



Knowledge, attitude and preventive practices related to COVID-19: a cross-sectional study in two Pakistani university populations

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Abstract

Objective The aim of this study was to assess COVID-19-related knowledge, attitudes, and preventive practices of two Pakistani university populations.

Methods A cross-sectional study was conducted among students and employees of two higher education institutions in Lahore, Pakistan, namely the University of Lahore and the Gulab Devi Educational Complex. Participants were recruited using a convenient sampling method. A validated 45-item, self-administered questionnaire was used to collect data. Total possible scores were 0–14 for knowledge (scores < 7, 7–10 and > 10 were considered to indicate poor, moderate and good knowledge, respectively); 0–7 for attitude (scores > 5 were considered to indicate a good attitude); and 0–18 for COVID-19 preventative practices (scores > 12 were considered to indicate good preventative practices).

Results Of the 417 enrolled participants, 416 reported that they were aware of COVID-19 and social media was the major source of their information. Mean scores were 10.12 ± 2.20 for knowledge (good, moderate and poor knowledge in 50.2%, 42.8% and 7.0% of participants, respectively); 5.74 ± 1.28 for attitude (65.4% of individuals had a positive attitude); and 11.04 ± 3.34 for COVID-19 preventative practices (only 36.5% of participants had good preventive practices).

Conclusion Pakistani university students and employees have good knowledge and attitudes regarding COVID-19, but unsatisfactory preventive practices. Therefore, health regulators should use multiple communication approaches, such as electronic, print and social media, phone messages, etc., to increase awareness and improve practices related to COVID-19.

Introduction

Coronaviruses are large, enveloped, RNA viruses, categorised into four genera; alpha, beta, delta and gamma [1]. Previously, six types of coronaviruses were pathogenic to humans, of which four species, namely 229E, OC43, NL63 and HKU1, usually caused common cold-like symptoms,

whereas the other two species caused severe respiratory infection, including severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS). In late December 2019, an outbreak of novel coronavirus, initially called 2019-nCoV but later named SARS-CoV2, appeared in Wuhan, China [2, 3]. In just a few months, it swept across the world, becoming a global pandemic. The first positive coronavirus disease (COVID-19) case in Pakistan was reported on 26 February 2020. In order to effectively combat the disease, on 13 March 2020 [Order No. SO(I&C-I) 1–2/2020], the government of the Punjab, a province of Pakistan, closed all educational institutions (schools, colleges and universities) and Deeni Madaris (religious schools). All religious congregations and ceremonies were suspended, marriage/banquet halls were ordered to close, and all public and private sport festivals were cancelled. Moreover, on 23 March 2020 [Order NO. SO(IS-11)1-1/2004], a complete lockdown was imposed in the country. On 27 March 2020, it was estimated there were 13,328

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COVID-19 cases (10,018 active cases, 281 deaths and 3029 recoveries) across the country [4].

As there is no vaccine or approved cure for COVID-19, it is of immense importance that the public have good knowledge about the individual measures (physical distancing, proper hand hygiene, use of a face mask and respiratory etiquette) that will serve as the first line of defense against this disease. Therefore, the present study was conducted to evaluate knowledge, attitudes and preventive practices of COVID-19 among Pakistani university students and employees. It was conducted before the universities were closed and an aggressive media campaign was launched by the government to disseminate information related to COVID-19. Therefore, our findings may provide baseline information on awareness of the disease among educated Pakistanis, and highlight misperceptions, myths and malpractices related to it. Our findings are likely to assist the authorities in better planning of awareness campaigns to eradicate misconceptions and malpractices related to COVID-19, which may result in curtailing the disease.

Methods

Study design, participants and settings

This cross-sectional survey was carried out among students and employees at two higher educational institutions in Lahore, Pakistan, namely the University of Lahore and the Gulab Devi Educational Complex. A convenient sampling method was used to recruit the study participants (undergraduate and postgraduate students and employees). Researchers approached individuals at the study settings, from 22 February to 12 March 2020, and explained the objectives of the study. Those who consented were given the study survey.

Ethical considerations

The study protocol was approved by the Research Ethics Committee of the Department of Pharmacy Practice, Faculty of Pharmacy, the University of Lahore (REC/DPP/FOP/12). Verbal consent was obtained from each participant prior to their enrollment. Moreover, all current COVID-19 preventative measures were used during data collection.

Sample size

The sample size for the study was calculated using the Raosoft sample size calculator by keeping a margin of error of 5%, a 95% confidence interval, a population size of 20,000, and a 50% response distribution [5]. A minimum of 377 individuals were required for the study.

Study instrument

A self-administered questionnaire was designed based on the published literature [6–11]. The questionnaire was in English, which is the primary language of higher education in Pakistan; there was no need for an Urdu version of the questionnaire in this study. The initial draft of the questionnaire was reviewed by an expert panel (one professor, one associate professor, two assistant professors and a lecturer) for validation. The questions were revised based on the comments and suggestions of the expert panel. The final questionnaire had the following five sections:

- Section I: Seven questions regarding the demographic details of the study participants.
- Section II: Sixteen questions to explore participants' knowledge of COVID-19. The first two questions were "Have you heard of the recent corona disease outbreak?" and "If yes, where did you first learn about corona?" Those who responded 'yes' to the first question were asked to respond to the subsequent 14 COVID-19 knowledge questions. Each correct answer received 1 point, with a total possible knowledge score of 0–14; participants with a score < 7, 7–10 and > 10 were considered to have poor, moderate and good knowledge, respectively.
- Section III: Nine questions to assess participants' perception of COVID-19.
- Section IV: Seven questions to evaluate the attitude of study participants toward COVID-19. Each positive attitude received 1 point, with a total possible attitude score of 0–7; participants with a score > 5 were considered to have a good attitude.
- Section V: Six questions to evaluate the participants' preventive practices regarding COVID-19. A 4-point Likert scale (0 indicating 'never' and 3 indicating 'always') was used for each question. The total possible preventive practices-related score was 0–18; participants with a score > 12 were considered to have good preventative practices.

The questionnaire was pretested in 10 pharmacy students at the University of Lahore before it was used by the study participants. All pretest participants reported that they completely understood the questions and response options, and all questions were relevant to COVID-19.

Statistical analysis

Data were analysed using SPSS version 22 for Windows. Number and percentages were presented for categorical

variables, and mean \pm standard deviation (SD) were presented for continuous variables. The independent *t* test and analysis of variance were used to determine significance, where applicable, and a *p* value < 0.05 was considered to indicate statistical significance.

Results

A total of 492 individuals were approached, with 417 giving consent and being enrolled in the study (response rate 84.8%). The mean age was 22.60 ± 4.64 years. The demographics of the study sample are shown in Table 1. The majority were female (58.9%) and undergraduates (85.3%). Of 417 participants, 416 were aware of COVID-19; the major source of their information was social media (62.0%).

Responses of the 416 study participants regarding COVID-19 knowledge are shown in Table 2. A wide majority of the study participants knew COVID-19 was caused by a virus, but only 58.9% knew it was not a water-borne disease and 44.7% did not know the incubation

period of COVID-19. Moreover, 54.1% reported that there were approved cures for COVID-19; of these participants, the majority stated that antibiotics could cure COVID-19. Moreover, 33.4% did not know that no vaccine was available for COVID-19. The mean knowledge score was 10.12 ± 2.20 , with 50.2%, 42.8% and 7.0% of participants having good, moderate and poor COVID-19 knowledge, respectively. As shown in Table 3, there was no significant difference ($p > 0.05$) between knowledge scores across all demographic variables except economic class. In post hoc analysis, participants in the lower economic class had significantly lower knowledge scores than those in the middle ($p < 0.001$) or upper ($p = 0.002$) economic classes.

As shown in Table 4, most (72.4%) participants reported they were scared of COVID-19. Approximately 58% believed the media were overestimating COVID-19, 47.8% stated that 'lack of public awareness' was the foremost reason that COVID-19 had not yet been contained, and 54% believed that some fruits, vegetables and herbs could help in the prevention and/or treatment of COVID-19.

Table 1 Characteristics of the study population

Characteristic	Response	No. of participants (%)
Age, years	≤ 20	137 (32.9)
	21–25	234 (56.1)
	> 25	46 (11.0)
Sex	Male	172 (41.2)
	Female	245 (58.8)
Participant categories	Undergraduate	356 (85.3)
	Postgraduate	37 (8.9)
	Staff	24 (5.8)
Type of university education	Medical	68 (16.3)
	Pharmacy	293 (70.3)
	Allied health sciences	56 (13.4)
Nationality	Pakistani	412 (98.8)
	Foreigner	5 (1.2)
Economic class	Lower	17 (4.1)
	Middle	367 (88.0)
	Upper	33 (7.9)
Place of residence	Rural	67 (16.1)
	Urban	350 (83.9)
Have you heard about the ongoing corona disease (COVID-19) outbreak?	Yes	416 (99.8)
	No	1 (0.2)
Where did you first learn about COVID-19?	Friends/family/relatives/neighbours	32 (7.7)
	Social media (Facebook/Twitter/Instagram, etc.)	258 (62.0)
	Television/radio	111 (26.7)
	Newspapers	6 (1.4)
	Others	9 (2.1)

Table 2 Response of study participants to COVID-19 knowledge questions

Question	No. of participants (%)	
	Correct	Incorrect
What is the cause of COVID-19?	392 (94.2)	24 (5.8)
Is COVID-19 a water-borne disease (spread by water)?	245 (58.9)	171 (41.1)
COVID-19 is transmitted by close contact with an infected person	394 (94.7)	22 (5.3)
What is the time range between infection with COVID-19 and the onset of symptoms?	230 (55.3)	186 (44.7)
Fever, cough, and shortness of breath are symptoms of COVID-19	387 (93.0)	29 (7.0)
Myalgia (muscle ache), sore throat, and diarrhoea are also possible symptoms of COVID-19	226 (54.3)	190 (45.7)
Patients with underlying chronic diseases are at a higher risk of infection	299 (71.9)	177 (28.1)
Washing hands with soap and water can help in the prevention of COVID-19 transmission?	364 (87.5)	52 (12.5)
Wearing a face mask is an effective prevention strategy for COVID-19	383 (92.1)	33 (7.9)
At this moment, is there a cure for COVID-19?	191 (45.9)	225 (54.1)
At this moment, is there a vaccine active against COVID-19?	277 (66.6)	139 (33.4)
COVID-19 can be life-threatening	368 (88.5)	48 (11.5)
Where was the first case of COVID-19 recorded?	315 (75.7)	101 (24.3)
Outside of China, how many countries have reported confirmed cases of COVID-19?	235 (60.8)	181 (39.2)

Table 3 Between-demographic differences in knowledge, attitudes and practices scores

Variable	Subgroup	Mean score \pm SD		
		Knowledge	Attitudes	Practices
Age, years	≤ 20	10.02 \pm 2.09	5.80 \pm 1.27	11.12 \pm 3.46
	21–25	10.23 \pm 2.22	5.76 \pm 1.30	10.87 \pm 3.35
	> 25	10.34 \pm 2.37	2.48 \pm 1.19	11.57 \pm 2.92
	<i>p</i> value	0.594	0.858	0.276
Sex	Male	9.92 \pm 2.37	5.43 \pm 1.43	10.54 \pm 3.50
	Female	10.13 \pm 2.10	5.96 \pm 1.12	11.38 \pm 3.19
	<i>p</i> value	0.336	<0.001	0.012
Participant categories	Undergraduate	10.21 \pm 2.13	5.76 \pm 1.29	10.99 \pm 3.36
	Postgraduate	9.72 \pm 2.61	5.84 \pm 1.24	11.54 \pm 3.56
	Staff	10.33 \pm 2.46	5.25 \pm 1.03	10.83 \pm 2.65
	<i>p</i> value	0.416	0.614	0.378
Type of university education	Medical	10.26 \pm 2.10	5.79 \pm 1.29	10.96 \pm 3.34
	Pharmacy	10.18 \pm 2.19	5.79 \pm 1.24	11.31 \pm 3.53
	Allied health sciences	10.05 \pm 2.31	5.43 \pm 1.22	11.12 \pm 3.15
	<i>p</i> value	0.867	0.729	0.934
Economic class	Lower	7.94 \pm 3.36	5.47 \pm 1.59	8.59 \pm 4.18
	Middle	10.26 \pm 2.08	5.75 \pm 1.26	10.94 \pm 3.19
	Upper	10.45 \pm 2.12	5.82 \pm 1.29	13.39 \pm 3.31
	<i>p</i> value	<0.001	0.643	<0.001
Place of residence	Rural	9.84 \pm 2.23	5.09 \pm 1.59	10.67 \pm 4.11
	Urban	10.08 \pm 2.21	5.87 \pm 1.17	11.01 \pm 3.17
	<i>p</i> value	0.403	<0.001	0.311

SD standard deviation

Table 4 Response of study participants to COVID-19 perception questions

Question	Response	No. of participants (%)
Are you afraid of COVID-19?	Yes	301 (72.4)
	No	115 (27.6)
If yes, why are you afraid of COVID-19?	No cure	95 (31.6)
	Is highly contagious	112 (37.2)
	Is a new disease	38 (12.6)
	No preventive methods	56 (18.6)
Do you believe the media is overestimating COVID-19?	Yes	241 (57.9)
	No	171 (41.1)
	Unanswered	4 (1.0)
Why has it been difficult to stop the spread of COVID-19?	Lack of awareness	199 (47.8)
	Inadequate health personnel	110 (26.4)
	Porous borders	58 (13.9)
	Other	49 (11.8)
Do you think COVID-19 can be brought under control in 2020?	Yes	312 (75.0)
	No	95 (22.8)
	Unanswered	9 (2.5)
Do you think that people suspected to have COVID-19 should be quarantined?	Yes	323 (77.6)
	No	84 (20.2)
	Unanswered	9 (2.2)
Do you believe there are some foods that can effectively cure or prevent COVID-19?	Yes	225 (54.1)
	No	188 (45.2)
	Unanswered	3 (0.7)
Do you think thermal surveillance/screening of passengers at air or sea ports can prevent the spread of COVID-19?	Yes	337 (81.0)
	No	76 (18.3)
	Unanswered	3 (0.7)
Do you think it is safe to visit a country with reported COVID-19?	Yes	58 (13.9)
	No	350 (84.1)
	Unanswered	8 (0.9)

Table 5 Response of study participants to COVID-19 attitude questions

Question	No. of participants (%)	
	Negative	Positive
COVID-19 is not a serious disease	84 (20.2)	332 (79.8)
Can it be treated at home without staying in touch with a doctor?	63 (15.1)	353 (84.9)
If a corona vaccine is available, would you have it?	98 (23.6)	318 (76.4)
Is it important to use a face mask as a prevention strategy?	25 (6.0)	391 (94.0)
Is it important to follow cough or sneezing etiquette?	44 (10.6)	372 (89.4)
Health education has nothing to do with disease prevention	96 (23.1)	320 (76.9)
Handling a COVID-19 patient does not put you at risk of the infection	118 (28.4)	298 (71.6)

The attitude of study participants towards COVID-19 are shown in Table 5. The mean attitude score was 5.74 ± 1.28 , with 65.4% of participants having a positive attitude. Attitude scores did not significantly differ between

age, economic class, education and participant categories (Table 3), however attitude scores were better in females than in males (5.43 ± 1.43 vs. 5.96 ± 1.12 ; $p < 0.001$) and

Table 6 Response of study participants to COVID-19 preventative practice questions

Question	No. of participants (%)			
	Never	Rarely	Sometimes	Always
I cover my nose and mouth with a tissue during sneezing or coughing	28 (6.7)	65 (15.6)	151 (36.3)	172 (41.3)
I throw the used tissue in the trash bin	19 (4.6)	55 (13.2)	101 (24.3)	241 (57.9)
If no tissue is available, I cough or sneeze into my upper sleeve	109 (26.2)	90 (21.6)	136 (32.7)	81 (19.5)
I avoid touching my face (eyes, nose or mouth) with contaminated hands	49 (11.8)	85 (20.4)	121 (29.1)	161 (38.7)
I use soap and water to wash my hands quickly after coughing or sneezing or touching contaminated objects such as a tissue	44 (10.6)	100 (10.6)	127 (30.5)	145 (34.9)
I use a face mask in the crowds and when I visit healthcare settings nowadays	148 (35.6)	88 (21.2)	104 (25.0)	76 (18.3)

in individuals from urban areas than in those from rural areas (5.09 ± 1.59 vs. 5.87 ± 1.17 ; $p < 0.001$).

Participants' preventive practices related to COVID-19 are shown in Table 6. The mean preventive practice score was 11.04 ± 3.34 , with 36.5% of participants having good preventive practices related to COVID-19. Preventative practices were better in females than in males ($p = 0.012$) and in participants in the middle ($p = 0.004$) and upper ($p < 0.001$) economic categories than in those in the lower economic category (Table 3).

Discussion

To our knowledge, this is the first study that investigated COVID-19-associated knowledge, attitudes and practices among Pakistani university students and staff. COVID-19 is neither an air-borne nor water-borne disease; it spreads from infected individuals to others through respiratory droplets while sneezing or coughing, and through contaminated hands. The incubation period has been reported to be 5.2 days (95% CI 4–7) [12], however the Centers for Disease Control and Prevention (CDC) suggests it can range from 2 to 14 days [13]. The most common symptoms of COVID-19 are fever, fatigue, and dry cough, with one-third of patients experiencing dyspnoea [7, 8]. Other symptoms include myalgia, headache, sore throat, and diarrhoea [8]. Moreover, the elderly, patients with chronic diseases (hypertension, diabetes, cardiovascular, cerebrovascular disease and chronic respiratory diseases) and healthcare professionals are at greater risk of COVID-19 [8, 14]. In our study, most participants knew the mode of transmission of COVID-19, 55.3% were aware of its incubation period, 93.7% knew the common symptoms, and 72% were aware of high-risk individuals. To date, management of COVID-19 has been largely supportive. Several drugs approved for other indications (e.g. chloroquine, hydroxychloroquine, lopinavir, ritonavir, sofosbuvir, ribavirin, etc.) and some investigational drugs (e.g. remdesivir, favipiravir) are being investigated to prevent or treat COVID-19 [15]. Surprisingly, $\approx 33\%$ and

54% of study participants were unaware that there was no vaccine and any approved cure for COVID-19, respectively. Overall, it was encouraging to see that the majority of university students and employees had good COVID-19 knowledge and attitudes. This might be because our sample comprised staff and students belonging to the medical, pharmacy and allied health sciences fields of education. Similar studies conducted in China, Jordan and Saudi Arabia reported better knowledge, attitudes and practices regarding COVID-19 in university students [16–18] than were reported in our study in Pakistan.

In our study, despite the overall good knowledge and attitudes, it was worrisome that preventive practices related to COVID-19 were far from satisfactory. If the educated sector of Pakistan has poor preventive practices, one may wonder what the practices of the general public will be. We believe that due to limited access to online health information resources, vulnerable populations such as illiterate or low-literate, geriatric and rural populations would be more likely to have poor knowledge, attitudes, and preventive practices.

Our study has some limitations. The study was conducted among university students and employees belonging to medical, pharmacy and allied health science departments. Moreover, we used a non-probability sampling method, namely the convenient sampling method. Therefore, our findings may not be representative of the entire Pakistani university population. Awareness of a particular disease can be influenced by the gravity of the situation. Since COVID-19 has been declared a pandemic and aggressive awareness campaigns are in full swing, the knowledge, attitudes and practices are likely to be improving by the day.

Conclusions

Pakistani university students and employees have satisfactory knowledge and attitudes to COVID-19, however their preventive practices related to the disease are inadequate. Therefore, there is dire need of campaigns to improve preventive practices such as physical distancing, handwashing

and respiratory etiquette. Health regulators can use multiple communication tools (e.g. social media platforms, TV, radio, phone texts, etc.) to educate and enforce these prevention practices.

Take home messages

- Be aware that the COVID-19 pandemic is the most devastating health crisis since the influenza pandemic in 1918, and that no vaccine or approved treatment is currently available.
- Realise that awareness campaigns can help ensure that appropriate knowledge about measures that can serve as the first line of defense against COVID-19 (e.g. physical distancing, proper hand hygiene, use of a face mask and respiratory etiquette) are available to the public.
- Recognise that due to limited access to online health information resources, vulnerable individuals (e.g. illiterate, low-literate, geriatric and rural populations) are more likely to have poor knowledge, attitudes, and preventive practices.

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Author contributions MS and KH conceived and designed the study; MS and ZUM conducted the literature review; MS, NA, HAZ and ZS collected the data; MS, NS and ZUM analysed and interpreted data; MS drafted the manuscript; and TMK critically revised the manuscript. All authors approved the manuscript submitted for publication.

Compliance with ethical standards

Conflict of interest None declared.

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