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 ± 0.89, 8.9 ± 4.1 and 7.3 ± 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
The government in our country has all the necessary healthcare facilities and are able to control the epidemic situation. I avoid unnecessary close contact and practice social distancing and keep at least 1-m distance from patients and other healthcare workers.

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

| K1. Have you ever heard about the novel coronavirus and the related terms COVID-19 or 2019-nCoV | Yes no I don’t know |
| K2. COVID-19 disease is a viral infection | Yes no I don’t know |
| K3. Fever, sore throat, cough and shortness of breath are possible K4 symptoms of COVID-19 infection | Yes no I don’t know |
| K4. The novel coronavirus is a similar virus as SARS-CoV and MERS-CoV | Yes no I don’t know |
| K5. The novel coronavirus is a similar virus as SARS-CoV and MERS-CoV | Yes no I don’t know |
| K6. Is the COVID-19 infection the same illness as flu or cold? | Yes no I don’t know |
| K7. Is there any laboratory test to confirm the presence of COVID-19 infection? | Yes no I don’t know |
| K8. The incubation period of COVID-19 infection is 1–2 weeks? | Yes no I don’t know |
| K9. 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 |
| K10. People with a compromised immune system and old age people are at more risk of developing the infection? | Yes no I don’t know |
| K11. Patients with comorbidities are at more risk of developing the infection | Yes no I don’t know |
| K12. 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 |
| K13. People in crowded places are at increased risk of getting affected by the disease | Agree Neutral Disagree |
| K14. Patients of COVID-19 infection should be immediately isolated to avoid the transfer of infection to other people | Agree Neutral Disagree |
| A1. The disease can be transmitted by coughing and sneezing | Agree Neutral Disagree |
| A2. Transmission of COVID-19 infection can be prevented through wearing masks | Agree Neutral Disagree |
| A3. Transmission of COVID-19 infection can be prevented through washing hands and face regularly with antiseptics and sanitizers | Agree Neutral Disagree |
| A4. Transmission of COVID-19 infection can be prevented through washing the hands and face regularly with antiseptics and sanitizers | Agree Neutral Disagree |
| A5. Transmission of COVID-19 infection can be prevented by taking antibiotics | Agree Neutral Disagree |
| A6. 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 |
| A7. Avoiding touching nose, mouth and eyes can reduce the risk of infection | Agree Neutral Disagree |
| A8. Avoiding touching the surface of doors, furniture or other things can be helpful in preventing the disease | Often Sometime Never |
| A9. If a vaccine is developed against the novel coronavirus, it can significantly reduce the epidemic spread | Often Sometime Never |
| A10. The available information about COVID-19 disease is sufficient in Pakistani society | Often Sometime Never |
| A11. The government in our country has all the necessary healthcare facilities and are able to control the epidemic situation | Often Sometime Never |
| P1. I eat thoroughly cooked food especially meat products | Often Sometime Never |
| P2. I am keeping myself warm and hydrated | Often Sometime Never |
| P3. I am using soap or sanitizer to wash their hands and face | Often Sometime Never |
| P4. I am avoiding close contact with people having cough and flu-like symptoms | Often Sometime Never |
| P5. During interaction with the Covid-19 patient, I wear the necessary personal protective equipment such as masks, gloves and gown etc | Often Sometime Never |
| P6. I perform hand hygiene before and after touching the Covid-19 patients or before and after performing an aseptic procedure | Often Sometime Never |
| P7. I perform hand hygiene after touching the patient’s surroundings like beds, tables, doors etc | Often Sometime Never |
| P8. 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 |
| P9. 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 ≥ 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               |
| 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 (± standard deviation) of the participants was 26.0 ± 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 demographics 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 ± 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 ± 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 ± 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 ± SD | Knowledge score | Attitude score | Practice score |
|-----------|----------------|---------------|---------------|
| Age (years) |               |               |               |
| 26.4 ± 2.01 | 12.75 ± 0.89 | < 0.001 | 8.9 ± 4.32 | < 0.001 | 12.75 ± 0.89 | < 0.001 |
| Gender |               |               |               |
| Male | 12.73 ± 0.91 | 8.81 ± 4.17 | 0.2 | 11.89 ± 2.45 | 0.31 |
| Female | 12.78 ± 0.89 | 9.27 ± 4.45 | 11.38 ± 2.40 |
| Marital status |               |               |               |
| Married | 12.65 ± 1.10 | 8.03 ± 4.30 | 0.002 | 11.18 ± 2.56 | 0.002 |
| Unmarried | 12.93 ± 0.26 | 10.68 ± 3.57 | 12.71 ± 1.86 |
| Education level |               |               |               |
| Bachelor | 12.67 ± 0.95 | 10.91 ± 3.03 | 0.0001 | 11.17 ± 2.63 | < 0.0001 |
| Master | 12.82 ± 0.98 | 9.58 ± 3.37 | 12.24 ± 1.95 |
| Doctorate | 12.85 ± 0.49 | 2.75 ± 2.12 | 12.35 ± 2.46 |
| Profession |               |               |               |
| Physician | 12.93 ± 0.25 | 9.14 ± 3.85 | < 0.001 | 11.07 ± 2.75 | < 0.0001 |
| Nurse | 12.85 ± 0.89 | 10.82 ± 3.37 | 12.26 ± 2.00 |
| Hospital |               |               |               |
| HMC | 12.71 ± 0.78 | 8.44 ± 4.49 | 0.02 | 12.11 ± 1.99 | < 0.0001 |
| KTH | 13.00 ± 0.0 | 11.09 ± 3.0 | 11.05 ± 3.42 |
| LRH | 12.88 ± 1.31 | 11.89 ± 3.93 | 11.54 ± 2.35 |
| Residence |               |               |               |
| Urban | 12.73 ± 0.83 | 9.84 ± 3.91 | 0.001 | 11.15 ± 2.32 | 0.02 |
| Rural | 12.79 ± 1.04 | 7.03 ± 4.34 | 13.09 ± 2.17 |
Table 4 Knowledge about COVID-19

| 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             | 4.9            |
| Don’t know                                                                              | 0             | 0              |
| 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           |
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 ± 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 Jordon (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 ± 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 ± 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 Jordon, 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 ± SD: 32.1 ± 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.
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,
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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