table 5 - Practice of respondents regarding COVID-19 control and prevention

The correlation between participants' scores of knowledge, attitude, and practice was examined by Pearson correlation test. The results showed a statistically significant positive correlation between knowledge and attitude, attitude and practice, and also knowledge and practice. Table 4 indicates the correlation coefficients and P values.

Table 6 -The results of Pearson correlation test

DISCUSSION

According to our searches, so far, the survey is the first and only nationwide KAP study conducted in Iran regarding COVID-19. Several KAP studies have been carried out in Iran about the epidemic of viral diseases such as Ebola, Crimean-Congo hemorrhagic fever, and H1N1 influenza, but all targeted specific groups such as students, residents, and healthcare workers as study population (Askarian, Danaei, & Vakili, 2013; Holakouie-Naieni et al., 2015; Rahnavardi et al., 2008; Salimi et al., 2016). Consequently, it was not possible to compare the level of knowledge, attitude, and practice of Iranians towards different type of viral disease epidemics. As we used some information from the recent KAP study conducted in China to compile our questionnaire, it was possible to compare some parts of the results between the two countries.

Since identifying demographic factors associated with KAP will be useful for health policy-makers to recognize target populations for COVID-19 prevention and health education (Zhong et al., 2020), the effect of different demographic groups on participants' KAP was examined. In our study, as in China, females had significantly more knowledge than males. Similar results were obtained in KAP studies of SARS in Qatar and Singapore (Bener & Al-Khal, 2004; Vijaya et al., 2004). Contrariwise, results of the Indians KAP study regarding the H1N1 influenza epidemic indicated males had higher knowledge than females (Kamate et al., 2010). This discrepancy may be attributed to differences in the value of countries' indicator of adult female literacy rate. According to the World Bank data, value of the indicator in Singapore(2018), China(2018), Qatar(2017), Iran(2016) and India(2018) is 96, 95, 95, 81 and 66 %, respectively(World Bank, 2019). In terms of age, younger respondents (18 to 25 years old) had poorer knowledge, attitude, and practice than other age groups. Further, based on the post-hoc test, their practice score was significantly lower than other age groups. Some studies have also reported poorer knowledge in younger groups (Iliyasu et al., 2015; Kamate et al., 2010; Zhong et al., 2020). According to data reported from US CDC in March 16, 2020, showed

that younger adults can be among the at-risk groups of COVID-19, and some may need hospitalization, even ICU (CDC weekly report)(CDC, 2020b). Therefore, they should be considered as an important target group for further education. The mean scores of marrieds' knowledge, attitudes, and practice were higher than singles. These findings agree with other studies (Iliyasu et al., 2015; Kamate et al., 2010; Zhong et al., 2020).

Like many KAP studies (Iliyasu et al., 2015; Kamate et al., 2010; Xiang et al., 2010; Zhong et al., 2020, the respondents' knowledge was directly related to their education level. However, there was no significant difference between respondents' attitude and practice with different levels of education. In the KAP study of COVID-19 in China, similarly, respondents with higher education had a slightly weaker attitude, albeit the difference was not significant (Zhong et al., 2020).

Similar to the Chines study, in which respondents received a mean score of 90/100, in our study, the respondents' level of knowledge was assessed as very good with a mean score of 87.7/100. This shows that the public education provided by the Ministry of Health through the national official media at the beginning of the epidemic has greatly increased the knowledge of Iranians and also reveals that the spread of misinformation through informal media such as messengers has not had a significant effect on public awareness. Furthermore, it can be interpreted that the public has actively learned about COVID-19 due to the serious situation of the epidemic and extensive news coverage (Zhong et al., 2020).

One of the most challenging parts in the knowledge section of this survey was the question about using face masks outside the home. Contradictory news and misinformation about the virus being airborne in the media may be one of the main reasons for this discrepancy. Health authorities in different countries have also adopted different decisions. In the latest documentary regarding the use of masks in the context of COVID-19 which was released on April 6, 2020, WHO did not consider the use of masks alone to be a complete preventative, and declared that the use of masks not recommended for everyone (WHO, 2020a). The US CDC has also recommended that face masks should be worn in public places, especially in places where it is not possible to maintain social distance (CDC, 2020a). The disagreements in scientific communities and even among health authorities around the world due to the unknown nature of the virus and its characteristics can affect public knowledge, attitudes, and practice and also confused them by the propagation of misinformation without evidence. For example, a study in Taiwan at the time of the outbreak showed that Internet searches for COVID-19 and face masks were rapidly increased in the country (Husnayain, Fuad, & Su, 2020). Despite the WHO's advice and also the recommendation of Iranian Health authorities, there are still some resources and references have emphasized the use of masks for healthy people in the community (Feng et al., 2020).

The results in the attitude section were slightly different. For example, the results of the Chines study showed that 90.8% believed that COVID-19 will finally be successfully controlled. In our study, only 47.1% of respondents had a positive attitude toward the same question. There are several possible reasons for the difference. First, in the attitude section of our study, the 5 points Likert scale was used to respond, so participants had more options than yes or no. For example, in Chines study, the first question was a three-choice and the second was a two-choice approach (Zhong et al., 2020). We also added two more questions to the attitude section. Another notable rationale is that, unlike China, this is the first widespread viral disease epidemic in the country in recent decades that has affected everyone. Therefore, the lack of experience in this field may cause a poor attitude among the people. For instance, the level of healthcare providers' attitude toward MERS-CoV infection was reported to be very poor due to the novelty of disease and lack of experience in dealing with it (Nour et al., 2015). The other important reason for the relatively negative attitude of Iranians compared to the Chinese toward the common question may be attributed to the current economic and political situation of Iran because of the imposition of the toughest sanctions(Takian, Raoofi, & Kazempour-Ardebili, 2020), an important factor that can undermine people's confidence.

Due to proper public education and raising the level of knowledge, our findings suggest that Iranians behaved well in the early stages of the COVID-19 outbreak. Further, the outcomes of Pearson correlation test indicated a positive correlation between sample knowledge, attitude and practice. So sufficient public training will undoubtedly affect people's behavior. According to the Worldmeters data on 30 April 2020, from early

April, the daily Coronavirus active and new cases and also its death have been declining (Worldmeters.info, 2020). Definitely, proper practice of people in observing national preventive protocols is one of the most important causes of the reduction of cases.

CONCLUSION

In summary, our findings suggest that despite the rapid dissemination of reliable and unreliable information about COVID-19 through cyberspace, the Iranian people have sufficient knowledge to deal with COVID-19 outbreak. Although they may not have enough confidence and a good attitude toward success in the battle for a variety of reasons, the proper behavior of the people ultimately helped the government to control the disease in a desirable way.

ACKNOWLEDGMENT

This research has been financially supported by the grant (Project No: 23423) from Shahid Beheshti University of Medical Sciences (SBMU), Tehran, Iran. In addition, the authors are grateful to express their gratitude for the support of the School of Public Health and Safety at SBMU.

ETHICAL STATEMENT

The study was approved by the Ethics Committee in Research of the School of Public Health and Safety, SBMU. Also consent of participants was taken prior to the response.

CONFLICT OF INTERES

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The analyzed data in the original language are available on https://survey.porsline.ir/r/5rQukYZ. Additional data are available on request from the corresponding author.

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Table 1- Questions/Items used in each section of the questionnaire

Sections of questionnaire/ question ID	Questions or items
Knowledge section	
KQ1	Clinical symptoms of COVID-19
KQ2	Treatment of COVID-19
KQ3	Severity of clinical symptoms
KQ4	Possibility of transmission by asymptomatic
KQ5	Transmission of the disease through respiratory droplets
KQ6	Using masks
KQ7	Preventive measures for children and adolescents
KQ8	Going to crowded places
KQ9	Using chlorine-based disinfectants

Sections of questionnaire/ question ID	Questions or items
KQ10	Isolation of COVID-19 patients
KQ11	Quarantine of patients with suspected COVID-19
KQ12	Unnecessary trips
KQ13	Using alcohol-based disinfectants
Attitude section	
AQ1	The country's success in controlling COVID-19
AQ2	Proper informing and public education and training by authorities
AQ3	Public compliance with preventive regulations
AQ4	Having adequate information by respondent
Practice section	
PQ1	I have gone to crowded places during the outbreak
PQ2	I have visited my relatives during New Year holidays
PQ3	I have observed physical distancing during the outbreak
PQ4	I regularly wash my hands with soap and water

Characteristics of respondents		Number of respondents (%)	Knowledge score (mean±
Gender	Female	711(43.7)	89.09±10.94
	Male	917(56.3)	86.78±13.25
Age group (year)	18-25	207(12.7)	85.19±13.44
	26-35	549(33.7)	87.65±12.68
	36-45	542(33.3)	89.16±11.39
	46-55	208(12.8)	88.72±11.79
	>55	122(7.5)	85.21±13.02
Marital status	Married	1122(68.9)	88.22±12.11
	Single	506(31.1)	86.83±12.80
Education level	Under Diploma	96(5.9)	78.66±17.64
	Diploma and Associate's degree	407(25)	85.04±14.70
	Bachelor and master's degree	1030(63.3)	89.34±10.21
	Doctorate and PhD	95(5.8)	92.02±9.44
Relation of education to health	Relevant	431(26.4)	91.59±8.41
	Irrelevant	1197(73.6)	86.42±13.22
Occupation	Related to healthcare	153(9.4)	93.46±7.29
	Employee	598(36.7)	88.38±11.94
	Worker	91(5.6)	83.50±13.53
	Retired	96(5.9)	87.08±13.66
	Salesman and businessman	153(9.4)	84.69±14.03
	Student	164(10.1)	87.15±11.39
	Others	373(22.9)	87.30±12.82
Place of residence	City/Town	1566(96.2)	87.81±12.42
	Village	62(3.8)	87.32±10.24

Table 2- Demographic characteristics of respondents and KAP scores by demographic variables

Table 3- Main categories of knowledge questions and average responses to each option

Main category	%	%	%
	Correct response	Wrong response	I don't know

Main category	%	%	%
Preventive measures	87.40	9.0	3.60
Disease control	95.25	1.7	3.05
Treatment of COVID-19	95.60	1.4	3.10
Clinical symptoms of the disease	83.50	11.0	5.45
Transmission routes	82.25	7.8	10.05

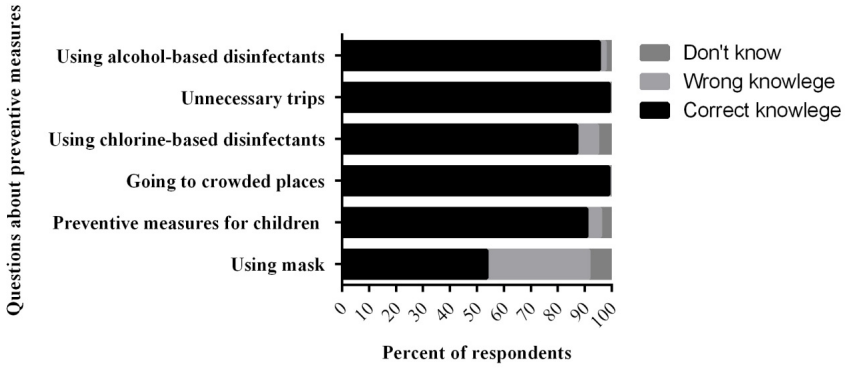

Figure 1- Knowledge level of participants regarding preventive measures questions

Table 4 -Attitude of respondents toward prevention and control of COVID-19

Attitude questions	%	%	%
	Positive attitude	Negative attitude	No idea
Country will finally control the outbreak	47.1	20.9	31.9
Public training is good enough	63.7	20.9	15.4
Public follow the principles of prevention	17.2	63.7	19.1
I have enough information about the principles of prevention	85.6	3	11.4

Table 5 - Practice of respondents regarding COVID-19 control and prevention

Practice questions	%	%	%	%	%
	Always	Often	Occasionally	Seldom	Never
I have gone to crowded places during the outbreak	0.6	2.2	9.5	30.8	56.9
I have visited my relatives during New Year holidays	0.1	0.2	2.6	15.5	81.5
I have observed physical distancing during the outbreak	55.6	30.8	6.9	5.3	1.4
I regularly wash my hands with soap and water	82.2	15.7	1.4	0.4	0.3

Table 6 -The results of Pearson correlation test

		Scaled sc
Scaled score of knowledge	Pearson Correlation	1
	Sig. (2-tailed)	
	N	1628

Scaled score of attitude	Pearson Correlation	.145**
	Sig. (2-tailed)	.000
	N	1628
Scaled score of Practice	Pearson Correlation	.179**
	Sig. (2-tailed)	.000
	N	1628

. Correlation is significant at the 0.01 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed). **. Corre