The acceptance and determinants of COVID-19 vaccine among the hospital attendants in Qena city

Reham Abdallah Mohamed[a*], Ahmed Mohammed Mahmoud Hany[b], Asmaa Abdelhakim Nafady[c]

[a]Department of Public Health and Community Medicine, Faculty of Medicine, South Valley University, Qena, Egypt.

[b]Department of Public Health and Community Medicine, Faculty of Medicine, Assiut University, Assiut, Egypt.

[c]Department of Clinical Pathology, Faculty of Medicine, South Valley University , Qena, Egypt.

Abstract

Background: Arabs have been reported to exhibit a high percentage of resistance to the COVID-19 vaccine; these rates were comparatively higher than the global rate. The low level of public acceptance of COVID-19 vaccinations is most likely a result of misconceptions. According to reports from Egypt and many other Arab countries, the main obstacles to mass immunization campaigns are worry over severe post-vaccination side effects and incorrect information regarding the COVID-19 vaccine.

Objectives: The current study's objectives were to assess the level of COVID-19 vaccination acceptability and identify factors that influence it among hospital attendants in Qena City.

Patients and methods: 450 people who were at least 18 years old participated in a cross-sectional study. A standardized questionnaire was used to collect the data. The participants were split into two categories: those who decided to receive the COVID-19 vaccine and those who decided not to.

Results: Our study's subjects had a 50.9% acceptance rate for the COVID-19 vaccination. Age, marital status, the belief that immunity will develop after receiving the COVID-19 vaccination, and trust in the vaccine's safety and efficacy were the key determinants of COVID-19 vaccine acceptance.

Conclusion: Low levels of COVID-19 vaccination acceptability have been observed among the subjects in our study. Confidence in the safety of the vaccine was the main predictor of COVID-19 vaccine adoption. Therefore, there is a need for intervention that focuses on providing the general population with enough knowledge about the safety and effectiveness of COVID-19 vaccines.

Keywords: COVID-19 vaccine; Acceptance; Qena; Egypt.

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*Correspondence: reham.abdallah@med.svu.edu.eg

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Introduction

The COVID-19 pandemic is regarded as a global problem for all nations to control its spread. The World Health Organization along with various research groups and clinical experts throughout the world are spearheading efforts for prevention, diagnosis, and treatment. There are no particular COVID-19 antiviral drugs available. Humans' compliance with social distance and prolonged face-masking is also not guaranteed. Therefore, developing an effective vaccine is the best strategy for containing and gradually preventing this pandemic **(Callaway, 2020).**

Since the COVID-19 pandemic's beginning, there have been urgent requests for the creation of safe and effective vaccinations, as mass immunization is the ideal protocol and the best hope for combating viral illness **(Rzymski et al., 2021).** As a result, the collaboration between researchers, industry, and financial authorities enabled the COVID-19 vaccines to be licensed and made available for use on a global scale. Because of the rumours that circulated about this lightning-fast, incredible success regarding these vaccinations and the virus itself, the global hesitation to receive the COVID-19 vaccine increased **(Joshi et al., 2021).**

Numerous studies have noted that Arabs are significantly more hesitant to receive the COVID-19 vaccine, and these rates were comparatively greater than the global rate **(Kaadan et al., 2021; Qunaibi et al., 2021).** The poor level of public acceptance of COVID-19 vaccinations is likely a result of rumours and misinformation **(Sallam et al., 2021).**

On the other hand, the vaccination acceptance rate was substantially correlated with having adequate knowledge of the vaccines and their adverse effects **(Zawahrah et al., 2021).** However, hesitation and acceptance rates for the COVID-19 vaccine may differ depending on a variety of elements, including the subjective nature and sociodemographic characteristics **(McElfish et al., 2021).**

Therefore, the present study was formulated targeting the hospital attendants in Qena City to assess the level of COVID-19 vaccination acceptability and identify factors that influence it.

Patients and Methods:

A cross-sectional study was carried out, including 450 participants aged 18 years or more. Simple random sampling was the method used. The studied group was selected from attendants of Qena University Hospitals. In prevalence research, the appropriate sample size was determined using this simple equation:

$$n = \frac{z^2 p(1-p)}{d^2}$$

where n is the sample size, Z is The standard normal variant (at 5% type 1 error (P<0.05) it is 1.96,

d (absolute error or precision) =0.05

p (The COVID-19 vaccine acceptance rate reported in a previous study done in the United States) =64%

the level of confidence usually aimed for is 95%

$$n = \frac{1.96^2 \times 0.64\ (1-0.64)}{0.05^2}$$

$= 0.885/0.0025=354$

the sample size will be increased to 450 participants.

Inclusion criteria

1-People in the age group (18 and above).

2-Accept to participate in the study.

Exclusion criteria

1-People in the age group (below 18).

2 -Refusal to participate in the study.

Data collection

Data were collected during the period from October 2021 to October 2022. Data collection was done using a questionnaire. It contained:

1. Personal and demographic data: name, age in years, sex, marital status, residence, education, and occupation.
2. History of preexisting health conditions.

3. COVID-19 vaccination Acceptance: Our main outcome variable was categorized as acceptance "yes" and refusal "no".
4. Possible factors that could affect the acceptance of the COVID-19 vaccine include The probability of contracting COVID-19, the anticipated severity of COVID-19 symptoms, the immunity developed after being infected with and surviving COVID-19 in comparison to immunity developed after COVID-19 vaccination, the expected efficacy of COVID-19 vaccines, and whether there are any expected hazards to health from COVID vaccinations.

Ethical consideration

The research was approved by the ethical committee of the Qena Faculty of Medicine. The ethical approval code: SVU-MED-COM009-2-21-8-231.

Statistical analysis

Statistical Package for Social Sciences (IBM SPSS) version 26 was used to analyze the data. Frequencies and percentages were used to represent qualitative variables. The chi-square test was utilized to compare two qualitative datasets. The analysis of binary logistic regression was applied. Significant factors by chi-square test were entered in univariate logistic regression analysis, and the odds ratio (OR) was calculated. The significant factors in univariate analysis were entered multivariate logistic regression analysis, and the adjusted odds ratio (AOR) was calculated. The allowable margin of error was set at 5%, while the confidence interval (CI) was set at 95%. A p-value below 0.05 is therefore regarded as significant.

Results

Of the 450 participants,40.2% were aged 18–27 years, 39.3% were aged 28-37 years, 10.4% were aged 38-47years,6.7% were aged 48-57 years, and 3.3% were aged 58 years and above **(Fig.1).** According to sex distribution, most of the participants 288(64%) were Females. 51.3% of the participants were from rural areas. Majority of the study participants (88.4%) were educated, while (55.1%) were married. According to occupation, (80.4%) of the participants were non-healthcare workers while 19.6% were healthcare workers.15.3% of the participants reported having chronic diseases. Chronic diseases' distribution was as follows: 4.4%of the participants reported DM,3.8% reported HTN, while 2.7% reported asthma, 3.6% reported arthritis, 0.6% lupus erythematosus and 0.2% reported Behcet disease **(Table.1).**

Our study's subjects had a 50.9% acceptance rate for the COVID-19 vaccination **(Fig. 2).** 49.1% of participants indicated they were likely to catch the infection. Subjects who anticipated that their COVID-19 symptoms were going to be severe were 31.3%. Moreover, 18.2% of respondents disagreed with the statement that "development of natural immunity after exposure to COVID-19 is preferable to immunity generated by a COVID-19 vaccine." compared to 15.6% agreed with that, and 66.2%reported that they do not know. 31.6% of the participants expected doubtful efficacy of COVID-19 vaccines, 44.2% expected good efficacy of COVID-19 vaccines, and 24.2% reported that they did not know. Most of the participants (45.6%) expected limited safety of the COVID-19 vaccines, while 28% of them expected good safety of the COVID-19 vaccines. Factors related to COVID-19 vaccine acceptance among the studied group showed in **(Table. 2)**.

Table 1. Socio-demographic characteristics of the studied group

Variable	Frequency	Percentage
Age groups (in years)		
18-27	181	40.2%
28-37	177	39.3%
38-47	47	10.4%
48-57	30	6.8%
≥58	15	3.3%
Sex		
Male	162	36%
Female	288	64%
Residence		
Urban	219	48.7%
Rural	231	51.3%
Marital Status		
Married	248	55.1%
Unmarried	202	44.9%
Education		
Illiterate	52	11.6%
Educated	398	88.4%
Occupation		
Healthcare worker	88	19.6%
Non-Healthcare worker	362	80.4%
Chronic disease		
Yes	69	15.3%
No	381	84.7%
Type of chronic disease		
Diabetes mellitus	20	4.4%
Hypertension	17	3.8%
Asthma	12	2.7%
Arthritis	16	3.6%
Lupus erythematosus	3	0.6%
Behcet disease	1	0.2%

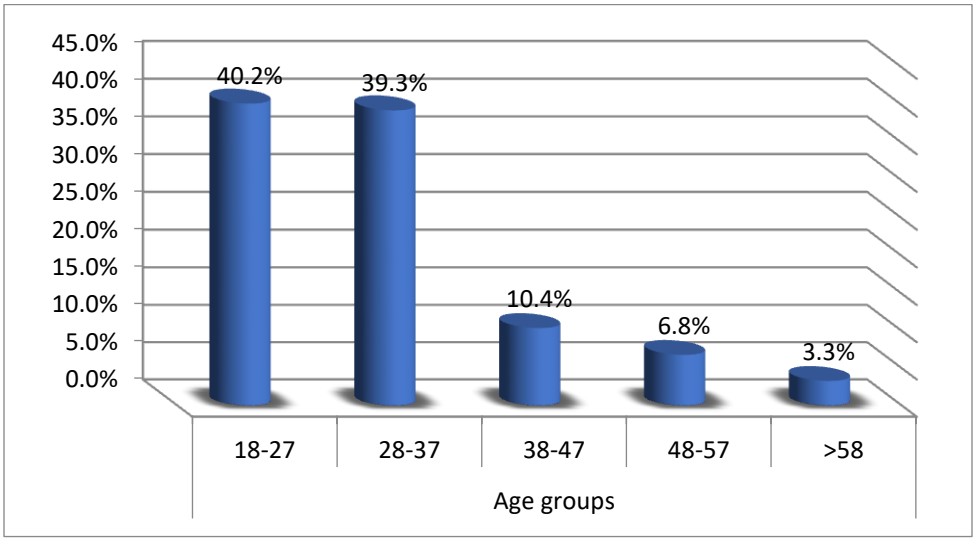

Fig.1. Age distribution among the studied group

Table 2. Factors related to COVID-19 vaccine acceptance among the studied group

Variable	Frequency	Percentage
What do you think are your chances of getting infected by COVID-19?		
Likely	194	43.1 %
Unlikely	80	17.8 %
Don't know	176	39.1 %
What symptoms would you expect if you contracted COVID-19?		
Mild	90	20%
Moderate	106	23.6%
Severe	141	31.3%
Don't know	113	25.1%
Do you believe that immunity acquired by COVID-19 infection is better than immunity acquired via COVID-19 vaccination?		
Agree	82	18.2%
Disagree	70	15.6%
Don't know	298	66.2%
What do you think about the effectiveness of COVID-19 vaccination?		
Limited effectiveness	142	31.6 %
Good effectiveness	199	44.2 %
Don't know	109	24.2 %
What do you think about the safety of COVID-19 vaccination?		
Limited safety	205	45.6%
Good safety	126	28%
Don't know	119	26.4%

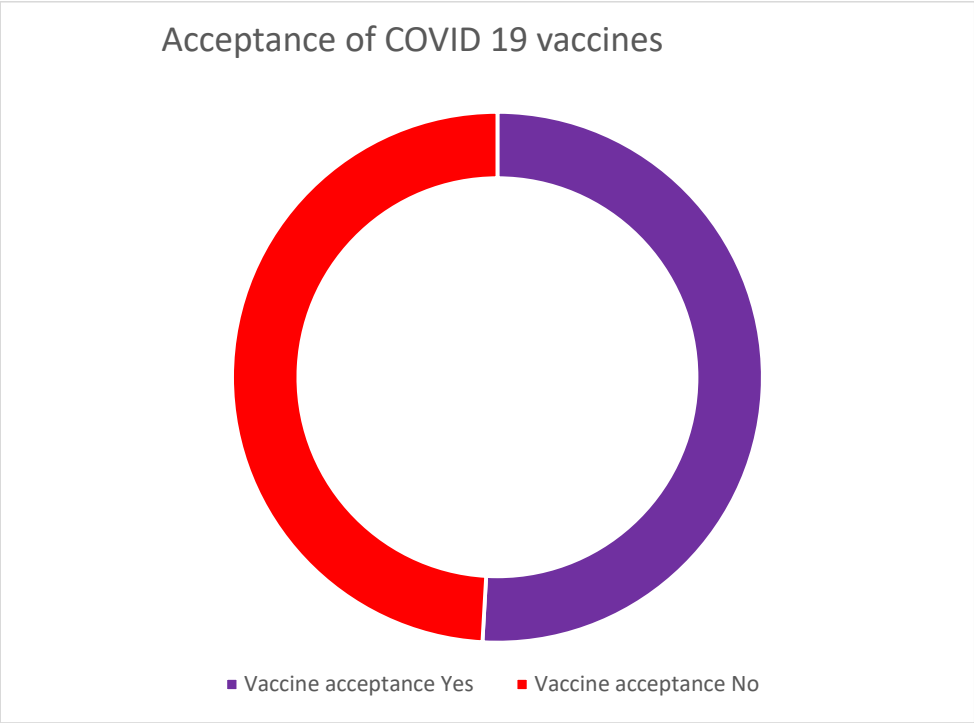

Fig. 2. 50.9% of the participants reported acceptance of COVID-19 vaccines.

Participants aged 48–57 years showed the highest vaccination acceptance (70%) (p=0.019), and unmarried participants accepting the vaccine more than married (59.9% vs 43.5%)(p=0.001) **(Table 3)**.

Participants who strongly disagreed with the statement "development of natural immunity after exposure to COVID-19 is preferable to immunity generated by a COVID-19 vaccine" had higher acceptance rates for the COVID-19 vaccine than participants who strongly agreed with the statement (81.4% vs. 47.6%, $p < 0.001$). Participants who believed the COVID-19 vaccine's efficiency would be restricted were less accepting of the shot than participants who believed it would have good efficacy (33.1% vs. 71.9%, $p < 0.001$), respectively. Participants who suspected the COVID-19 vaccine's safety would be limited were less likely to accept the vaccine than those who thought it would be safe (28.3% vs. 81.7%, $p < 0.001$), **(Table. 4)**.

According to multivariate analysis, the anticipated good safety of COVID-19 vaccines was the strongest predictor for the acceptance of COVID-19 vaccine. The participants who anticipated the good safety of COVID-19 vaccines and those who reported “don’t know” were more accepting of the vaccine than those who anticipated the limited safety of COVID-19 vaccines by 10.681 times and 3.489 times respectively. The participants who anticipated good efficacy of COVID-19 vaccines were 5.036 times more accepting the vaccines than those who anticipated limited efficacy. Moreover, Participants who disagreed with the statement "development of natural immunity after exposure to COVID-19 is preferable to immunity generated by a COVID-19 vaccine" were 6.006 times more accepting of the COVID-19 vaccines than participants who agreed with that. Participants within the age group 48-57 years reported more acceptance of the COVID-19 vaccine than the corresponding group (AOR; 4.161, 95% CI: 1.249-13.86, p=0.02). The unmarried Participants reported more acceptance of COVID-19 vaccines than married (AOR; 2.568, 95% CI: 1.328 - 4.965, p=0.005) **(Table .5)**.

Table 3. Association between acceptance of COVID-19 vaccines and Sociodemographic characteristics of the studied group

Variable	Acceptance of COVID-19 vaccines		P-value
	Yes	No	
Age groups (in years)			
18-27	97 (53.6%)	84 (46.4%)	0.019*
28-37	89 (50.3%)	88 (49.7%)	
38-47	15 (31.9%)	32 (68.1%)	
48-57	21 (70%)	9 (30%)	
≥58	7 (46.7%)	8 (53.3%)	
Sex			
Male	89 (54.9%)	73 (45.1%)	0.197
Female	140 (48.6%)	148 (51.4%)	
Residence			
Urban	115 (52.5%)	104 (47.5%)	0.503
Rural	114 (49.4%)	117 (50.6%)	
Marital Status			
Married	108 (43.5%)	140 (56.5%)	0.001*
Unmarried	121 (59.9%)	81 (40.1%)	
Education			
Illiterate	33 (63.5%)	19 (36.5%)	0.054
Educated	196 (49.2%)	202 (50.8%)	
Occupation			
Healthcare worker	38 (43.2%)	50 (56.8%)	0.107
Non-Healthcare worker	191 (52.8%)	171 (47.2%)	
Chronic disease			
Yes	38 (55.1%)	31 (44.9%)	0.450
No	191 (50.1%)	190 (49.9%)	
Type of chronic disease			
Diabetes mellitus	13 (65%)	7 (35%)	0.183
Hypertension	11 (64.7%)	6 (35.3%)	
Asthma	8 (66.7%)	4(33.3%)	
Arthritis	5 (31.2%)	11 (68.8%)	
Lupus erythematosus	1 (33.3%)	2 (66.7%)	
Behcet disease	0(0%)	1 (100%)	

*statistically significant p <0.05.
Chi-Square Test was used

Table 4.Association between the acceptance of COVID-19 vaccine and its related factors.

Variable	Acceptance of COVID-19 vaccines		P-value
	Yes	No	
What do you think are your chances of getting infected by COVID-19?			
Likely	98 (50.5%)	96 (49.5%)	0.724
Unlikely	38(47.5%)	42(52.5%)	
Don't know	93(52.8%)	83(47.2%)	
What symptoms would you expect if you contracted COVID-19?			
Mild	51 (56.7%)	39 (43.3%)	0.186
Moderate	57 (81.4%)	47 (44.3%)	
Severe	70(49.6%)	71 (50.4%)	
Don't know	49(43.4%)	64 (56.6%)	
Do you believe that immunity acquired by COVID-19 infection is better than immunity acquired via COVID-19 vaccination?			
Agree	39 (47.6%)	43 (52.4%)	<0.001*
Disagree	57 (81.4%)	13 (18.6%)	
Don't know	133 (44.6%)	165 (55.4%)	
What do you think about the effectiveness of COVID-19 vaccination?			
Limited effectiveness	47 (33.1%)	95(66.9%)	<0.001*
Good effectiveness	143(71.9%)	56(28.1%)	
Don't know	39 (35.8%)	70(64.2%)	
What do you think about the safety of COVID-19 vaccination?			
Limited safety	58(28.3%)	147(71.7%)	<0.001*
Good safety	103(81.7%)	23(18.3%)	
Don't know	68(57.1%)	51(42.9%)	

*statistically significant p <0.05.
Chi-Square Test was used.

Table 5. Multivariate logistic regression analysis of different factors related to COVID-19 vaccine acceptance

Variable	AOR	95% CI		P-value
		Lower	Upper	
Age of patients (in years)				
18-27	Reference			
28-37	1.743	0.879	3.458	0.112
38-47	0.541	0.196	1.493	0.235
48-57	4.161	1.249	13.860	0.02*
>58	1.883	0.468	7.575	0.373
Marital status				
Married	Reference			
Unmarried	2.568	1.328	4.965	0.005

Do you believe that immunity acquired by COVID-19 infection is better than immunity acquired via COVID-19 vaccination?				
Agree	Reference			
disagree	6.006	2.471	14.597	<0.001*
Don't know	0.874	0.457	1.672	0.683
What do you think about the perceived effectiveness of COVID-19 vaccination?				
Limited effectiveness	Reference			
Good effectiveness	5.036	2.746	9.237	<0.001*
Don't know	1.773	0.863	3.645	0.119
What do you think about the perceived safety of COVID-19 vaccination?				
Limited safety	Reference			
Good safety	10.681	5.650	20.191	<0.001*
Don't know	3.489	1.969	6.182	<0.001*

*statistically significant p <0.05.
Binary logistic regression analysis was used.

Discussion

Vaccination is one of the 21st century's greatest achievements in public health. However, its acceptance varies depending on the circumstances and variations in human behavior over time and geography (**Habersaat and Jackson, 2020).** The rate of vaccination uptake is a key factor in how well the population can develop herd immunity against infection. Lower COVID-19 vaccine acceptance will limit the global efforts to eradicate the pandemic and its effects. Understanding people's beliefs, their motivations for getting vaccinated, and the things that cause particular populations to reject the vaccination are crucial for addressing vaccine hesitancy **(Joshi et al., 2021).**

Our study is a cross-sectional study conducted in Qena University Hospitals. The current study measured the acceptance of COVID-19 vaccines and identified contributing factors of COVID-19 vaccine acceptance among hospital attendants in Qena City. The acceptance rate of COVID-19 vaccines was 50.9%. This finding was in agreement with a study carried out in Kuwait (53.1%) **(Alqudeimat et al., 2021),** United Arab Emirates (55%) **(Muqattash et al., 2020)**, Poland (57%) and Russia (55%) **(Lazarus et al., 2021).** Additionally, research based on a sample of American adults done in April 2020 revealed an acceptability rate of 57.6% **(Fisher et al., 2020)**, which is very close to what we estimated.

A survey on the acceptance of the COVID-19 vaccine was held online in Arabic from January 14 to January 29, 2021, involving all 23 Arab countries and 122 other countries. In both the Arab region and outside of it, there was a considerable rate of vaccine hesitancy among Arabs (83% and 81%, respectively) **(Qunaibi et al., 2021).**

The acceptability rates revealed in our study, however, were lower than those of Malaysian residents (94.3%) **(Wong et al., 2020),** residents of Denmark (80%), and France (62%) (**Neumann-Böhme et al., 2020).** At the neighborhood level, our survey participants' stated acceptance levels were lower than those of a sample of Saudi individuals (64.7%) **(Al-Mohaithef and Padhi, 2020).** The average vaccine acceptability recorded globally in March 2020 was 86%; by July 2020, it had fallen to 54%. While this percentage rose to

72% in September **(Neumann-Böhme et al., 2020).**

In our study, Participants between the ages of 48 and 57 years were the most accepting of vaccination (70%), the difference is statistically significant (p = 0.019) . This finding was in agreement with a study conducted in Saudi Arabia which indicated that participants aged more than 40 years were associated with a higher level of acceptance for COVID-19 vaccines (**Al-Mohaithef and Padhi, 2020**). Another study conducted by Fisher et al. has demonstrated that acceptance rises with age **(Fisher et al., 2020).** Contrary to this, a study carried out in Kuwait revealed that respondents between the ages of 21 and 24 years had the highest acceptability (74.3%) **(Alqudeimat et al., 2021)**, such disparate results could be attributed to fluctuating public attitudes about vaccination, which vary by age group.

Regarding marital status, our study showed that the acceptance of a COVID-19 vaccine was more in unmarried than married participants (59.9% vs. 43.5%). The difference is statistically significant (p = 0.001). However, a Saudi Arabian study found that being married was linked to increased acceptance of the COVID-19 vaccine (**Al-Mohaithef and Padhi, 2020**). Such different findings might be explained by the fact that married couples may be affected by their partner's opinion about vaccination, also some rumors about the effect of COVID-19 vaccines on fertility and the possibility of fetal malformation may have played a role in decreasing COVID-19 vaccine acceptance among married participants in our community.

Our study showed that the participants who strongly disagreed with the statement "development of natural immunity after exposure to COVID-19 are preferable to immunity generated by a COVID-19 vaccine" had higher acceptance rates for the COVID-19 vaccine than participants who strongly agreed with the statement (81.4% vs. 47.6%, p < 0.001). Such findings were in agreement with the study conducted in Kuwait which reported that in contrast to those who agreed with the establishment of natural immunity (i.e., immunity from developing the infection and recovering), those who disagreed with this concept were more likely to accept the COVID-19 vaccination **(Alqudeimat et al., 2021)**.

In contrast to our findings, a study carried out in the United States of America (USA) found that respondents' opinions towards immunizations were unaffected by their knowledge of vaccines and immunity **(Pogue et al., 2020).** Such different findings might be explained by a higher level of awareness about immunity among them either accepting the vaccines or not.

Considering the effectiveness of the COVID-19 vaccination, Participants who believed the COVID-19 vaccine's efficiency would be restricted were less accepting of the shot than participants who believed it would have good efficacy (33.1% vs. 71.9%, p < 0.001), respectively. Such results were consistent with an online survey of USA people aged 18 and older (n = 2,006) who indicated that factors linked to vaccine effectiveness would influence their willingness to receive vaccinations (**Reiter et al., 2020**). According to a cross-sectional study done in China, people who believed getting the COVID-19 vaccination was an effective method of preventing and controlling the disease had an elevated level of vaccine acceptance (OR: 1.56, 95% CI: 1.08-2.25) **(Wang et al., 2020)**.

Considering the COVID-19 vaccine's safety, Participants who suspected the COVID-19 vaccine's safety would be limited were less likely to accept the vaccine than those who thought it would be safe (28.3% vs. 81.7%, p < 0.001). **Reiter et al., (2020)** revealed that participants who were ready to receive COVID-19 vaccines were unlikely to say that the possibility of vaccine side effects affected their decision to get vaccinated. (53% vs. 69%, p < 0.05). Additionally, those who believed that COVID-19 vaccines have health

hazards were less expected to accept receiving the vaccines (28.9%) than those who thought vaccines do not have health concerns (82.5%) **(Alqudeimat et al., 2021)**.

Conclusion

Our study's subjects had a 50.9% acceptance rate for the COVID-19 vaccination. Age, marital status, the belief that immunity will develop after receiving the COVID-19 vaccination, and trust in the vaccine's safety and efficacy were the key determinants of COVID-19 vaccine acceptance.

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