

Public knowledge, attitudes, and practices regarding the coronavirus disease pandemic: a cross-sectional study in the Kurdistan region, Iraq

Running title: Public KAP toward the COVID-19 pandemic

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Abstract:

Background/Objectives: Coronavirus disease (COVID-19) is an emerging viral respiratory disease that has currently reached a pandemic status. This study aimed to assess COVID-19 knowledge, attitudes, and practices among the Kurdish population in Iraq.

Methods: This cross-sectional study was conducted from July 15 to September 15, 2020 among the Kurdish population in Iraq. A total of 885 subjects were interviewed. All subjects were aged 15–75 years. Knowledge scores, attitudes, and practices of subjects were analyzed according to demographic characteristics.

Results: The study subjects were largely male, the average age was 31.79 years, and 41.92% of subjects were from Erbil province. Approximately 85.31% of subjects had enhanced knowledge regarding disease prevention and control. The lowest subscale scores were related to clinical manifestations of the disease. Knowledge scores were significantly associated with age, place of current residence, and level of education. A large number of participants believed COVID-19 would be controlled and the fight against the pandemic would be won. Subjects' attitudes toward success differed significantly by demographic characteristics, except marital status. Approximately 40.03% of subjects reported that they had not visited a crowded place, and 60.22% of these subjects wore face masks when leaving home.

Conclusions: This study found good knowledge, positive attitudes, and proper practices among the general population regarding the COVID-19 pandemic. However, community-based health campaigns in the region should encourage optimistic attitudes and appropriate practices regarding virus

containment and dissemination. Our findings may be used as a baseline for planning health education campaigns in the region.

Keywords: Attitudes, Iraq, Kurdistan region, Knowledge, Practices, Public health, severe acute respiratory syndrome coronavirus 2

Introduction

Coronavirus disease (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is an emerging viral respiratory disease. Its outbreak was first recognized in December 2019 in Wuhan city, China (1). On March 11, 2020, the World Health Organization (WHO) declared the COVID-19 outbreak a pandemic and a community health emergency (2). The common clinical signs associated with this disease are fever, cough, respiratory symptoms, shortness of breath, fatigue, and myalgia (3). SARS-CoV-2 infection may cause severe acute respiratory syndrome (SARS), pneumonia, kidney failure, and eventually death in severe cases.

Contact and respiratory precautions are essential to reduce the spread of COVID-19 (4). The Kurdistan Regional Government has adopted various measures to prevent and control COVID-19. These measures include locking down all schools, restricting large public gatherings such as weddings and funerals, social distancing, hand hygiene, closing borders, closing airports, positioning health facilities for treatment, isolating infected people, and quarantining suspected cases (5, 6). Since March 15, 2020, the Kurdistan authorities have locked down the region and issued stay-at-home orders for people (7). Community health prevention programs cannot be successful without health education programs. These programs increase public commitment to control infection (8, 9). Community-based education programs have significant influence that may be used to help prevent the spread of COVID-19 among the general population (10, 11). Lack of knowledge, unfavorable attitudes, and practices such as visiting crowded places along with inappropriate use of masks may also contribute to the increasing spread of COVID-19 (12, 13).

Primary COVID-19 prevention can be accomplished through improvement of community-based programs regarding COVID-19 knowledge, attitudes, and practices. Detection and isolation of active cases within the general population is also necessary (14, 15). Examining the knowledge, attitudes, and practices of the general population and evidence of disease transmission and prevention are necessary to assess the public's knowledge regarding the disease. Hence, this study aimed to determine the level of knowledge as well as the attitudes and practices associated with the COVID-19 pandemic among the Kurdish population in Iraq.

Methods

Study design and population

This cross-sectional survey was conducted among the general population in the Kurdistan region of Iraq from July 15 to September 15, 2020. A total of 885 randomly selected participants aged 15–75 years were interviewed face to face. In total, there were 531 male participants and 354 female participants.

Measurements

The Knowledge, Attitudes, and Practices (KAP) Questionnaire used in this study was based on a previous study conducted in Hubei City, China (16) followed the original guidelines for the

management of COVID-19 put forth by the National Health Commission of the People's Republic of China (17)

The study questionnaire was composed of two sections. The first section consisted of demographic characteristics, including sex, age, education level, marital status, and place of residence (the three provinces in the Kurdistan region of Iraq including Duhok, Erbil, and Sulaimani).

The second section contained KAP questions. The knowledge component consisted of 12 questions (Table 1)—four questions (K1–K4) regarding the clinical manifestations of the infection, three questions (K5–K7) regarding the modes of transmission, and five questions (K8–K12) regarding the prevention and control of the infection. Participants answered “True,” “False,” or “I am not sure.” Each correct answer was given a score of 1, and an incorrect answer or no answer was given a score of 0. A subject received a total knowledge score of 0–12, with higher scores representing an good level of knowledge concerning COVID-19.

In addition, attitudes toward COVID-19 were assessed using two questions (A1 and A2; Table 1). The first question measured agreement or disagreement concerning whether COVID-19 was completely controlled. The second question measured the confidence of Kurdish people's capability to win the fight against the disease. Further, practices were assessed using two questions regarding behavior (P1 and P2; Table 1). These questions asked participants to report whether they had visited a crowded area and whether they used a face mask when leaving home during the pandemic.

Ethics consideration

The study procedure, methods of obtaining consent, and format of informed consent were approved by the Ethical and Scientific Committee of Zakho Medical College, University of Zakho. Informed consent was obtained from all participants prior to the interviews.

Statistical analysis

Knowledge scores, attitudes, and practices of the various subjects, according to demographic characteristics, were compared using one-way analysis of variance, the independent samples *t*-test, or the chi-square and Fisher's exact test as appropriate. A *p*-value of <0.05 was considered statistically significant. GraphPad Prism version 8 software was used for statistical analysis.

Results

Demographic characteristics

A total of 855 subjects were recruited for this study. The average age of the participants was 31.79 years (standard deviation: 11.98, range: 15–79). Approximately 531 (60.0%) participants were male, and 371 (41.92%) participants were from Erbil province (Table 2). In total, 455 (51.41%) participants were aged 15–29 years, and 522 (58.98%) participants were married. Additional demographic characteristics are shown in Table 2.

Assessment of knowledge

The correct answer rate for all 12 questions regarding knowledge of COVID-19 was 37.51%–89.03%. The correct answer rates for the knowledge of each item are listed in Table 1. The mean COVID-19 knowledge score was 9.19 ± 2.91 (range: 2–12, Table 2). This demonstrated a moderate-to-high rate of knowledge. COVID-19 knowledge scores were significantly associated with age,

place of residence, and education level ($P < 0.001$, Table 2). Sex ($p < 0.67$) and marital status ($p < 0.188$) were not significantly associated with knowledge scores (Table 2).

The average rate of COVID-19 knowledge among the Kurdish people was 76.31% (Table 3). Participants showed high knowledge toward infection prevention and control subscale with 85.31% correct answers (Table 3). The lowest subscale scores were for the clinical manifestations of the disease (65.73%, Table 3).

Assessment of attitudes

Participants demonstrated mixed opinion on whether COVID-19 will be successfully controlled. Approximately 546 (61.69%) subjects agreed that the infection will be controlled (Figure 1). Participants' attitudes toward final success were significantly associated with all demographic variables, except marital status ($p < 0.94$, Table 4). In addition, participants responding "Disagree" and "I am not sure" regarding the final success in controlling the infection had significantly lower COVID-19 knowledge scores than those responding "Agree" ($p < 0.001$, Table 4). Approximately 572 (64.63%) respondents were confident that the Kurdish authority would be successful, while the remaining 313 (35.37%) respondents disagreed (Figure 1). The attitudes concerning confidence in winning the battle against the pandemic differed significantly with age ($P < 0.001$) and place of residence ($P < 0.001$, Table 4). Furthermore, the total knowledge scores were notably lower in people without confidence than in those with confidence regarding winning the fight against the pandemic ($P < 0.001$, Table 4).

Assessment of practices

In terms of practice, nearly 372 (42.03%) participants reported that they had not visited a crowded area in recent days (Figure 2). The rate of this practice among participants differed significantly by sex ($P < 0.002$), age ($p < 0.02$), and place of residence ($p < 0.006$, Table 5). Additionally, approximately 533 (60.22%) participants reported that they currently used a mask when leaving home (Figure 2). The rate of this practice differed significantly according to the demographic characteristics of the participants (Table 5). Furthermore, people who visited a crowded place had a significantly lower knowledge score than those who did not ($P < 0.01$, Table 5). In addition, people who wore a mask outside the home had a significantly higher knowledge score than those who did not ($P < 0.001$, Table 5).

Discussion

In the present study, the overall knowledge score regarding COVID-19 was 76.31% among the general population. Participants showed good knowledge concerning the prevention and control of the infection (85.31%). This revealed that the massive community education campaigns (specifically via social media) during the outbreak were successful in providing active health education. This result is consistent with that reported by many other studies on COVID-19 KAP among university students in China (18) and the Kurdistan region of Iraq (13). However, compared to other studies involving the general population of China (16), the Kurdish participants of this study had a significantly lower COVID-19 knowledge score. Among the Chinese population, the knowledge score was 90%. However, the Kurdish participants correctly answered approximately 76.31% questions. This is most likely because the Chinese study measured COVID-19 symptoms using direct questions rather than requesting the participants to select from multiple responses. Our study also revealed that the knowledge scores of individuals aged > 50 years, people living in Erbil

province, and individuals who had a master's degree or above had significantly higher scores than other participants ($P < 0.001$). In addition, knowledge scores were significantly higher in Duhok province than in other provinces ($p < 0.001$). Hence, the case fatality rate of COVID-19 in Duhok province was lower than that in other provinces (19). Generally, most participants had good knowledge regarding the clinical symptoms, treatment, vaccine unavailability, and methods of prevention and control of COVID-19. This is in line with results of studies conducted in Vietnam (20) and China (16) concerning COVID-19 KAP. Furthermore, our results regarding the differences in responses according to age, sex, marital status, and education level related to COVID-19 KAP were very similar to those of previous studies conducted in Iraq (13).

It is important to note that approximately 85.31% participants correctly answered questions regarding COVID-19 prevention and control measures, and 77.36% correctly answered questions regarding modes of transmission. The good knowledge of these participants may be explained by several factors. These include the seriousness of the infection and the effectiveness of media campaigns and educational programs concerning the disease in the region. In addition, this sufficient knowledge reflects a good relationship between participant's understanding and the information available regarding COVID-19. This includes information on social media, on television, and in literature. However, participants were only confused regarding knowledge questions about the clinical manifestations of the disease (65.73%), particularly the question "Unlike the common cold, stuffy nose, runny nose, and sneezing are less common." The confusion among participants may be due to misinformation regarding COVID-19. These results suggest that social media campaigns must focus on the clinical manifestations of the disease and isolation of suspected and active cases to avoid an outbreak in the region.

This study reports another important finding—most respondents had an optimistic attitude toward conquering COVID-19. This is expected because the outbreak is widely covered by regional and international social media. The Kurdish people's positive attitude was attributed to the unprecedented control measures implemented by the Kurdistan regional government to prevent the spread of COVID-19 (5). The measures included lockdown of cities, workplaces, shopping malls, and closure of educational institutions. Nearly 62.0% participants were confident that the COVID-19 pandemic would eventually be controlled, and 64.63% participants were confident that the Kurdistan region would win the fight against the COVID-19 pandemic. It was projected that most participants would be optimists regarding the questions related to attitude as substantial time has passed since the pandemic situation was declared. These findings are consistent with those of several previous studies on COVID-19 in Iraq and China (13, 16), in which most of the respondents agreed that the COVID-19 pandemic would be successfully controlled. They expressed confidence that their region would win the fight against COVID-19 and that their country was working satisfactorily to control the pandemic. During the COVID-19 pandemic, there was a shortage of personal protective equipment globally to help prevent the pandemic (21). This would be why some participants had an unfavorable attitude. It was also observed that sex, age, place of residence, and education levels were significantly associated with attitudes toward COVID-19. In addition, the present study found that higher knowledge scores concerning the infection were significantly associated with a higher likelihood of optimistic attitudes and good practices during the COVID-19 pandemic.

Surprisingly, more than half of the recruited subjects (57.97%) did not avoid crowded places and only approximately 40% respondents used a face mask when leaving home. The emergence of

COVID-19 caused a substantial rise in requests for hand sanitizers and medical face masks in the region, and supplies were very limited. The limited supply of face masks meant that most of the community were unable to obtain them. Our findings are consistent with those of studies performed in Malaysia (22) where only half of the participants (51.2%) wore masks when leaving home. However, a study conducted in China during an outbreak found that 96.4% of the recruited participants avoided crowded places and 98% used a face mask when leaving home during the COVID-19 pandemic (16). These results are consistent with those of several studies suggesting that higher education levels, sex, age, and knowledge predicted positive practices regarding COVID-19 (13, 16). These differences could be due to participants who do not have satisfactory knowledge and are not educated; therefore, they are not likely to engage in positive practices. The majority of community-based studies and online surveys most likely recruited participants who could read and write. This might have affected the higher reports of high levels of knowledge scores, good attitudes, and positive practices associated with COVID-19 (22-25).

The present study has several limitations. First, the study sampling method was conducted among a community via an in-depth interview (face-to-face interview), and the small sample size may not represent the general population of the region. Therefore, there is a probability of bias as underprivileged populations might not have been able to participate in this study. Second, social desirability bias was also possible, particularly regarding questions associated with attitudes and practices. Third, the KAP assessment of the instrument was previously designed based on a survey in China (16). However, due to the constrained time and urgency of the study, we did not have time to create a new measurement and conduct validity and reliability testing procedures. Finally, possible factors related to knowledge, attitudes, and practices, including health literacy and risk perceptions (26) were not analyzed in the present study. These factors may have been a valuable addition to the understanding of the knowledge, attitudes, and practices associated with COVID-19 in the Kurdistan region of Iraq.

Conclusion

The present study provides an inclusive assessment of the knowledge, attitudes, and practices of the Kurdish population regarding COVID-19. Our results suggest that the Kurdish people have good knowledge regarding COVID-19. They are largely positive in their outlook on overcoming the pandemic. The participants had better knowledge on the prevention and control of the infection rather than that on the mode of transmission and/or clinical manifestations of the disease. Most participants were completely confident that the local authority of the region would control the infection successfully and would win the battle against COVID-19. In addition, most respondents avoided practices that increased the risk of spreading such infection, such as not using a mask when leaving home. These findings highlight that consistent messaging from local health authorities is a key point to improve public health knowledge and understanding of COVID-19. Furthermore, several people in the population may benefit from health education campaigns to raise COVID-19 knowledge and improve preventive measures against COVID-19. Our findings may be used as a baseline for planning health awareness education campaigns in the future.

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Table 1. Questionnaire regarding knowledge, attitudes, and practices toward COVID-19 among the general population

Questions	Statement		
Knowledge toward COVID-19 (correct rate, % of total participants)			
K1. The main clinical symptoms of COVID-19 are fever, fatigue, dry cough, and myalgia (89.03%)	TRUE	FALSE	Not sure
K2. Unlike the common cold, stuffy nose, runny nose, and sneezing are less common in persons infected with COVID-19 (37.51%)	TRUE	FALSE	Not sure
K3. There currently is no effective cure for COVID-19, but early symptomatic and supportive treatment can help most patients recover from the infection (83.39%)	TRUE	FALSE	Not sure
K4. Not all persons with COVID-19 will develop to severe cases. Only those who are elderly, have chronic illnesses, and are obese are more likely to be severe cases (52.99%)	TRUE	FALSE	Not sure
K5. Eating or contacting wild animals would result in the infection by the COVID-19 virus (74.24%)	TRUE	FALSE	Not sure
K6. Persons with COVID-2019 cannot infect the virus to others when a fever is not present (79.77%)	TRUE	FALSE	Not sure
K7. SARS-CoV-2 spreads via respiratory droplets of infected individuals (78.08%)	TRUE	FALSE	Not sure
K8. Ordinary residents can wear general medical masks to prevent COVID-19 (77.74%)	TRUE	FALSE	Not sure
K9. It is not necessary for children and young adults to take measures to prevent COVID-19 (85.05%)	TRUE	FALSE	Not sure
K10. To prevent COVID-19, individuals should avoid going to crowded places such as train stations and avoid taking public transportations (88.71%)	TRUE	FALSE	Not sure
K11. Isolation and treatment of people with COVID-19 are effective ways to reduce the spread of the disease (73.35%)	TRUE	FALSE	Not sure
K12. People who have contact with someone infected with COVID-19 should be immediately isolated in a proper place. In general, the observation period is 14 days (81.69%)	TRUE	FALSE	Not sure
Attitudes toward COVID-19			
A1. Do you agree that COVID-19 will finally be successfully controlled?	Agree	Disagree	Not sure
A2. Do you have confidence that Kurdistan can win the battle against COVID-19?	YES	NO	
Practices toward COVID-19			
P1. Have you visited to any crowded place in recent days?	YES	NO	
P2. Have you worn a mask when leaving home in recent days?	YES	NO	
COVID-19, coronavirus disease			

Table 2: Participant's demographic characteristics and knowledge scores regarding COVID-19 by demographic variable

Variables	No. of participants (%)	Knowledge score (mean ± SD)	p-value
<u>Sex</u>			
Male	531 (60.0)	9.08 ± 2.09	<i>p</i> <0.67
Female	354 (40.0)	9.02 ± 2.07	
<u>Age (year)</u>			
15–29	455 (51.41)	8.94 ± 2.0	<i>p</i> <0.008
30-49	321 (36.27)	9.07 ± 2.04	
>50	109 (12.32)	9.51 ± 2.41	
<u>Marital status</u>			
Single	363 (41.02)	8.94 ± 2.09	<i>p</i> <0.188
Married	522 (58.98)	9.13 ± 2.07	
<u>Place of residence</u>			
Duhok	243 (27.34)	9.76 ± 1.63	<i>p</i> <0.001
Erbil	371 (41.92)	8.54 ± 2.39	
Sulaimani	271 (30.62)	9.13 ± 1.76	
<u>Education level</u>			
None	57 (6.44)	9.05 ± 2.38	<i>p</i> <0.001
Secondary school and below	126 (14.24)	8.75 ± 2.09	
High school	213 (24.07)	8.89 ± 2.27	
Diploma degree	158 (17.85)	8.44 ± 1.92	
Bachelor's degree	305 (34.46)	9.53 ± 1.86	
Master's degree and above	26 (2.94)	10.08 ± 1.57	

COVID-19, coronavirus disease

Table 3: Participants mean and percentage scores for COVID-19 knowledge among the general population

Questions classification	Number of Questions	Score (Mean \pm Standard Deviation)	Percentage score (%)
Clinical manifestations	(4) K1–K4	2.85 \pm 1.08	65.73
Routes of transmission	(3) K5–K8	2.03 \pm 0.86	77.36
Prevention and control	(5) K9–K12	4.31 \pm 0.97	85.31
Total knowledge scale	12	9.19 \pm 2.91	76.31

COVID-19, coronavirus disease

Table 4: Attitudes regarding COVID-19 by demographic variable among the general population

Variable	Attitudes regarding COVID-19, No (%) or Mean (Standard Deviation)							
	A1: Final success in controlling				A2: Confidence of winning			
	Agree	Disagree	Don't know	<i>p</i> -value	Yes	No	<i>p</i> -value	
Sex								
Male	343 (38.76)	90 (10.17)	98 (11.07)	<i>p</i> <0.007	351 (39.66)	180 (20.34)	<i>p</i> <0.214	
Female	203 (22.94)	54 (6.10)	97 (10.96)		224 (25.31)	130 (14.69)		
Age (year)								
15–29	270 (30.51)	56 (6.33)	129 (14.58)	<i>p</i> <0.001	270 (30.51)	185 (20.90)	<i>p</i> < 0.001	
30–49	205 (23.16)	56 (6.33)	60 (6.78)		235 (26.55)	86 (9.72)		
>50	71 (8.02)	32 (3.62)	6 (0.68)		70 (70.91)	39 (4.61)		
Marital status								
Single	225	60 (6.78)	78 (8.81)	<i>p</i> <0.94	231 (26.10)	132 (14.92)	<i>p</i> <0.328	

	(25.42)						
	321		117				
Married	(36.27)	84 (9.49)	(13.22)		341 (38.53)		181 (20.45)
Place of residence							
	139						
Duhok	(15.71)	65 (7.35)	39 (4.41)	<i>p</i> <0.001	147 (16.61)		96 (10.85) <i>p</i> < 0.001
	220		108				
Erbil	(24.86)	43 (4.86)	(12.20)		216 (24.41)		155 (17.51)
	187						
Sulaimani	(21.13)	36 (4.07)	48 (5.42)		218 (24.63)		53 (5.99)
Education level							
None	33 (3.73)	12 (1.36)	12 (1.36)	<i>p</i> <0.047	34 (3.84)		23 (2.59) <i>p</i> < 0.285
Secondary school and below	68 (7.68)	24 (2.71)	34 (3.84)		81 (9.15)		45 (5.09)
	146						
High school	(16.49)	24 (2.71)	43 (4.86)		141 (15.93)		72 (8.14)
Diploma degree	87 (9.83)	32 (3.61)	39 (4.41)		97 (10.96)		61 (6.89)
	190						
Bachelor's degree	(21.47)	50 (5.65)	65 (7.34)		200 (22.59)		105 (11.86)
Master's degree and above	22 (2.49)	2 (0.23)	2 (0.23)		22 (2.49)		4 (0.45)
COVID-19 knowledge score	9.44 (2.02)	9.19 (2.19)	8.39 (2.01)	<i>p</i> <0.001	8.8 (2.27)		9.19 (1.96) <i>p</i> < 0.001

Table 5: Practices associated with the COVID-19 pandemic by demographic variable among the general population in the Kurdistan region of Iraq

Practice toward COVID-19, No (%) or Mean (\pm Standard Deviation)

Variable	P1: Visiting to a crowded place			P2: wearing a mask		
	Yes	No	<i>p</i> -value	Yes	No	<i>p</i> -value
Sex						
Male	328	202	<i>p</i> < 0.002	304	227	<i>p</i> < 0.016
Female	185	170		229	125	
Age (year)						
15–29	263	192	<i>p</i> < 0.029	252	203	<i>p</i> < 0.008
30–49	197	124		207	114	
>50	51	58		74	35	
Marital status						
Single	204	157	<i>p</i> < 0.255	194	168	<i>p</i> < 0.001
Married	309	215		339	184	
Place of residence						
Duhok	148	95	<i>p</i> < 0.006	104	139	<i>p</i> < 0.001
Erbil	192	179		283	88	
Sulaimani	172	99		146	125	
Education level						
None	41	16	<i>p</i> < 0.208	20	37	<i>p</i> < 0.001
Secondary school and below	71	54		62	64	
High school	131	82		113	100	
Diploma degree	93	65		98	60	
Bachelor's degree	167	138		215	90	
Master's degree and above	14	12		24	2	
COVID-19 knowledge score	8.9±2.04	9.26±2.12	<i>p</i> < 0.01	9.29±1.99	8.69±2.15	<i>p</i> < 0.001

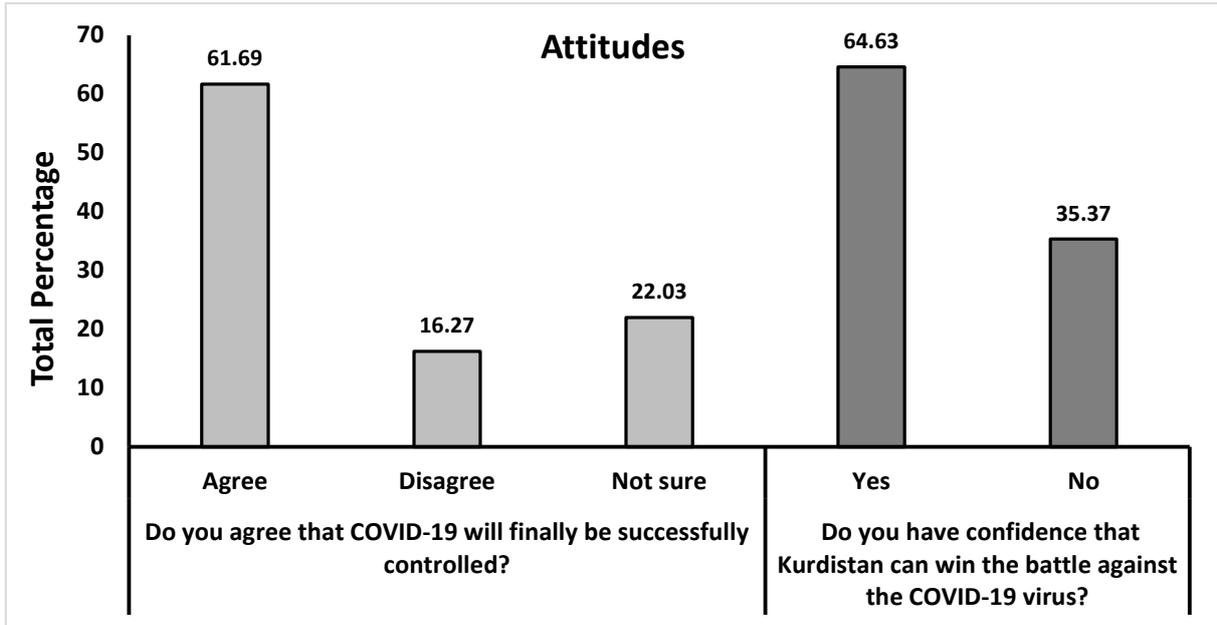


Figure 1: Total percentages of participants attitudes toward COVID-19 (N=885)
 COVID-19, coronavirus disease

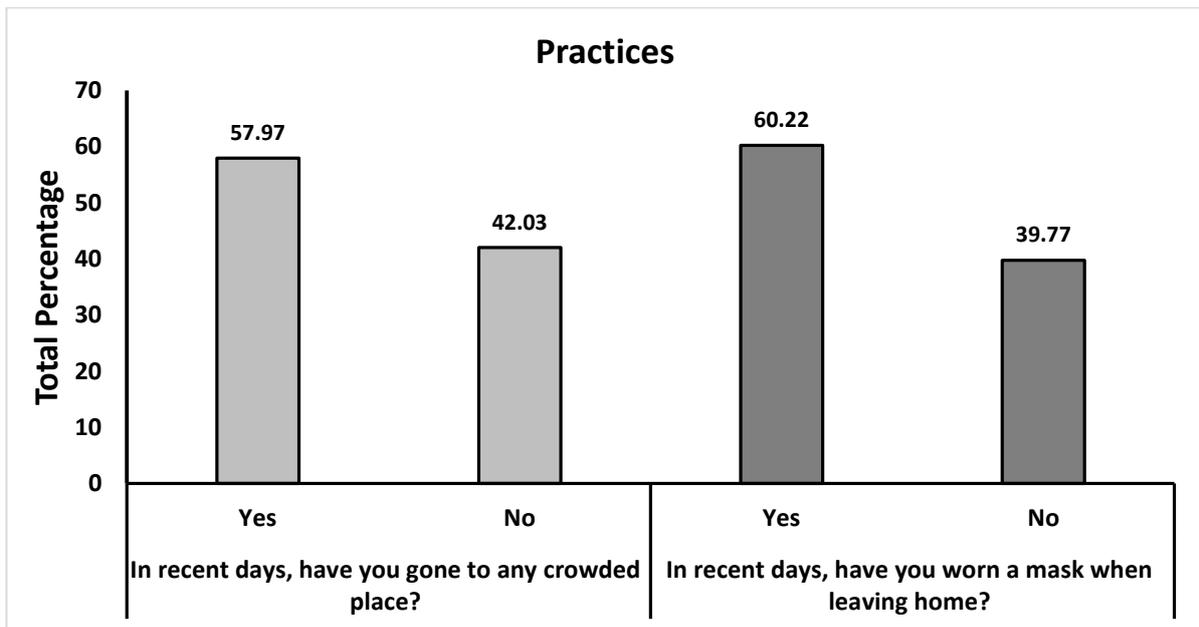


Figure 2: Total percentages of participants practices associated with COVID-19 (N=885)
 COVID-19, coronavirus disease