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Knowledge, attitude and practice regarding COVID-19 among Sudanese population during the early days of the pandemic: Online cross-sectional survey

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ARTICLE INFO

Article history:

Received 7 June 2020

Revised 7 November 2020

Accepted 27 November 2020

Keywords:

COVID-19
Knowledge
Attitude
Practice
Sudan

ABSTRACT

Background: Coronavirus disease (COVID-19) is an infectious disease caused by a new coronavirus strain. The first case of the disease was reported as pneumonia of unknown cause in late December 2019, in Wuhan, China, and then the disease started to spread to other countries. This study aimed to assess the knowledge attitude and practice of the Sudanese population toward COVID-19.

Methods: This cross-sectional online study was conducted among the Sudanese population. The Data was collected by using a self-administered online survey, the survey was in Arabic language and we tested it before the distribution. The data collection period was started from 31 March to 3 April 2020. We used an appropriate statistical test and a *p*-value of <0.05 was considered as statistically significant.

Result: About 62% of the respondents were females, and 55.1% aged 12–24 years. Our study determined that 68.3% of the study participants had a good knowledge toward COVID-19, and the majority (96.4%) knew that the COVID-19 is transmitted through droplets, while 89.9% of the participants had a positive attitude toward the COVID-19 pandemic. On the other hand, only 48.5% of the participants had a good practice toward COVID-19 pandemic. We also found that good knowledge is significantly associated with good practice.

Conclusion: Our participants had good knowledge, and positive attitude toward the COVID-19. Our findings revealed that education is positively associated with knowledge, and good level of knowledge is associated with good practice toward COVID-19. Efforts should focus more to raise the awareness among the less educated people.

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¹ Study concept and design, drafting of the article, final approval and agreement to be Accountable for the Accuracy and Integrity of all aspects of the work.

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Introduction

Coronavirus disease (COVID-19) is an infectious disease caused by a new coronavirus strain [3]. The disease was reported as pneumonia of unknown cause in late December 2019, in Wuhan, China, Later the World Health Organization (WHO) announced a name for the new coronavirus disease: COVID-19, and the virus was named: severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [9].

There were previous coronavirus outbreaks such as acute respiratory syndrome-Coronavirus (SARA-CoV) and Middle East Respiratory syndrome-Coronavirus (MERS-CoV) in 2003 and 2012 respectively. The current COVID-19 shows a lot of similarities to the former coronaviruses [7,15,14].

According to Johns Hopkins University and medicine COVID-19 report update on May 1st, the virus is confirmed in about 187 countries/regions with and 233,429 death worldwide [4]. In Sudan, according to Federal Ministry of Health (FMOH), the first COVID-19 case report was on March 13, 2020, the case is of a man in 50 s traveled from United Arab Emirate (UAE) in the first week of March where COVID-19 was prevalent, after that the number of new cases in Sudan began to raise. According to the WHO, COVID-19 virus transmission occurs either directly from close contact with an infected person via respiratory droplets or indirectly through infected immediate environment contain the virus or with objects used by/on an infected person [6].

COVID-19 affects different persons in different ways, usually with mild symptoms like fever, dry cough and tiredness, also it can be asymptomatic, fortunately, about 80% of COVID-19 patients will recover from the disease without the need of hospital treatment, but about one out of five will have severe illness and develop difficulty in breathing, most of those who developed severe symptoms were elderly people with underlying medical conditions like heart and lung disease, diabetes, high blood pressure or cancer; however, any patient can develop severe symptoms [5].

Nowadays the FMOH works hardly in collaboration with other organizations to raise the awareness of the overall population toward the COVID-19 pandemic. Measure the perception of the public toward the COVID-19 would help the FMOH to identify the gaps in knowledge, and so it can be filled, also we can correct the wrong practices toward the disease to break the chain of COVID-19 infection

Our study aimed to assess the knowledge attitude and practice of the Sudanese population toward COVID-19, a better understanding of the problem lead to effective intervention.

Materials and methods

Study area and participant

A cross-sectional community-based study was conducted to assess the knowledge, practice attitude toward COVID-19; it was focused on the Sudanese people who live in Sudan.

Data collection

The Data was collected by using a self-administered online survey via Google form it was uneasy to conduct a population-based survey in this critical condition. The survey was in the Arabic language and we tested it before the distribution. The link of the questionnaire will be distributed in different Sudanese social media channels. To minimize the missed data the respondent was required to fill all the survey items otherwise the respondent would not be able to move to the next page of the survey or submit the response. The data collection period was about four days (from March 31 and was closed on April 3, 2020).

The survey

We used a pretested, self-administered survey. Our survey includes four parts, the first part was about the socio-demographic characteristics and other parts were include questions about Knowledge, attitude and practice. Questions were chosen after reviewing previous similar studies.

Knowledge about the COVID-19 was assessed by using '9' questions. People who got more than 75% in the knowledge assessment section were considered as having adequate knowledge about the COVID-19.

Attitude toward the COVID-19 was assessed by using '3' questions. People who got more than 75% in the attitude assessment section were considered as having a positive attitude toward the COVID-19.

Practice toward the COVID-19 was assessed by using '5' questions. People who got more than 80% in the practice assessment section were considered as having good practice toward the COVID-19.

Data analysis

After data collection, data was imported from Google form to Microsoft Excel then reviewing the data using statistical package for social science (SPSS) version 25 for data analysis. We used the appropriate descriptive and inferential statistical tests to analyze the data. To identify the predictor factor we used Binary logistic regression, we used a multivariate method

Table 1
Socio-demographic variables.

Variable		N (%)
Gender	Male	652 (38)
	Female	1066 (62)
Age	12–24	946 (55.1)
	25–30	448 (26.1)
	31–40	224 (13)
	41–50	71 (4.1)
	More than 50	29 (1.7)
Marital status	Married	357 (20.8)
	Not married	1327 (77.2)
	Separated	29 (1.7)
	Widowed	5 (0.3)
Education	Illiterate	3 (0.2)
	Primary school	9 (0.5)
	Secondary school	56 (3.3)
	Some college	791 (46)
	College degree	588 (34.2)
	Post graduate degree	271 (15.8)
Occupation	Student	781 (45.5)
	Unemployed	166 (9.7)
	Employee	184 (10.7)
	Doctor	314 (18.3)
	Engineer	108 (6.3)
	Others	165 (9.6)
Children	Father/mother of a child younger than 16 years	261 (15.2)
	Father/mother of a child older than 16 years	28 (1.6)
	Not a father/mother	1429 (83.2)

to control for the confounding factors, and then finally crude odds ratio (COR) and adjusted odds ratio (AOR) with 95% confidence interval (CI) were reported. We considered the p -value < 0.05 for statistical significance for all the statistical tests.

Ethical consideration

Ethical approval was issued from Omdurman Islamic University; faculty of medicine and health sciences, and each respondent participated voluntarily.

Results

Socio-demographic characteristics

We received responses from 1718 participants. About 1066 (62%) of the respondents were females, and 946 (55.1%) aged 12–24 years. Other socio-demographic data were presented in [Table 1](#).

Knowledge of the study participants about COVID-19

Our study determined that 1173 (68.3%) of the study participants had a good knowledge toward COVID-19 (answered more than 75% in the knowledge assessment section). About 1656 (96.4%) of the participants, knew that the virus is transmitted through droplets ([Table 2](#)).

Attitude of the study participants toward COVID 19

Our study showed that 1545 (89.9%) of the participants had a positive attitude toward the COVID-19 pandemic (got more than 75% in the attitude assessment section). About 1703 (99.1%) of the participants, were agreed that COVID-19 will be successfully controlled ([Table 3](#)).

Practice of the study participants toward COVID 19

Our study determined that 834 (48.5%) of the study participants had a good practice toward the COVID-19 pandemic (got more than 80% in the practice assessment section). About 426 (24.8) of the participants never avoided crowded spaces ([Table 4](#)).

Table 2
Knowledge of the participants about COVID-19.

Question	Yes (%)	No (%)	Do not know (%)
Is the virus transmitted through droplets?	1656 (96.4)	56 (3.3)	6 (0.3)
Can the virus be transmitted by touching surfaces contaminated with it?	1616 (94.1)	70 (4.1)	32 (1.9)
Are the cases of COVID-19 increasing?	1649 (96)	62 (3.6)	7 (0.4)
Are the deaths due to COVID-19 increasing?	1471 (85.6)	223 (13)	24 (1.4)
Are there cases of recovery from COVID-19?	1605 (93.4)	97 (5.6)	16 (0.9)
Do the People who were contacted with someone infected with the COVID-19 virus need to be immediately isolated	1650 (96)	57 (3.3)	11 (0.6)
Is it necessary for children and young adults to take measures to prevent the infection by the COVID-19 virus	1657 (96.4)	51 (3)	10 (0.6)
Questions			N (%)
The main clinical symptoms of COVID-19 are		Fever	1709 (99.5)
		Fatigue	1678 (97.7)
		Dry cough	1581 (92)
		Shortness of breath	1364 (79.4)
		May present without symptoms	448 (26.1)
What is the proper isolation period for person with contact with COVID-19 patient		7 days	1205 (70.1)
		14 days	294 (17.1)
		28 days	219 (12.7)

Table 3
Attitude of the participants towards blood donation.

Question		N (%)
Do you agree that COVID-19 will finally be successfully controlled?	Agree	1703 (99.1)
	Disagree	15 (0.9)
Do you have confidence that world can win the battle against the COVID-19 virus?	Yes	1697 (98.8)
	No	21 (1.2)
Do you think that the measures done towards the COVID-19 pandemic are exaggerated?	Yes, always	72 (4.2)
	Yes, most of the time	87 (5.1)
	Sometime	76 (4.4)
	Never	1483 (86.3)

Table 4
Practice of the participants towards COVID 19.

Question		N (%)
Do you cover your face when you sneeze or cough?	Yes, always	1112 (64.7)
	Yes, most of the time	448 (26.1)
	Sometime	135 (7.9)
	Never	23 (1.3)
Do you regularly wash your hands with water and soap?	Yes, always	962 (56)
	Yes, most of the time	470 (27.4)
	Sometime	254 (14.8)
	Never	32 (1.9)
Do you wash your hands after sneezing or coughing?	Yes, always	424 (24.7)
	Yes, most of the time	395 (23)
	Sometime	458 (26.7)
	Never	441 (25.7)
Do you wash your hands after touching contaminated surfaces?	Yes, always	877 (51)
	Yes, most of the time	526 (30.6)
	Sometime	259 (15.1)
	Never	56 (3.3)
Do you avoid crowded spaces?	Yes, always	429 (25)
	Yes, most of the time	415 (24.2)
	Sometime	448 (26.1)
	Never	426 (24.8)

Factors associated with the level of knowledge

Our study revealed that education was associated with knowledge about COVID-19; participants with secondary school or lower educational levels were less likely to had good knowledge about COVID-19. Also, we found that doctors were more likely to had good knowledge about COVID-19 (AOR = 0.136 95% CI: 0.072, 0.255) (Table 5).

Table 5
Factors associated with the level of knowledge.

Variables		N (%)	Knowledge level		COR (95% CI)	AOR (95% CI)
			Good	Poor		
Gender	Male	652 (38)	424	228	1.271 (1.032, 1.564) ^b	1.065 (0.844, 1.344)
	Female ^R	1066 (62)	749	317		
Age	12–24	946 (55.1)	581	365	2.408 (0.971, 5.971)	1.432(0.459, 4.469)
	25–30	448 (26.1)	342	106		
	31–40	224 (13)	177	47		
	41–50	71 (4.1)	50	21		
	More than 50 ^R	29 (1.7)	23	6		
Marital status	Married	357 (20.8)	272	85	0.208 (0.034, 1.268)	0.227(0.034, 1.510)
	Not married	1327 (77.2)	876	451		
	Separated	29 (1.7)	23	6		
	Widowed ^R	5 (0.3)	2	3		
Education	Secondary school or lower educational level ^R	68 (4)	17	51	0.239 (0.135, 0.421) ^b	0.181 (0.094, 0.348) ^b
	Some college	791 (46)	461	330		
	College or higher educational level	859 (50)	695	164		
Occupation	Student	781 (45.5)	440	341	1.638 (1.147, 2.338) ^b	1.244 (0.711, 2.178)
	Unemployed	166 (9.7)	118	48		
	Employee	184 (10.7)	125	59		
	Doctor	314 (18.3)	298	16		
	Engineer	108 (6.3)	80	28		
	Others ^R	165 (9.6)	112	53		
Children	Father/mother of a child younger than 16 years	261 (15.2)	194	67	0.700 (0.519, 0.944) ^b	1.580 (0.830, 3.009)
	Father/mother of a child older than 16 years	28 (1.6)	22	6		
	Not a father/mother ^R	1429 (83.2)	957	472		

AOR, Adjusted odds ratio; COR, Crude odds ratio.

^R Reference category.^b Significant association.

Factors associated with the level of attitude

Our study revealed that doctors were more likely to have a positive attitude toward COVID-19 pandemic (AOR = 0.268 95% CI: 0.115, 0.627). The study also showed that study participants who have good knowledge were more likely to have positive attitude toward the pandemic (AOR = 0.613 95% CI: 0.436, 0.861) (Table 6).

Factors associated with the level of practice

Our study revealed that participants who aged 25–30 years were more likely to have good practice toward COVID-19 pandemic (AOR = 2.967 95% CI: 1.151, 7.644). In addition, we found that doctors were more likely to have good practice toward the pandemic (AOR = 0.480 95% CI: 0.317, 0.725). Moreover, our study concluded that participants with good knowledge about COVID-19 were more likely to have good practice toward the pandemic (AOR = 0.769 95% CI: 0.615, 0.961).

Discussion

Since the declaration of COVID-19 as a pandemic, the disease becomes the center of the global concern. COVID-19 put high pressure on the health care system and force many countries to impose curfew to decrease the rate of the infection, nearly, every aspect of life has been affected by the disease. It is known that the knowledge, attitude and practice toward an infectious disease may be influenced by different factors like the spread of the disease, morbidity and mortality rate. Therefore, day by day the awareness, perception and practice toward the COVID-19 are growing. Because this study has been done in the early phases of the outbreak, the results could be used as a historical reference for other studies. According to our knowledge, there is no published study from Africa regarding the knowledge, attitude and practice toward the COVID-19. COVID-19 resembles other respiratory infections; therefore, questions in our questionnaire can be used in studies regarding other respiratory infections.

Our study revealed that 68.3% of the participants have a good knowledge about the COVID-19. This finding is lower than a previous study conducted in China during the first phases of the COVID-19 outbreak, where the overall correct rate on the knowledge section was equal to 90% [16]. Both studies were conducted in the early stage of the outbreak, but as a result

Table 6
factors associated with the level of attitude.

Variables		N (%)	Attitude level		COR (95% CI)	AOR (95% CI)
			Positive	Negative		
Gender	Male	652 (38)	570	82	1.541 (1.124, 2.114) ^b	1.297 (0.921, 1.827)
	Female ^R	1066 (62)	975	91		
Age	12–24	946 (55.1)	845	101	0.747 (0.255, 2.190)	0.853 (0.226, 3.219)
	25–30	448 (26.1)	410	38	0.579 (0.192, 1.752)	0.633 (0.177, 2.266)
	31–40	224 (13)	207	17	0.513 (0.160, 1.646)	0.442 (0.122, 1.599)
	41–50	71 (4.1)	58	13	1.401 (0.416, 4.720)	0.990 (0.268, 3.653)
	More than 50 ^R	29 (1.7)	25	4		
Marital status	Married	357 (20.8)	315	42	0.200 (0.032, 1.232)	0.252 (0.035, 1.842)
	Not married	1327 (77.2)	1202	125	0.156 (0.026, 0.942) ^b	0.180 (0.027, 1.197)
	Separated	29 (1.7)	25	4	0.240 (0.030, 1.916)	0.300 (0.034, 2.660)
	Widowed ^R	5 (0.3)	3	2		
Education	Secondary school or lower educational level ^R	68 (4)	54	14		
	Some college	791 (46)	701	90	0.495 (0.264, 0.927) ^b	0.777 (0.361, 1.670)
	College or higher educational level	859 (50)	790	69	0.337 (0.178, 0.637) ^b	0.422 (0.210, 0.849)
Occupation	Student	781 (45.5)	696	85	0.837 (0.503, 1.395)	0.559 (0.262, 1.192)
	Unemployed	166 (9.7)	147	19	0.886 (0.457, 1.718)	0.998 (0.498, 1.999)
	Employee	184 (10.7)	162	22	0.931 (0.492, 1.764)	1.037 (0.531, 2.024)
	Doctor	314 (18.3)	305	9	0.202 (0.090, 0.453) ^b	0.268 (0.115, 0.627) ^b
	Engineer	108 (6.3)	91	17	1.281 (0.642, 2.557)	1.576 (0.755, 3.290)
	Others ^R	165 (9.6)	144	21		
Children	Father/mother of a child younger than 16 years	261 (15.2)	229	32	1.307 (0.868, 1.969)	1.131 (0.511, 2.501)
	Father/mother of a child older than 16 years	28 (1.6)	25	3	1.123 (0.335, 3.766)	0.674 (0.151, 3.006)
	Not a father/mother ^R	1429 (83.2)	1291	138		
Knowledge	Good	1173 (68.3)	1081	92	0.488 (0.355, 0.670) ^b	0.613 (0.436, 0.861) ^b
	Poor ^R	545 (31.7)	464	81		

AOR, Adjusted odds ratio; COR, Crude odds ratio.

^R Reference category.^b Significant association.

of the serious situation in china, early and rapid spread of the disease from the beginning, and the massive news report, the China population was dynamically getting knowledge from different TV channels and official websites. About 96.4% of our participants know that the virus is transmitted through droplets. This finding is in agreement with previous studies conducted in Egypt and Uganda, where more than 95% in both studies know that the disease can be transmitted through droplets of the affected person [1,10]. Our study also concluded that there is a positive association between the level of education and the knowledge about the COVID-19. This finding is in agreement with a previous study conducted in China [16].

Our study also showed that 89.9% of our participants had a positive attitude toward the COVID-19 pandemic. About 99.1% of our participants agreed that COVID-19 will finally be successfully controlled. While in a previous study conducted in China, 90.8% agreed that COVID-19 will be successfully controlled at the end [16]. Both studies were done during the early stage of the outbreak, many factors can influence the attitude of the population toward the pandemic, e.g. the spread of the disease, morbidity and mortality of the particular disease, knowledge of the population, the previous experience of the population with pandemics, the development of the health care system in the country and other factors.

Our study revealed that only 48.5% had a good practice toward the COVID-19, and only 49.2% of the participants had not visited any crowded place recently. This finding is lower than previous studies conducted in China and India, where more than 95% in both studies had avoided the crowded place recently [13,16]. This difference might be due to the rapid and early spread of the disease in both China and India, also it can be due to the strict implementation of the curfew in both countries. WHO and the centers for diseases control and prevention (CDC), advice to practice social distancing in order to break the chain of COVID-19 infection, tips for social distancing include; to stay at least two meters from other people, avoid gathering in groups, avoid crowded spaced and other protective measures [2,11]. Moreover, our study showed that good knowledge about the COVID-19 is associated with a good practice toward the COVID-19 (AOR = 0.769 95% CI: 0.615, 0.961). This result is in agreement with a previous study conducted in China. Awareness is an important preventive factor for infectious diseases, especially emerging infectious diseases [8].

Regarding the limitations of this study, we used a non-probability sampling technique to save time and due to the limited resources, this type of study is time-sensitive, the results will be changed with time. Moreover, to apply the social distancing

Table 7
Factors associated with the level of practice.

Variables		N (%)	Practice level		COR (95% CI)	AOR (95% CI)
			Good	Poor		
Gender	Male	652 (38)	266	386	1.655 (1.359, 2.016) ^b	0.620 (0.502, 0.766)
	Female ^R	1066 (62)	568	498		
Age	12–24	946 (55.1)	432	514	2.644 (1.192, 5.867) ^b	3.158 (0.196, 8.339)
	25–30	448 (26.1)	224	224		
	31–40	224 (13)	120	104		
	41–50	71 (4.1)	38	33		
	More than 50 ^R	29 (1.7)	20	9		
Marital status	Married	357 (20.8)	185	172	0.620 (0.102, 3.754)	1.042 (0.161, 6.742)
	Not married	1327 (77.2)	634	693		
	Separated	29 (1.7)	13	16		
	Widowed ^R	5 (0.3)	2	3		
Education	Secondary school or lower educational level ^R	68 (4)	27	41	0.869 (0.524, 1.441)	0.997 (0.561, 1.773)
	Some college	791 (46)	341	450		
	College or higher educational level	859 (50)	466	393		
Occupation	Student	781 (45.5)	335	446	1.083 (0.772, 1.518)	0.916 (0.552, 1.519)
	Unemployed	166 (9.7)	76	90		
	Employee	184 (10.7)	93	91		
	Doctor	314 (18.3)	206	108		
	Engineer	108 (6.3)	50	58		
	Others ^R	165 (9.6)	74	91		
Children	Father/mother of a child younger than 16 years	261 (15.2)	135	126	0.855 (0.656, 1.113)	1.027 (0.623, 1.693)
	Father/mother of a child older than 16 years	28 (1.6)	16	12		
	Not a father/mother ^R	1429 (83.2)	683	746		
Knowledge	Good	1173 (68.3)	612	561	0.630 (0.513, 0.774) ^b	0.769 (0.615, 0.961) ^b
	Poor ^R	545 (31.7)	222	323		
Attitude	Positive	1545 (89.9)	757	788	1.198 (0.873, 1.643)	1.004 (0.724, 1.391)
	Negative ^R	173 (10.1)	77	96		

AOR, Adjusted odds ratio; COR, Crude odds ratio.

^R Reference category.^b Significant association.

we were compelled to use an online survey, this results in oversampling of specific groups of people (students and youths) who have a tendency to use the internet more than others.

Conclusion

In this paper, we have seen that Sudanese who were participated in our study had good knowledge, and a positive attitude toward the COVID-19. Our findings revealed that education is positively associated with knowledge, and knowledge is associated with a positive attitude and a good level of knowledge is associated with good practice toward COVID-19. In Sudan, 25% of the population is illiterate, while only 18% were joined a tertiary education (after secondary school) [12]; efforts should focus more to raise the awareness among the less educated people. Nowadays as the universities are closed, university students can be trained to help in various ways in the awareness program. COVID-19 made the world realize the importance of public health. Nowadays, after all research on the COVID-19 face mask, hand washing, and social distancing were the main preventive measurement against COVID-19.

Declaration of Competing Interest

The authors have no conflict of interest to declare.

Funding

No funding sources.

Availability of data and material

All the raw data are available.

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