ORIGINAL RESEARCH

COVID-19 Vaccine Acceptance: Beliefs and Barriers Associated with Vaccination Among the Residents of KSA

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Introduction: COVID-19 was declared a pandemic in March 2020 by the World Health Organization. Control of COVID-19 depends on the potential vaccine and its successful delivery to a large portion of the population to develop herd immunity. All the governments have made a robust plan to distribute the vaccine to their people, but many countries could not achieve adequate vaccination coverage. Hence, this study explores people's beliefs and barriers to vaccination and provides valuable inputs to the government to attain adequate vaccination.

Objective: To know the knowledge level about the COVID-19 vaccine among the residents of KSA. To find out the various concerns (beliefs) about COVID-19 and its vaccine among the residents of KSA. To estimate the vaccine acceptance and understand the barriers to accepting the COVID-19 vaccine among residents of KSA.

Materials and Methods: A web-based, cross-sectional study was conducted from April to June 2021 in a restricted environment on the adult (>18 years) residents of Saudi Arabia. The minimum calculated sample was 685; 796 study samples were finally studied to minimize the sampling error. Snowball sampling was used to select the study samples, after meeting the inclusion criteria.

Results: A total of 796 people responded. Only 782 (98.2%) were finally considered after excluding the incomplete information forms. The selected participant's age ranges from 18 years to 80 years. Almost 723 (92%) of the study group knew COVID vaccines. Most of the participants, 370 (47%), preferred USA-manufactured vaccine followed by Saudi Arabia 217 (28%). A total of 259 (33.1%) participants were hesitant to receive the vaccine. Out of 782, half of the participants, 386 (50%), believed the COVID vaccine will prevent the infection.

Conclusion: The government must implement appropriate culturally accepted interventional vaccination educational campaigns to remove the beliefs, worries regarding the safety and efficacy of COVID-19 vaccines, to increase vaccine acceptance rates.

Keywords: COVID-19, public willingness, vaccine, vaccine hesitancy, vaccine acceptance, Saudi Arabia

Introduction

In China, the Wuhan city of Hubei province reported a considerable number with the exponential increase of new cases with symptoms of fever, cough, and breathlessness. These symptoms ranged from none to very severe life-threatening.[1] Later, the reason for these symptoms was linked to the coronavirus on February 11, 2020. WHO named it has COVID-19 caused by a coronavirus (SARS-CoV-2); this declared the COVID-19 outbreak a Public Health Emergency of International

3243

Concern in January 2020 and a pandemic in March 2020 by the World Health Organization.[2] This COVID-19 pandemic has caused a heavy burden of morbidity and mortality and economic tumult around the Globe. COVID-19 has reached almost 227 countries across the Globe, affected more than 200 million population, and killed nearly 4.3 million people worldwide. Although the first case was reported a year ago, there is no definite antiviral treatment for COVID-19.[3] Several scientists in the recent past repurposed several drugs for the COVID-19 management. Some have shown slight effectiveness in reducing mortality, but the morbidity and incidence of the cases were unchanged. Long-term COVID-19 control will depend on the potential vaccine and its successful delivery to a large portion of the population to prevent and control COVID-19.[4] The containment of the ongoing community spread of COVID-19 is only possible with adequate vaccine coverage to develop herd immunity within the community. Immunization is one of the most successful and cost-effective health interventions to prevent infectious diseases. The vaccines against COVID-19 are of great importance to avoid disease morbidity and mortality.[5]

The Strategic Advisory Group of Experts (SAGE) Working Group on Vaccine Hesitancy has defined vaccine hesitancy as "delay in acceptance or refusal of vaccines despite availability of vaccine services".[6] As per the WHO, the reluctance or refusal to vaccinate threatens the progress made in tackling vaccine-preventable diseases, and it is 1 of the top 10 public health problems in the world.

The government has made a robust plan to distribute to their public at the earliest to control this COVID-19 pandemic. Through mass media and non-governmental agencies like the WHO, the governments are continuously working to build vaccine literacy among the public to accept the vaccine when it is available and appropriate. Anti-vaccination activists are already campaigning in multiple countries against the need for a vaccine. Some are denying the vaccine because of the nonexistence of COVID-19 altogether.[7]

Need for the Study

The reluctance or refusal to vaccination despite the availability of the COVID-19 vaccine will threaten to reverse progress made in tackling the coronavirus disease 2019 (COVID-19) diseases. This study intends to find out the perceptions, beliefs, and barriers associated with the COVID-19 vaccination. In addition, the current study will find out the psychological, social, and political behaviour of the individual towards a COVID-19 vaccine. Finally, this study will provide insight to the administrators and program managers to improve vaccine coverage in the country.[8] Hence, this study aimed to provide inputs to the government in tackling the COVID-19 pandemic, with the following objectives.

Objectives

1. To know the knowledge level about COVID-19 vaccine among the residents of KSA
2. To find out the various concerns (beliefs) about COVID-19 and its vaccine among the residents of KSA
3. To estimate the vaccine acceptance and to understand the barriers to accepting the COVID-19 vaccine among residents of KSA

Methodology

A cross-sectional study that was web-based conducted from April to June 2021 in a restricted environment on the adult (>18 years) residents of Saudi Arabia. This study was planned through online mode because Saudi Arabia currently has a total population of 35.08 million. Moreover, 27.08 million (79.25%) of the population are active social media users.[9] This study primarily focused on the literate individuals who are willing to participate and able to read and write either English or Arabic and having internet access was included. The sample size calculation was based on the previous study conducted in Saudi Arabia. The acceptance rate was 64.7%.[10] The sample size was calculated using the $4pq/d^2$ formula: $4 \times 64.7 \times 35.3/4 \times 4 = 571$. The minimum calculated sample was 571 of this calculated sample size; 20% (114) considered as non-response or incomplete submission in total (685) subjects must be studied. To minimize the sampling error we finally studied 796 samples. Study samples were selected using snowball sampling after meeting the following inclusion criteria: age greater than 18 years, residing in the KSA, and willing to give informed consent to participate in the study.

Study Tool

The basic outline of the study is to prepare the validated self-administered electronic study tool. The tool was adapted from previous studies with modifications validated by three independent research experts.[11,12] The study tool was prepared in the English language, translated to local

language Arabic, and back-translated to check the validity of the translation. The study instrument was divided into five major sections to collect the data in section one. The consent for the study; the second section was socio-demographic details of the participants, the third section regarding the general information includes the weight, height, habits, any history of allergy, and any chronic illness or physical impairment of the study subjects in section four concentrated on the Beliefs on COVID-19 of the study group, and in section five COVID-19 vaccine acceptance, and barriers preventing to get vaccinated. The self-administered online survey electronic study tool was made in Google Forms and circulated through social media sites, such as WhatsApp, Facebook, Twitter, etc.

Statistical Analysis

All the collected data were downloaded from Google forms in the MS office 2019 Excel spreadsheet. The data are then validated and analyzed using Statistical Package for the Social Sciences (SPSS) version 21 for windows (SPSS Inc, Chicago, IL, USA). Qualitative variables expressed in proportions and chi square and other appropriate tests were applied to test the hypothesis. The data were analyzed at the 95% confidence interval level, where a p-value of <0.05 was considered significant.

Ethical Approval

This study was conducted in accordance with the Declaration of Helsinki. The informed consent was obtained prior to participating in the study. Institutional Ethical approval was obtained from the Research Ethics Committee at King Khalid University (HAPO-06-B-001) Abha Kingdom of Saudi Arabia (ECM#2020-3311).

Results

A total of 796 people responded; out of these responses, only 782 (98.2%) were finally considered for the analysis after excluding the incomplete information forms.

The survey reached a population ranging from 18 to 80 years with a mean age of 35.08 years (± 10.13 years). Of the 782 respondents, 276 (35.3%) were women, and 506 (64.7%) were men. Most of the respondents, 752 (96.1%), were Saudi nationals, and very few 30 (3.9%) were non-Saudi Nationals, three-fourth of the participants, 549 (70.9%), were married, followed by one-third of the responders were unmarried 228 (29.1%), and the remaining 5 (0.6%) were either widows or separated. More than half of the respondents, 444 (56.7%), completed their

graduation, one-quarter of the respondents were postgraduates and above 202 (25.8%), and the remaining studied up to High school or less 136 (17.4%). Many of the responders lived in urban areas 683 (87.3%), and the remaining were rural 99 (12.7%). The socio-demographic information is tabulated in Table 1.

Out of 752 Saudi respondents, 259 (34.4%) were not willing (hesitance) to take COVID-19 vaccine. Among the vaccine hesitance group, 124 (47.8%) of them were females and around one-quarter 135 (52.1%) of them were males, the difference between these were statistically significant (p<0.0001). Nearly 40% of the middle-aged (40–59 years) responders were not interested to intend the vaccine; the difference between age groups to accept the vaccine was statistically significant (p<0.007). All the levels of educated responders showed a similar type of hesitancy towards vaccination. The multivariate analysis showed the education is the significant potential factor for accepting the vaccine. The urban population showed more unwillingness than the rural population to accept the vaccine. Those responders with chronic diseases expressed their negativism towards COVID-19 vaccine. This might be due to the fear of side effects and lack of evidence on the vaccine efficacy. Further details have been provided in Table 2.

Of the study participants, nearly half of them expressed that the risk of getting COVID in near future is high [124 (16%) was strongly agreed, and 280 (36%) were agreed], where 103 (13%) were firmly disagreed this statement. The difference was statistically significant (p<0.001).

Majority, 723 (92%), were having knowledge on different types of COVID vaccines. The difference in male–female was statistically significant (p<0.001). Half of the participants, 386 (50%), feel the COVID vaccine will prevent the infection among the vaccinated, followed by face mask 188 (24%) and social distancing 125 (16%) to prevent the COVID infection. Most of the participants, 520 (66%), informed that two doses of vaccine per person are required to get the Immunity against the COVID-19 to prevent the mortality. The difference between males and females was statistically not significant (p>0.42) Further details have been provided in Table 3.

Out of the 782 participants, 354 (45%) were willing to take the vaccine, and nearly one-quarter of the participants, 345 (44%), were still in a dilemma; (almost equal proportion of males and females were answered no to vaccination) they were willing to receive vaccine after received by most of the population, maybe they want to

Table 1 Distribution of Respondents Based on Socio-Demographic Details (n=782)

Socio-Demographic Information		Gender						p=value
		Male		Female		Total		
		Count	%	Count	%	Count	%	
Nationality	Non-Saudi	24	80	6	20	30	100	>0.074 NS*
	Saudi	482	64	270	36	752	100	
Age Group	<20	26	90	3	10	29	100	<0.0001 S**
	20–39	353	72	135	28	488	100	
	40–59	118	46	138	54	256	100	
	>60	9	100	0	0	9	100	
Education	High School	60	44	76	56	136	100	<0.0001 S**
	Graduate	301	68	143	32	444	100	
	≥Postgraduate	145	72	57	28	202	100	
Occupation	Professional	35	66	18	34	53	100	<0.0001 S**
	Employed	284	67	141	33	425	100	
	Un employee	38	26	111	74	149	100	
	Student	149	96	6	4	155	100	
Marital status	Married	312	57	237	43	549	100	<0.0001 S**
	Single	190	83	38	17	228	100	
	Widow/D	4	80	1	20	5	100	
Rural/Urban	Rural	71	72	28	28	99	100	>0.118 NS*
	Urban	435	64	248	36	683	100	

Abbreviations: *NS, not significant; *S, significant.

wait and watch the vaccination progress, observe the side effects and efficacy of the vaccine, the vaccine hesitancy difference in males and females was statistically significant (p<0.0001). Most of the participants, 370 (47%) preferring to take USA-manufactured vaccine followed by Saudi Arabia–prepared vaccine 217 (28%), were willing to accept significant number of females were opting for their nation-made vaccine than males. This difference was statistically significant, and the details have been provided in Table 4.

Naturally like other studies, this study also observed higher education participants were more the knowledge of COVID-19. Almost all education-level participants are equally willing for the vaccine. There is no statistically significant difference between these groups (p>0.05). Lower educated people preferred the native country–manufactured vaccine, whereas higher educated people are chosen for the USA-based vaccine. Fear of side effects, doubt of vaccine efficacy and safety worries were high in the higher educated participants than lower educated. This difference was statistically significant (p<0.001); the details have been provided in Table 5.

Many of the participants, 349 (44.6%) [female 163 (59%) and male 186 (37%)], were opined that if enough evidence on vaccine safety and efficacy were established, people will accept the vaccine without much hesitance. Nearly half (42%) of the participants [245 (48%) men and 90 (33%) women] were expressed their view that if the government forces by implementing a law, many will accept the vaccine. Details have been provided in Figure 1.

This study observed that education is the main potential factor having most influence on the vaccine acceptance, followed by the age of the individuals, those with chronic diseases afraid of side effects and doubt on the efficacy of the vaccine – the potential influential factors on the hesitance of the vaccine. Details have been provided in Table 6.

Discussion

Herd immunity is one of the essential aspects of containing any diseases. To get herd immunity, one fundamental weapon is the vaccine. Despite the benefits of vaccination, this health-protecting tool is facing many obstacles nationally and internationally. This study aimed to understand

Table 2 Distribution of Study Group-Based on Socio-Demographic Profile with the Willingness to Receive the Vaccine

Parameter		Willing to Take the Vaccine										p-value
		Absolutely No		May be no		Maybe Yes		Absolutely Yes		Total		
		Count	%	Count	%	Count	%	Count	%	Count	%	p<0.05 S**
Nationality	Non-Saudi	1	3	14	47	5	17	10	33	30	100	>0.12 NS*
	Saudi	82	11	162	22	164	22	344	46	752	100	
Gender	Female	31	11	93	34	58	21	94	34	276	100	<0.0001 S**
	Male	52	10	83	16	111	22	260	51	506	100	
Age Group	<20	5	17	7	24	6	21	11	38	29	100	<0.007 S**
	> 60	1	11	0	0	0	0	8	89	9	100	
	20–39	50	10	93	19	106	22	239	49	488	100	
	40–59	27	11	76	30	57	22	96	38	256	100	
Education	<High school	14	10	32	24	24	18	66	49	136	100	>0.39 NS*
	Graduate	51	11	99	22	107	24	187	42	444	100	
	>Postgraduate	18	9	45	22	38	19	101	50	202	100	
Occupation	Employed	41	10	99	23	95	22	190	45	425	100	<0.0001 S**
	Professional	4	8	19	36	19	36	11	21	53	100	
	Student	20	13	20	13	38	25	77	50	155	100	
	Un Employed	18	12	38	26	17	11	76	51	149	100	
Marital status	Married	47	9	151	28	101	18	250	46	549	100	<0.001 S**
	Single	34	15	25	11	68	30	101	44	228	100	
	Widow/D	2	40	0	0	0	0	3	60	5	100	
Rural/Urban	Rural	4	4	19	19	21	21	55	56	99	100	<0.05 S**
	Urban	79	12	157	23	148	22	299	44	683	100%	
Chronic Diseases	Yes	29	21	60	43	45	32	6	4	140	100	<0.001 S**
	No	54	8	294	46	124	19	170	26	642	100	
	Total	83	11	354	45	169	22	176	23	782	100	
H/o Allergy	Yes	3	30	2	20	3	30	2	20	10	100	>0.146 NS*
	No	80	10	174	23	166	22	352	46	772	100	
H/o COVID	Yes	18	12	26	17	35	22	77	49	156	100	>0.273 NS*
	No	65	10	150	24	134	21	277	44	626	100	
Blood group	A Positive	34	16	37	17	54	25	90	42	215	100	<0.0001 S**
	A Negative-	1	2	0	0	15	29	35	69	51	100	
	B Positive	0	0	2	5	3	7	36	88	41	100	
	B-Negative	8	67	0	0	4	33	0	0	12	100	
	O Positive	32	9	109	31	66	19	142	41	349	100	
	O Negative	4	11	11	31	7	20	13	37	35	100	
	AB Positive	0	0	1	9	4	36	6	55	11	100	
	AB Negative	1	5	10	48	10	48	0	0	21	100	
	Do not know	3	6	6	13	6	13	32	68	47	100	
Disability	Locomotor	2	8	23	92	0	0	0	0%	25	100	<0.001 S**
	No	81	11	153	20	169	22	350	46	753	100	
	Visual	0	0	0	0	0	0	4	100	4	100	

Abbreviations: *NS, not significant; *S, significant.

Table 3 Distribution of Sample Based on Gender and Knowledge About COVID Vaccine

COVID Vaccine Awareness		Gender						p-value
		Male		Female		Total		
		Count	%	Count	%	Count	%	
Chance of getting the infection in the near future	Strongly agree	62	12	62	22	124	16	<0.001
	Agree	193	38	87	32	280	36	S**
	Disagree	178	35	97	35	275	35	
	Strongly disagree	73	14	30	11	103	13	
	Total	506	100	276	100	782	100	
I heard about the COVID vaccine.	Yes	465	92	258	93	723	92	<0.0001
	No	41	8	18	7	59	8	S**
	Total	506	100	276	100	782	100	
Most specific to prevent COVID-19 infection	Vaccine	272	54	114	41	386	50	>0.42
	Face mask	142	28	46	17	188	24	NS*
	Hand washing/sensitizer	24	5	49	18	73	9	
	Social distance	60	11	65	23	125	16	
	All options	8	2	2	1	10	1	
	Total	506	100	276	100	782	100	
COVID-19 vaccine will stop the disease.	Yes	272	54	114	41	386	50	<0.0001
	No	78	15	31	11	109	14	S**
	I do not Know	156	31	131	47	287	37	
	Total	506	100	276	100	782	100	
How many doses of vaccine per person are needed to prevent COVID?	1	26	5	9	3	35	4	
	2	371	73	149	54	520	66	
	≥3	6	1	13	4	19	2	
	Depending on the type of vaccine	103	20	105	38	208	27	
	Total	506	100	276	100	782	100	

Abbreviations: *NS, not significant; *S, significant.

the contextual human behaviour, which influences the acceptance of vaccination among the population.[13] The behavioural determinants of vaccine acceptance and hesitancy play a crucial role in fighting with COVID-19 pandemic.

This study was conducted among adults aged between 18 years and above, because currently, the vaccine is available for 18 years and above only; we received responses up to 80 years. A similar study conducted by Sharun et al in India also found a similar age group.[12] Among the study subjects, men (64.7%) were outnumbered than women (35.3%). Sharun et al also found similar results. In this study, 82.5% of the participants were either graduates or postgraduates and above. These results align with Sharun et al study conducted in India and Linda Thunstrom et al in the USA.

Although several studies are being conducted all around the world, this study observed that vaccine acceptance is 67%, which is lesser than the results obtained from similar studies conducted in the USA[14] Thunstrom et al reported 80% of the general population accepted to get vaccinated, and another study conducted by[15] Fu et al, in China, found that 72.5% of the health care workers accepted to get vaccinated. This study reported that vaccine acceptance among the participants was lower, but it is in alignment with the studies of South Africa (64%), Russia (54%), and France (59%)[16] IPSOS, 2020. It is important to note that COVID-19 vaccine hesitancy may not be purely attributable to people's behaviour and attitude towards vaccines; in general, this might be fast-tracked approval, novel techniques used for the development of COVID-19 vaccine before establishing enough

Table 4 Distribution of Sample Based on Gender vs Vaccine Acceptance and Its Barriers

| | | Gender | | | | | | |
| | | Male | | Female | | Total | | |
		Count	%	Count	%	Count	%	p-value
Willing to take the vaccine?	Absolutely yes	260	51	94	34	354	45	<0.0001
	Maybe yes	111	22	58	21	169	22	S**
	May be no	83	16	93	34	176	22	
	Absolutely no	52	10	31	11	83	11	
	Total	506	100	276	100	782	100	
Which country-manufactured vaccine preferred?	Saudi Arabia	122	24	95	34	217	28	<0.0001
	USA	282	56	88	32	370	47	S**
	China	17	3	38	14	55	7	
	Russia	17	3	19	7	36	5	
	India	15	3	3	1	18	2	
	Other	53	10	33	12	86	11	
	Total	506	100	276	100	782	100	
Intended to take vaccine after received by many people?	Strongly agree	167	33	113	41	280	36	>0.134
	Agree	136	27	59	21	195	25	NS*
	Disagree	130	26	67	24	197	25	
	Strongly not agree	73	14	37	13	110	14	
	Total	506	100	276	100	782	100	
Reasons for not intended to the vaccine (n=428)	Fear of injection	10	2	5	3	15	4	<0.0001
	Fear of side effects	55	11	57	31	112	26	S**
	Not sure of Vaccine efficacy and safety	93	18	70	38	163	38	
	The vaccine does not require because I am healthy and follow instructions	36	7	16	9	52	12	
	Not to answer	52	10	34	19	86	20	
	Total	246	100	182	100	428	100	
Preferring different forms of a vaccine	Yes	287	56	141	50	428	54	>0.110
	No	219	44	135	50	354	46	NS*
	Total	506	100	276	100	782	100	

Abbreviations: *NS, not significant; *S, significant.

evidence of vaccine safety and not enough measures to create the awareness about the vaccine in the community.[17]

As per the "3 Cs" model, statement of MacDonald,[6] vaccine hesitancy toward vaccination might be the influencing factors like confidence, complacency, and convenience. The most common reason for the vaccine hesitancy was lack of confidence in the vaccine efficacy, and safety and fear of side effects are the major barriers prevailing among the study subjects. A similar study conducted by Shimaa M. Saied in Egypt also observed similar findings.[18] This hesitancy might be due to the fast-track approval of vaccines or widespread conspiracy theory may be the reason for the vaccine hesitance.[7] Another major barrier

to COVID-19 vaccination is spreading the misinformation/ falsified information very rapidly via various social media platforms globally.[19]

Suggesting ways to improve vaccine acceptance, this study noticed that more people are concerned about the safety and efficacy of the vaccine. Based on the overall response, if more studies are conducted to evaluate the effectiveness and safety of vaccines, many were expressed if the substantial evidence was available for the security, and the government made compulsion for vaccination by linking the job or travel welfare schemes. Similar findings were observed by the different studies conducted by Sharun et al in India[12] and Linda Thunstrom et al in the USA.[14]

Table 5 Distribution of Sample Based on Education vs Vaccine Acceptance and Its Barriers

		Education							
		≤High School		Graduate		≥Postgraduate		Total		
		Count	%	Count	%	Count	%	Count	%	p-value
Willing to take the vaccine?	Absolutely yes	66	49	187	42	101	50	354	45	>0.39
	Maybe yes	24	18	107	24	38	19	169	22	NS*
	may be no	32	24	99	22	45	22	176	23	
	Absolutely No	14	10	51	11	18	9	83	11	
	Total	136	100	444	100	202	100	782	100	
Which country-manufactured vaccine preferred?	Saudi Arabia	45	33	151	34	21	10	217	28	<0.0001
	USA	40	29	173	39	157	78	370	47	S**
	China	3	2	47	11	5	2	55	7	
	Russia	5	4	31	7	0	0	36	5	
	INDIA	2	1	2	0	14	7	18	2	
	Other	41	30	40	9	5	2	86	11	
	Total	136	100	444	100	202	100	782	100	
Intended to take vaccine after received by many people	Agree	28	21	90	20	77	38	195	25	<0.0001
	Disagree	30	22	119	27	48	24	197	25	S**
	Strongly Agree	60	44	170	38	50	25	280	36	
	Strongly Not Agree	18	13	65	15	27	13	110	14	
	Total	136	100	444	100	202	100	782	100	
Reasons for not taking	Fear of injection	5	7	10	4	0	0	15	4	<0.0001
	Fear of side effects	25	36	61	24	26	26	112	26	S**
	Not sure of Vaccine efficacy and safety	17	24	106	41	40	40	163	38	
	I am healthy and follow instructions	15	21	37	14	0	0	52	12	
	Not to answer	8	11	43	17	35	35	86	20	
	Total	70	100	257	100	101	100	428	100	
Preferring different forms of vaccine	Yes	93	68	241	54%	90	45	424	54	<0.0001
	No	43	32	203	46	112	55	358	46	S*
	Total	136	100	444	100	202	100	782	100	

Abbreviations: *NS, not significant; *S, significant.

Limitations

This study was conducted in a restricted environment. Since COVID-19 restrictions were imposed and it was difficult to recruit directly the study subjects, the snowball sampling technique was used. The authors have very little control on the recruitment of the study samples. They may not be representative to the entire target population, but only reach to the known groups, educated people. Large sample size with a more systematic, inclusive sampling method can improve the representativeness and generalizability of the findings.

Another limitation of the present study is the possibility of participants' positive responses. However, as this study was conducted online, participants could answer positively, giving socially accepted, because of online questions, instead of what they were practicing.

Another limitation of the study was the self-administered questionnaire, where responses were recorded electronically by sophisticated methods that senior citizens may not know.

Conclusion

The findings of the current study can be utilized for planning the vaccination campaigns. This study observed the worries among the participants regarding the safety and efficacy of COVID-19 vaccines. The government must implement appropriate culturally accepted interventional vaccination educational campaigns to remove the beliefs,
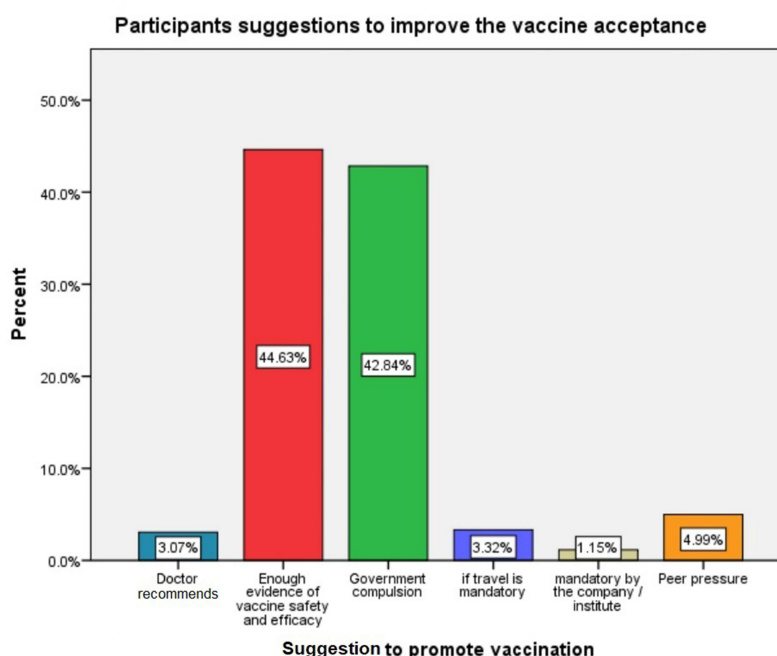
Figure 1 Study participants suggestion to improve the vaccination coverage.

worries regarding the safety, efficacy, and vaccine side effects of COVID-19 vaccines, which will help to increase vaccine acceptance rates. These concerns may hamper the vaccination program government might think of implementing a law for compulsory vaccine to proceed for educational activities, international travel and tourism centres, etc. Provision of evidence-based information on COVID-19 vaccines and effective initiatives to keep surveillance on social media to fight misinformation/falsified information. Telecast expert group from health professionals and scientists for scientific discussion in social and traditional media and provide evidence on COVID-19 vaccine will help the reconstruction of the confidence and trust on vaccine.

Table 6 Multivariate Analysis for the Vaccine Acceptance

Adherence of COVID-19 Vaccination			
Covariates	**Mean Square**	***F* Value**	**P value**
Education	2.066	4.591	0.033
Non-Adherence of COVID-19 Vaccination			
Age	34.024	39.381	0.001
Diabetes	5.953	6.891	0.009
Hypertension	10.7.3	12.389	0.001
Preferring different vaccine	19.486	22.554	0.001

More studies on the larger sample are required to get an insight on approval, clearing the worries and willingness for COVID-19 vaccines. This study will help the program planners and administrators formulate efficient strategies to help achieve COVID-19 vaccination above the expected level to establish herd immunity in Saudi Arabia.

Acknowledgments

Disclosure

The authors report no conflicts of interest in this work.

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