Awareness, Barriers, and Perceptions Regarding SARS-CoV-2 Vaccine Administration among the Adult Population in the Kingdom of Saudi Arabia

Khalid M AlGhuthayr[1]*, Othub S AlBalawi[1], Abdullah Mohammed Asiri[1], Sara A Mustafa[1], Shahd S Alghawi[1], Meshari S AlZahrani[1], Abdulwahab F Jokhadar[1], Hassan Mansour S Dhaen[1], Fatima A Hamidaddin[1], Abdullah A Alqahtani[1], Razan S Hanafi[1] and Khaldoon M AlRoomi[2]

[1]*Medical Intern, Medical College, Arabian Gulf University, Manama, Bahrain*

[2]*Department of Family and Community Medicine, College of Medicine and Medical Sciences Arabian Gulf University, Manama, Bahrain*

*Corresponding Author: Khalid M AlGhuthayr, Medical Intern, Medical College, Arabian Gulf University, Manama, Bahrain.

Abstract

Objectives: To assist health authorities in increasing the acceptability of the COVID-19 vaccine and feature booster doses in the adult population of Saudi Arabia.

Methods: This online cross-sectional study was conducted between April 2023 and April 2024 among adults of both sexes in Saudi Arabia. Data were collected through a web-based questionnaire using Microsoft Forms, which was available in Arabic, with the option of completing it in English. The questionnaire assessed the implications of vaccine acceptance. Statistical analysis was performed using SPSS.

Results: Most respondents were female (59.8%) and the majority of them aged < 50 years. Of all respondents, 87.1% considered COVID-19 vaccination effective for preventing and controlling COVID-19, 45.7% strongly agreed that COVID-19 vaccine might have side effects such as fever, and the remaining either agreed or strongly disagreed. Safety (42.3%) and efficacy (35.1%) of the vaccine played major roles in the decision to whether take the COVID-19 vaccine. The main reasons for accepting COVID-19 vaccination were self-protection to avoid sickness and protection of close relatives for 73.4% and 57.5% of the respondents, respectively.

Conclusion: The Saudi population has good awareness and attitude toward Covid-19 vaccination administration, and one of the main factors influencing the decision to take the vaccine was the history of previous flow vaccination. The main reasons for the participants' refusal to vaccinate or hesitation were concerns regarding the safety and efficacy of the vaccine.

Keywords: Awareness; Barriers; Perceptions; SARS-CoV-2 Vaccine

Introduction

The World Health Organization (WHO) declared the coronavirus disease 2019 (COVID-19) outbreak as a pandemic on March 11, 2020 [1]. The pandemic had economical, psychological, and environmental impact worldwide, and most significantly, it impacted the healthcare system.

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a pathogen that attacks the respiratory system. Its symptoms are variable and have shown a correlation in terms of severity with preexisting conditions, which may lead to a cascade of respiratory and

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extra-respiratory complications, such as pneumonia, secondary infections, and thrombosis, which may be fatal. COVID-19 has infected over 266 million people worldwide, with a death toll of 5.2 million people.

Various studies have been conducted and protocols have been followed regarding the treatment of COVID-19; however, no definitive treatment has been found [2,3]. Health policymakers worldwide urge individuals to take protective measures such as social distancing, avoiding unnecessary outings, wearing masks, and practicing cautious hygiene habits [4,5].

 This pandemic has disrupted the routines of billions of people and destroyed many economies. Several countries have produced, and are still working to produce, vaccines, some of which have been approved by some countries, including Saudi Arabia. Saudi Arabia approved the Pfizer-BioNTech, Moderna, AstraZeneca, and Johnson & Johnson's Janssen vaccines, all of which are free of charge to everyone in Saudi Arabia; however, priority is given to those who most need it, including people aged > 65 years, those with chronic diseases, hospital inpatients, and healthcare workers.

However, many questions have been raised regarding the safety of the vaccine because it is a new technology and the first of its kind in humans, and variable opinions have been expressed regarding the will to take it.

Aim of the Study

This study aimed to understand the attitude of the Saudi population toward taking the vaccine and the justifications for refusing to be vaccinated, thereby hoping to identify and correct any misinformation circulating in the population.

Materials and Methods

This cross-sectional study was conducted between April 2023 and April 2024 among adults of both sexes in the Kingdom of Saudi Arabia.

Inclusion criteria

Saudi adults aged > 18 years who can read, understand, and use social media and reside in the Kingdom of Saudi Arabia were eligible for this study.

Exclusion criteria

The following eight groups were excluded from the study:

- Pregnant women or women planning to get pregnant in the next 6 months.
- Teenagers aged < 16 years for the Pfizer-BioNTech vaccine and < 18 years for the other vaccines.
- Immunocompromised patients.
- People having allergies.
- Frontline health workers.
- People who were infected in the past 3-6 months.
- People who have no internet connection or do not use social media.
- Non-Saudi adults: This was because they were a heterogeneous group of people who came from almost 160 countries and had different perceptions, attitudes, and knowledge of the COVID-19 vaccine.

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Ethics

Written informed consent was obtained from all participants and the study was approved by the Research Ethics Committee of the Faculty of Medicine. This study was conducted in accordance with the code of ethics of the World Medical Association (Declaration of Helsinki).

Study variables

Study variables were divided into the following three categories:

- Sociodemographic information (age, sex, etc.)
- Awareness and knowledge (number of vaccine doses, main source of information regarding vaccines, etc.)
- Attitude and perception (fear of complications or death, etc.).

The response variables were knowledge, attitude, and implications of the acceptance of the new COVID-19 vaccine in the adult Saudi population. To evaluate the knowledge, attitude, and implications of acceptance, the questionnaire included the following information: (a) The COVID-19 vaccine is now available and will be distributed to the population; (b) the new COVID-19 vaccine has been tested clinically in humans; (c) injection site reaction is the most widely revealed side effect of the vaccine, and discomfort or other effects may be caused by such reactions at the injection site; and (d) vaccine will be provided free and optionally by the government. Participants were asked to respond to the question of whether they would be vaccinated with a new COVID-19 vaccine with the possible answers "yes", "no" or "uncertain". In addition, they were asked about factors that increase their willingness to take the vaccine. The explanatory variables were sociodemographic data, including age, sex, educational level, marital status, working situation, and region of residence. Age was classified into five categories (18-29, 30-39, 40-49, 50-59, and 60 and above); educational level was divided into four groups (primary school degree, secondary school degree, university degree, and master or doctorate degree); marital status was grouped into four categories (single, married, widow, divorced or separated); working was classified into working full-time, working part-time, stay-at-home-parent, unemployed, retired, student, other; region of residence was classified into 13 groups (Makkah, Madinah, Riyadh, Qassim, Eastern, Assir, Tabuk, Hail, Northern Border, Jazan, Najran, Bahah, and Jouf). The questionnaire also included respondents' health factors, such as whether they were previously infected with COVID-19, socialized with infected persons, and whether they had a chronic disease.

Statistical analysis

A standard computer analysis program, SPSS v.27 (IMB Corp., Armonk, NY, USA), was used to perform the descriptive analysis, which included Frequency distribution tables, Proportions, and Percentages. The chi square test was used to estimate the level of significance, and P value < 0.05 was considered to be statistically significant.

Pilot study

The initial questionnaire was produced and submitted to other groups. Eventually, a final questionnaire was produced for all groups, and the combined questionnaire was piloted with 50 people in Saudi Arabia.

Results

This study included 972 participants. They were divided into the following three groups: (1) Approximately 440 (45%) participants who took the vaccine, (2) 370 (38%) participants who did not receive the vaccine but had intention to take it, and (3) 162 (17%) participants who did not receive the vaccine and had no intention to take it (Table 1).

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Socio-demographical characteristics	Took the COVID-19 vaccine			P-value
	Yes	**No, but have intention**	**No, but don't have Intention**	
	n (440) (45%)	**n (370) (38%)**	**n (162) (17%)**	
Age in years				
18 - 20	39 (8.9)	88 (23.8)	19 (11.7)	<0.001
21 - 30	129 (29.3)	113 (30.5)	42 (25.9)	
31 - 40	91(20.7)	65 (17.6)	42 (25.9)	
41 - 50	104 (23.6)	77 (20.8)	39 (24.1)	
>50	77 (17.5)	27(7.3)	20 (12.3)	
Gender				
Male	207 (47)	130 (35.1)	54 (33.3)	<0.001
Female	233 (53)	240 (64.9)	108 (66.7)	
Educational level				
Secondary or below	93 (21.1)	107 (28.9)	34 (21)	0.051
Diploma	48 (10.9)	44 (11.9)	26 (16)	
Bachelor's degree	247 (56.1)	190 (51.4)	85 (52.5)	
Above Bachelor's degree	52 (11.8)	29 (7.8)	17 (10.5)	
Marital status				
Single	154 (35)	184 (49.7)	45 (27.8)	<0.001
Married	266 (60.5)	174 (47)	105 (64.8)	
Widowed/Divorced	20 (4.5)	12 (3.2)	12 (7.4)	

***Table 1:** Association between taking the COVID-19 vaccine and socio-demographic characteristics.*

After this division, based on P-values and differences between the three groups, it was clear that the participants who did not take the vaccine, whether they intended or not, were in the younger age groups, which means that the older age groups were more excited to take the vaccine. In addition, women (108 [66.7%]) were more afraid to take the vaccine than men (54 [33.3%]). This may be due to some concerns, including the vaccine leading to infertility and affecting the reproductive system. In addition, more married participants (266) took the vaccine and had intention to take it than single individuals (154).

People who either took the vaccine (47.3%) or intended to take it (41.9%) were greatly influenced by its safety (Table 2). On the other hand, the safety of the vaccine also affected the decisions of people who did not take the vaccine and do not intend to take it (29.6%). Regarding the efficacy of the vaccine, it played a significant role in people who received the vaccine (40.9%) or intended to take it (31.4%). In addition, people who did not take the vaccine and do not intend to take it (27.8%) were also affected by this factor.

The association between taking the vaccine and the reasons to accept it was studied based on the correlation of answers to the questions presented in table 3. The options for answer to the first question were: "Yes," "No, but have intention," and "No, but do not have

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Factors	Took the COVID-19 vaccine			P-value
	Yes	No, but have intention	No, but don't have intention	
	n (440%)	n (370%)	n (162%)	
My age	113 (25.7)	73(19.7)	16 (9.9)	<0.001
My health history	100 (22.7)	74 (20)	21 (13)	0.030
Recent travels outside of Saudi Arabia, or having plans to travel soon	137 (31.1)	94(25.4)	35 (21.6)	0.037
Recommendation of my doctor to take the vaccine	64 (14.5)	34 (9.2)	15 (9.3)	0.036
Efficacy of the vaccine	180 (40.9)	116(31.4)	45 (27.8)	0.002
Presence of side effects	45 (10.2)	54(14.6)	38 (23.5)	<0.001
Opinions of family or friends	79 (18)	77(20.8)	18 (11.1)	0.027
Number of people contracting COVID-19	151 (34.3)	10(27.8)	24 (14.8)	<0.001
The vaccine is free	139 (31.6)	12(33.2)	15 (9.3)	<0.001
Convenience of the vaccine	172 (39.1)	111 (30)	9 (5.6)	<0.001
Safety of the vaccine	208 (47.3)	15(41.9)	48 (29.6)	0.001
Senior political figures have taken the vaccine	147 (33.4)	97(26.2)	10 (6.2)	<0.001

Table 2: Association between taking the COVID-19 vaccine and factors that could play a role in the decision of whether to take the COVID-19 vaccine.

intention." The options for answer to the second question were: "Self-protection to avoid sickness," "Protecting my close relatives," "The vaccine will stop the outbreak," "Vaccines are safe," "Vaccines have no side effects," "Getting vaccinated is convenient and quick," "Self-protection to avoid work absenteeism," "Vaccination is recommended by public authorities," "Getting vaccinated is a civic duty".

Reasons for accepting of the COVID- 19 vaccine	Took the COVID-19 vaccine			P-value
	Yes	No, but have intention	No, but don't have intention	
	n (440%)	n (370%)	n (162%)	
Protecting myself to avoid sickness	350 (79.5)	297 (80.3)	66 (40.7)	<0.001
Protecting my close relatives	275 (62.5)	226 (61.1)	58 (35.8)	<0.001
The vaccine will stop the outbreak	275 (62.5)	194 (52.4)	46 (28.4)	<0.001
Vaccines are safe	199 (45.2)	124 (33.5)	34 (21)	<0.001
Vaccines have no side effects	62 (14.1)	36 (9.7)	30 (18.5)	0.016
Getting vaccinated is convenient and quick	183 (41.6)	108 (29.2)	17 (10.5)	<0.001
Protecting myself to avoid work absenteeism	68 (15.5)	36 (9.7)	5 (3.1)	<0.001
Vaccination is recommended by public authorities	166 (37.7)	113 (30.5)	37 (22.8)	0.001
Getting vaccinated is a civic duty	213 (48.4)	123 (33.2)	28 (17.3)	<0.001

Table 3: Association between taking the COVID-19 vaccine and reasons for accepting the COVID-19 vaccine.

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People had several reasons to reject the COVID-19 vaccine: 70.4% of the participants who did not take the vaccine and do not intend to take it thought that the vaccines were not sufficiently safe, whereas 60.8% of the participants who did not take the vaccine but had intention to take it considered that the vaccine has side effects, and 13% who took the vaccine and were willing to take it thought that COVID-19 is not a severe disease (Table 4).

Reasons for rejecting of the COVID-19 vaccine	Took the COVID-19 vaccine			P-value
	Yes	No, but have intention	No, but don't have intention	
	n (440%)	n (370%)	n (162%)	
Vaccines are not safe enough	211 (48)	158 (42.7)	114 (70.4)	<0.001
Vaccines have side effects	241 (54.8)	225 (60.8)	96 (59.3)	0.205
I don't need it, since I'm not in a risk group	67 (15.2)	61 (16.5)	38 (23.5)	0.055
COVID-19 is not a severe disease	57 (13)	36 (9.7)	33 (20.4)	0.004
Vaccines are ineffective	74 (16.8)	49 (13.2)	39 (24.1)	0.009
I never get sick	19 (4.3)	21 (5.7)	5 (3.1)	0.389
I dislike the shots	77 (17.5)	57 (15.4)	22 (13.6)	0.464
Getting vaccinated is inconvenient	21 (4.8)	15 (4.1)	5 (3.1)	0.646
I have medical reasons to avoid vaccines	82 (18.6)	62 (16.8)	22 (13.6)	0.336

Table 4: Association between taking the COVID-19 vaccine and reasons for rejecting the COVID-19 vaccine.

Discussion

The present study demonstrated the perceptions, awareness, and barriers associated with the administration of SARS-CoV-2 vaccine among the adult population of Saudi Arabia. The study population consisted of individuals of different age groups, regions, educational backgrounds, employment, monthly income, and marital statuses. The study findings demonstrated that a large number of people who participated in the survey had adequate and sound knowledge regarding the COVID-19 vaccine, including its dosage, effectiveness, and importance in combating the infection, and possible side effects, leading to vaccine hesitancy. This finding is consistent with other studies that have shown satisfactory levels of knowledge across the Saudi population regarding epidemics such as Middle East Respiratory Syndrome [6]. In addition, the population of Saudi Arabia identified certain factors, such as age, presence of side effects, number of people contracting COVID-19, cost-effectiveness, convenience, and vaccination administered to senior political figures, all of which were statistically significant (p < .001), that could play a role in deciding whether to take the COVID-19 vaccine.

Regarding the association between sociodemographic characteristics and COVID-19 vaccine acceptance, a statistically significant finding was observed among older individuals (< 50 years) who were keen to get vaccinated compared to younger individuals (p < .001). Furthermore, we found that women (108 [66.7%]) were more afraid of getting vaccinated than men (54 [33.3%]) (p < .001). This may be due to concerns that the vaccine could lead to infertility and affect the reproductive system, especially when it is a novel vaccine, for which data are lacking. However, other demographic characteristics were not statistically significant. These findings were in accordance with those of a few other studies conducted in the United States and China, which reported that sex, occupation, income, and marital status also impacted the knowledge and perception of participants regarding the vaccine [7,8]. Upon assessing the history of participants' diseases and association between taking the COVID-19 vaccine, the results showed that patients with diabetes were willing to get vaccinated, and a statistically significant relationship was found only with diabetes (p < .001). Patients with a medical history of heart disease,

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chronic kidney disease, hypertension, or respiratory conditions were willing to take the vaccine to prevent complications in case they were infected with COVID-19, and even if they were not vaccinated, they intended to be vaccinated.

People who did not receive the seasonal flu vaccine were more likely to refuse the COVID-19 vaccine than those who received the seasonal vaccine, accounting for 93.2% and 6.8% of the participants, respectively. The majority of the vaccinated population believed that COVID-19 vaccination is an effective way to prevent and control COVID-19. Similarly, people who did not take the vaccine but intended to take it reported that COVID-19 vaccination is an effective way of prevention and control, whereas a population with no intention to receive the vaccine questioned its effectiveness. Majority of the participants reported that the COVID-19 vaccine did not completely protect themselves from contracting or transmitting the virus.

The main factor that promoted vaccine acceptance among the Saudi Arabian population was the belief that COVID-19 vaccine would protect them from future sickness, thereby avoiding work absenteeism, and protect their close relatives. Additionally, vaccines were considered safe and effective tools to stop outbreaks. The majority of the population considered the vaccination process to be quick and convenient, and getting vaccinated as a civic duty ($p < .001$).

People who rejected the COVID-19 vaccine attributed safety concerns as the key factor for not intending to get vaccinated (70%), whereas people who were vaccinated had a comparatively lower percentage (48%) of those who considered vaccines unsafe. This demonstrates that people lack trust and confidence in the vaccine's usability and ability to reduce infections. To ensure wide acceptance of the vaccine among all age groups, it is critical to identify the main risks and reasons for the rejection of the COVID-19 vaccine. Similarly, other studies have also stressed on recognizing the factors leading to vaccine hesitancy and improving the vaccination rate in the country [6-9].

Individuals who were not willing to be vaccinated were fearful of the vaccine and how it would impact their bodies, whereas individuals who had taken the vaccine displayed trust and confidence in the vaccine ($p < .001$). The most common reason for fear was their belief that it would make them sick. This finding is consistent with that of another study that showed that a lack of trust was a cause of hesitation for vaccination or refusal in many participants [10].

Although the majority of the population reported that they had received vaccines in the past with no fear or health concerns, owing to the recent development of COVID-19 vaccines, it was difficult for them to accept it readily. It is important to identify the perceived risk of infection among the population to enhance vaccination intention. A previous study demonstrated that participants with a higher perceived risk demonstrated lower vaccination hesitancy [11]. Thus, population awareness of the seriousness of this disease will help increase their consciousness and willingness to accept the vaccine. All the factors that limit the scope of vaccination should be detected so that the rationale for refusal or hesitancy can be identified and eliminated. Previous studies across Europe [12], the United States [10], and China [9] have also mentioned concerns about vaccine safety and adverse outcomes as the most important reasons for vaccine hesitancy.

Several strategies have been adopted to improve the knowledge and awareness regarding the significance of COVID-19 vaccines. Owing to rigorous vaccine testing and numerous clinical trials, researchers and pharmaceutical companies are in a better position to detect side effects and tackle any complication [13]. Conspiracy theories related to vaccines propagated through social media campaigns are developing an environment of fact-checking. The WHO has discussed different behavioral factors to improve vaccine acceptance and the understanding of their roles in dealing with pandemics. These approaches include educating people about vaccine efficacy and safety, and addressing their misconceptions and beliefs by supporting open communication [14]. Public confidence in the vaccine can be increased by a joint collaboration between the public and private sectors, enabling the Kingdom of Saudi Arabia to reach herd immunity at a fast pace.

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Reports from different Gulf States, including Bahrain (67.2%), Qatar (78.3%), and the United Arab Emirates (81.6%), indicate a greater percentage of fully vaccinated populations. Owing to the geography and population of Saudi Arabia, inoculating the entire population is challenging. The findings of the present study will help healthcare organizations, governments, and other authorities to design strategies that augment public knowledge, awareness, and perception of COVID-19 vaccines.

Study Limitations

This study has some limitations. First, the results cannot be generalized to other regions and nations, as they were specifically oriented toward the Saudi Arabian population. Second, the study was based on an online questionnaire, which increased the scope of selection and recall bias. However, literature suggests that the web-based approach is a cost-effective method for representing a large section of the population at minimal cost [15]. Third, vaccination intentions may differ depending on vaccine availability. Fourth, the study included 972 individuals, who did not represent a large proportion of the population. Therefore, further clinical trials with larger sample sizes should be conducted to gain a better and broad understanding of the acceptance and perception of the general population.

Conclusion

The results of this study suggest that the Saudi Arabian population has a generally good awareness and attitude toward taking COVID-19 vaccination, and one of the main factors influencing the decision to take the vaccine is the history of previous vaccination. The main reasons for the participants' refusal of vaccination or hesitation were concerns about safety and efficacy.

Acknowledgements

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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