

Knowledge, attitude, and practices of front line health workers after receiving a COVID-19 vaccine: a cross-sectional study in Pakistan (#69803)

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Knowledge, attitude, and practices of front line health workers after receiving a COVID-19 vaccine: a cross-sectional study in Pakistan

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Aim Worldwide, there is an increased risk of COVID-19 infection among front line health workers. This study aimed to evaluate the knowledge, attitude, and practices of front line health workers of Pakistan after getting the COVID-19 vaccine. **Methods** A population web-based survey on COVID-19 vaccine was carried out on 635 front line health workers in Pakistan between 15th April - 15th July 2021. The survey focused on four main sections consisting of socio-demographic data, knowledge, attitude, and practices after getting COVID-19 vaccine. The data was analysed on SPSS. Multiple linear regression was done to assess the role of knowledge and attitudes in predicting practice after getting COVID-19 vaccine. $p < 0.05$ was considered significant. **Results** Overall, 60% of front-line health workers were nervous before getting vaccinated with the most leading reason to get vaccinated was their concern to protect themselves and their community (53.4%). A majority of front-line health workers had fear about the unseen side effects of the COVID-19 vaccine (59.7%) used in Pakistan with the most common side effect reported was soreness at the injection site (39%). It has been observed that almost all of the frontline health workers observed preventive practices after getting vaccinated. In multiple linear regression model, females were less likely to have favorable practices after getting COVID-19 vaccine (though statistically in-significant) in contrast to males, while practices were significantly predicted from marital status, number of information sources, knowledge of COVID-19 vaccination and attitude after getting COVID-19 vaccination. **Conclusion** The findings reflect that frontline health workers have good knowledge and a positive attitude after getting COVID-19 vaccine, though they were worried about its side

effects. This study is significant as the frontline health workers are a symbol for guidance, reliable source of information, and encouraging mean of COVID-19 vaccine for the general public. This study also reported that post-vaccination side effects were mild which will aid in reducing the vaccine hesitancy among the general Pakistani population.

Knowledge, Attitude, and Practices of Frontline Health Workers after Receiving COVID-19 Vaccine: A Cross-Sectional Study in Pakistan

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Abstract

Background

Worldwide, there is an increased risk of COVID-19 infection among frontline health workers. This study aimed to evaluate the knowledge, attitude, and practices of frontline health workers of Pakistan after getting the COVID-19 vaccine.

Methods

A population web-based survey on COVID-19 vaccine was carried out on 635 frontline health workers in Pakistan between 15th April - 15th July 2021. The survey focused on four main sections consisting of socio-demographic data, knowledge, attitude, and practices after getting COVID-19 vaccine. The data was analyzed on SPSS. The data was analyzed on SPSS. Multiple linear

regression was done to assess the role of knowledge and attitudes in predicting practice after getting COVID-19 vaccine. $p < 0.05$ was considered significant.

Results

Overall, 60% of frontline health workers were nervous before getting vaccinated with the leading reason to get vaccinated was their concern to protect themselves and their community (53.4%). A majority of frontline health workers had fear about the unseen side effects of the COVID-19 vaccine (59.7%) used in Pakistan with the most common side effect reported was soreness at the injection site (39%). It has been observed that almost all of the frontline health workers observed preventive practices after getting vaccinated. In the multiple linear regression model, females were less likely to have favorable practices after getting COVID-19 vaccine (though statistically insignificant) in contrast to males, while practices were significantly predicted from marital status, the number of information sources, knowledge of COVID-19 vaccination, and attitude after getting COVID-19 vaccination.

Conclusion

The findings reflect that frontline health workers have good knowledge and a positive attitude after getting COVID-19 vaccine, though they were worried about its side effects. This study is significant as the frontline health workers are a symbol for guidance, reliable source of information, and encouraging mean of COVID-19 vaccine for the general public. This study also reported that post-vaccination side effects were mild which will aid in reducing the vaccine hesitancy among the general Pakistani population.

Introduction

Worldwide, all parts of life have been affected due to the covid-19 pandemic (Huynh et al., 2021). According to the world health organization (WHO), there have been 308,458,509 confirmed cases of COVID-19, including 5,492,595 deaths, and a total of 9,194,549,698 vaccine doses have been administered Worldwide till 11th January 2022 (WHO, 2021a). The WHO had listed frontline health workers as a priority group for COVID-19 vaccination (Gagneux-Brunon et al., 2021), as they are at increased risk because of their direct contact with COVID-19 patients referred to hospitals or isolation centers for diagnosis, quarantine, and management resulting in an increasing number of positive cases and deaths in frontline health workers (Dhahri et al., 2020). Initially, about 10% - 20% of frontline health workers have been identified with the COVID-19 infection,

68 therefore protecting them from COVID-19 infection acts as a vital role, not only for their selves
69 but also for the conservation of the healthcare system (Nguyen et al., 2020).

70 The COVID-19 infection is extremely contagious and involves the Worldwide population,
71 therefore the most useful approach to save the population from COVID-19 infection is vaccines,
72 which is a significant public health measure. Ten COVID-19 vaccines have been registered by
73 WHO and distributed in different countries so far, with almost 33 vaccines are approved by at least
74 one country Worldwide. The frontline health workers are suggested as the top priority for the
75 vaccination in contrast to the general population (Islam et al., 2021; WHO, 2021b). Therefore, it
76 is significant for frontline health workers to attain early raised vaccination coverage which will
77 not only confirm the sufficient workforce to treat the infected patients but also permit them to share
78 their vaccination experiences with patients and their families. (Thorsteinsdottir and Madsen, 2021)
79 As in several countries, long-term lockdown is not doable because of economic crisis, therefore
80 the accessibility of COVID-19 vaccines might be the only means to control the COVID-19
81 infection. Thus, in addition to following the COVID-19 sops (personal protective equipment and
82 social distancing), there is an essential need to be vaccinated against COVID-19 infection to limit
83 the COVID-19 community transmission in Pakistan (Malik et al., 2021a).

84 Literature research has revealed that percentages of knowledge and acceptance of COVID-19
85 vaccines in health care workers vary among countries, which was 73.9% in Europe, 40% in Hong
86 Kong and, only 27.7% in Congo accordingly (Wang et al., 2020b, Nzaji et al., 2020).

87 To evaluate the beliefs and intentions about the past vaccination, the health belief model is a
88 beneficial method. The model evaluates four features i.e., perceived susceptibility and severity,
89 perceived barriers, benefits, and signs to action (Giao et al., 2019). The worries of frontline health
90 workers regarding the safety of the COVID-19 vaccine must be answered soon, as they are the
91 first ones to get the vaccine (Huynh et al., 2021). Throughout the World, the prevalence of COVID
92 -19 vaccination hesitancy among frontline health workers ranged from 4.3 to 72% which vary
93 because of numerous socio-demographic features (Biswas et al., 2021). To develop trust among
94 frontline health workers, self-governing committees and trusted bodies should deliver reliable
95 knowledge and information regarding COVID -19 vaccines and their safety. In April 2020, the
96 WHO, European Union, and France introduced the COVID-19 vaccines global access (COVAX)
97 as a platform to speed up the development and manufacture of covid-19 vaccines Worldwide
98 (Kasozi et al., 2021). Nowadays, many vaccines are available that are believed to be safe and

effective by international medicines regulatory bodies, though doubts in evaluating the efficacy of these vaccines still exist (Ledda et al., 2021).

In Pakistan, WHO has declared that there have been 1,345,801 confirmed cases of COVID-19 with 29,042 deaths, and 169,131,246 vaccine doses have been administered till 21st January 2022 (WHO, 2021b). Presently, multiple conspiracy theories about the COVID-19 vaccine are circulating in Pakistan, like vaccine containing nano-chips which is implanted in the bodies of the individuals to achieve control by 5g towers. Furthermore, COVID -19 was a magnificent illusion to aim at the Islamic nations and was created to permit the Jews to take control over the World (Khan et al., 2020).

Frontline health workers serve as role models for the general population in encouraging them for preventive health behaviors like getting vaccinated against COVID-19 infection. Also, they play a significant role in delivering knowledge regarding the source of COVID-19 vaccine and its effects in the upcoming years. So far, the data on the knowledge, attitude, and practices after getting vaccinated against COVID-19 among frontline health workers of Pakistan are rare. Therefore, the aim of this study is: To assess the role of socio-demographic characteristics, knowledge, and attitude of front line health workers in predicting practices after getting COVID-19 vaccine and to develop policies with the help of this survey to have a helpful and continuous vaccination rollout plan for COVID-19 infection by the government of Pakistan.

Materials & Methods

Design

A cross-sectional study was carried out to assess the knowledge, attitude, and practices of frontline health workers of Pakistan after getting the COVID-19 vaccine from 15th April 2021 till 15th July 2021. Because of the 3rd wave of the COVID-19 in Pakistan, it was not possible to carry out the community-based survey, therefore a semi-standardized electronic questionnaire was designed to gather the data using an online secure Google survey tool, a shareable link was produced (<https://docs.google.com/forms/d/e/1FAIpQLSe7fGJHOLxYvmhduuJ1ccUgf7j5ZODQ5VFAunUVHlbFrskQ4g/viewform?usp=sfink>) and disseminated through multiple social media like a personal social network, Facebook, and WhatsApp with mandatory email addresses to ensure one response per individuals so that results may not be compromised. The survey includes an introduction that specified the purpose of the study. The data was collected anonymously and email

addresses were kept confidential. The biasness of the study was decreased by keeping the survey open for 3 months.

Inclusion and exclusion Criteria

The inclusion criteria of the study participants were: being a Pakistani resident, frontline health workers, and having internet access. The exclusion criteria included an incomplete survey.

Sample Size:

The sample size was calculated using the following equation:

$$n = \frac{z^2 pq}{d^2}$$

$$n = \frac{1.99^2 \times 5 \times (1 - .5)}{.05^2}$$

$$n = 396.01$$

Here,

n = number of samples

z = 1.96 (95% confidence level)

p = prevalence estimate (50% or .5) (as no study found)

q = (1- p)

d = precision limit or proportion of sampling error (.05)

As there is no earlier similar study on frontline health workers concentrating on knowledge, attitudes, and practices after getting the COVID-19 vaccine in Pakistan, the best assumption (p) made for the present study would be 50%. A sample size of 396.01 participants was assessed, assuming a 10% non-response rate. Our sample size exceeded this estimate.

Questionnaire:

While keeping in mind the objectives of the study, a 30 online self-administered questionnaire (based on validated questions) was prepared from previous studies (Islam et al., 2021, Danabal et al., 2021). The Google form consists of four key focus areas including socio-demographic data, knowledge about COVID vaccine, post-vaccination attitude, and practices along with informed consent. Each section consists of a range of options from multiple choices to forced-choice (yes/no) questions depending on the subject matter. All the questions were compulsory.

In the first section, respondents were asked nine questions regarding their socio-demographic characteristics like age, gender, etc. The key independent variables were knowledge and attitude

related to COVID-19 vaccine. Knowledge of COVID-19 vaccine was assessed using 6-items with three possible responses (i.e., “Yes”, “No”, and “Don’t know”). A sample item used to assess knowledge was: Vaccine is important to end the COVID-19 pandemic. A higher score on the scale showed higher knowledge of COVID-19 vaccine. Attitude towards COVID-19 vaccine was assessed using 10-items with five possible responses (i.e., *Strongly disagree*, *Disagree*, *Neutral*, *Agree*, and *Strongly Agree*) which were later recoded to three responses (*Disagree*, *Neutral*, and *Agree*). A sample item used to assess attitudes was: Do you believe that the benefits of COVID-19 vaccination are greater in comparison to its risk? A higher score on the scale showed favorable attitudes towards COVID-19 vaccine. The dependent variable included in the study was practiced after getting COVID-19 vaccine, which was assessed using 6-items with three possible responses (i.e., “Yes”, “No”, and “Don’t know”). A sample item used to assess practices was: Do you still follow COVID-19 basic prevention guidelines after getting vaccinated? A higher score on the scale showed favorable practices towards COVID-19 vaccine.

Participants:

The target population of the current study was frontline health workers including physicians, dental surgeons, pharmacists, physiotherapists, laboratory technicians, nurses, hospital administrative staff, and undergraduate medical and allied health sciences students from all over Pakistan. A total of 635 responses were obtained.

Ethical Declaration:

The current study was conducted following the principles for human investigations (i.e., Helsinki Declaration) and has passed the ethical approval from the institutional ethical review board of Akhtar Saeed Medical and Dental College (M-21/069/-Oral Pathology). All the respondents participated willingly in the survey. The respondents were assured that their information will be kept confidential.

Statistical Analysis:

The Data cleaning, editing, and sorting were done on Microsoft excel version (2014). The data was then imported on the SPSS 20 version (IBM Corp., Armonk, NY, USA) spreadsheet where the coding of data and analysis was done. The quantitative data is presented in the form of descriptive statistics like frequencies and percentages. First-order analyses like the chi-square test and Fisher exact test were completed to check the association among socio-demographic characteristics (age and gender), attitude, and practices after COVID-19 vaccine. To predict

practices after getting COVID-19 vaccine from socio-demographic and key independent variables (knowledge and attitude), a multivariate linear regression analysis was conducted. To test for multicollinearity, tolerance values and VIF values were considered which showed that multicollinearity was not a threat. *P*-values < 0.05 were considered statistically significant with 95% confidence interval.

Results

Demographic Data

A total of 704 respondents from all over Pakistan participated in this study, out of which 69 were excluded because of an incomplete survey. (Table 1) gives an outline of their sociodemographic characteristics. Most of the respondents *n* = 296 (46.3%) were of young age (20-30 years), females (373, 58.7%), single (349, 55%) and completed bachelor in dental surgery (289, 45.5%). The majority of the participants gathered information about the COVID-19 vaccine via social media and television (241, 38%). The most frequently reported minor side effects were soreness at injection site *n* = 246 (39%) followed by body aches only *n* = 95 (15%) (Figure 1).

Data Regarding COVID-19 Vaccine knowledge

The participant's responses concerning knowledge about the COVID-19 vaccine are summarized in (Table 2). Only 31% of respondents had been diagnosed previously as COVID-19 positive with the most common reason for getting the COVID-19 vaccination was their concern to protect themselves and their community (53.4%). Moreover, more than half of the respondents (60%) stated that they were nervous before getting the COVID-19 vaccine. About 75.9% responded that they will still catch the COVID-19 infection and infection others, also majority (88.5%) of the respondents answered that vaccine is important to end the COVID-19 pandemic.

Data Regarding belief and attitude about COVID-19 Vaccine

Table 3 shows the distribution of participants regarding the belief and attitude of frontline health care workers after getting the COVID-19 vaccine. From 635 respondents, *n* = 356 (56%) agreed that the newly developed COVID-19 vaccine is not safe as it is developed in an emergency. The majority of the respondents (379, 59.7%) endorsed the concern regarding the unseen effects of the COVID - 19 vaccine. However, despite their concerns, most of the respondents still believed that it will not discourage them from getting vaccinated (537, 84.5%). Half of the respondents (360, 56.7%) were worried about contracting the virus even after getting vaccinated.

When it comes to trust in the measures taken by the Ministry of Health of Pakistan to ensure vaccine safety only (59, 9.3%) did not have trust.

More than half of the participants 68.4% were concerned about the vaccine efficacy, whereas n = 542 (85.4%) perceived those benefits of the COVID-19 vaccine are greater as compared to its risk. The overall result of the survey showed that 28.9% of participants disagreed with the fact that the COVID-19 vaccine might be approved quickly because of political pressure. The responses are summarized in (Table 3).

Practices After Getting Covid-19 Vaccine

The frequencies of practices among the respondents after getting the COVID-19 vaccine were presented in (Table 4). It was noticed that a huge number of the participants (95%) showed a positive attitude towards the preventive COVID-19 practices. The COVID-19 vaccine acceptance is related to the idea of recommending the vaccine to their friends and family. Of note, a large majority of respondents (93.9%) will recommend the COVID-19 vaccine to their friends and family.

Females (n = 181; 58.4%) were more knowledgeable regarding the duration to build the immunity in comparison to males (n = 129; 41.6%) with significant association between them (p = 0.034). There were significant differences in belief and attitude after getting the COVID-19 vaccine among both genders. It was noticed that females (n = 112; 72.3%) were significantly more nervous before getting vaccinated in comparison to males (n = 43; 27.7%). However, a greater number of male respondents believed that the COVID-19 vaccine will provide them long-term protection against the virus with $p < 0.05$ (Table 5).

Female respondents were more likely to follow COVID-19 practices in comparison to males. Although it was seen that a greater number of females followed COVID-19 basic prevention guidelines n = 356 (59%) in contrast to males n = 247 (41%) with an insignificant association (p = 0.294). A similar trend was observed among females (50%) regarding wearing a mask in comparison to males (40.4%) after getting the COVID-19 vaccine which was found to be significantly associated (p = 0.046).

Out of 197 respondents who had a previous history of COVID-19 infection it was observed that most of them were between 20 – 30 years of age (n = 83; 42.1%), followed by 31-40 years of age n = 71 (36%), with a positive correlation among them (p = 0.036). When participants have inquired about the reason for getting vaccinated it was seen that majority of 20 - 30 years of respondents n

= 161 (47.5%) wants to protect themselves and their community ($p = 0.017$). The level of nervousness before getting vaccinated was the one which was significantly associated ($p = 0.000$) among different age groups i.e., decreasing with increasing age predominantly seen in 20 - 30 years $n = 71$ (45.8%) followed by 31- 40 years $n = 61$ (39.4%), 41 - 50 years $n = 18$ (11.6%), 51- 60 years $n = 2$ (1.3%) and above 60 years $n = 3$ (1.9%) accordingly. It is worth noting that soreness at the injection site was the most commonly reported minor side effect among all age groups after getting vaccinated.

Regarding practices among different age groups, it was found that all age groups followed basic SOPs of COVID-19 infection and people above 41 years of age groups (100%) were more likely to wear a mask than those of younger age groups after their vaccination.

The model predicting favorable attitudes after getting COVID-19 vaccine was statistically significant, $F(9, 625) = 4.599$, $p < .001$, adj. $R^2 = .049$. The value of adjusted R-square showed that roughly 5% of the variation in favorable attitudes after getting COVID-19 vaccine was predicted by the independent variables of the study. The results showed that favorable attitudes after getting COVID-19 vaccine increased with age by 0.29 units ($B = 0.29$, $p < .01$). Another significant finding of the study was that the favorable attitudes after getting COVID-19 vaccine increased by 0.55 units in those respondents who were not currently practicing ($B = 0.55$, $p < .05$). The results further showed that with one unit increase in knowledge of respondents with respect to COVID- 19 vaccine, favorable attitudes after getting COVID-19 vaccine increased by 0.24 units ($B = 0.24$, $p < .001$). The remaining variables included in the model were statistically insignificant ($p > .05$) (Table 6).

Table 6 show the model predicting favorable practices after getting COVID-19 vaccine was statistically significant, $F(10, 624) = 12.16$, $p < .001$, adj. $R^2 = .150$. The value of adjusted R-square showed that 15% of the variation in favorable practices towards COVID-19 vaccine was predicted by the independent variables of the study. The results of multivariate regression analysis further showed that females were less likely to have favorable practices after getting COVID-19 vaccine than males ($B = -0.30$, $p < .05$). Respondents who were married showed more favorable practices after getting COVID-19 vaccine than those who were unmarried ($B = 0.65$, $p < .001$). Another significant finding of the study was that the favorable practices towards COVID-19 vaccine increased by 0.21 units with a one-unit increase in sources of information ($B = 0.21$, $p < .01$). This shows that respondents with multiple sources of information adopted favorable practices

after getting COVID-19 vaccine than those with fewer sources of information. Both key independent variables included in the study were statistically significant. The results showed that with a one-unit increase in knowledge of respondents with respect to COVID-19 vaccine, favorable practices after getting COVID-19 vaccine increased by 0.21 units ($B = 0.21, p < .001$). Likewise, one unit increase in favorable attitudes after getting COVID-19 vaccine increased favorable practices towards COVID-19 vaccine by 0.16 units ($B = 0.16, p < .001$). The remaining variables included in the model were statistically insignificant ($p > .05$).

Discussion

COVID-19 vaccine is an ideal way to end the COVID-19 infection. The government of Pakistan has already started the COVID-19 vaccination roll-out in February 2021 which creates hope as part of the pandemic solution (Siddiqui et al., 2021). To date, very limited studies have investigated the response of frontline health workers regarding their knowledge and attitude after getting vaccinated. This study is going to give first-hand and novel information about the knowledge, attitude, and practices of frontline health workers in Pakistan after getting COVID 19 vaccination which will play an important role in the general population vaccine acceptance. The results show that a few sociodemographic, knowledge, and attitude variables influence the practices after getting COVID-19 vaccine which will be important in developing health-related education and awareness programs about COVID-19 vaccine.

Now a day's social media plays an important role in creating awareness and spread of messages across the masses. In our study, the majority of participants have acquired knowledge from social media and television regarding the importance of the COVID 19 vaccine (Shekhar et al., 2021, Alwi et al., 2021). This is not a surprising element as the Government of Pakistan has taken all the appropriate steps for providing facts and figures regarding COVID 19 prevention and recommendations to the public. Mobile applications related to healthcare and informative television campaigns have played an immense role in creating awareness about vaccination programs and are also useful for policymakers in terms of the COVID-19 vaccine information in Pakistan.

More than half of the survey participants (53.4%) justified their decision by replying that they got vaccinated as they want to protect themselves and their community (Benis et al., 2021, Loomba et al., 2021). There is a lot of debate on social media regarding vaccine safety, its adverse effects,

effectiveness, and approval by authorities. It has created lots of concerns and anxiety even in frontline health workers. More than 60% of the respondents were nervous before getting the vaccine which is similar to previous studies (Shekhar et al., 2021, Malik et al., 2020). Furthermore, a high level of concern was shown for COVID-19 vaccine safety as it is developed in an emergency but despite these concerns, 84.5% were willingly getting the vaccine. This is in contrast with the study conducted in Australia (Dodd et al., 2021) where concern about the vaccine's safety was 36% and only 11% among those who were willing to get the vaccination. While it is in accordance with the studies conducted by Detoc et al. (Detoc et al., 2020) and Barry et al. who found that 75% of frontline health workers expressed willingness for the COVID-19 vaccine (Barry et al., 2020). In our study, 59.7% of participants were worried that the vaccine currently being used in Pakistan could have some side-effect which is similar to the national and international data (Malik et al., 2021b, Callaghan et al., Elharake et al., 2021). Literature research has revealed that the leading cause for vaccine hesitancy was fear of the adverse effects of the COVID -19 vaccines (Alwi et al., 2021, Malik et al., 2021b, Callaghan et al., Elharake et al., 2021, Wang et al., 2020a). Nearly all reported side effects were mild with the most frequently reported minor side effects being soreness at the injection site which is in agreement with another local study (Siddiqui et al., 2021). There are multiple conspiracy theories linked with the vaccine efficacy and its associated side effects, therefore, it is significant to take relative measures to reduce such rumors which will ultimately increase the willingness to get vaccinated (Shekhar et al., 2021, Pogue et al., 2020). Misconception and lack of trust are contributing factors for Covid-19 vaccine acceptance. The finding of this study (77.2%) is aligned with the study carried out by Benis et al. reflecting that majority of the participant have complete trust in their government regarding the Covid-19 vaccine (Benis et al., 2021). Data from previously carried out local and international studies revealed that a population with an increased level of trust is linked with a high rate of vaccine acceptance (Qamar et al., 2021, Vasilevska et al., 2014). The majority of the frontline health workers in our study are likely to recommend the COVID-19 vaccine to their families and friends to protect them from the lethal COVID-19 infection (Shekhar et al., 2021, Benis et al., 2021, Schwarzsinger et al., 2021). In Pakistan, frontline health workers are the first to be vaccinated and can be role models for the general population. Therefore, their acceptance and recommendation may affect the hesitant general public to eventually accept the vaccine.

In the present study, females showed a less likely positive attitude after getting vaccine and prevention which is in contrast with the studies conducted in Bangladesh (Ferdous et al., 2020) and Indonesia (Harapan et al., 2016) but in accordance with the study conducted in China (Wang et al., 2020a). Overall, good hygiene practices and a positive attitude towards preventive measures were observed among the participants of the current study which is in accordance with the earlier reported data on frontline health workers from the Pakistan and Vietnam (Ladiwala et al., 2021, Saqlain et al., 2020, Huynh et al., 2020) but in contrast to the study conducted in Uganda (Kamacooko et al., 2021). Good hygiene practices and preventive measures in frontline health workers can be attributed to proper knowledge of the spread of disease and the importance of preventive measures in decreasing risk for COVID-19. The current study showed that knowledge and awareness play a significant role in the practices to prevent the risk of infection with COVID 19. Concerns regarding COVID 19 vaccine should be addressed in media and awareness campaigns are a must to shed light on the importance of vaccines to prevent the COVID 19. There are a few limitations that should be addressed in the understanding of the results of the current study. Firstly, a major limitation is that the survey was carried out online which impose methodological limitation because of passive exclusion of inactive and non-social media users, though extensive use of social media will reveal such concerns. The second limitation is that this study used a snowball sampling technique which might result in the selection of biasness, therefore a study with random sampling is recommended. Though the survey has been carried out in the early days of the vaccination roll-out campaign, its findings might be different once the mass vaccination program is carried out countrywide targeting the general population as well.

Conclusions

The COVID-19 pandemic continues to cause Worldwide chaos on livings and lives, and the COVID-19 vaccines indicate the light of hope for the future. The findings of the present study showed an adequate knowledge with positive attitudes of frontline health workers after getting COVID-19 vaccination in Pakistan. The study highlight number of socio-demographic factors influencing the knowledge, attitudes, and practices of frontline health workers after getting COVID-19 vaccine. This study can give a direction in planning to health care authorities and public health experts in Pakistan to ensure adequate knowledge, positive attitudes towards COVID-19 vaccine to have maximal acceptance of COVID-19 vaccination and to decrease the vaccine

hesitancy supported and facilitated by misinformation in the media. It is the need of time that the general population should get adequate and correct information about the vaccines. Therefore, this study will be significant in developing COVID-19 vaccination-related awareness and health education programs.

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Table 1 (on next page)

Descriptive statistics of socio-demographic characteristics

1 **Table 1:** Descriptive statistics of socio-demographic characteristics

Variables	N (%)
Age	
20 – 30	294 (46.3)
31 – 40	207 (32.6)
41 – 50	80 (12.6)
51 – 60	25 (3.9)
Above 60	29 (4.6)
Gender	
Male	262 (41.3)
Female	373 (58.7)
Marital status	
Married	286 (45)
Single	349 (55)
Education level	
MBBS	223 (35.1)
BDS	289 (45.5)
Pharmacy	39 (6.1)
Physiotherapy (DPT)	17 (2.7)
Graduation	51 (8)
Under graduation	16 (2.5)
Occupation	

Physician	136 (21.4)
Dental Surgeon	182 (28.7)
Pharmacist	37 (5.8)
Physiotherapist	17 (2.7)
Laboratory Technician	30 (4.7)
Nurse/Dispenser	15 (2.4)
Hospital Administrative	30 (4.7)
Medical Student	188 (29.6)
Are you currently in practice?	
Yes	314 (49.4)
No	321 (50.6)
Where did you receive information about the COVID-19 vaccine?	
Social Media (WhatsApp, Facebook)	120 (18.9)
Friends and Family	56 (8.8)
Television	26 (4.1)
Workplace	31 (4.9)
Government Helplines	22 (3.5)
SM, NP, WP	24 (3.8)
Friends, Government Helplines	13 (2.0)
Social Media and Television	241 (38.0)
Social Media, friends and family	37 (5.8)
All	65 (10.2)

When Did You Get Vaccinated Against Covid-19?	
January 2021	19 (3)
February 2021	77 (12.1)
March 2021	150 (23.6)
April 2021	206 (32.4)
May 2021	69 (10.9)
June 2021	114 (18)

Table 2(on next page)

Frequencies and percentages regarding knowledge about Covid -19 vaccine

Table 2: Frequencies and percentages regarding knowledge about Covid -19 vaccine

Variables	N (%)
Which of the following best describe your reason for getting vaccinated against COVID-19?	
I want to protect myself and community	339 (53.4)
I have increased exposure with the patients	65 (10.2)
I had COVID in the past and don't want to have it again	47 (7.4)
It can lower the chance of getting COVID-19	74 (11.7)
To be able to travel safely	19 (3.0)
It helps to stop the COVID-19 pandemic	51 (8.0)
It is safer way to help build the protection	40 (6.3)
How long will it take to build immunity against COVID-19 after getting vaccinated?	
Immediately after first dose	16 (2.5)
14 days after first shot	141 (22.2)
Immediately after second dose	47 (7.4)
14 days after second dose	310 (48.8)
One to two months after second dose	121 (19.1)
Have you ever been infected with COVID-19 infection?	
Yes	197 (31.0)
No	321 (50.6)
Don't know	117 (18.4)

Do you feel nervous before getting COVID-19 vaccination?	
No	254 (40)
Yes	381 (60)
After Getting a COVID-19 vaccine can you still catch Covid-19 infection and can also infect others	
Yes	482 (75.9)
No	55 (8.6)
Don't Know	98 (15.4)
A vaccine is important to end the COVID-19 pandemic	
Yes	562 (88.5)
No	38 (6)
Don't Know	35 (5.5)

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Table 3(on next page)

Belief and attitude of respondents after getting COVID-19 vaccine (n = 635)

1 **Table 3:** Belief and attitude of respondents after getting COVID-19 vaccine (n = 635)

Variables	Agree N (%)	Disagree	Neutral N (%)
Safety of a vaccine cannot be considered guaranteed	356 (56)	75 (11.8)	204 (32.1)
Worried about unseen effects of COVID-19 vaccine	379 (59.7)	86 (13.5)	170 (26.8)
Believe that the side effects of the vaccine are reasonable and will not discourage me from taking the vaccine	537 (84.5)	31 (4.9)	67 (10.6)
After getting a COVID-19 vaccine you are worried about getting the virus	360 (56.7)	149 (23.5)	126 (19.8)
Trust the Ministry of Health of Pakistan regarding vaccine safety	490 (77.2)	59 (9.3)	86 (13.5)
Concerned about COVID-19 vaccine efficacy	434 (68.4)	84 (13.2)	117 (18.4)
Believe that benefits of COVID-19 vaccine are greater than its risk	542 (85.4)	29 (4.5)	64 (10.1)
Believe that COVID-19 vaccine provides long term protection	269 (42.4)	177 (27.9)	189 (29.8)
Believe that COVID-19 vaccine is approved quickly	311 (48.9)	184 (28.9)	140 (22)
Have you ever had serious reaction after getting COVID-19 vaccine	11 (1.7)	624 (98.2)	0%

Table 4(on next page)

Detailed distribution of practices of respondents

1 **Table 4:** Detailed distribution of practices of respondents

Follow basic SOPS After Getting COVID-19 Vaccine	
Responses	Respondents n (%)
Yes	603 (95)
No	17 (2.7)
Don't know	15 (2.4)
Recommend COVID-19 Vaccine to Relatives and Friends	
Yes	596 (93.9)
No	15 (2.4)
Don't know	24 (3.8)
Recommend COVID-19 Vaccine to Immuno-Compromised Patients	
Yes	367 (57.8)
No	141 (22.2)
Don't know	127 (20)
Still Wear a Face Mask After COVID-19 Vaccination	
Yes	614 (96.7)
No	8 (1.3)
Don't know	13 (2)
Have You Completed Your Dosage Of COVID-19 Vaccine?	
Yes	343 (54)
No	292 (46)

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Table 5(on next page)

Effects of genders on respondents belief and attitudes after getting COVID-19 vaccine by applying Chi-square and Fisher exact test

- 1 **Table 5:** Effects of genders on respondents belief and attitudes after getting COVID-19 vaccine
- 2 by applying Chi-square and Fisher exact test

Gender	Strongly agree	Agree	Strongly Disagree	Disagree	Neutral	P > 0.05
Worry About Unseen Side Effects Of COVID-19 Vaccine						
Males	38 (14.5)	116 (44.3)	8 (3.1)	30 (11.5)	70 (26.7)	0.901
Females	53 (14.2)	172 (46.1)	7 (1.9)	41 (11)	100 (26.8)	
Concerned About Vaccine Efficacy						
Males	63 (24)	109 (41.6)	8 (3.1)	39(14.9)	43 (16.4)	0.040
Females	88 (23.6)	174 (46.6)	4 (1.1)	33 (8.8)	74 (19.8)	
Believe That Vaccine Side-Effects Are Reasonable						
Males	83 (31.7)	136 (51.9)	0	11 (4.2)	32 (12.2)	0.037
Females	90 (24.1)	228 (61.1)	5 (1.3)	15 (4)	35 (9.4)	
Trust the ministry of Health of Pakistan Regarding Vaccine Safety						
Males	68 (26)	151 (57.6)	5 (1.9)	12 (4.6)	26 (9.9)	0.000
Females	52 (13.9)	219 (58.7)	9 (2.4)	33 (8.8)	60 (16.1)	
Benefits are Greater than Risk						
Males	85 (32.4)	144 (55)	4 (1.5)	9 (3.4)	20 (7.6)	0.064
Females	87 (23.3)	226 (60.6)	7 (1.9)	9 (2.4)	44 (11.8)	
COVID-19 Vaccine Provide Long Term Protection						
Males	27 (10.3)	96 (36.6)	10 (3.8)	66 (25.2)	63 (24)	0.002
Females	16 (4.3)	130 (34.9)	5 (1.3)	96 (25.7)	126 (33.8)	

Table 6(on next page)

Multivariate regression analyses for models predicting attitudes and practices towards COVID-19 vaccine (N = 635)

Table 6: Multivariate regression analyses for models predicting attitudes and practices towards COVID-19 vaccine (N = 635)

Variables	Attitudes towards COVID-19 Vaccine [†]					Practices towards COVID-19 Vaccine [‡]				
	B	SE	t	β	p-value	B	SE	t	β	p-value
Age ^a	0.29	0.11	2.67	0.12	.008	0.03	0.07	0.44	0.02	.660
Gender ^b	-0.31	0.21	-1.48	-0.06	.141	-0.22	0.13	-1.69	-0.07	.092
Marital Status ^c	0.01	0.24	0.02	0.00	.983	0.53	0.15	3.43	0.16	.001
Education ^d	-0.26	0.33	-0.79	-0.03	.428	-0.02	0.21	-0.11	-0.01	.912
Occupation ^e	0.23	0.30	0.76	0.04	.445	-0.05	0.19	-0.27	-0.01	.789
Currently Practicing ^f	0.55	0.25	2.21	0.11	.028	-0.05	0.16	-0.33	-0.02	.742
Month of Vaccination ^g	-0.06	0.08	-0.80	-0.03	.426	-0.03	0.05	-0.68	-0.03	.497
Information sources	0.07	0.10	0.67	0.03	.505	0.19	0.07	2.86	0.11	.004
Knowledge	0.24	0.06	4.45	0.17	<.001	0.15	0.04	4.23	0.16	<.001
Attitude	---	---	---	---	---	0.12	0.03	4.61	0.18	<.001

Note: B = unstandardized regression coefficient; SE = Standard error; β = Standardized regression coefficient; ^a 1 = 20-30, 2 = 31-40, 3 = 41-50, 4 = 51-60, 5 = Above 60; ^b 1 = Male, 2 = Female; ^c 1 = Single, 2 = Married; ^d 1 = Graduation/Undergraduate, 2 = Minimum 16 years with medical specialization; ^e 1 = Medical Student, 2 = Medical Professional; ^f 1 = Yes, 2 = No; ^g 1-6 = January-June 2021; Bold and Italic indicates significant

[†] $F_{(9,625)} = 4.599$; $p < .001$; $R^2_{Adj.} = .049$

[‡] $F_{(10,624)} = 9.507$; $p < .001$; $R^2_{Adj.} = .118$

Figure 1

Minor Side Effects of Respondents After Receiving COVID-19 Vaccine

