Public willingness to receive COVID-19 vaccine in Saudi Arabia

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Abstract

Background: The coronavirus disease 2019 (COVID-19) pandemic has scattered globally across the world leaving millions infected and hundreds of thousands of dead. Immunization programs appeared to be the only effective strategy to end the pandemic which is achieved when there are high rates of acceptance and coverage. To achieve that, it is important to realize Saudis' concept and risk perceptions about COVID-19, and acceptance of a COVID-19 vaccine.

Aim: to assess public willingness and preparedness with their attitude to receive COVID-19 vaccine in Saudi Arabia.

Methodology: A descriptive cross-sectional study was conducted targeting all available population in Saudi Arabia. Data were collected from participants using pre-structured electronic questionnaire. The questionnaire included the following data: participants socio-demographic data information regarding covid-19 experience and infection among participants. The last section covered items of participants' intention to receive a COVID-19 vaccine.

Results: The study included 2,227 participants whose ages ranged from 18 to 62 years old with mean age of 31.7 ± 11.3 years old. Exactly 70.2% of the participants were females and 48.4% were single. Exactly 26.2% had chronic health problems. About 60% of the participants reported their agreement to have the covid-19 vaccine if available. The most reported causes for refusing taking the vaccine for those who refused, were fear of side effects (66.7%), followed by fear of safety issue (49.4%), and fear of efficacy issue (32.4%). More than half (57.3%) of the respondents agreed that Vaccination is a good idea because it makes them feel less anxious about getting COVID-19 infection. Also, 60.4% agreed that vaccination reduces my chances of catching COVID-19 or its complications.

Conclusions: In conclusion, the study revealed that acceptance of the COVID-19 vaccine in Saudi Arabia is somewhat good but not sufficient to have the recommended herd immunity. It is affected by the effectiveness of the vaccine, safety of the vaccine, being taken by others, and history of getting infection or experienced death due to covid-19.

Key words:
Covid-19, corona virus, vaccine, willing, acceptance, attitude, population, barriers, determinants

Introduction

At the end of 2019, a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) started in Wuhan, Hubei province in China. Then the SARS-CoV-2 started to spread worldwide to more than 213 countries, leaving hundreds of thousands of victims (1, 2). By January 2021, the number of persons infected by the virus in the KSA has reached 363,155 and Saudi authorities have reported 6,256 deaths from the virus (3). With no available vaccine or effective treatment, health care providers globally are struggling to suppress the spread of the COVID-19 with the implementation of quarantine and lockdowns, social distancing measures, community-use of facemasks, and travel restrictions. All these actions resulted in the enormous physical and psychosocial effects on people and have led to a huge decline in the global economy (4-6).

Researchers are competing with time to have a confirmed treatment. Beyond the current outbreak, in the longer term, the development of vaccines against SARS-CoV-2 and their global access are a main concern for the pandemic to come to an end (7, 8). Many studies have focused on recognising the possible barriers to vaccine acceptance; one of these studies, surveyed a broad sample of Italian citizens, and reported that there is some public hesitancy towards the future vaccine against COVID-19, and that it seems to be higher among younger participants (9). Another study was a nationwide online survey in China, where more than 80% reported vaccination intent, of which only 28.7% stated a definite intent (10). Concerns of side-effects and efficacy were perception of barriers that negatively influence on vaccination intention. Another study was conducted by regions and stratified for health care personnel at academic medical centres across Israel. Surprisingly, healthcare providers appear to trust a COVID-19 vaccine less than the general population, with nurses more vaccine-hesitant than physicians (11). To the best of the authors' knowledge, no similar studies in Saudi Arabia have explored the general worries for the safety and effectiveness of the future vaccine, which can lead to vaccine hesitancy. However, intention to be vaccinated against an infectious disease is recognized as a foremost issue affecting the success of vaccination programs. This study aimed at surveying adult citizens in Saudi Arabia, to get insights into how general attitudes towards vaccines affect their willingness to vaccinate against COVID-19 and whether these variables play different roles across gender and age groups.

Methodology

A descriptive cross-sectional study was conducted targeting all available population in Saudi Arabia. Persons with ages of 18 years or more living in Saudi Arabia were invited to participate in the survey. A total of 3,000 eligible persons received the study survey. Exactly 2,227 persons completed the study questionnaire with a response rate of 74.2%. Data were collected from participants using pre-structured electronic questionnaire. The researchers constructed the questionnaire after intensive literature review and expert's consultation. Tool was reviewed using a panel of 3 experts from the College of Medicine at King Khalid University to check the clarity and its content validity. Tool reliability was assessed using a pilot study of 25 participants with reliability coefficient (α-Cronbach's) of 0.71. The questionnaire included the following data: participants socio-demographic data like age, gender, education, marital status, job nature (medical vs. non-medical), and medical history. The second section included information regarding covid-19 experience and infection among participants. The last section covered items of participants' intention to receive a COVID-19 vaccine. A questionnaire was uploaded online using social media platforms by researchers and their friends and all eligible parents were invited to fill it in after explaining the purpose and confirming their data confidentiality.

Data analysis

After data was collected, it was modified, coded and entered into Statistical Software IBM SPSS version 22(SPSS, Inc. Chicago, IL). All statistical analysis was done using two tailed tests. P value less than 0.05 was considered to be statistically significant. Descriptive analysis based on frequency and percent distribution was done for all variables including demographic data, covid related infection history, vaccination preparedness and attitude. Cross tabulation was used to test for the distribution of covid-19 vaccination preparedness according to respondent's personal data, covid infection and death history, and attitude towards the vaccine. Pearson chi-square test was used to test for relations significance.

Results

The study included 2,227 participants whose ages ranged from 18 to 62 years old with mean age of 31.7 ± 11.3 years old. Exactly 70.2 % of the participants were females and 48.4% were single while 46.4% were married. As for education, 68% were university graduated and 80.2% were working as 16% of them are health care providers. Exactly 26.2% had chronic health problems, as DM was reported by 3.7% while 3.8% had respiratory disease (Table 1).

Table 1. Personal characteristics of study participants, Saudi Arabia

Personal data	No	%
Age in years		
18-29	1239	55.6%
30-39	344	15.4%
40-49	345	15.5%
50+	299	13.4%
Gender		
Male	663	29.8%
Female	1564	70.2%
Marital status		
Single	1078	48.4%
Married	1033	46.4%
Divorced / widow	116	5.2%
Educational level		
Basic	90	4.0%
Secondary	622	27.9%
University/above	1515	68.0%
Job		
Not working	442	19.8%
Working	1785	80.2%
Job nature		
Non health care provider	1499	84.0%
Health care provider	286	16.0%
Diseases		
None	*1643*	*73.8%*
DM	*83*	*3.7%*
HTN	*85*	*3.8%*
Chronic respiratory disease	*84*	*3.8%*
Hypothyroidism	*2*	*.1%*
Obesity	*65*	*2.9%*
Others	*265*	*11.9%*

Table 2 shows covid infection history and perception among study participants. Exactly 72.1% of the participants had a family member, or someone infected with covid-19 and 44.1% know someone who died with covid-19. Exactly 19.2% of the participants agreed on that probability of my infection with Corona (COVID- 19) in the coming months is very high and 53.7% rated their fear of COVID-19 by 2-3 out of 5 points. Also, 57.1% of the participants agreed that complications from COVID-19 are serious.

Table 2. Covid infection history and perception among study participants, Saudi Arabia

Covid-19 related data	No	%
You or family member, or someone you know infected with covid-19		
Yes	1606	72.1%
May be	118	5.3%
No	503	22.6%
Know someone who died with covid-19		
Yes	981	44.1%
May be	122	5.5%
No	1124	50.5%
The probability my infection with Corona (COVID- 19) in the coming months is very high		
SD	228	10.2%
Disagree	742	33.3%
Neutral	830	37.3%
Agree	258	11.6%
SA	169	7.6%
How would you rate your fear of COVID-19 as (1) low, 5 high		
1	589	26.4%
2-3	1196	53.7%
4-5	442	19.8%
Complications from COVID-19 are serious		
SD	48	2.2%
Disagree	154	6.9%
Neutral	754	33.9%
Agree	703	31.6%
SA	568	25.5%

Table 3 demonstrates covid-19 vaccination preparedness among study participants in Saudi Arabia. Exactly 60.1% of the participants reported their agreement to have the covid-19 vaccine if available. The most reported causes of refusing to take the vaccine for those who refused were fear of side effects (66.7%), followed by fear of safety issue (49.4%), fear of efficacy issue (32.4%), and distrust of pharmaceutical companies (24.3%). Also, 54.1% of the respondents reported that they heard of conspiracy theories about the COVID-19 vaccine.

Table 3. Covid-19 vaccination preparedness among study participants, Saudi Arabia

Covid-19 vaccination preparedness	No	%
If the government provides you with the COVID-19 vaccine, will you take it for yourself and your family members		
Disagree	486	21.8%
Neutral	403	18.1%
Agree	1338	60.1%
If refused, why?		
Fear of side effects	486	66.7%
Fear of safety	360	49.4%
Fear of efficacy	236	32.4%
Distrust of pharmaceutical companies	177	24.3%
Religious barriers	76	10.4%
Have you heard of conspiracy theories about the COVID-19 vaccine?		
Yes	1205	54.1%
Maybe	352	15.8%
No	670	30.1%

As for participants' attitudes towards covid-19 vaccine (Table 4), exactly 57.3% of the respondents agreed that Vaccination is a good idea because it makes them feel less anxious about getting COVID-19 infection. Also, 60.4% agreed that vaccination reduces my chances of catching COVID-19 or its complications while 40.4% of them agreed that they will only receive the COVID-19 vaccine if it is taken by many in the public. On the other hand, 73.7% of the respondents agreed on their need to receive more information about the COVID-19 vaccine and only 28.4% may change their opinion about the COVID-19 vaccine, whether by acceptance or rejection.

Table 4. Attitude towards covid-19 vaccine reported among study participants, Saudi Arabia.

Attitude items	No	%
Would you like to receive more information about the COVID-19 vaccine?		
SD	81	3.6%
Disagree	237	10.6%
Neutral	268	12.0%
Agree	806	36.2%
SA	835	37.5%
Vaccination is a good idea because it makes me feel less anxious about getting COVID-19?		
SD	126	5.7%
Disagree	255	11.5%
Neutral	570	25.6%
Agree	664	29.8%
SA	612	27.5%
Vaccination reduces my chances of catching COVID-19 or its complications?		
SD	101	4.5%
Disagree	222	10.0%
Neutral	561	25.2%
Agree	676	30.4%
SA	667	30.0%
I will only receive the COVID-19 vaccine if it is taken by many in the public		
SD	257	11.5%
Disagree	508	22.8%
Neutral	562	25.2%
Agree	531	23.8%
SA	369	16.6%
May change your opinion about the COVID-19 vaccine, whether by acceptance or rejection?		
Disagree	796	35.7%
Neutral	798	35.8%
Agree	633	28.4%

Table 5 shows distribution of participants' preparedness for covid-19 vaccination by their personal data. Agreement to have the vaccine was reported by 63.5% of males compared to 58.6% of females with recorded statistical significance (P=.032). Also, 61.2% of working participants agreed to have the vaccine compared to 55.7% of those who do not work (P=.034). Exactly 72% of respondents who work as health care providers agreed to have the vaccine compared to 59.1% of others (P=.001).

Table 5. Distribution of participants' preparedness for covid-19 vaccination by their personal data

Personal data		Will have the vaccine if available				P-value
		Agree		Disagree / neutral		
		No	%	No	%	
Age in years	18-29	741	59.8%	498	40.2%	.136
	30-39	191	55.5%	153	44.5%	
	40-49	220	63.8%	125	36.2%	
	50+	186	62.2%	113	37.8%	
Gender	Male	421	63.5%	242	36.5%	.032*
	Female	917	58.6%	647	41.4%	
Marital status	Single	644	59.7%	434	40.3%	.934
	Married	623	60.3%	410	39.7%	
	Divorced/ widow	71	61.2%	45	38.8%	
Educational level	Basic	54	60.0%	36	40.0%	.070
	Secondary	350	56.3%	272	43.7%	
	University/above	934	61.7%	581	38.3%	
Job	Not working	246	55.7%	196	44.3%	.034*
	Working	1092	61.2%	693	38.8%	
Job nature	Non health care provider	886	59.1%	613	40.9%	.001*
	Health care provider	206	72.0%	80	28.0%	
Have chronic health problem	Yes	364	62.3%	220	37.7%	.197
	No	974	59.3%	669	40.7%	

P: Pearson X2 test
* P < 0.05 (significant)

Table 6 illustrates distribution of participants' preparedness for covid-19 vaccination by history and perception regarding covid-19. Exactly 63.8% of respondents who had or knew someone whodied due to covid agreed to have the vaccine compared to 57.2% of those who did not (P=.006). Also, 70.9% of those who fear a high probability of being infected agreed to have the vaccine in comparison to 53.5% of those who do not (P=.001). Exactly 64.5% of those who had high fear level agreed to have the vaccine in comparison to 54.5% of those who rated their fear low (P=.003). Besides, 68.8% of respondents who know about covid complications will have the vaccine compared to 39% of those who do not (P=.001).

Table 6. Distribution of participants' preparedness for covid-19 vaccination by history and perception regarding covid-19.

Covid-19 related data		Will have the vaccine if available				P-value
		Agree		Disagree / neutral		
		No	%	No	%	
You or family member, or someone you know infected with covid-19	Yes	963	60.0%	643	40.0%	.834
	Maybe	74	62.7%	44	37.3%	
	No	301	59.8%	202	40.2%	
Know someone died with covid-19	Yes	626	63.8%	355	36.2%	.006*
	Maybe	69	56.6%	53	43.4%	
	No	643	57.2%	481	42.8%	
The probability my infection with Corona (COVID- 19) in the coming months is very high	SD	122	53.5%	106	46.5%	.001*
	Disagree	422	56.9%	320	43.1%	
	Neutral	496	59.8%	334	40.2%	
	Agree	183	70.9%	75	29.1%	
	SA	115	68.0%	54	32.0%	
How would you rate your fear of COVID-19 as (1) low, 5 high	1	321	54.5%	268	45.5%	.003*
	2-3	732	61.2%	464	38.8%	
	4-5	285	64.5%	157	35.5%	
Complications from COVID-19 are serious	SD	20	41.7%	28	58.3%	.001*
	Disagree	60	39.0%	94	61.0%	
	Neutral	399	52.9%	355	47.1%	
	Agree	468	66.6%	235	33.4%	
	SA	391	68.8%	177	31.2%	

P: Pearson X2 test
* P < 0.05 (significant)

Table 7 shows distribution of participants' preparedness for covid-19 vaccination by attitude towards the vaccine. Exactly 63.3% of participants who heard of conspiracy theories about the COVID-19 vaccine will have it and 70.5% of those who need to know more information regarding the vaccine (P=.001). Also, 88.4% of those who agreed that it is a good idea because it makes me feel less anxious about getting COVID-19 will have the vaccine compared to 10.6% who disagreed (P=.001). About 90% of respondents who know that vaccination reduces my chances of catching COVID-19 or its complications will have the vaccine in comparison to 5.9% of those who refused that assumption (P=.001). Also, 70.2% of respondents reported that they will have the vaccine if taken by many in the public compared to 55.3% of those who refused that condition (P=.001).

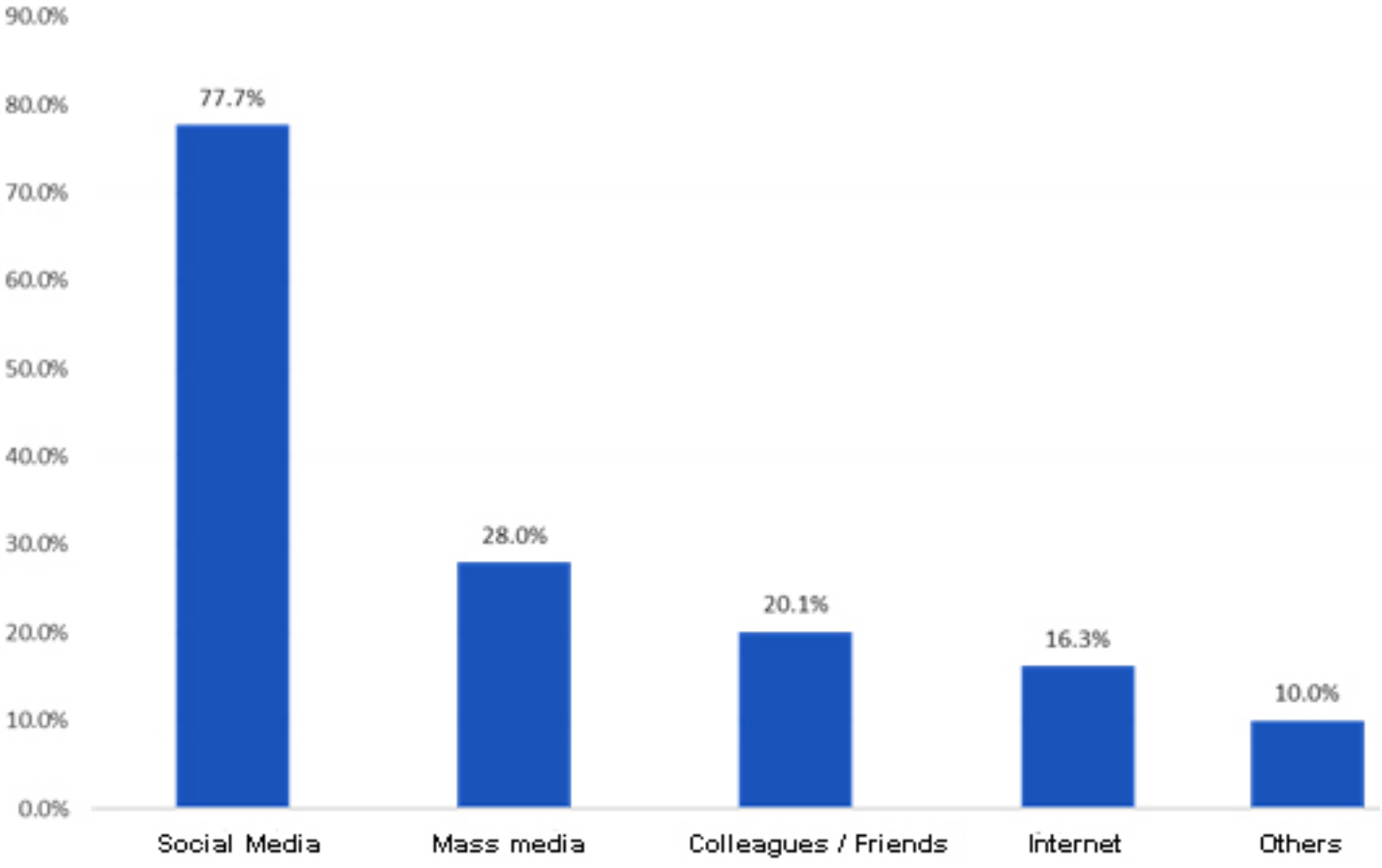
Considering source of information regarding covid-19 vaccine (Figure 1), the most reported source was social media (77.7%), followed by mass media (28%), colleagues and friends (20.1%), and internet (16.3%).

Table 7. Distribution of participants' preparedness for covid-19 vaccination by attitude towards the vaccine

Attitude		Will have the vaccine if available				P-value
		Agree		Disagree / neutral		
		No	%	No	%	
Have you heard of conspiracy theories about the COVID-19 vaccine?	Yes	763	63.3%	442	36.7%	.003*
	May be	196	55.7%	156	44.3%	
	No	379	56.6%	291	43.4%	
Would you like to receive more information about the COVID-19 vaccine?	SD	18	22.2%	63	77.8%	.001*
	Disagree	74	31.2%	163	68.8%	
	Neutral	131	48.9%	137	51.1%	
	Agree	526	65.3%	280	34.7%	
	SA	589	70.5%	246	29.5%	
Vaccination is a good idea because it makes me feel less anxious about getting COVID-19?	SD	18	14.3%	108	85.7%	.001*
	Disagree	27	10.6%	228	89.4%	
	Neutral	233	40.9%	337	59.1%	
	Agree	519	78.2%	145	21.8%	
	SA	541	88.4%	71	11.6%	
Vaccination reduces my chances of catching COVID-19 or its complications?	SD	6	5.9%	95	94.1%	.001*
	Disagree	27	12.2%	195	87.8%	
	Neutral	174	31.0%	387	69.0%	
	Agree	526	77.8%	150	22.2%	
	SA	605	90.7%	62	9.3%	
I will only receive the COVID-19 vaccine if it is taken by many in the general public	SD	142	55.3%	115	44.7%	.001*
	Disagree	301	59.3%	207	40.7%	
	Neutral	292	52.0%	270	48.0%	
	Agree	344	64.8%	187	35.2%	
	SA	259	70.2%	110	29.8%	
May change your opinion about the COVID-19 vaccine, whether by acceptance or rejection?	Disagree	566	71.1%	230	28.9%	.001*
	Neutral	368	46.1%	430	53.9%	
	Agree	404	63.8%	229	36.2%	

P: Pearson X2 test
* P < 0.05 (significant)

Figure 1. Source of information regarding covid-19 vaccine among study participants



Discussion

The study aimed to survey adult citizens in Saudi Arabia, to get insights into how general attitudes towards vaccines affect their willingness to vaccinate against COVID-19 and whether these variables play different roles across gender and age groups. World Health Organization (WHO), 2015, Strategic Advisory Group of Experts on Immunization classified vaccine hesitancy as a 'delay in acceptance or refusal of vaccination in spite of availability of vaccination services'(12), which can differ in method and intensity based on time and place of occurrence and what vaccine is involved, as has been confirmed in multiple studies (13, 14). Vaccine hesitancy is growing worldwide (15). Actually, WHO labelled it as one of the top ten global health hazards in 2019 (16). Globally, vaccine hesitancy and misinformation is reported as significant obstacles to getting coverage and community immunity (17, 18).

The current study revealed that nearly three quarters of the respondents had a family member, or someone they know who were infected with covid-19 while about 44% of them know someone who died with covid-19. Also, very low portions of the respondents reported that the probability of being infected with Corona (COVID-19) in the coming months is very high where one fifth of them rated that fear as 4 out of 5.

Regarding vaccination preparedness among study participants, two thirds of the current study participants showed their intention to have the covid-19 vaccine if available by the government. For those who refused, fear of side effects was reported among two thirds of them followed by fear of safety which was reported by half of those who will not have the vaccine. Doubt regarding the vaccine efficacy was the third cause (among one third), and 1 out of each four had distrust of pharmaceutical companies. Religious concepts were the barrier against being vaccinated among only 10% of refusers. A second factor that may stand behind being unvaccinated was that more than half of the respondents heard conspiracy theories about the COVID-19 vaccine. This means public awareness regarding vaccine nature; mechanism of manufacturing and approval procedures should be explained to keep them on track and be ready for being vaccinated with no doubt regarding safety and efficacy.

Regarding participants attitude towards the covid-19 vaccine, the current study revealed that about two thirds of the participants agreed that Vaccination reduces my chances of catching COVID-19 or its complications and nearly half of them thought that vaccination is a good idea because it makes me feel less anxious about getting COVID-19. Irrespective of that promising attitude, nearly 40% of the participants reported that they will only receive the COVID-19 vaccine if it is taken by many in the public which is mostly due to their distrust of vaccine safety and fear of side effects. Only one quarter of the respondents reported their hesitancy and may change their current situation towards being vaccinated.

As for factors associated with participants' preparedness to have the vaccine if available, the current study showed that males were more ready to have the vaccine, and participants who work in contact with public and that explains their readiness, and health care providers (who are at more risk of catching infection). Also, higher preparedness to receive the vaccine was reported among participants who know someone who died due to covid-19 infection (that motivates them to be vaccinated), those who thought that they are at high risk to catch the infection, and those who know about covid-19 complications severity and seriousness. Besides, participants with a positive attitude towards the vaccine need and role in minimizing the infection, had higher preparedness to have the vaccine.

Lazarus JV et al conducted a global survey of potential acceptance of a COVID-19 vaccine.(19). Researchers found that 71.5% of participants reported that they are somewhat ready to take a COVID-19 vaccine. Also, 48.1% reported that they would accept their employer's recommendation to do so. Variations in acceptance rates ranged from about 90% (in China) to less than 55% (in Russia). Respondents with higher trust level regarding the information from government sources were more ready to receive a vaccine and take their employer's advice to do so. In USA, Malik AA et al, (20) reported that 67% of the public told about their acceptance to have a COVID-19 vaccine if it is recommended for them. Males (72%) compared to females, older adults (≥55 years; 78%) compared to younger adults, Asians (81%) compared to other racial and ethnic groups, and college and/or graduate degree holders (75%). In Asia, Harapan H et al, (21) assessed that 93.3% of respondents were inclined to be vaccinated for a 95% effective vaccine, but this acceptance diminished to 67.0% for a vaccine with 50% effectiveness. In Saudi Arabia, determinants of COVID-19 vaccine acceptance were studied by Al-Mohaithef M et al (22). Authors found that 64% of the participants showed interest to accept the COVID-19 vaccine if it is available which is nearly identical to the current study finding. Readiness to accept the future COVID-19 vaccine is relatively high among older age groups, being married, participants with education level postgraduate degree or higher (68.8%), non-Saudi (69.1%), employed in government sector (68.9%). There were many other studies that assessed a highly variable rate of vaccine acceptance which varied between 8% and 67% for the H1N1 influenza A pandemic vaccine (23). The acceptance rate was reported to be 64% in the United States, (24) 56.1% in the United Kingdom, (25) 59.5% in Hong Kong, (16) and 59.5% in China (27).

The recommended herd immunity threshold for SARS-CoV-2, the virus causing COVID-19, is estimated to be between 55% and 82% which is higher than estimated preparedness to have the vaccine in Saudi Arabia which means building confidence in a COVID-19 vaccine is essential and mandatory to control the pandemic (28).

Conclusions and recommendations

In conclusion, the study revealed that acceptance of the COVID-19 vaccine in Saudi Arabia is somewhat good but not sufficient to have the recommended herd immunity. It is affected by the effectiveness of the vaccine, safety of the vaccine, being taken by others, and history of getting infection or experienced death due to covid-19. In addition, since acceptance is associated with perceived risk for COVID-19, it is also important to increase the perceived risk in communities. Policymakers and stakeholders should focus on evidence-based community messaging to improve uptake and break the transmission dynamics.

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