

Knowledge, Acceptance and Attitudes of Jordanian Dental Patients regarding COVID-19 Vaccines

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ABSTRACT

Objectives: This study aimed to determine the level of knowledge and attitudes to Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) and the acceptance of Coronavirus disease 2019 (COVID-19) vaccination among a sample of Jordanian citizens; dental patients and their companions.

Methods: Self-administered questionnaires using closed-ended questions were directed to patients (18–72 years old) in three major regions (north, middle, and south) of Jordan. The questionnaire contained 26 questions; these questions were designed to measure the knowledge and opinions of COVID-19 among the participants, the acceptance of COVID-19 vaccines, the knowledge of COVID-19 vaccination among the participants and the attitudes of the Jordanian population sample towards COVID-19 vaccination.

Results: Among the 1072 participants, the percentage of subjects who have had the COVID-19 vaccine during the last year was 11.6%. In evaluating the knowledge regarding the COVID-19 vaccine, the study showed that 53.9% had good knowledge. Around 38.6% of participants reported that the COVID-19 vaccine is effective against preventing COVID-19. However, 27.4% reported that COVID-19 could be treated with the COVID-19 vaccine. Moreover, 70.9% thought the COVID-19 vaccine is important for older adults. In terms of attitudes towards the vaccine, 68.8% had a positive attitude and 75.6% strongly agreed that COVID-19 is a serious disease in older adults, who should take the COVID-19 vaccine to prevent the disease.

Conclusion: The study showed a low COVID-19 vaccination rate among the Jordanian sample, but a good level of COVID-19 vaccination knowledge and a good level of positive attitude towards vaccines among the participants.

Keywords: COVID-19, Vaccine, Prevalence, Knowledge, Attitude, Jordan and dental patients.

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Introduction

The outbreak of a new virus, Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), the cause of Coronavirus disease 2019 (COVID-19), has spread globally and led to a huge load on the healthcare system worldwide. The World Health Organization (WHO) Emergency Committee declared COVID-19 as a global health emergency in January 2020^[1]. The confirmed daily cases are changing daily and can be tracked online through the Centre for Systems Science and Engineering (CSSE) Johns Hopkins University website^[2] and other forums.

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Coronaviruses (Latin: corona = crown) are positive-sense single-stranded large, enveloped RNA viruses that infect humans and other animals. COVID-19 generally causes mild to moderate symptoms such as fever, cough, nasal congestion, and other signs of upper respiratory tract infection, with an incubation period of 5 days (range: 0–24 days)^[3]. However, some patients may develop severe pneumonia or gastrointestinal symptoms, and about 5% may, in late stages, develop acute respiratory distress syndrome (ARDS), septic shock, and/or multiple organ failure^[4, 5]. Older adults, and people with a weak immune system are high-risk groups that are more susceptible to complications of COVID-19, including hospitalisation, disease and death.

The main clinical management of confirmed symptomatic COVID-19 patients involves symptomatic management and oxygen therapy, with mechanical ventilation for patients with lung failure. Many antiviral drugs are being actively tested; however, none have been specifically approved for COVID-19^[6]. Given that, we do not have experience in treating COVID-19; the consequences of repeated epidemics will be unacceptably high mortality, severe economic disruption, and major changes to our way of life, including social distancing and self-isolation. Therefore, the development of an effective vaccine has been essential, and the benefit will be even greater if it can be used to prevent recurrence or continuous epidemics. The ability of viruses to achieve pandemic spread and viral replication is reduced by establishing higher levels of community (herd) immunity^[7].

Whether protection is gained by the rapid development of an effective vaccine or by repeated waves of infection over the next few years until approximately 75% of people develop immunity^[7]. These options must be considered in terms of the risk: benefit calculations.

In the past century, vaccination has progressively been seen not only as one of “medicine’s greatest life-savers”, but also as the ideal form of intervention against infectious diseases^[8, 9]. Therefore, in order to stop the spread of COVID-19 across the world, governments have turned a hopeful eye towards research and development of a vaccine against this new disease^[10]. However, while scientists succeeded in discovering a number of vaccines that have now been approved by many governments, high vaccination coverage in the public has not been achieved in most countries. One reason for this is that the public may be hesitant to take the vaccine, despite it being made available by their government^[10, 11]. For many years, public doubt and uncertainty about vaccines has become an increasingly important global issue^[12, 13]. Vaccine hesitancy (negative attitudes towards vaccines) was included as one of the ten threats to global health in 2019 by the WHO, and whether COVID-19 vaccines will be accepted and widely used in countries will be affected by the attitude and knowledge of the public regarding the vaccines^[10].

This study selected dental patients and their companions because of the ease of reaching of this sample during their emergency visit to dental departments especially during the COVID-19 lockdown period in Jordan and other countries.

In Jordan, the Ministry of Health (MOH) has started a vaccination programme against COVID-19 and Jordanian citizens are recommended to receive the COVID-19 vaccines by many health agencies. Analyses of Jordanian knowledge and attitudes towards COVID-19 vaccination can provide areas for development to enhance vaccination rates in the Jordanian population. Hence, this study aimed to evaluate their knowledge and attitude towards COVID-19 vaccines.

Methods

Study design

This study is a descriptive cross-sectional survey in which a sample of dental patients and their companions (aged 18–72 years) were approached in dental department of the Jordanian Royal Medical Services (JRMS) in three major regions (north, middle, and south) of Jordan between April and June 2021. The principal investigators developed a structured questionnaire based on a previously published research ^[14, 15]. The questionnaire was developed in Arabic language because Arabic is the main spoken language for 98% of the Jordanian citizens. The questionnaire was originally formulated in English, translated to Arabic, and then back translated to English by different translator and the two English versions were found to be comparable. An expert panel assessed the content validity of the developed survey. To confirm face validity, the questionnaire was given to 25 individuals and changes were implemented based on their comments. The data of these participants was not included in the final study. The self-administered questionnaire was given to participants that attended the dental clinic for emergency dental treatments and their escorts. We explained to them the purpose of the study and the estimated timing needed to fill the questioner (8 to 10 minutes) and we took a verbal approval for that .The investigator was available during the time of the questionnaire filling to provide any required information needed by the volunteer.

A convenience sampling method was used in this study. To calculate the required sample size, Kish formula was used at a 95% significance level and a 3-percentage-point margin of error. The estimated sample size was 1014; however, 1072 participants were included in the study.

According to Department Of Statistics in Jordan, Statistical Yearbook of Jordan 2021, Jordanian population is a young population with 63. 19% between 14_65 years old and only 3.95% above 65 years age. Additionally, most of the population is distributed over the country's regions; where about 62.8% of the population lives in the central region; and about 9.4% of the population lives in the south region. While the northern region lives in it about 27.8% of the population

Therefore, it is crucial to evaluate the level of knowledge and attitudes to SARS-CoV-2 and the acceptance of COVID-19 vaccination, of those who are eligible for the vaccination, from this group as they represent a large portion of the community.

The study inclusion criteria required all participants to be literate dental patients seeking dental care at dental departments of the Jordanian Royal Medical Services (JRMS) and their escorts, aged 18 years or older and to be native Arabic speakers.

The first section of the study questionnaire covered general information about participants, including name, ID number, gender, age and their living place. The second section contained 26 questions, where 1–8 covered the knowledge and opinions of COVID-19 among the participants. Responses to these questions were framed as yes, no, or do not know. Question numbers 9 and 10 were designed to measure the acceptance of COVID-19 vaccines and the sources, while questions number 11–19 measured the knowledge of COVID-19 vaccination among the participants. Questions 20–26 aimed to measure the attitudes of the Jordanian sample towards COVID-19 vaccination. Responses to attitude questions were framed as a 5-point scale (Strongly agree, Agree, Neutral, Disagree, and Strongly disagree). This study was approved by the higher ethical committee of the JRMS. Study objectives were explained to every participant and verbal informed consent was given before the administration of the questionnaire.

Statistical analysis

Anonymous data were numerically coded and entered into an Excel spreadsheet (Microsoft® Office Excel). All statistical analyses were conducted using IBM SPSS software version 25 (Chicago, IL, USA).

The frequency distribution for categorical variables was used to describe the demographic characteristics of the study participants, whereas the mean and standard deviation were used to describe the continuous variables. Seventeen questions were used to score the data regarding COVID-19 and COVID-19 vaccines. We performed additional analysis to classify the study participants as having good knowledge or poor knowledge regarding COVID-19 disease and COVID-19 vaccines. COVID-19 disease and COVID-19 vaccines scores were combined to 17 questions. The median score was 11, the IQR ranged from 8.5 to 13.5 and the maximum score was 17. Scores equal or above the median (≥ 11) were considered good knowledge, while scores less than < 11 were considered poor knowledge. we have used the median as a cut-off.

There were seven questions on the participants' attitudes, and they were scored on a 5-point Likert scale for a total of 35 points. An attitude score ≥ 23 (cut-off $\geq 65\%$) was considered a positive attitude, while attitude score < 23 was considered a negative attitude.

Results

Among the 1072 participants, 11.6 % (n = 124) had received a COVID-19 vaccine. In total, 53.9% had good knowledge of the COVID-19 vaccine, and 68.8% had positive attitudes.

Around 38.6% of participants reported that COVID-19 vaccines are effective against preventing COVID-19; however, 27.4% erroneously reported that COVID-19 can be treated with the COVID-19 vaccine. Moreover, 70.9% thought that the COVID-19 vaccine is important for older adults. Overall, 75.6% strongly agreed that COVID-19 is a serious disease in older adults, and that they should take a vaccine to prevent COVID-19.

In this study, we invited 1162 dental patients and their escorts at JRMS to participate in the study and 1072 subjects agreed to participate (a response rate of 92%). The participants were between 18 and 72 years old, the mean age of participants was 35.4 ± 11.3 years.

Demographic characteristics of the study participants are presented in (Table I). Around half of the participants were female patients. Regarding the distribution of participants in Jordan, around half of the participants were from middle Jordan that contains the largest population in Jordan.

Table I: Demographic characteristics of the study participants (N = 1072)

	Characteristics	Frequency (percentage %)
Gender	Male	534 (49.8%)
	Female	538 (50.2%)
Living place	Middle	508 (47.4%)
	North	380 (35.4%)
	South	184 (17.2%)

N=number

Regarding participants' knowledge about COVID-19, almost nine out of ten participants knew that it is a viral disease, and believed that COVID-19 is a contagious disease. Meanwhile, nearly eight in 10 patients believed that older adults are at higher risk of COVID-19; adults with serious medical problems are at higher risk of getting seriously illness by SARS-CoV-2 and reported that COVID-19 could occur

at any time of the year. In the same way, 40.3% believed that COVID-19 could be treated with antibiotics. These results are shown in **Table II** and **fig.1**.

Table II: Knowledge about COVID-19 (N = 1072)

Item /frequency(percentage)	Yes	No	I don't know
COVID-19 is a viral disease	1008 (94%)	16 (1.5%)	48 (4.5%)
Older adults are at high risk of getting infected with SARS-CoV-2	922 (86.0%)	76 (7.1%)	74 (6.9%)
Adults with serious medical problems are at high risk of getting infected with SARS-CoV-2	928 (86.6%)	70 (6.5%)	74 (6.9%)
COVID-19 is a contagious disease	1008 (94.0%)	20 (1.9%)	44 (4.1%)
COVID-19 can occur at any time of the year	936 (87.3%)	28 (2.6%)	108 (10.1%)
COVID-19 is a serious disease in older adults	986 (92.0%)	22 (2.1%)	64 (6.0%)
COVID-19 is a serious disease in adults with serious medical problems	968 (90.3%)	36 (3.4%)	66 (6.2%)
COVID-19 can be treated with antibiotics	432 (40.3%)	354 (33.0%)	286 (26.7%)

(N = number)

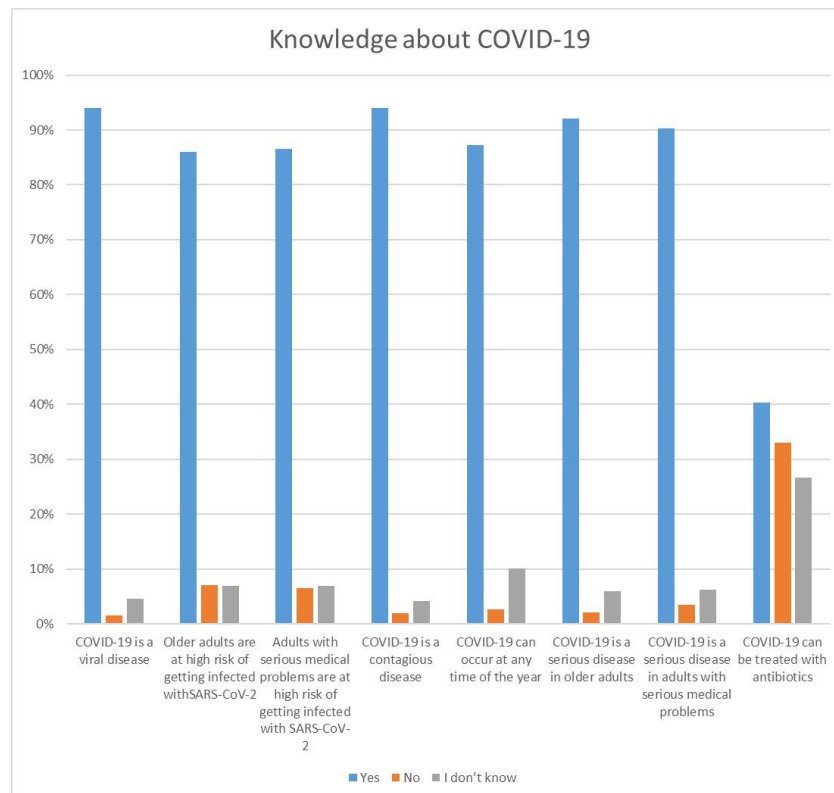


Figure1: knowledge about COVID-19

Regarding participants' knowledge of COVID-19 vaccination. In total, Around a quarter of interviewed patients reported of participants reported that COVID-19 vaccines are effective against

preventing COVID-19, Meanwhile, one third of participants believed that COVID-19 can be treated with COVID-19 vaccines and that COVID-19 vaccines are safe. Almost half of all study participants reported that COVID-19 vaccines have side effects but could prevent serious complications of COVID-19 among older adults In addition, Seven out of ten participants reported that COVID-19 vaccines are important for adults and adults with serious medical problems (Table III and fig.2).

Table III: Knowledge about the vaccines (N = 1072)

Item/frequency(percentage)	Yes	No	I don't know
COVID-19 vaccines are effective against preventing COVID-19	414 (38.6%)	262 (24.4%)	396 (36.9%)
COVID-19 can be treated with COVID-19 vaccines	294 (27.4%)	362 (33.8%)	416 (38.8%)
COVID-19 vaccines are safe	320 (29.9%)	210 (19.6%)	542 (50.6%)
COVID-19 vaccines have side effects	584 (54.5%)	78 (7.3%)	410 (38.2%)
Once vaccinated, you cannot get the disease	192 (17.9%)	418 (39.0%)	462 (43.1%)
COVID-19 vaccines are important for older adults	760 (70.9%)	66 (6.2%)	246 (22.9%)
COVID-19 vaccines are important for adults with serious medical problems	706 (65.9%)	94 (8.8%)	272 (25.4%)
COVID-19vaccinescan prevent serious complications among older adults	570 (53.2%)	112 (10.4%)	390 (36.4%)
COVID-19 vaccines can prevent serious complications among adults with serious medical problems	532 (49.6%)	120 (11.2%)	420 (39.2%)

(N = number)

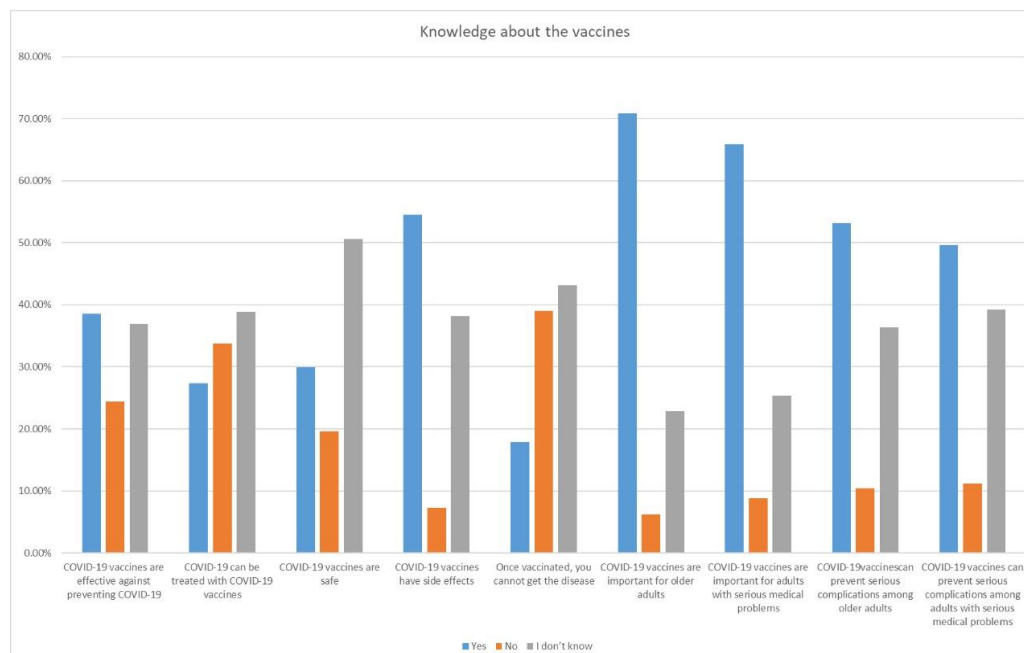


Figure 2: knowledge about COVID-19 vaccines.

Regarding the attitude of participants toward COVID-19 vaccines, only 34.1% strongly agreed that COVID-19 vaccines were safe, 65.1% strongly agreed that COVID-19 is a serious disease in older

adults, 61% strongly agreed that it is important for healthy adults over the age of 65 to get a COVID-19 vaccine. Also 76% strongly agreed that COVID-19 is a serious disease in adults with serious medical problems, so the vaccine should be given to prevent the disease. In addition, 33.6% of participants strongly agreed that they do not need the vaccine, but 42.2% strongly agreed that they required the vaccine to prevent COVID-19. Finally, 7.8% of participants strongly agree that they are not susceptible to COVID-19 disease, while 73% strongly disagree that they are not susceptible to COVID-19 (**Table IV and fig.3**).

The acceptance of COVID-19 vaccines among the sample where 31.3% of the participants are willing to take a vaccine, 23.3% will refuse to take it, 33.8% are undecided, and only 11.6% have already taken it.

Table IV: Participants' attitudes (N = 1072)

Item/frequency(percentage)	Strongly agree and Agree	Neutral	Strongly disagree and disagree
I consider COVID-19 vaccines to be safe	366 (34.14%)	472 (44.03%)	234 (21.8%)
I think COVID-19 is a serious disease in older adults, thus the vaccine should be given to prevent the disease	698 (65.1%)	280 (26.1%)	94 (8.8%)
It is important for healthy adults over the age of 65 to get a COVID-19 vaccine	654 (61.0%)	308 (28.7%)	110 (10.3%)
I think COVID-19 is a serious disease in adults with serious medical problems, thus the vaccine should be given to prevent the disease	814 (75.9%)	194 (18.1%)	64 (6.0%)
I don't think I need a COVID-19 vaccine	360 (33.6%)	382 (35.6%)	330 (30.8%)
I would take a COVID-19 vaccine to prevent COVID-19	452 (42.2%)	346 (32.3%)	274 (25.6%)
I am not susceptible to COVID-19	84 (7.8%)	206 (19.2%)	782 (72.9%)

(N = number)

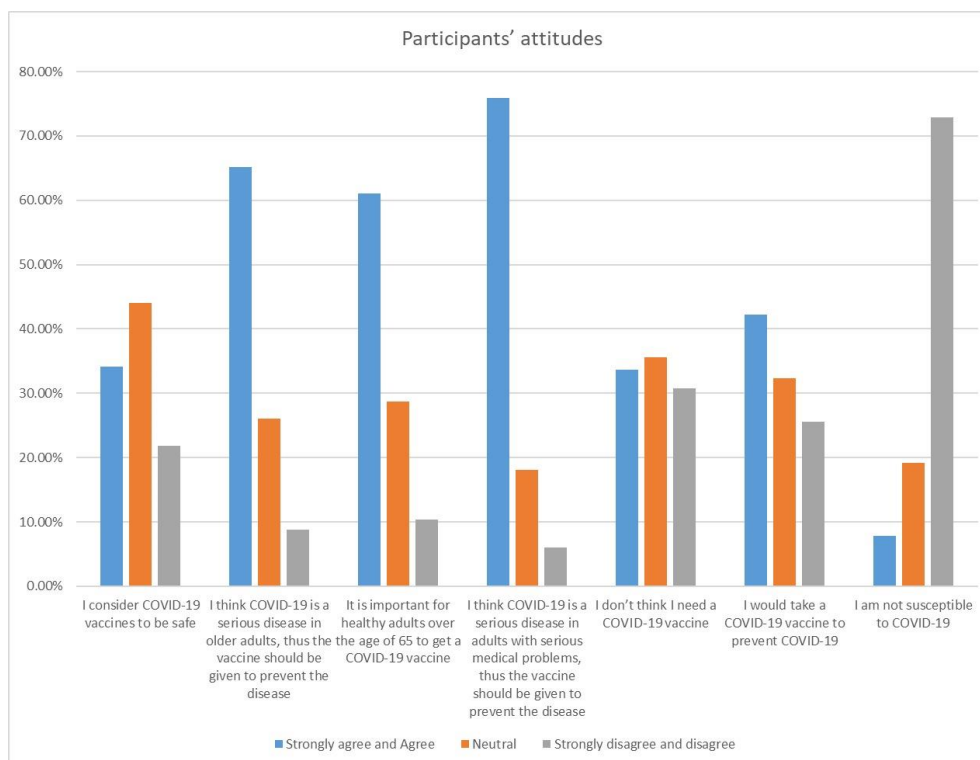


Figure 3: participant attitudes.

When an additional analysis was performed in order to assess the knowledge and attitude scores regarding COVID-19 vaccines as mentioned in statistical analysis section, 53.7% of the participants had good knowledge. The difference in perceived knowledge of COVID-19 vaccines was statistically significant in terms of the gender; the males had a good knowledge than females with a p-value of 0.002. In term of attitude, 68.8% had positive attitudes (score ≥ 23) and although female had more positive attitude than males the difference was not statistically significant p-value 0.83 (**Table V**)

Table V: Differences of knowledge and attitude scores regarding COVID-19 vaccines between male and females.

		Attitude Negative	Positive	Total
Gender	Male	168	366	534
	Female	166	372	538
Total		334	738	1072

Pearson Chi-Square Asymptotic Significance (2-sided) = .830

		knowledge Poor	Good	Total
Gender	Male	222	312	534
	Female	274	264	538
Total		496	576	1072

Pearson Chi-Square Asymptotic Significance (2-sided) = .002

Discussion

Vaccines are in use worldwide for the control of diseases; however, the acceptance of these vaccines varies among different cultures. This study adds new knowledge regarding the acceptance and attitude towards the COVID-19 vaccine among 1072 dental patients and their companions in JRMS. The median knowledge score was 11 and 53.7% of the participants had good knowledge, while 68.8% of participants had positive attitudes (score \geq 23). In addition to that, the current study showed a low acceptance level of vaccines among the participants (31.3%). Moreover, most European countries showed a higher public acceptance level, ranging from 59–75%^[14].

The current study showed that the acceptability level of vaccinations in the studied subjects was lower than in Saudi Arabia, a country with similar demographic characteristics, which reported a 64.7% acceptance level^[15]. In this study, the COVID-19 vaccine acceptance rate was 31.3%. This is in agreement with the study by Pogue, which reported that 67% of people would accept a COVID-19 vaccine in the United States of America (USA)^[16].

In the current study, the low acceptance level of COVID-19 vaccines may be due to the confusing information about the new mRNA-based vaccines, as these are based on new technology so there is no previous experience and no results have been reported before the current pandemic. Furthermore, the time for vaccine development and registration is shorter than usual (less than 9 months), which may have played a role in decreasing the acceptance level. The current study revealed that 50% of participants did not know if the vaccine was safe or not, which may lead them to be concerned about side effects. Our results are similar to those of Pogue and colleagues, where 63% of participants in the USA were worried about the side effects of COVID-19 vaccines^[16]. This observation is in agreement with another study of 19 countries which showed a lower acceptance level of COVID-19 vaccines and lower trust in the authorities' handling of the pandemic^[14].

In addition, in our study, 70.9% of the participants agreed that receiving the vaccine is important for older adults to protect against COVID-19. Additionally, 65.9% indicated that the vaccine is important for adults with serious medical problems. This may be because patients with serious medical problems may have a weak immune system and may experience more severe symptoms if infected with SARS-CoV-2.

A study in Jordan also showed that those who accept the COVID-19 vaccine are less likely to believe in conspiracy theories regarding COVID-19. Also it revealed that there is a group of citizens who had no confidence in local Jordanian governments and rejected their management of the pandemic as a whole. More everlarger group of public expressed their worries that many of the governments' decisions were unacceptable, and more than half of citizens believed that Jordan was not moving in a positive direction during the wave of COVID-19 (August-October 2020), given the daily increase in confirmed positive cases and high mortality rate^[17]. This may indicate that further efforts are needed by the government to put in place effective vaccine awareness campaigns in order to raise trust in their handling of the current emergency situation.

Vaccine availability and affordability are key factors when investigating vaccine acceptability^[18,19]. Nevertheless, this study did not investigate whether the participants believed that the government had the economic capacity to offer the vaccine for free, or whether the unwillingness to pay for the vaccine was an important factor in vaccine acceptance. The Jordanian government provides free COVID-19 vaccines for all registered people. However, in the current study, more than half of participants were concerned and lacked confidence in the vaccine due to its perceived side effects.

Information resources about the COVID-19 pandemic are varied, including television, social media, family members, co-workers, healthcare staff, researchers, and governments. These information sources can influence peoples' acceptance or rejection of COVID-19 vaccines^[20]. Therefore, it is critical to publish clear and accurate data about vaccine safety and effectiveness, in order to increase the trust of the population.

Future research is highly recommended to evaluate the awareness of COVID-19 vaccine side effects.

Conclusions

In conclusion, the study showed a low COVID-19 vaccination rate among the Jordanian sample, with the percentage of the participants who had already taken the vaccines being only 11.6%. The results of this study showed that there is a good level of knowledge among participants and a good level of positive attitude towards vaccines despite the low COVID-19 vaccination rate among participants. Therefore, the health authorities and MOH should design awareness campaigns and distribute them via variety of media types in order to spread clearer information about the safety and efficacy of the vaccines via trusted sources. In addition, they should ensure that they offer the vaccine for free to increase vaccine acceptance among the population.

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