



# Knowledge, Attitude, and Practices Toward COVID-19 in Primary Healthcare Providers: A Cross-Sectional Study from Three Tertiary Care Hospitals of Peshawar, Pakistan

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## Abstract

An online cross-sectional study was carried out to evaluate the knowledge, attitude, and practice about coronavirus disease 2019 (COVID-19) among primary health care providers (PHPs) at three tertiary care hospital, Peshawar, Pakistan. Data was collected via email and online social media platforms. Statistical package for social science (SPSS) version 25.0 was used for data analysis. Among the total participants (n = 114), 74 (66.7%) were male and 37 (33.3%) were female. The mean scores for knowledge, attitude and practice were  $12.7 \pm 0.89$ ,  $8.9 \pm 4.1$  and  $7.3 \pm 1.2$ , respectively. Most of the participants knew the term COVID-19 and its mode of transmission (90%), signs and symptoms (84%) and risk factors (72%) associated with it. Most of the participants agreed that COVID-19 can be transmitted through coughing and sneezing (74.3%) and 84.6% were in favor that COVID-19 can be prevented by adopting preventive measures. Around 68.8% of the participants disagreed with the use of antibiotics in the prevention of COVID-19. Ninety percent of the respondents were avoiding close contact with the people having cough and flu-like symptoms. Most PHPs had good knowledge, positive attitude and reasonable practices regarding COVID-19. Moreover, focused training programs for PHPs at the Government level can further improve their understanding of risks and preventive strategies related to COVID-19, which will help them to provide appropriate care to their patients as well as to protect themselves from this infection.

**Keywords** COVID-19 · Knowledge · Attitude · Practices · Primary healthcare providers · Peshawar

## Introduction

Coronavirus disease 2019 (COVID-19) is the emerging respiratory disease that is caused by a novel coronavirus. It was first reported in Wuhan, China in December 2019 [1, 2]. The main clinical symptoms of this highly infectious disease

include fever, dry cough, fatigue, myalgia and shortness of breath. The advanced stage of COVID-19 is characterized by respiratory distress syndrome, septic shock, bleeding and coagulation dysfunction [3, 4].

Since, December 2019, the COVID-19 has spread from Wuhan city to other cities of China and ultimately around the whole world [1, 5]. The World Health Organization (WHO) has declared the COVID-19 outbreak a public health emergency of international concern on 30th January 2020 and a pandemic on 11th March 2020. To date (9th April, 2020), there are 1.4 million laboratory-confirmed cases of COVID-19 in the world and 85,582 deaths have been associated with it [6].

It has been reported that around 209 countries are affected due to COVID-19 in the world [5]. Pakistan is also been hit by this infection and the number of confirmed COVID-19 cases are increasing by every passing day. According to the Ministry of National Health Services, Regulation and Coordination (MoNHSRC) the confirmed cases of COVID-19 till

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6th April 2020 were 4601 and the associated deaths were 66. The laboratory-confirmed cases of COVID-19 in Khyber Pakhtunkhwa (KPK) province were 620 and 22 deaths have been reported with it. In comparison with other provinces of Pakistan (death rates: Sindh 1.86%, Punjab 0.7%, Balochistan 0.4%), KPK ranks at first position regarding the associated death with (death rate of 3.4%) COVID-19 [7]. The Government of Pakistan has taken unprecedented measures to control the COVID-19 spread in Pakistan. These measures include, suspension of public transportation services, the closing of schools and universities and implementation of general lockdown in the country along with special measures to isolate the infected and suspected cases [7, 8].

The battle against COVID-19 is still ongoing in Pakistan. In order to achieve success against the spread of COVID-19, the adherence to the control measures by the Primary Health Providers (PHPs) and the public are very important. The knowledge, attitude and practices of the PHPs towards COVID-19 infection will play a vital role in controlling this pandemic [1, 9].

## Aims

To facilitate the management and control of COVID-19 in Pakistan, there is an urgent need to understand the awareness of PHPs regarding COVID-19. In this study, we have

**Table 1** Questionnaire to evaluate the level of knowledge, attitudes and practices about COVID-19 among PHPs of three tertiary care hospitals in Peshawar, Pakistan

<b>K1.</b> Have you ever heard about the novel coronavirus and the related terms COVID-19 or 2019-nCoV	Yes no I don't know
<b>K2.</b> COVID-19 disease is a viral infection	Yes no I don't know
<b>K3.</b> Fever, sore throat, cough and shortness of breath are possible K4 symptoms of COVID-19 infection	Yes no I don't know
<b>K4.</b> The novel coronavirus is a similar virus as SARS-CoV and MERS-CoV	Yes no I don't know
<b>K5.</b> The novel coronavirus is a similar virus as SARS-CoV and MERS-CoV	Yes no I don't know
<b>K6.</b> Is the COVID-19 infection the same illness as flu or cold?	Yes no I don't know
<b>K7.</b> Is there any laboratory test to confirm the presence of COVID-19 infection?	Yes no I don't know
<b>K8.</b> The incubation period of COVID-19 infection is 1–2 weeks?	Yes no I don't know
<b>K9.</b> Can COVID-19 infection be caught from a person who presents no symptoms and has recently visited the affected area?	Yes no I don't know
<b>K10.</b> People with a compromised immune system and old age people are at more risk of developing the infection?	Yes no I don't know
<b>K11.</b> Patients with comorbidities are at more risk of developing the infection	Yes no I don't know
<b>K12.</b> Health care workers and hospitalized patients who are near to infected patients are at more risk of developing the infection	Yes no I don't know
<b>K13.</b> People in crowded places are at increased risk of getting affected by the disease	Agree Neutral Disagree
<b>K14.</b> Patients of COVID-19 infection should be immediately isolated to avoid the transfer of infection to other people	Agree Neutral Disagree
<b>A1.</b> The disease can be transmitted by coughing and sneezing	Agree Neutral Disagree
<b>A2.</b> Transmission of COVID-19 infection can be prevented through wearing masks	Agree Neutral Disagree
<b>A3.</b> Transmission of COVID-19 infection can be prevented through washing hands and face regularly with antiseptics and sanitizers	Agree Neutral Disagree
<b>A4.</b> Transmission of COVID-19 infection can be prevented through the isolation of COVID-19 infected patients	Agree Neutral Disagree
<b>A5.</b> Transmission of COVID-19 infection can be prevented by taking antibiotics	Agree Neutral Disagree
<b>A6.</b> Restricting the travel of COVID-19 infected people to other areas of the world and of people in other areas to affected areas can be beneficial to prevent the spread of the infection	Agree Neutral Disagree
<b>A7.</b> Avoiding touching nose, mouth and eyes can reduce the risk of infection	Agree Neutral Disagree
<b>A8.</b> Avoiding touching the surface of doors, furniture or other things can be helpful in preventing the disease	Often Sometime Never
<b>A9.</b> If a vaccine is developed against the novel coronavirus, it can significantly reduce the epidemic spread	Often Sometime Never
<b>A10.</b> The available information about COVID-19 disease is sufficient in Pakistani society	Often Sometime Never
<b>A11.</b> The government in our country has all the necessary healthcare facilities and are able to control the epidemic situation	Often Sometime Never
<b>P1.</b> I eat thoroughly cooked food especially meat products	Often Sometime Never
<b>P2.</b> I am keeping myself warm and hydrated	Often Sometime Never
<b>P3.</b> I am using soap or sanitizer to wash their hands and face	Often Sometime Never
<b>P4.</b> I am avoiding close contact with people having cough and flu-like symptoms	Often Sometime Never
<b>P5.</b> During interaction with the Covid-19 patient, I wear the necessary personal protective equipment such as masks, gloves and gown etc	Often Sometime Never
<b>P6.</b> I perform hand hygiene before and after touching the Covid-19 patients or before and after performing an aseptic procedure	Often Sometime Never
<b>P7.</b> I perform hand hygiene after touching the patient's surroundings like beds, tables, doors etc	Often Sometime Never
<b>P8.</b> I avoid unnecessary close contact and practice social distancing and keep at least 1-m distance from patients and other healthcare workers	Often Sometime Never
<b>P9.</b> The government in our country has all the necessary healthcare facilities and are able to control the epidemic situation	Often Sometime Never

investigated the knowledge, attitudes, and practices of PHPs towards COVID-19 in three tertiary care hospitals of Peshawar, KPK, Pakistan.

## Methods

### Study Design and Settings

A cross-sectional survey was conducted from March 15 to April 4, 2020 in three tertiary care hospitals, named as Hayatabad Medical Complex (HMC), Khyber Teaching Hospital (KTH) and Lady Reading Hospital (LRH), located in Peshawar, Pakistan.

### Ethical Approval and Consent to Participate

This research involved online data collection from the participants. Every participant gave an online informed consent before filling the study questionnaire. The study was approved by the Ethical Committee of the Department of Pharmacy Practice, Bahauddin Zakariya University (BZU), Multan (reference number Acad/21/20/11).

### Measuring Instrument

A self-administered questionnaire was developed and validated in a pilot study of 22 participants. The Cronbach's alpha coefficient for the developed questionnaire was 0.76, which indicates acceptable internal consistency. This questionnaire consisted of four parts as shown in Table 1. The first part was regarding demographics including age, gender, occupation, residence, and workplace. The second part comprised of 14 questions regarding COVID-19 knowledge (K1-K14, Table 1). Each question had three possible answers, yes/no and "I don't know". The total knowledge score ranged from 0 to 14. A mean knowledge score  $\geq 10$  represent good knowledge. A correct response was assigned 1 point and incorrect/ I don't know was assigned 0 points. The third part comprised of 11 questions regarding attitude toward COVID-19 (A1-A11, Table 1). These questions were answered on 3-point Likert Scale (disagree, neutral and agree) and a mean score equal or less than 11 was associated with a positive attitude. The final part was regarding prevention practices associated with COVID-19 and were answered on some time, often and never basis (P1-P9, Table 1). A mean score equal to or less than 8 was an indicator of good preventive practices and a score greater than 8 was associated with poor preventive practices.

## Data Collection

The questionnaire was developed using Google Docs (Google LLC. USA) and its online link was shared with the PHPs through email and via online social media. The questionnaire contained a brief introduction to the background, objective, procedures, voluntary nature of participation, declarations of anonymity and confidentiality, and the notes for filling in the questionnaire.

## Statistical Analysis

The statistical package for social science (SPSS) version 25.0 (IBM Corp. Armonk, NY) was used to analyze the data. Descriptive statistics including frequency, percentage, mean, and standard deviation were used to describe sample characteristics, level of knowledge, attitudes, and practices. Chi-square test ( $\chi^2$ ) was used for categorical variables and for scale variables, student t-test and Mann–Whitney U test were used.

**Table 2** Demographics characteristics of the participants (n = 114)

	Mean	Standard Deviation
Age	26	2
	Frequency (n)	Percentage (%)
Gender		
Male	74	66.7%
Female	37	33.3%
Marital status		
Married	41	36.6
Unmarried	71	63.4%
Education level		
Bachelor	54	48.2%
Master	38	33.9%
Doctorate	20	17.9%
Profession		
Pharmacist	44	39.3%
Physician	46	41.1%
Nurse	22	19.6%
Hospital		
HMC	65	57.5%
KTH	22	19.5%
LRH	26	23.0%
Residence		
Urban	78	69.9
Rural	34	30.4

## Results

A total of 114 participants completed the survey, amongst which 74(66.7%) were male and 37(33.3%) were female. The mean age ( $\pm$  standard deviation) of the participants was  $26.0 \pm 2.0$  (range: 22–33). Ninety-two (82.1%) respondents were having a bachelor or master's degree. Most of the participants were un-married 71(63.4%) and most of the respondents were from HMC 65(57.5%). Other demographic characteristics are shown in Table 2.

The participants of the survey had a good overall knowledge of COVID-19. The mean COVID-19 knowledge score was  $12.7 \pm 0.89$  (range: 0–14) showing that 90.7% of participants had knowledge about the COVID-19. Knowledge score was significantly different across the professions ( $p=0.003$ ), and hospitals ( $p=0.007$ ). The knowledge scores of PHPs regarding COVID-19 can be seen in Table 3. Almost 90% of the participants knew the term COVID-19 and its mode of transmission. Most of the participants knew the signs and symptoms (84%) and risk factors (72%) associated with COVID-19. The results related to the participant's knowledge can be seen in Table 4.

The majority of the respondents showed a positive attitude towards COVID-19 infection. Their mean score was

$8.9 \pm 4.1$ , suggesting that 90% of the respondents had a positive attitude toward the COVID-19 infection as shown in Table 3. Most of the participant agreed that COVID-19 can be transmitted through coughing and sneezing (74.3%) and can be prevented by, wearing a mask (88.3%), washing hands (81.7%), isolating the infected patient (95%), restricting travel to infected areas (85.6%) and avoiding touching nose, eyes, and mouth (97.3%). Concerning the use of the antibiotics in the prevention of COVID-19, around 2% of respondents were in its favor and 68.8% were against the statement as shown in Table 5. The attitude toward COVID-19 significantly differed with age ( $p < 0.0001$ ), marital status ( $p=0.0001$ ), profession ( $p < 0.0001$ ), hospital ( $p=0.02$ ) and residential place ( $p=0.001$ ) (Table 3).

The mean practice score of PHPs toward COVID-19 was  $7.3 \pm 1.2$ , which suggested that overall COVID-19 preventive practices were good. Most of the respondents were, eating thoroughly cooked food, keeping themselves warm and hydrated, avoiding close contact with the people having cough and flu-like symptoms and wearing personal protective equipment during interaction with COVID-19 patients. Most of the participants were taking care of proper hand hygiene before and after interaction with COVID-19 patients. Almost 100% practiced social distancing of one

**Table 3** Knowledge, Attitude and Practices scores of PHPs about COVID-19

Mean $\pm$ SD	Knowledge score		Attitude score		Practice score	
	Mean $\pm$ SD	P-value	Mean $\pm$ SD	P-value	Mean $\pm$ SD	P-value
Age (years)						
26.4 $\pm$ 2.01	12.75 $\pm$ 0.89	<0.0001	8.9 $\pm$ 4.32	<0.0001	12.75 $\pm$ 0.89	<0.0001
Gender						
Male	12.73 $\pm$ 0.91	0.5	8.81 $\pm$ 4.17	0.2	11.89 $\pm$ 2.45	0.31
Female	12.78 $\pm$ 0.89		9.27 $\pm$ 4.45		11.38 $\pm$ 2.40	
Marital status						
Married	12.65 $\pm$ 1.10	0.5	8.03 $\pm$ 4.30	0.002	11.18 $\pm$ 2.56	0.002
Unmarried	12.93 $\pm$ 0.26		10.68 $\pm$ 3.57		12.71 $\pm$ 1.86	
Education level						
Bachelor	12.67 $\pm$ 0.95	0.6	10.91 $\pm$ 3.03	0.0001	11.17 $\pm$ 2.63	<0.0001
Master	12.82 $\pm$ 0.98		9.58 $\pm$ 3.37		12.24 $\pm$ 1.95	
Doctorate	12.85 $\pm$ 0.49		2.75 $\pm$ 2.12		12.35 $\pm$ 2.46	
Profession						
Pharmacist	12.93 $\pm$ 0.25	0.003	9.14 $\pm$ 3.85	<0.0001	11.07 $\pm$ 2.75	<0.0001
Physician	12.85 $\pm$ 0.89		10.82 $\pm$ 3.37		12.26 $\pm$ 2.00	
Nurse	12.18 $\pm$ 1.40		4.91 $\pm$ 3.88		12.00 $\pm$ 2.37	
Hospital						
HMC	12.71 $\pm$ 0.78	0.007	8.44 $\pm$ 4.49	0.02	12.11 $\pm$ 1.99	<0.0001
KTH	13.00 $\pm$ 0.0		11.09 $\pm$ .30		11.05 $\pm$ 3.42	
LRH	12.88 $\pm$ 1.31		11.89 $\pm$ .93		11.54 $\pm$ 2.35	
Residence						
Urban	12.73 $\pm$ 0.83	0.3	9.84 $\pm$ 3.91	0.001	11.15 $\pm$ 2.32	0.02
Rural	12.79 $\pm$ 1.04		7.03 $\pm$ 4.34		13.09 $\pm$ 2.17	

**Table 4** Knowledge about COVID-19

	Frequency (n)	Percentage (%)
Have you heard about the novel coronavirus and the related terms COVID-19 or 2019-nCoV		
Yes	106	94.5
No	0	0
Don't know	6	5.4
COVID-19 disease is a viral infection		
Yes	101	90.1
No	9	8.0
Don't know	2	1.7
COVID-19 can be transmitted through close contact with infected people and infected animals		
Yes	101	90.1
No	5	4.5
Don't know	6	5.4
Fever, sore throat, cough and shortness of breath are possible symptoms of COVID-19 infection		
Yes	104	92.4
No	5	4.5
Don't know	3	2.3
The novel coronavirus is a similar virus as SARS-CoV and MERS-CoV		
Yes	96	85.7
No	10	8.9
Don't know	6	5.4
Is the COVID-19 infection the same illness as flu or cold?		
Yes	107	95.5
No	5	8.9
Don't know	0	5.4
Is there any laboratory test to confirm the presence of COVID-19 infection?		
Yes	107	95.5
No	0	0
Don't know	3	2.4
The incubation period of COVID-19 infection is 1–2 weeks?		
Yes	106	94.5
No	0	0
Don't know	6	5.4
Can COVID-19 infection be caught from a person who presents no symptoms and has recently visited the affected area?		
Yes	108	97.0
No	0	0
Don't know	4	4.4
People with a compromised immune system and old age people are at more risk of developing the infection?		
Yes	96	85.7
No	10	8.9
Don't know	6	5.4
Patients with comorbidities are at more risk of developing the infection		
Yes	100	89.7
No	6	5.4
Don't know	6	5.4
Health care workers and hospitalized patients who are near to infected patients are at more risk of developing the infection		
Yes	96	85.7
No	10	8.9
Don't know	6	5.4
People in crowded places are at increased risk of getting affected by the disease		
Yes	96	85.7

**Table 4** (continued)

	Frequency (n)	Percentage (%)
No	10	8.9
Don't know	6	5.4
Patients of COVID-19 infection should be immediately isolated to avoid the transfer of infection to other people		
Yes	104	92.9
No	5	4.5
Don't know	3	2.7

meter from patients and other healthcare workers (Table 6). There was a significant difference across the age ( $p < 0.0001$ ) educational level ( $p = 0.001$ ), hospital ( $p = 0.04$ ) and residence ( $p = 0.02$ ) of the participants as shown in Table 3.

## Discussion

To our knowledge, this is the first study in Pakistan that has assessed the KAP of PHPs toward the COVID-19 infection. The participants of this study had good overall knowledge about COVID-, as we found an overall correct response rate of 90.7% on the knowledge questionnaire. The knowledge score was significantly different across the professions ( $p = 0.003$ ) and the hospitals ( $p = 0.007$ ). Most of the respondents showed an optimistic attitude toward COVID-19. The mean attitude score suggested that 80% of the respondents had a positive attitude toward the COVID-19 infection. The attitude toward COVID-19 significantly differed across the age ( $p < 0.0001$ ), profession ( $p < 0.0001$ ) and hospital ( $p = 0.02$ ). Despite this, the PHPs adopted good preventive practices regarding COVID-19. The mean practice score of  $7.3 \pm 1.2$ , suggested that the preventive practices regarding COVID-19 among the PHPs were acceptable.

Knowledge greatly reflects the practice of individuals as it provides a base for good practice [10]. The knowledge of PHPs regarding COVID-19 is of paramount importance as they are on the frontline in dealing with the COVID-19 outbreak. The Physicians, Pharmacists, and Nurses are the professionals who are in direct contact with the COVID-19 infected patients and they must be fully aware of the associated risks with this infection. In the presented study the correct knowledge response rate was 90%, this finding was consistent with studies conducted in China (90%) [1] and Kenya (88%) [9], but was higher than that of Jordan (40%) [11]. One study from China reported that 89.5% of the participants knew COVID-19 which was in line with our study [12]. The knowledge of the Iranian general population about COVID-19 was 87% which is consistent with our study [13]. Another study from China reported that 88% of the healthcare workers knew COVID-19 (knowledge score:  $8.17 \pm 1.30$ ), this finding was in line with our study [14].

The present study demonstrated that most of the respondents showed a positive attitude toward COVID-19. Almost 80–90% of the respondents agreed that infection can be prevented by wearing masks, washing hands, using sanitizer and soap, restricting travel to infected areas, isolation of infected patients and avoiding touching nose, eyes, and mouth, which was consistent with studies reported from China (94%) [1] and Iran (90%) [13]. Another study from China stated that 93.3% of the participant agreed with the statements that COVID-19 transmission can be prevented by washing hands with soap frequently, isolation of COVID-19 positive patients and acceptance of isolation after getting COVID-19 (attitude score:  $1.86 \pm 0.43$ , range: 1–4) which was in line with our findings [14].

The adaption of preventive practices is the only solution to defeat the COVID-19, as to date, there is no specific treatment and prevention for the novel coronavirus [15]. In the present study preventive practice adopted by the PHPs were appreciable. The majority of respondents often practiced thoroughly cooked food (92%), keeping themselves warm and hydrated (69.6%), avoiding close contact with the people having cough and flu like symptoms (76%) and wearing personal protective equipment during interaction with COVID-19 patients (88.4%). Most of the participants had performed hand hygiene before and after interaction with COVID-19 patients (99.1%). Almost 100% practiced social distance of one meter from patients and other healthcare workers. This figure was consistent with the reported studies from China, where 96% of the respondents were practiced preventive practices by avoiding crowded places and wearing masks [1] and Jordan, where 87.5% of the participants adopted preventive practice by washing hands with alcohol or soap, wearing personal protective equipment (PPE) and putting a mask on confirmed or suspected patients [11]. Another study from Iran reported that 89% of the participants practiced preventive measures regarding COVID-19 (mean  $\pm$  SD:  $32.1 \pm 2.9$ , range: 12–36) these numbers are consistent with our study [13]. The good PHPs practices seen in this study may be attributed to the various directives issued by the Government Agencies and by the awareness campaigns ran on the social and electronic media.

**Table 5** Attitude toward COVID-19

	Frequency (n)	Percentage (%)
The disease can be transmitted by coughing and sneezing		
Agree	81	74.3
Neutral	27	24.8
Disagree	1	0.9
Transmission of COVID-19 infection can be prevented through wearing masks		
Agree	98	88.3
Neutral	11	9.9
Disagree	2	1.8
Transmission of COVID-19 infection can be prevented through washing hands and face regularly with antiseptics and sanitizers		
Agree	84	77.1
Neutral	20	18.3
Disagree	5	4.6
Transmission of COVID-19 infection can be prevented through the isolation of COVID-19 infected patients		
Agree	69	63.3
Neutral	29	26.6
Disagree	11	10.1
Transmission of COVID-19 infection can be prevented by taking antibiotics		
Agree	2	1.8
Neutral	32	29.4
Disagree	75	68.8
Restricting the travel of COVID-19 infected people to other areas of the world and of people in other areas to affected areas can be beneficial to prevent the spread of the infection		
Agree	95	85.6
Neutral	14	12.6
Disagree	2	1.8
Avoiding touching nose, mouth and eyes can reduce the risk of infection		
Agree	108	97.3
Neutral	3	2.7
Disagree	0	0.0
Avoiding touching the surface of doors, furniture or other things can be helpful in preventing the disease		
Agree	79	72.5
Neutral	28	25.7
Disagree	2	1.8
If a vaccine is developed against the novel coronavirus, it can significantly reduce the epidemic spread		
Agree	93	85.0
Neutral	14	12.5
Disagree	2	1.8
The available information about COVID-19 disease is sufficient in Pakistani society		
Agree	79	72.5
Neutral	28	25.7
Disagree	2	1.8
The government in our country has all the necessary healthcare facilities and are able to control the epidemic situation		
Agree	79	72.5
Neutral	28	25.7
Disagree	2	1.8

## Limitations of the Study

In the present study, all the participants were from Peshawar, which is the provincial capital of KPK and they all had easy

access to the internet but it is pertinent to mention that a considerable number of PHPs are working in basic health units (primary health care settings) of rural areas of Pakistan have very limited access to the internet and their knowledge,



**Table 6** Practice toward COVID-19

	Frequency (n)	Percentage (%)
I eat thoroughly cooked food especially meat products		
Often	103	92.0
Never	0	0.0
Sometime	9	8.0
I am keeping myself warm and hydrated		
Often	78	69.6
Never	6	5.4
Sometime	28	25.0
I am using soap or sanitizer to wash their hands and face		
Often	87	77.7
Never	4	3.6
Sometime	21	18.8
I am avoiding close contact with people having cough and flu-like symptoms		
Often	86	76.8
Never	0	0.0
Sometime	26	23.2
During interaction with the Covid-19 patient, I wear the necessary personal protective equipment such as masks, gloves and gown etc		
Often	99	88.4
Never	0	0.0
Sometime	13	11.6
I perform hand hygiene before and after touching the Covid-19 patients or before and after performing an aseptic procedure		
Often	94	83.9
Never	0	0.0
Sometime	18	16.1
I perform hand hygiene after touching the patient's surroundings like beds, tables, doors etc		
Often	111	99.1
Never	0	0.0
Sometime	1	0.9
I avoid unnecessary close contact and practice social distancing and keep at least 1-m distance from patients and other healthcare workers		
Often	110	99.1
Never	0	0.0
Sometime	1	0.9

attitude, and practices (KAP's) regarding COVID-19 were not evaluated in this study. This may be a limitation of this study.

## Conclusion

The findings from the current study suggested that PHPs have good knowledge, optimistic attitude and reasonable practices regarding COVID-19 infection. Moreover, focused training programs for PHPs can improve the understanding of risk and preventive strategies related to COVID-19 infection, which in turn can improve the confidence of PHPs to provide appropriate care to their patients as well as to protect themselves from this infection.

Hopefully, by designing effective COVID-19 prevention and management programs at Government level, countries like, Pakistan can manage the spread of COVID-19 infection.

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## Compliance with Ethical Standards

**Conflict of interest** The authors declare that they have no conflict of interest.



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