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Abstract

Background: Vaccine hesitancy re-emerged as a critical public health issue during the COVID-19 pandemic.

Aims: This study assessed the concerns of recovered COVID-19 patients about vaccination and the predictors of vaccine hesitancy.

Methods: This was a cross-sectional study of 319 adult patients who recovered from COVID-19 in Saudi Arabia. It was conducted during 1 May to 1 October 2020 at King Abdulaziz Medical City, Riyadh. Each participant was interviewed 6–12 months post-recovery using the vaccination attitude examination scale. Data were collected on COVID-19 illness severity, sociodemographic characteristics, history of chronic disease, and post-COVID-19 vaccination. Level of vaccination concern was assessed based on the percentage mean score (PMS).

Results: Most (85.3%) of the patients who recovered from COVID-19 expressed moderate overall concern (PMS = 68.96%) about vaccination. Concern was highest for mistrust in vaccine benefits (PMS = 90.28%), followed by natural immunity preference (PMS = 81.33%) and worries about the vaccine side-effects (PMS = 60.29%). Concern over commercial profiteering was low (PMS = 43.92%). The overall PMS for concern about vaccination was significantly higher among patients aged 45+ years (t = 3.12, P = 0.002) and among those who had experienced severe COVID-19 illness (t = 1.96, P = 0.05).

Conclusion: Overall concern about vaccination was high, and specific concerns were prevalent. Patient education on how the vaccine protects against reinfection should be targeted at COVID-19 patients before being discharged from hospital.

Keywords: COVID-19, vaccine hesitancy, attitude, VAX scale, vaccination, Saudi Arabia

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Introduction

Vaccine hesitancy, identified in 2019 by the World Health Organization as one of the major threats to global health, became a potentially more important issue during the COVID-19 pandemic. The Strategic Advisory Group of Experts on Immunization describes vaccine hesitancy as “delay in acceptance or refusal of vaccination despite the availability of vaccination services” (1). After a year of worldwide morbidity, mortality, physical distancing and lockdowns, and despite the development of several clinically tested and efficacious vaccines, not everyone is willing to be vaccinated against COVID-19. Considering the devastating health, economic and

social effects of the pandemic, the availability of efficacious vaccines represents an important component of the hope to return society to normality (2).

However, some individuals and groups have expressed concerns regarding the fast-tracked new technology involved with the development of COVID-19 vaccines, and these, along with the well-established concerns of anti-vaccine movements, have contributed to substantial hesitancy to take vaccines (3–7). A nationally representative survey conducted in March–April 2020 with sample sizes ranging from 1041 to 2025 reported rates of potential acceptance of COVID-19 vaccines of 65% in Ireland and 69% in the United Kingdom (3). A more recent 32-country study conducted before vaccine approval (October–December 2020;

n = 26 758), with sample sizes between 500 and 1500, found various levels of acceptance for COVID-19 vaccines. Results ranged from 91% of individuals who reported likely vaccine acceptance in China and India to 81% in the United Kingdom, 66% in the United States of America and 44% in France (4). An online survey among 13 426 participants from 19 countries showed that the acceptance of COVID-19 vaccines ranged from 54.8% in Russia to 88.6% in China (5). In the Eastern Mediterranean Region, Jordan and Saudi Arabia had 37.4% and 64.7% acceptance, respectively (6,7).

For COVID-19-infected patients, it is advisable to receive the full dosage irrespective of their history of COVID-19 infection, as this would help in developing a strong immune response against the disease (8). A study of COVID-19 infections in Kentucky among people who were previously infected with SARS-CoV-2 showed that unvaccinated individuals were more than twice as likely to be re-infected as those who were fully vaccinated (8). These data further indicate that COVID-19 vaccines offered better protection than natural immunity alone and that the vaccines helped prevent reinfection. In India, those who had COVID-19 and those who had contracted it after taking the first vaccine dose were advised to have the vaccination 3 months after fully recovering from the disease (9). In Saudi Arabia, vaccinating COVID-19 patients 6 months after recovery has been recommended as a “booster for their immunity” (10).

Understanding the attitudes that underlie vaccine refusal or hesitancy is important for predicting vaccination behaviour among patients who have recovered from COVID-19 (11). Identifying the most prominent concern driving vaccine refusal can help target interventions because individuals who are concerned about vaccine safety, for example, are unlikely to be influenced by messages directed at changing beliefs about the effectiveness of vaccines in reducing the likelihood of contracting a specific infectious disease.

To our knowledge, no study has previously been conducted in Saudi Arabia to assess the level of acceptability and concerns of COVID-19-recovered patients about vaccination. This study was designed to assess the levels of concern among this group about vaccination at King Abdulaziz Medical City, Riyadh, Saudi Arabia, and to determine the predictors of vaccine hesitancy.

Methods

Study population

This cross-sectional study was conducted at King Abdulaziz Medical City in Riyadh, Saudi Arabia. In this facility, the practical guidelines on clearance and recovery for COVID-19 patients, stipulate that for severe and mild confirmed cases, at least 10 days should have passed since the onset of symptoms, they should have had no recorded fever in the last 3 days without the use of antipyretics and there should be improvement of other symptoms (cough, shortness of breath, and gastrointestinal symptoms). For critical cases, patients must be isolated for at least 21 days after symptom onset and have 2 negative polymerase chain reaction (PCR) tests, 48 hours apart. If the patient still tests positive, the process should be repeated after one week until 2 negative results are recorded. The patient is considered recovered based on the above criteria and, after a thorough assessment once recovery is achieved, isolation can be discontinued (12).

A sample of adults aged 18 years and over of both sexes was selected from all COVID-19 patients who were diagnosed and treated by King Abdulaziz Medical City, Riyadh, Saudi Arabia, during the period 1 May 2020 to 1 October 2020. Using systematic random sampling, every 10th patient of a total of 16 000 patients was selected from the medical records. We contacted 1220 recovered patients individually by telephone 6–12 months after recovery. Patients for whom there was insufficient data in the medical records were excluded from the study.

Data collection

Vaccine attitudes and concerns

Participants who agreed to participate in the study (n = 319, 26.1%) were interviewed by a doctor during April and May 2021. The interviews were conducted by one of 3 trained doctors using the Vaccination Attitude Examination (VAX) scale to measure the participants' attitudes towards COVID-19 vaccines (11). The scale is a validated tool that has 12 items covering public perceptions of vaccination under 4 domains: mistrust of vaccine benefit, worries about the effects, commercial profiteering concerns and preference for natural immunity. It uses a 5-point Likert rating, where a score of 1 = absolutely disagree and 5 = absolutely agree were given for the negative statements, while for the positive statements, the reverse of these scores was given. The concern score and the percentage mean score (PMS) were calculated. The total concern scores reported by our respondents ranged from 12 points to 60 points. The respondents were categorized into 3 groups: low concern, PMS 75% (12). This categorization

was used for each of the 4 domains.

Predictor variables

The following data were collected during the interview: sex; age group; education; marital status, living status, employed as a healthcare worker, having a chronic physical health condition such as diabetes mellitus, hypertension, cardiovascular disease, etc.; post-COVID-19 vaccination; and severity of the previous COVID-19 infection [mild (treated at home), moderate (required hospital admission) or severe (admitted to intensive care unit)].

Data analysis

We used SPSS, version 26.0, for data analysis. Categorical data were summarized and reported as frequencies and percentages. The arithmetic mean was used as a summary statistic for concern scores, with standard deviation as a measure of dispersion. The chi-squared test was used to compare frequencies of respondents at different concern levels associated with categorical variables. Quantitative data were compared using the Student t-test. For all statistical analyses, significance was considered as $P \leq 0.05$.

Ethical approval and consent

Participation in this study was voluntary. No written consent was sought, as there were no personal identifiers on the interviews. Agreement to participate in the interview was considered consent. This study was approved by the institutional review board of the Ministry of National Guard Health Affairs in Riyadh, Saudi Arabia (Ref. NRC21R/061/01). This study was conducted in accordance with the Declaration of Helsinki.

Results

We interviewed 319 recovered COVID-19 patients from the central region of the Ministry of National Guard Health Affairs. Just over half (57.7%) were males and 66.1% were under 45 years old (Table 1); around 12% were healthcare workers and most participants (75.2%) had received post-COVID-19 vaccination.

The majority of participants expressed a strong mistrust of vaccine benefits (80.9%), showed a strong preference for natural immunity (67.4%) and had moderate worries about the effects of vaccination (74.0%) (Figure 1). Concerns about commercial profiteering was low among the majority of our participants (74.0%). Overall, concerns about vaccination was moderate (85.3%), with high concern expressed by only 13.8%.

The majority of the participants did not agree that they felt safe after being vaccinated (74.6%) and said they could not rely on vaccines to fight serious infections (74.9%) (Table 2). More than half of the participants thought that natural immunity lasts longer (58.6%) and is more protective (57.4%) and safer (58.9%) than vaccination. Just over half the participants disagreed that children could experience challenges to their health because of vaccination (50.5%) and that they worried about the unknown effects of vaccines in the future (47.3%). The majority (66.5%) disagreed on the issues of commercial profiteering regarding companies making a lot of money from vaccines, the promotion of vaccination by authorities for financial gain (79.0%) and vaccination programmes being a “big con” (85.6%).

In general, participants reported having a moderate level of concern about vaccination [PMS = 68.96, standard deviation (SD) 7.48] (Table 2). This level of concern was high for preference for natural immunity (PMS = 81.33, SD 20.88), high for mistrust of vaccine benefits (PMS = 90.28, SD 15.38), moderate for worries about the effects (PMS = 60.29, SD 10.46), and low for commercial profiteering (PMS = 43.92, SD 17.09) (
Table 2
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Table 3 shows the association between level of concern about the COVID-19 vaccine and selected personal and disease characteristics. Males showed a statistically significantly greater mistrust of vaccine benefits (PMS = 91.9, SD 14.7% vs 88.1, SD 16.0%, t = 2.19, P = 0.029), while females reported more worries about the effects (PMS = 61.8, SD 10.9% vs 59.2, SD 10.0%, t = 2.23, P = 0.026). Married participants were significantly more concerned than single ones about commercial profiteering (PMS = 45.2, SD 18.1 vs 41.0, SD 14.2, t = 2.22, P = 0.027). Healthcare workers were statistically significantly less mistrustful of vaccine benefits (PMS = 80.9, SD 20.4 vs 91.6, SD 14.1, t = 3.17, P = 0.003) than non-healthcare workers. Those who had recovered from severe COVID-19 illness reported significantly greater overall concern than those who had experienced COVID-19 illness of mild or moderate severity (PMS = 73.8, SD 4.2 vs 68.8, SD 7.5, t = 1.96. P = 0.05).

Recovered patients who had received post-COVID-19 vaccination reported significantly lower overall concern than those who had not received any such vaccination (PMS = 68.4, SD 7.5 vs 70.6, SD 7.1, t = 2.27, P = 0.024) (Table 3). They were also less concerned about the effects of the vaccine (PMS = 59.0, SD 9.8 vs 64.1, SD 11.5, t = 3.54, P = 0.001) and commercial profiteering (PMS = 41.4, SD 14.7 vs 51.6, SD 21.3, t = 3.97, P