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KNOWLEDGE, ATTITUDES AND PRACTICES TOWARD COVID-19 AMONG POPULATION: AN ONLINE-BASED CROSS-SECTIONAL STUDY FROM SYRIA

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ABSTRACT

Background: COVID-19 is a highly contagious disease which achieved a pandemic status. Adherence toward control measures is affected by knowledge towards disease. This study aimed to determine the knowledge, attitudes and practices toward COVID-19 among the Syrian during the lockdowns period. **Methods:** It is a web-based cross-sectional study that carried out at the end of June, among Syrian internet users. Self-reported structured questionnaire was used. Participant's demographic characteristics and source of information regarding COVID-19 were analyzed. The association between participant's demographic characteristics and scores regarding knowledge, attitude and practice was tested using appropriate statistical tests. **Results**: The average age of 4336 participants was 39.9 ±12.2 years. Out of (59.2%) were women, (43.9%) has university degree or higher, 29.7% work in healthcare or medical field, (72.3%) were urban residents and half of them from middle region of Syria. The overall correct rates of knowledge, attitude and practice were 73.7%, 47.3% and 65.8 % respectively. In general, three quarter of participants had good knowledge; half of them had moderate practice and attitude. Females, rural residents and low educated people have lower knowledge about COVID-19. The sources of information for Syrian population about COVID-19 were TV/satellite channels followed by social media. **Conclusion**: This study suggest that Syrian population exhibit good knowledge, moderate practice and attitude towards COVID-19. Personal protective behavior needs to be improved and strengthened through TV and social media, the mean source of information for Syrian community.

KEY WORDS: Knowledge, Attitude, Practice, COVID-19, Syria.

INTRODUCTION

Novel Coronavirus is a large RNA virus, with a typical crown-like appearance under an electron microscope due to the presence of glycoprotein spikes on its envelope. It belongs to the family Coronaviridae of the order Nidovirales.[1,2]

The first cases of coronavirus disease 2019 occurred in Wuhan, China in December 2019.[3] On the February 12th, the WHO permanently named the 2019-nCoV pathogen as SARS-CoV-2 and the causing disease as coronavirus disease 2019 (COVID-2019)[4] Since then, it has rapidly spread and achieved a pandemic status as declared by WHO on 12th March 2020. [4, 5] The case fatality rate among infected people is varying in different countries. However, global case fatality rate is presently around 3.92%.[6, 7]

COVID-19 is considered a highly contagious, has an incubation period of 2–14 days. Its clinical features ranged from asymptomatic course to requirement of hospitalization in the intensive care unit.[5, 7] The most common symptoms in mild to moderate patients are fever, fatigue, and dry cough, followed by other symptoms including headache, nasal congestion and sore throat.[6,7] A minority of patients had gastrointestinal symptoms, such as nausea, vomiting, and diarrhea.[8]

In Syria, the first case of COVID-19 was detected on March 22th in Damascus; later at the end of March 4 cases including two deaths were confirmed by Syrian

Ministry of Health.[9] Prior to that, the Syrian Prime Minister enforced lockdowns procedure on March 18th 2020, that include restricted individuals from leaving the country and all foreigners from entry, beside closure of unnecessary businesses, public transportation, schools, and universities. During the lockdown period, curfew was enforced from 6 pm to 6 am and residents are advised to stay home at day unless there is an emergent need.[10] However, the lockdowns began to loosen gradually, allowing businesses and markets to open if they adhered to public safety measures like distancing and disinfecting surfaces.

Currently, there were no FDA approved vaccines or drugs for treatment of COVID- 19.[11] The most practical available solution to prevent the spread of the virus is to limit the community activities between people.[12] According to WHO, social distance and self-isolation; and lockdown are two important nationwide social measures.[13]

It was reported that despite the mandatory nature of public protective measures, the adherence to each of them is moderately and poor among the poor knowledge population.[14] Public awareness of dealing with infectious diseases plays a vital role in limiting the spread of the infection.[15] Attitudes towards government measures to contain the epidemic are highly associated with the level of knowledge about Covid-19.[15, 16] Thus, this study aimed to assess the knowledge, practice and attitude towards COVID-19 and determine associated factors among Syrian community.

METHODS

Study setting

The web-based cross-sectional study was carried out at the end of June, 2020 among Syrian internet users. A self-reported structured questionnaire was prepared using the Google forms and the link was distributed to respondents, via social media platforms.

Study toll

The questionnaire was developed by the authors in Arabic language and further translated to English for preparing the study report. To assure the quality of data, the questionnaire was pre-tested and necessary modifications of the questionnaires were carried out. Individuals living in Syria, aged 15 years or older were participated in this study.

The questionnaire consisted of five sections. The first section gathered respondents' socio-demographic information. The second section assessed participants' knowledge of COVID19 using 18 questions on a true/false basis and an additional "I don't know" option, a correct answer was assigned 1 point and an incorrect/unknown answer was assigned 0 point. The third and fourth sections assessed participants' practice and attitude towards COVID-19 using 13 and 6 questions respectively on agree / disagree and an additional "sometimes" option for practice questions and "maybe" option for attitude questions. Correct answers in the section of practice and attitude had 1 point, while incorrect answers / sometimes or maybe answer had 0 point. Participants' overall knowledge, practice and attitude were categorized, as good if the score was between 70% and 100%, moderate if the score was between 40% and 70%, and poor if the score was less than 40%. In last section the source of the individuals' information about COVID-19 was clarified.

Ethical Considerations

The present study was approved by Ethics Committee of Al-Wataniya University. The purpose of this research was explained to the participants on the first page of questionnaire. The submission of the answered survey was considered as consent to participate in the study. Participant's anonymity and confidentiality were ensured.

Statistical analysis

The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 26. Frequency, percentage, scores means were calculated under descriptive analysis. The association between participant's scores regarding knowledge, attitude and practice; and demographic characteristics was tested using t- test and one-way ANOVA. The correlation between knowledge, practice and attitude was evaluated by Pearson correlation coefficient test. Multivariable analysis was done using linear regression to identify factors associated with poor knowledge. Chi square test (X^2) was used to find the differences among the categories of demographic characteristics regarding sources of information about Covid-19. In this study, $P< 0.05$ was considered as the significant level.

RESULTS

The survey was web-based and totally relied on the voluntary participation of all the eligible respondents so no prior sample size was calculated yet 4336 valid samples were collected during the survey period

Demographic information

A total of 4336 persons from 14 different governorate participated in the study. Out of the total, the average age was 39.9 years (SD = 12.2, range = 15–73), 2566 (59.2%) were women, (43.4%) has university degree or higher, 29.7% work in healthcare or medical field. Nearly three-quarter of them (72.3%) were urban residents and half of them from middle region of Syria. The distribution of gender, age, region, residence area, education level and occupation are detailed in Table 4.

Knowledge about COVID-19

Based on our results, the mean scores of knowledge of the 18 questions about COVID-19 was (13.27± 2.30) range 1-18, which indicates that overall correct rate of knowledge was 73.7%. The two-third of participants had good knowledge (66.2%), whereas (32.1%) had moderate knowledge and only (1.7%) had poor

knowledge. The distribution of answer rates for the rest of knowledge questions are shown in Table 1.

Differences in knowledge scores among different demographic characteristics were assessed using ANOVA and t-tests. Table 4 shows that knowledge scores were significantly different across genders (t = 3.2, P=0.02), age groups (F= 7.16, P<0.001), education level (F= 40.14, P<0.001), regions (F= 17.63 P<0.001), residence area (t = 2.7, P=0.04) and occupation group (F= 103.04, P<0.001). Higher knowledge scores were obtained among male participants, those between 45-54 year, holding postgraduate degree, working in medical field people and those from Southern region and urban area.

Table 1: Frequency of responses by the study participants for knowledge questions (n =4336).

Questions	True No. (%)	I'm not sure No. (%)	False No. (%)
K1- Covid- 19 is epidemic disease caused by novel corona virus	3878(89.4)	344(7.9)	114(2.6)
K2- Main common symptoms include fever, dry cough, sneezing, body aches and difficulty in breathing	4174 (96.3)	108(2.5)	54(1.2)
K3- Diarrhea, vomiting and intestinal cramp are one of COVID-19 symptoms	2400(55.4)	1172 (27.5)	764(17.6)
K4- Novel corona virus spread through respiratory droplets, which occur when infected people cough and sneeze	4262(98.3)	64(1.5)	10(0.2)
K5- Touching a contaminated surfaces or objects with virus , and then touching one's mouth, nose, or eyes lead to COVID-19 infection	2096 (48.3)	880(20.3)	1360(31.4)
K6- The disease could be transmitted from asymptomatic person	3286 (75.8)	668(15.4)	382(8.8)
K7- The incubation period of COVID-19 ranges from 2 to 14 days	4010 (92.5)	242(5.6)	84(1.9)
K8-it is possible to be infected without showing any symptom	3284(75.7)	668(15.4)	384(8.9)
K9- Close contact with the Coronavirus patient must be quarantined for a 14 days	4194 (96.7)	96(2.2)	46(1.1)
K10- Elderly and those suffer from chronic diseases at higher risk for mortality following getting COVID-19	3872 (89.3)	254(5.9)	210(4.8)
K11- Many pre-existing medications are tried to relieve symptoms	3756 (86.6)	438 (10.1)	142 (3.3)
K12- Infection with the novel Coronavirus always leads to death	96(2.2)	246(5.7)	3994 (92.1)
K13- The mortality rate due to COVID 19 exceeds 20%	578 (13.3)	1170(27)	2588 (59.7)
K14- Hospitalization speeds up recovery from COVID19	1656 (38.2)	1080 (24.9)	1600(36.9)
K15- Boosting the immune system is an important way to prevent infection	4124 (95.1)	124(2.9)	88(2)
K16- Antibiotics play an effective role in curing COVID19	858(19.8)	1182(27.3)	2296 (53)
K17- An effective drug for COVID-19 has been discovered.	112(2.6)	1134(26.2)	3090(71.3)
K18- An effective Corona vaccine will be available soon	1276 (29.4)	2406 (55.5)	654(15.1)

Attitude towards COVID-19

Based on participant's answers rates shown in Table 2, the scores mean of attitude for 6 questions about COVID-19 was (2.84± 2.8, range 0-6) which indicates that overall correct rate of attitude was 47.3%.

Our results reveal that 55.4% of respondents had moderate attitude, whereas 38.3%, 6.3% of respondents had good and poor attitude respectively. Table 4 shows that attitude scores were significantly varied across gender (t = 1.24, P=0.045), and regions (F= 6.88, P<0.001). Higher attitude scores were obtained among male's participants and those from Northern region.

Table 2: Frequency of responses by the study participants for attitude questions (n =4336).

Questions	Agree No. (%)	Maybe No. (%)	Disagree No. (%)
A1- I think that this disease is dangerous	2142(49.4)	1344(31.0)	850(19.6)
A2- I am afraid of catching the COVID-19	1348(31.1)	832(19.2)	2156(49.7)
A3- I think this virus was designed as a biological weapon	1148(26.5)	2350(54.2)	838(19.3)
A4- I think the media coverage about this disease are exaggerated	1694(39.1)	1118(25.8)	1524(35.1)
A5- the lockdowns procedure is necessary	2976(58.6)	664(15.3)	696(26.1)
A6- the lockdowns procedure has negative effects on economic situation	2986(68.9)	494(11.4)	856(19.7)

Practice towards COVID-19

According to our finding, the scores mean of correct answer of the 13 questions was 8.55 ± 2.21 ranges 0-13 showing 65.8% of total achievable scores Table 3. About half of participants (54.1%) had good practice towards COVID-19, (36.5%) had moderate practice scores and only (9.4%) had poor practice scores. The practice scores varied significantly across age groups (F = 2.97, P=0.049), residence area (t = 3.17, P=0.002) and occupations (F= 2.18, P=0.044). Higher practice scores were obtained among participants aged 45-54 year, housewife and those from urban area Table 4.

According to the multivariable analysis, knowledge about COVID-19 was lower in females, in low educated participant as well as in the rural residents. The practices were poorer in the males and in rural residents. Attitude was lower in rural residents Table 5.

Pearson test showed that the participant's scores of knowledge and practice; scores of knowledge and attitude had no correlation with (r= -0.006, P=-0.7) and (r= -0.007, P= 0.7) respectively. Whereas, practice and attitude scores were significantly correlated (r= 0.212, P<0.001).

Table3: Frequency of responses by the study participants for practice questions (n =4336).

Questions	Agree No. (%)	Sometimes No. (%)	disagree No. (%)
In order to prevent contracting COVID19			
P1- I stay home and avoid unnecessary daily activities	3503 (80.0)	629 (14.5)	204(4.7)
P2- I always put a facemask outdoor	1775(40.9)	1074(24.8)	1487(34.3)
P3- I put a facemask in crowded places	2276 (52.5)	462(10.7)	1598(36.9)
P4- I use sanitizer and alcoholic solutions for hands decontamination	2630 (60.7)	916 (21.1)	790 (18.2)
P5- I wash my hands carefully with soap and water when return home	3523(81.3)	471 (10.9)	342 (7.9)
P6- I avoid handshaking, hugging, kissing	3680 (84.9)	486(11.2)	170 (3.9)
P7- I use the same facemask few days	324(7.5)	270(6.2)	3742(86.3)
In order to boost your immunity			
P8- I take vitamin supplements like vitamin and vitamin C	3216 (74.2)	662(15.3)	458(10.6)
P9- I eat garlic, onion, zingepera	2002 (46.2)	1208(27.9)	1126(26)
P10- I eat citrus frequently	2662(61.4)	1034(23.8)	640(14.8)
P11- I drink medicinal herbal tea*	1916(44.2)	1224(28.2)	1196 (27.6)
what to do in case suspecting infection with COVID-19			
P12- I visit a physician clinic	3064 (70.7)	766(17.7)	506(11.7)
P13- I take medication home	1988(45.8)	958(22.1)	1390(32.1)

* The most herbal plants reported by participants are chamomile 68%, ginger66.3%, thyme 60.9% , green mint 59.1%, rosemary 51%, common sage 42.4%.

Table 4: Univariable analysis of demographic characteristics of knowledge, attitude and practices about COVID-19.

Characteristics		NO. (%) Out of 4336	Knowledge		Practice		Attitude	
			Mean ± SD	Statistic test P value	Mean ± SD	Statistic test *P* value	Mean ± SD	Statistic test *P* value
Sex	Males	1770 (40.8)	13.34±2.49	t = 3.2 0.02	8.48± 2.23	*t* = 1.57 0.11	2.86±1.16	*t* =1. 24 0.045
	Females	2566 (59.2)	13.22±2.17		8.59±2.20		2.81±1.14	
Age (years)	15-24	1854 (42.8)	13.14±2.17	F= 7.16 <0.001	8.56± 2.26	*F*=2.97 0.049	2.87±1.13	*F*= 2.22 0.06
	25-34	1234 (28.5)	13.50±2.29		8.62± 2.15		2.79±1.16	
	35-44	532 (12.3)	13.03±2.37		8.31 ±2.25		2.80±1.17	
	45-54	392 (9.0)	13.52±2.57		8.65 ± 2.22		2.91±1.17	
	55 <	324 (7.5)	13.26±2.55		8.47± 2.14		2.74±1.15	
Education	Primary/Preparatory school	112 (2.6)	11.26±2.48	F= 40.14 <0.001	8.61± 2.19	0.968 0.41	2.87±1.18	*F*=0.65 0.58
	High school	2318 (53.5)	13.17±2.30		8.59± 2.22		2.85±1.15	
	University degree	1394 (32.1)	13.41±2.16		8.52 ±2.18		2.81±1.16	
	Postgraduate degree	512 (11.8)	13.77±2.40		8.42± 2.32		2.79±1.11	
regions	Northern region	978 (22.6)	13.17± 2.42	F= 17.63 <0. 001	8.62± 2.24	*F*= 0.997 0.408	2.90±1.07	*F*= 6.88 <0.001
	Middle region	2254 (52.0)	13.46±2.33		8.57± 2.25		2.82±1.17	
	Southern region	466 (10.7)	14.10±1.39		8.42 ± 2.13		3.36±1.14	
	Western region	600 (13.8)	13.41±2.12		8.46± 2.11		2.77±1.16	
	Eastern region	38 (0.9)	12.77±2.30		8.42± 2.59		2.76±1.15	
Area of residence	Urban	3134 (72.3)	13.37±2.28	t = 2.7	8.72±2.15	*t* = 3.17	2.83±1.14	*t* = 0.580

	Rural Area	1202 (27.7)	13.23±2.31	0.04	8.48 ± 2.24	0.002	2.84±1.15	0.955
Occupation	Free job	392 (9)	12.50±2.61	F= 103.04 <0.001	8.39± 2.02	*F*= 2.18 0.044	2.91±1.13	*F*=1.82 0.121
	Housewife	366 (8.4)	12.26±2.26		8.72±2.23		2.81±1.04	
	Student	1338(30.9)	13.21±2.11		8.63±2.21		2.87±1.12	
	Education Field	614 (14.2)	12.63±2.58		8.59± 2.23		2.76±1.12	
	Medical Field	1286 (29.7)	14.33±1.83		8.64 ±2.27		2.81±1.21	
	Engineering field	340 (7.8)	12.62±2.24		8.59±2.20		2.80±1.22	

Table 5: Linear regression analysis of variable associated with poor knowledge attitude and practice about COVID-19.

Variable	Coefficients	Std. Error	t	Sig.
Knowledge				
Sex (male)	-0.176	0.074	-2.37	0.017
Learning Level (Primary/Preparatory school)	0.363	.051	7.124	<0.001
Occupation (Housewife)	0.148	.026	5.620	<0.001
Area of residence (rural)	0.234	.038	6.160	<0.001
Attitude				
Area of residence (rural)	-0.767-	0.249	-3.080-	0.001
Practice				
Sex (male)	0.200	0.118	1.991	0.042
Area of residence (rural)	0.448	0.126	3.565	<0.001

Source of information

Participants were asked to determine the sources of their information about covid-19. The most commonly reported sources of knowledge were TV/satellite channels (92.1%), social media (78.1%), friends working in healthcare and medical field (66.7%) followed by the internet scientific web sites (39.1%).

Chi square test showed that using social media and net scientific web site as source of information were differing significantly among sex group. Resident area was associated with using TV and Health care working friends as source of information. All mentioned sources were differing significantly among occupation group Table 6.

DISCUSSION

While the governments around the world are harnessing all their efforts to stop the devastating spread of the epidemic, the new Corona epidemic continues to spread globally. Under these circumstances the bet would be mainly on the people's awareness in the communities and the strict commitment to preventive actions.[13,16,17]

The overall COVID-19 knowledge rate among Syrian population was 73.7%, indicating that most individuals were knowledgeable about this pandemic. This was predictable because the survey was conducted after two months of initiation government lockdown procedure. During this period, the participants were exposed to extensive government information about COVID-19 though local TV and satellite channels, besides flooding information and news reports displayed by social media and WHO site. Another reason could be the fact that half of the participants were highly educated and third of them work in healthcare and medical job.

The overall our study knowledge scores are similar to those reported in Egypt.[18] (74.5%) and higher to those reported in Iran (63%).[19] However, our knowledge score is lower than that reported in Bangladesh (79.4%),[20] Malaysia (80.5%),[21] Saudi (81.2%)[22] and China (90%).[16] It is worth mentioning that the lower knowledge scores were related to the questions that required deep main symptoms knowledge. However, main symptoms, incubation period and routes of transmission of COVID-19 are well recognized by majority of participants but less common symptoms like diarrhea and vomiting were only defined by half of them.

The most identified gap in knowledge among participants was related to disease treatment. Our study reported 19.8% of participants thought that antibiotics are effective for covid-19 comparing to 7.0 % reported in Egypt.[18] On the other hand, 80.7% knew that previous viral medication are used

Table 6: Source of information about COVID-19 among participants by socio-demographic variables.

Characteristics	NO. (%) Out of 4336	TV/satellite channels		Social media		Health care working friends		Net scientific web site	
		No (%)	X^2 value *P* value	No (%)	X^2 value P value	No (%)	X2 value P value	No (%)	X2 value P value
Total No.		3992 (92.1%)		3388(78.1%)		2892 (66.7%)		1696 (39.1%)	
Sex									
Males	1770 (40.8)	1646 (93.0)	3.5 0.07	1303(73.6)	3.49 0.03	624 (35.3)	5.7 0.09	1142 (64.5)	6.38 0.012
Females	2566 (59.2)	2346 (91.4)		2085(81.2)		1072 (41.4)		1750 (68.1)	
Age (years)									
15-24	1854 (42.8)	1718 (92.7)	6.85 0.158	1454(78.4)	9.67 0.27	738(39.8)	5.75 0.09	1240 (66.9)	1.05 0.82
25-34	1234 (28.5)	1132(91.7)		964(78.1)		488(39.5)		812 (65.8)	
35-44	532 (12.3)	482(90.6)		422 (79.3)		214 (40.2)		358 (67.3)	
45-54	392 (9.0)	354(90.3)		304(77.6)		144(36.7)		264(67.3)	
55 <	324 (7.5)	276(94.4)		244(75.3)		126(38.9)		218 (67.2)	
Education									
Preparatory school	112 (2.6)	102(91.0)	1.41 0.88	92(82.1)	5.6 0.54	50 (44.6)	0.38 .0.13	45 (40.1)	0.55 0.14
High school	2318 (53.5)	2138(92.2)		1804 (77.8)		922 (39.7)		1560 (67.3)	
University degree	1394 (32.1)	1282(92.0)		1104(79.2)		530 (38.0)		932 (66.9)	
Postgraduate degree	512 (11.8)	470(91.8%)		388 (75.8)		194 (37.9)		355 (69.3)	
Area of residence									
Urban	3134 (72.3)	2868(91.5)	4.75 0.029	2450 (78.2)	0.11 0.48	1264 (40.3)	7.04 0.004	2106 (67.2)	1.28 0.26
Rural Area	1202 (27.7)	1124 (93.5)		938(78.0)		432 (35.9)		786 (65.4)	
Occupation									
Treading Business	156 (3.6)	148(94.8)	22.54 0.027	126 (80.8)	32.22 0.004	60 (38.5)	11.30 0.04	104 (66.7)	39.74 <0.001
Housewife	366 (8.4)	322(88.0)		312 (85.2)		164 (44.8)		244 (66.7)	
Student	1338(30.9)	1236(82.4)		1050 (78.5)		520 (38.9)		1030 (76..9)	
Education Field	614 (14.2)	548(89.3)		482 (78.5)		254 (41.4)		440 (71.7)	
Medical Field	1286 (29.7)	1194(92.8)		692 (74.8)		496 (38.6)		784 (61.0)	
Engineering field	340 (7.8)	320 (94.1)		286 (84.1)		114(34.0)		228 (67.1)	
Free job	236 (5.4)	224(94.9)		170 (72.0)		88(37.3)		152 (64.4)	

to relieve symptoms, and only 2.6% of the participants reported the presence of a curing for COVID-19, which is close to 5.4% reported in Egypt.[18]

It noteworthy that the overall knowledge scores differences reported in different internet-based studies might be due to difference in participant's demographic characters, questions, scoring systems and period in which the studies were conducted.

Based on the overall practice score (65.8%), most of the participants took precautions to avoid infection by COVID-19 such as staying home, avoiding hand shaking and practicing proper hand hygiene. Our scores were lower than scores reported in Iran (78%),[19] China (94%)[16] and Bangladesh (92%).[20]

At the same context, 52.5% of participants put a facemask in crowded places which is much less than reported in China (100%),[16] Bangladesh (91%)[20] and Egypt (76.4%).[18] It is possible that the lack of supply, economic cost and the confusion caused by the mixed messages led to the lower response rate of face masks wearing when going out. WHO recommends using face masks only if a person has respiratory symptoms or caring for another person with symptoms.[23]

Our study found that the practices to prevent COVID-19 were associated with gender and residence area which is in line with the findings of studies conducted in China,[16] Iran[19] and Saudi.[22] However, level of education and occupation of our participants did not correlate to their practice scores which are contrary to previous studies.

People' risk perceptions can influence health-related behaviors and change risky behaviors.[24] Our study showed that only half of the participants thought that COVID-19 is dangerous and afraid of catching it. Similar rate was reported in Iran [19], whereas 86% Egyptian participants considered COVID-19 dangerous.[18] The optimism bias that some people exhibit can lead to underestimate their likelihood of contracting a disease and therefore ignore public health warnings.[25] Noteworthy that at the time of achievement of this survey only 28 cases and one death were confirmed by Ministry of Health laboratories. This may partially explain the poor and moderate practice scores of some participants.

Previous studies detailed that the higher the level of information, and education, the more the individuals would maintain a positive attitude and good practice towards Covid-19 preventive practices.[16, 19, 20, 22] This is contrary to our results where no association was found between knowledge and practice or knowledge and attitude.

Elders and housewife females had a lower level of knowledge and surprisingly higher practice score compared to other age and occupation groups respectively. The good practice score of both elder and housewife participant could be due a reflection of risk perception of COVID-19 rather than good knowledge.

According to response, (45.8%) of participants reported that they will take medication at home if they suspected of having infection. The Study conducted in Iran reported that 13.9% of participants stayed at home for self-treatment upon the occurrence of any suspected symptom of COVID-19. This response might be due to fear of social isolation and infection from others. Patients and their families felt judged by others and discriminated against by their community members and some patients might have felt shame and self-rejection.[26]

In order to prevent COVID- infection, the majority of participants takes vitamins supplements and to lesser extent eats citrus and drinks herbal tea. Many studies emphasized on importance role of vitamins, good nutrition for boosting immune system against infectious disease.[27, 28] At the same context, the antiviral activity of herbal plants mentioned by participant has been proven from multiple studies published before.[29, 30] The herbs used by our participants were well known as part of folk medicine that many Syrians used to practice.[31] Noteworthy, the current clinical guideline in China recommend using of both conventional medicine and traditional Chinese medicine (TCM) for the treatment of patients with infection of SARS-CoV-2 in China.[32] At the time of writing (September 17th), Syria recorded 3691 confirmed cases which are the lowest among other countries in the region.[33] It is likely that vitamins supplements and herbal plant has an influential role in this matter.

Recently, media are used as influential tools that utilized to enhance knowledge among communities. Based on the study in Egypt, people cited that their sources of knowledge about COVID-19 are social media (66.9%), the internet (58.3%) followed by TV/satellite channels (52.6%).[18] In addition, the Chinese study showed that social media platforms represented the most important source of information (92.0%), followed by TV (66.2%).[34]

Our finding recorded social media as the second most source of information about COVID-19 (78.1%) after TV/satellite channels (92.1%). This suggested that social media platforms and TV play important roles in delivering information. However, nonevidence-based information that is occasionally provided to people via Facebook may mislead them and transfer some incorrect information to them. In our study, about quarter of participants (26.5%) thought that the virus was designed as a biological weapon. Similar belief was reported by Egyptian (26.8%).[18] Many conspiracy theories appeared online since the early stages of the pandemic, leading to misinformation on the virus.[22, 35] Misconceptions about the disease may undermine efforts for immediate as well as long-term control measures.

The strength of this study lies in its large sample recruited during a critical period, the early stage of the COVID-19 outbreak in Syria. Nevertheless, the survey was limited to participants who had internet connectivity. In addition, our sample was obviously over-representative of women, well-educated people, and people engaging in medical work. Given the significant associations between these demographic variables and knowledge revealed in this study, we may have overestimated knowledge about COVID-19 among Syrian community.

It is necessary to conduct another study adjusting the methodology, trying to obtain results from a population with a lower education, older age and rural resident who are the ones at greatest risk.

CONCLUSION

Our findings demonstrated good knowledge, and reasonable practice and attitudes regarding COVID-19. However, personal protective behavior needs to be improved and strengthened through TV and social media, the mean source of information for Syrian community.

Although the government has taken major steps to educate the public and limit the spread of the disease, more effort is needed to educate and support the lower educated people, elders, and rural residence. These categories of the population may benefit from specific health education programs to raise COVID-19 knowledge and improve practices.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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