Original article

Assessment of knowledge related to COVID-19 among professionals and students: A cross-sectional study from Punjab, Pakistan

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ABSTRACT

Background: COVID-19 outbreak posed a serious threat to public health and greatly impacted the life of professionals and students. Hence, this study aimed to evaluate the knowledge related to COVID-19 during a lockdown in Punjab, Pakistan.

Subjects and methods: This cross-sectional online study recruited 833 participants (males=417, females=416) from major cities (Lahore, Islamabad, Rawalpindi, Gujranwala, Bahawalpur, Faisalabad, and Sialkot) in Punjab, Pakistan, during the months of March and April 2020. A pre-designed questionnaire was shared, among professionals (including pharmacists, paramedical staff, lawyers, businessmen, teachers) and students (including medical undergraduate and postgraduate students, and non-medical students), containing 12 questions regarding their knowledge of COVID-19. Data were collected using convenient sampling technique. Chi-square test and logistic regression model were applied for analysis using Statistical Package for Social Sciences (SPSS) software.

Results: The mean age of the participants was 23 years ranged from 15-68 years. Of the 833 participants, 365 (43.8%) were well aware, 405 (48.6%) were aware and only 63 (7.6%) were not aware of COVID-19. Most of the participants (69.4%) did not know about coronaviruses (Severe Acute Respiratory Syndrome Coronavirus and Middle East respiratory syndrome-related coronavirus) before this pandemic. Using logistic regression analysis, age above 24 years, being a student (*vs.* being a professional) and a prior knowledge about coronavirus resulted in having higher odds of knowledge about COVID-19 with a significant p-value (<0.05).

Conclusion: This study identifies that the majority of the participants had necessary knowledge about transmission, preventive measures and basic hygiene about COVID-19. However, there is a need to improve knowledge among the younger population and professionals.

Keywords:
Awareness, Knowledge, COVID-19, SARS-CoV2, Pandemic, Pakistan

INTRODUCTION

The Coronavirus disease (COVID-19) outbreak began from the Wuhan city of Hubei province of China, reportedly from a seafood wholesale market, in December 2019. The disease is believed to be of zoonotic origin.[1] The infectious disease agent was initially named as the 2019 novel Coronavirus (2019-nCOV), however, the name was changed to Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) by the International Committee on Taxonomy of Viruses on February 11, 2020.[2] The disease may cause no symptoms (asymptomatic), or mild to severe respiratory illness. Some of the major clinical features include fever, chills, myalgia, shortness of breath, cough, dyspnea, and pneumonia. Apart from respiratory symptoms, allied symptoms of cardiovascular system, central nervous system, and gastrointestinal system may occur. The disease is usually more severe in the old, children, pregnant women, people with chronic debilitating diseases like diabetes, malignancy, and cardiovascular issues.[3] These characteristics of the COVID-19 are similar to SARS-CoV-1 and MERS-CoV (Middle East respiratory syndrome- related coronavirus) infections, the coronaviruses whose disease outbreaks have occurred in the past. However, reportedly, SARS-CoV-2 is more contagious than SARS-COV-1 and MERS-COV.[3,4] The disease rapidly began to spread throughout the world from China and hence, WHO declared it as a Pandemic on March 11, 2020.[5] Pakistan reported its first two confirmed cases on

February 26, 2020. They belonged to Karachi and Islamabad.[6] On August 07, 2020, Pakistan had 282,645 confirmed cases of COVID-19, the highest number being in Sindh (122,759). Amongst all provinces, Sindh is reported to have the highest number of deaths (2250 deaths) from COVID-19, with Punjab following closely (2164 deaths), on August 07, 2020.[7] For any country, apart from efforts of Governments, the awareness of the public is crucial for controlling the progression of COVID-19, and in fact, any other infectious disease. To assess the knowledge about COVID-19 among the masses, studies (both national and international) were conducted previously, which showed that the masses were mostly aware regarding the disease.[8-11] However, a Bangladeshi study showed that the majority of the subjects were not much aware regarding COVID-19.[12] This study was aimed to assess the knowledge related to COVID-19 outbreak based on an online questionnaire circulated among professionals and students.

SUBJECTS AND METHODS

A cross-sectional survey-based study was deemed suitable to assess the knowledge among professionals (including pharmacists, paramedical staff, lawyers, businessmen, teachers) and students (including medical undergraduate and postgraduate students, and non-medical students) related to COVID-19. The survey was conducted online through a 12-item questionnaire designed on Google forms and circulated through WhatsApp®, Facebook® and other social media platforms for data collection in the months of March and April 2020.The inclusion criteria to participate in the study were being Pakistani national having residence in Punjab province, having internet access, and voluntary participation. People not falling in categories of professionals or students were excluded from the study sample. However, post graduate resident doctors were still included in "Medical students- post graduate" category. To ensure that the questionnaire was valid and accurate, the initial draft was sent to senior researchers and after their approved consensus and expert opinion, the final questionnaire was drafted. The online questionnaire had a consent portion and participants who were willing, gave consent by clicking the 'continue' button and would then be directed to complete the self-administered questionnaire. The consent portion had details about the nature of the survey, the objectives required to be achieved after the research, the willingness of the participants as well as details about confidentiality and anonymity. The questionnaire consisted of two sections (1) Demographics (consisting of basic information from participants such as gender, age, and profession) (2) Knowledge (consisting of 12 questions related to COVID-19 about incubation period, symptoms, diagnosis, isolation, spread, severity, medication, vaccination, mortality, effect of temperature, effect of age, and prevention), and two more general questions were asked about knowledge of coronavirus (SARS-CoV-1 and MERS-CoV) before this pandemic and time spent on news information. The survey was offered in the English language as most of the professionals and students included understand English language easily. Data were analyzed using SPSS-21 for statistical analysis. Numerical variables were measured as mean and standard deviations, while categorical variables were expressed as frequencies and percentages. Inferential statistics were applied depending upon the nature of data and variables. Chi square test and Logistic regression model were applied to find the association of different variables with the Knowledge. A p-value <0.05 was considered significant in all tests. A common scoring method was used for the questionnaire in the knowledge section as follows: (1) 1 point for correct and 0 for incorrect answers and the total score was 12. Participants were grouped into three categories according to their level of knowledge; not aware (score ≤5 points); aware (score 6-9 points); well aware (score 10-12 points). Ethical consideration was taken according to Helsinki declaration and Consent was taken from each participant. Formal ethical approval was granted by the Ethical Review Committee Lahore General Hospital (Research No. 00-141-20).

RESULTS

Table 1 summarizes the demographic characteristics of the study participants (n = 833). Males were slightly higher in number (50.1%, n = 417) than females (49.9%, n = 416). Most of the participants (65.3%, n = 544) were aged between 21 years to 30 years, while the least number of participants was 61 years age or older (0.5%, n = 4). Regarding the profession, most of the participants were undergraduate medical students (24%, n = 200), while teachers (Schools, Colleges and Universities) were 2nd highest in number (20.2%, n = 168).

Table 2 summarizes the data regarding the answers obtained from the respondents. Majority of the participants (85.4%, n = 711) was aware of the accurate incubation period of COVID-19, that whether it spreads via respiratory droplets of infected individuals (90.5%, n = 754) and whether contacts should be

Table 1. Demographic characteristics of study participants (*n* = 833)

Characteristics	Frequency	Percent
Gender		
Male	417	50.1
Female	416	49.9
Age groups		
Median age (years)	25.49	
≤ 20 years	153	18.4
21 - 30 years	544	65.3
31 - 40 years	93	11.2
41 - 50 years	29	3.5
51 - 60 years	10	1.2
≥ 61 years	4	0.5
Profession		
Agriculture &Livestock	21	2.5
Banking & Financial Cooperative Sector	36	4.3
Businessmen & Entrepreneurs	54	6.5
Engineers	116	13.9
Daily wager, laborer, factory worker, hawkers	10	1.2
Judiciary & lawyers	7	0.8
Law enforcement & security forces	3	0.4
Media & journalism	9	1.1
Medical; allied health	9	1.1
Medical; pharmacist	3	0.4
Medical; physiotherapist	50	6.0
Medical students; postgraduate	69	8.3
Medical students; undergraduate	200	24.0
Teachers, school / college / university	168	20.2
Housewife	16	1.9
Non-medical students	59	7.1
Government or semi Government Job	3	0.4

immediately isolated for observation for 14 days or not (93.5%, *n* = 779). Similarly, most were aware of whether or not is there any specific medication or vaccination to treat/prevent COVID-19 (91%, *n* = 758 and 95.8%, *n* = 798 respectively), and that frequent cleaning of hands is one of the best ways of protection against COVID-19 (94.7%, *n* = 789). They were also aware of whether COVID-19 affects only old people or not (87%, *n* = 725). Most of the participants were also aware of the estimated mortality rate of COVID-19 infection (54.6%, *n* = 455) and whether it can be transmitted in regions with hot and humid climate or not (58.7%, *n* = 489). However, regarding the most common symptom of COVID-19 infection and the current diagnostic test used for its diagnosis

recommended by the Centers for Disease Control and Prevention (CDC), most of the participants were found to be unaware of (64.5%, *n* = 537, and 68.5%, *n* = 571).

Table 3 shows that most of the participants (48.6%, *n* = 405) were found to be aware of essential information regarding COVID-19, with scores 6-9. The percentages of cognizant (with scores 10-12) and unaware (scores 5 or less) participants were lower (43.8% and 7.6% respectively) (Table 3). Hence, 92.4% of the participants were aware of essential information regarding COVID-19. It can also be seen that most of the participants did not know Coronavirus before this pandemic (69.4%, *n* = 578). It can also be seen that most of the participants spent less than 1 hour daily on gaining information about COVID-19 (64.3%, *n* = 536).

In Table 4, data about awareness of the pandemic in residents of Punjab, Pakistan is summarized, using the Chi-square test. The data is stratified by gender, age profession, prior knowledge about Coronavirus, and time spent on news regarding COVID-19. It shows that the awareness in the participants differed based on age p<0.01) and profession (Pharmacists, Paramedics, Lawyers, Businessmen, teachers, medical and non-medical students) p<0.01). The association of gender, time spent on the news about the disease, and prior knowledge about the coronavirus (SARS-CoV and MERS-CoV) with the knowledge of these participants were not found to be significant (p=0.058, p=0.092, and p=0.032 respectively).

Table 5 shows the results of the logistic regression analyses. It can be seen that age above 24 years (OR=1.94, 95% CI 1.12-3.37, p<0.05), being a student (*vs*. being a professional) (OR=2.71, 95% CI= 1.51-4.86, p<0.05), and having prior knowledge related to Coronavirus (SARS-CoV and MERS-CoV) (OR= 1.96, 95% CI=1.07-3.57); all these elements resulted in higher odds of having significant awareness about the disease.

Table 2. Answers of the study participants (*n* = 833)

Questions	Frequency	Percent
The most accurate incubation period of COVID-19?	711	85.4
The most common symptom in patients with COVID-19 infection?	296	35.5
The current diagnostic test for COVID-19 used by CDC?	262	31.5
Does COVID-19 spread via respiratory droplets of infected people?	754	90.5
Contact with someone infected with COVID-19 to be immediately isolated for observation for 14 days?	779	93.5
In severe cases, infection of COVID-19 can cause death?	707	84.9
Is there any specific medication to prevent or treat the COVID-19?	758	91
Is there any effective vaccine against COVID-19 till now?	798	95.8
The estimated mortality rate of COVID-19 infection?	455	54.6
Does COVID-19 affect only older people?	725	87
Can COVID-19 infection be transmitted in regions with hot and humid climate?	489	58.7
Is cleaning hands frequently one of the best way to protect against COVID-19 infection?	789	94.7

Table 3. Awareness of COVID-19 score and related questions

Characteristics	Frequency	Percent
Awareness		
Not aware (score ≤5 points)	63	7.6
Aware (score 6-9 points)	405	48.6
Well aware (score 10-12 points)	365	43.8
Knowledge about coronavirus before this pandemic		
Yes	255	30.6
No	578	69.4
Daily time spent to focus on COVID-19 information		
<1 hour	536	64.3
1-3 hours	199	23.9
≥3 hours	98	11.8

[a]1 point was given for correct and 0 for incorrect answers, and the total score was 12

Table 4. Awareness of COVID-19 pandemic in residents of Punjab Province, Pakistan stratified by gender, age, profession, prior knowledge, and time spent on the news (n=833)

Characteristics	Not Aware (≤5 points)	Aware (6–9 points)	Well Aware (10-12 points)	p-value
Gender				
Male	32	186	199	0.058
Female	31	219	166	
Age groups (years)				
≤ 20	21	95	37	<0.001
21 - 30	35	239	270	
31 - 40	4	45	44	
41 - 50	0	19	10	
51 - 60	2	5	3	
≥ 61	1	2	1	
Profession				
Professionals[a]	13	123	192	<0.001
Students[b]	50	282	173	
Prior knowledge about Coronavirus[c]				
Yes	13	115	127	0.032
No	50	290	238	
Time Spent on news				
<1 hour	41	273	222	0.092
1 - 3 hours	11	86	102	
>3 hours	11	46	41	

[a]Professionals include pharmacists, paramedical staff, lawyers, businessmen, teachers
[b]Students include medical undergraduate and postgraduate students, and non-medical students.
[c]SARS-CoV and MERS-CoV

DISCUSSION

The COVID-19 pandemic can only be controlled if the public is sufficiently aware of the disease, as awareness (along with attitudes and practices) determines disease control by directing the public and the administration.[8,9] Cases of COVID-19 are rising rapidly in Pakistan and awareness of this disease in Pakistani public is of the utmost importance. This study showed that most of the participants (92.4%) had awareness of COVID-19. This is like what was seen in a Chinese study (90%), a Nepalese study (the correct answer rate for only one knowledge question was 30% while it was 65-99% for the remaining knowledge questions), another Pakistani study (64.8%), and another Chinese study conducted by Peng and co-authors (82.3% of the collected answers were correct).[8,9,10,11] However, a Bangladeshi study showed that a majority (51.7%) of the subjects had comparatively inaccurate knowledge about COVID-19.[12] In this study, a significant number of participants

(95.8%) knew that there is currently no vaccine available against this disease. Similar results were found in an Egyptian study and a Pakistani study, where 82.1% and 92% of the participants knew that there is no vaccine for COVID-19.[13,14] In this study, 91% of the participants knew that there is no definitive management for this disease. This is well within 76.2 to 96% reported in earlier studies.[8,9,13] Around 90.5% of the participants in this study knew that this disease spreads via respiratory droplets, and similar findings were reported in some other studies.[8,13] Regarding the cleaning of hands, 94.7% of participants agreed that this is the best preventive measure for this disease. Similar findings were reported by Abdelhafiz et al.[13]

84.9% of the participants in our study believed that this disease can cause death in severe cases. Similar results of 86% were reported by Abdelhafiz and coauthors that this disease is dangerous.[13] However, in a study from United States, it was indicated that only

Table 5. Results of logistic regression analyses (odds ratio)

Characteristics	Awareness		
	Odds ratio	95% Confidence Interval	
		Lower	Upper
Gender			
Male	1		
Female	1.23	0.76	1.99
Age			
≤24 year	1		
>24 year	1.94*	1.12	3.37
Professions			
Professionals[a]	1		
Students[b]	2.71*	1.51	4.86
Time spent on news			
< 1 hour	1.19	0.73	2
1 - 3 hours	2.05	1.10	3.82
> 3 hours	1		
Prior knowledge about coronavirus[c]			
Yes	1.96*	1.07	3.57
No	1		

[a]Professionals include pharmacists, paramedical staff, lawyers, businessmen, teachers.
[b]Students include medical undergraduate and postgraduate students, and non-medical students
[c]SARS-CoV and MERS-CoV

14.2% of the US adults thought that COVID-19 disease can cause death.[15] In present study, 54.6% of the participants were aware of the estimated mortality rate of COVID-19 around that time. The reason for this might be the higher percentage of medical students in our sample. An extensive campaign was launched by the Government of Pakistan, regarding the awareness of COVID-19 in collaboration with international organizations.[16-18] Social media was also an important source of awareness regarding COVID-19 as reported in two Egyptian studies.[13,19] This study was conducted among professionals and students, hence most of them were knowledgeable. Zhongand coworkers also documented that the knowledge regarding the COVID-19 is associated with education.[8] The spread of the disease might also serve as a stimulus to gain knowledge about the course of COVID-19.

Another reason for the most aware population in study could be the use of the internet by the participants, who were mostly of ages between 21 and 30 years. A survey of the Pakistan Telecommunications Authority indicates that most of the internet users in Pakistan were under 30 years of age.[20] This is observed in current study that most of the participants had given wrong answers about the most common symptom of COVID-19 and the current diagnostic test recommended by the (CDC) for diagnosis of coronavirus. These two findings can be linked i.e. the participants might be considering investigations of cough like X-ray chest as important, and secondly, the public is already less aware of polymerase chain reaction (PCR) test.

This study showed that the participants' knowledge of COVID-19 differed by age and profession. Similar results were reported by other studies. Zhong and colleagues reported that the knowledge differed by age groups.[8] Paudel and friends reported that the knowledge of the participants differed by occupation/profession.[9] A Saudi Arabian study showed that age was a differentiating factor.[21] Our study indicated that gender was not a significant differentiating factor for the knowledge about COVID-19. This is similar to what was reported in an earlier report but contrasts with the findings in the study conducted by Zhong and coauthors.[8,21]

In this study, most females and student participants had more knowledge about the COVID-19. In contrast, a previous study reported that being a student was associated with reduced knowledge about the coronavirus disease.[8] However, they documented that the female gender was associated with higher knowledge about COVID-19, which is like finding of this study.

There were certain limitations to our study. Firstly, due to lock down and social distancing printed forms could not be distributed for surveys. Secondly, recall bias cannot be ignored. Thirdly, most of study participants were young and educated, hence generalization cannot be guaranteed.

CONCLUSION
The majority of the participants were aware of essential information about COVID-19. Awareness levels among the majority were found to be satisfactory. Some factors

like being a student (vs professionals), spending more time on the news for COVID-19 information, and prior knowledge about the coronavirus (SARS-CoV and MERS-CoV) resulted in higher odds for having awareness regarding COVID-19 with a significant p-value (<0.05).

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