Original Article

MODESTUM

Public knowledge and attitude towards COVID-19 vaccines, implementation of preventive measures following vaccination, and perceived stress during the COVID-19 pandemic: A cross-sectional study in Jordan

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ARTICLE INFO	ABSTRACT
	Introduction: Coronavirus disease (COVID-19) is caused by a relatively new coronavirus strain known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which has become a significant worldwide health concern. The hesitancy of people to accept vaccination or implement the preventive measures following vaccination can be considered a serious issue that increases the spread of COVID-19. The objectives of the current study were to assess the knowledge and attitudes toward COVID-19 vaccination and the adoption of preventive measures following vaccination among the general population in Jordan and to compare the perceived stresses between the vaccinated and unvaccinated groups. **Methods:** An online cross-sectional survey was conducted among adults above the age of 18 years in Jordan during the period June-October 2021. The survey has six sections: (1) socio-demographic characteristics, (2) vaccination status, (3) knowledge of participants about COVID-19 vaccination, (4) attitude of participants about COVID-19 vaccination, (5) implementation of preventive practices among participants following COVID-19 vaccination, and (6) perceived stress toward COVID-19 among vaccinated and unvaccinated participants. **Results:** 605 respondents (69.8% female and 30.2% male) aged between 30-49 years completed the questionnaire. More than half were married and 40.5% received one (29.8%) or two doses (10.7%) of a vaccine. Generally, they showed a positive attitude toward COVID-19 vaccination with a value of 12.7 out of 19. Most of them (>85%) showed proactive practices following vaccination by implementing some preventive measures such as implementing social distancing, avoiding crowded places, and shaking hands. The average perceived stress scale of the general population in Jordan was moderate with a value of 21.5 out of 40. However, fully or partially vaccinated individuals had a significantly (p=0.03) lower PSS (20.97) than unvaccinated people (21.87). **Conclusion:** The respondents have a good knowledge and positive attitude towards COVID-19 vaccination with good practices following vaccination. However, unvaccinated individuals were more likely to be stressed than vaccinated people. This study may assist policymakers to enhance the extent of COVID-19 vaccination and reduce the spread of this infection. **Keywords:** COVID-19, vaccines, perceived stress, attitude, preventive measures, Jordan

INTRODUCTION

Coronavirus disease (COVID-19) is an infection caused by the new strain of coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The rapid transmission of the infection resulted in worldwide paranoia and global lockdowns. World Health Organization (WHO) declared COVID-19 a pandemic on 11 March 2020. By March 09, 2022, the virus had caused 450 million confirmed infections and 6.0 million

deaths globally. Jordan is a small country with a population of 10 million in the Eastern Mediterranean (Levant) region of Western Asia. The country reported 1.65 million COVID-19 cases and 13,882 deaths as of March 5, 2022 [1].

A large coverage of vaccinations within a given geographical area is considered the primary strategy to combat the virus. However, the community acceptance of COVID-19 vaccination is very critical, and it may vary based on factors like education level, socio-demographic status, etc. [2-4]. Despite the WHO and most of the public health sectors in the world agreeing that vaccines are safe and have minor side effects, studies indicate that many people refuse to get vaccinated [5-6]. Several studies have been previously conducted to better understand the issue of vaccine acceptance amongst various communities [2, 7-9]. One of these studies reported that only 54% of the respondents agreed to be vaccinated [8]. In another study, 48% of the respondents were unsure about getting vaccinated [9]. Although in Jordan, the vaccines have been offered free of charge to all residents regardless of their nationality or health insurance status, mobile onsite COVID-19 vaccination service was provided to people in rural areas, only 37.4% of the population received the COVID-19 vaccine. This is a relatively low percentage considering the gravity of COVID-19 [2].

Refusal to get vaccinated can be associated with individual knowledge, attitudes, and perceptions. In Bangladesh, a survey about the knowledge, attitudes, and practices (KAP) towards COVID-19 vaccinations was performed [10] and it was observed that despite inadequate knowledge, a positive attitude towards the COVID-19 vaccine existed. A deeper understanding of the KAP of the general population towards COVID-19 vaccinations is necessary for the government, policymakers, and health authorities to address barriers to mass vaccinations. This will help to develop appropriate interventions which could be in the form of, but not limited to, health education programs. In Jordan, most studies assessed the KAP of specific groups of population such as university students and healthcare workers towards the COVID-19 vaccination [2, 4, 11]. However, few studies investigated the KAP of the general population toward COVID-19 vaccination [3]. To the best of our knowledge, this is the first comprehensive study to assess the knowledge and attitude toward COVID-19 vaccination and the implementation of the preventive measure following vaccination among the general population in Jordan.

Vaccination hesitancy is a constant challenge often being cited as the top ten priorities for WHO including pandemics such as influenza and event COVID-19 [12]. This hesitancy as well as stress associated with receiving the vaccines can in fact influence the side effects cause by vaccines. Perceived stress toward COVID-19 in general influences depression and feeling of incompetence among individuals. Furthermore, it was reported that individuals in France with high levels of stress were more likely to have positive attitudes [13]. Studies also investigated the stress level among the population in Jordan during the lockdown period [14-15]. The comparison of perceived stress between vaccinated and unvaccinated individuals during the COVID-19 pandemic may influence positive or negative responses to the vaccine, this has not been studied in Jordan. Therefore, the objectives of the current study were, as follows:

(i) to assess the knowledge and attitude towards COVID-19 vaccination and the implementation of preventive measures following vaccination among the general population in Jordan, and

(ii) to compare the perceived stresses between the vaccinated and unvaccinated individuals.

MATERIALS AND METHODS

Study Design and Participants

The present initiative, conducted from June to October 2021, was organized as a cross-sectional study using an online survey to comply with public health safety requirements. Only those who were living in Jordan at the time of the study and were at least 18 years of age were considered eligible to participate regardless of their vaccination status (partially, fully, or unvaccinated). The survey recruited 605 respondents. To the best of our knowledge, no previously published prevalence data related to COVID-19 vaccination attitude and perceived stress in Jordan exists. Thereby, the sample size was calculated based on the assumption that the probability of having good positive attitudes, and low stress towards vaccination was 50%, at a confidence interval of 95% and a precision of 5%. Although the required minimum sample size specified by this formula was n=384, the number of collected samples (n=605) was far greater than needed.

Data Collection and Sampling

An Arabic web-based questionnaire was sent to the community via social media platforms (Facebook, WhatsApp, and Instagram). The questionnaire was further disseminated by word-of-mouth (snowball technique). The participants were informed about the nature of the study and their right to refuse to participate without any consequences. They were also informed that they could withdraw from the study at any time. All data was dealt with in a confidential manner and no personal information was collected.

Survey Instrument Validation

The survey tool is composed of six sections, as follows:
1. socio-demographic characteristics,
2. vaccination status,
3. knowledge of participants about COVID-19 vaccination,
4. attitude of participants about COVID-19 vaccination,
5. preventive practices among participants following COVID-19 vaccination, and
6. perceived stress toward COVID-19 among vaccinated and unvaccinated participants.

Each section involved close-ended (multiple-choice) questions with a single answer.

The socio-demographic questions included age, sex, marital status, education level, and suffering from any disease, while the vaccination status questions involved receiving the COVID-19 and influenza vaccines and the type of COVID-19 vaccine received.

The attitude of the population towards vaccination was assessed via the vaccine attitude examination (VAX) scale. This is the only general scale that has been used to assess attitudes towards vaccines, that does not necessarily focus on a specific population or vaccine. Studies have shown that although attitudes towards vaccination among people might be

different, the reasons including concerns about safety, lack of confidence are largely similar. Hence, a single measure which is validated provides the best measure of vaccine hesitancy [12].

The VAX scale has demonstrated good internal consistency (Cronbach's alpha value of 0.92), convergent and construct validity, and is a useful tool to understand health beliefs to promote or deter vaccination behavior [16]. The VAX scale consists of nineteen items: 9 negative attitudes and 10 positive attitudes. The negative ones were given a score of "0" and the positive attitudes were given a score of "1", and a total score of 19 (0-19). The VAX items comprise of four subscales: mistrust of vaccine benefits, worries about unforeseen future effects, concerns about commercial profiteering and preference for natural immunity [17].

Participants also completed the perceived stress scale (PSS)-10, which is a self-reporting measure of stress with 10 items to be marked on a Likert-type scale. This scale asks participants about their life experiences in the past month that are unpredictable, stressful, or overwhelming, with responses ranging from 0-never to 4-very often. All items are negatively worded except four questions. The total score was calculated by finding the sum of the 10 items, with reverse coding for 4 questions. This scale demonstrated good validity and reliability with scores ranging between 0 to 40, while higher scores would indicate more stress [18]. The PSS results were categorized as low stress (0-13), moderate stress (14-26), and high stress (27-40). The validity and reliability of the Arabic version was 0.67 [19].

The questionnaires were translated into Arabic by three bilingual speakers who were experts in the field. The questionnaires were then back-translated to ensure the reliability of the translation. The experts checked the questions for clarity and whether the questions met the objectives of the study. On a Likert scale of 1 to 10, they were requested to rate the questions for the same purpose. Any question which had an average score of less than 7, was re-translated. The final Arabic versions of the questionnaires were then piloted by Arabic-speaking speaking respondents and their feedback was assessed. In some instances, minor changes were recommended. With the mutual consent of all study authors, the requested changes were made. This questionnaire was considered to be reliable using Cronbach's alpha criterion (Cronbach's alpha=0.76).

Statistical Analysis

Statistical analysis was performed using statistical package for the social sciences software (SPSS), version 25.0 (SPSS, Chicago, IL). Depending on the type of variable, the data were expressed in the form of frequencies, percentages, and mean ± standard deviation. An independent t-test was used to compare means. A Chi-square (χ^2) test was used to explore the association between categorical variables. Statistical significance was considered to be when $p<0.05$.

RESULTS

Socio-Demographic Properties of the Participants

As noted, in this cross-sectional study, 605 respondents completed the questionnaire. More than two-thirds (69.8%) of the respondents were female and about one-third aged <30

Table 1. Sociodemographic characteristics of participants (n=)

	F	P
Age		
<20 years	28	4.6
20-29 years	179	29.6
30-39 years	160	26.4
40-49 years	136	22.5
50-59 years	78	12.9
≥60 years	24	4.0
Sex		
Female	422	69.8
Male	183	30.2
Marital status		
Single	244	40.3
Married	338	55.9
Divorced/widow	23	3.8
Education level		
High school	50	8.3
Undergraduate	393	65.0
Postgraduate	162	26.8
Do you have any disease?		
No known disease	473	78.2
Diabetes, hypertension, heart-lung disease, pregnancy	132	21.8

Note. n=605; F: Frequency; & P: Percentage (%)

Table 2. Vaccination status of participants

	F	P
Have you received the COVID 19 vaccine?		
No, I do not wish to get the vaccine	173	28.6
No, but appointment is scheduled	185	30.6
Yes, one dose taken	180	29.8
Yes, two doses taken	65	10.7
Yes, this is one dose vaccine only	2	0.3
Which vaccine did you receive?		
No vaccine taken	329	54.4
Others/I do not know	30	5.0
Sinopharm (Chinese)	93	15.4
Pfizer-BioNTech (USA, Germany)	83	13.7
Oxford-Astra Zeneca (UK)	67	11.1
Others	3	0.5
Have you ever taken the flu (influenza) vaccine?		
No, I have never taken the flu vaccine	416	68.8
Yes, I take it only when I travel	18	3.0
Yes, I take one every year	77	12.7
Yes, I took it few times	94	15.5

Note. n=605; F: Frequency; & P: Percentage (%)

years, and about half were between 30-49 years. More than half (55.9%) of the respondents were married and 21.8% of participants reported suffering from one or more diseases such as diabetes, hypertension, heart, or lung disease, or were pregnant (**Table 1**).

Vaccination Status of Participants

As of October 2021, more than half (59%) of the respondents had not received the COVID-19 vaccine, and of this group, a worrying 28.6% did not intend to get vaccinated. About 30% and 11% of the respondents reported receiving one or two doses, respectively. The majority of the respondents received Sinopharm, followed by Pfizer-BioNTech and Oxford-Astra Zeneca. Approximately two-thirds of the respondents indicated that they did not receive the seasonal flu vaccine while only 13% reported receiving it yearly (**Table 2**).

Table 3. Participants' knowledge about COVID-19 vaccination

Items	F	P
Source(s) of your COVID-19 vaccine information is/are (you can choose more than one answer)		
Government & official platforms, & scientific reports	476	78.7
TV, mass media, family & friends, & social media	129	21.3
The type of genetic materials in COVID-19 is		
Not sure	244	40.3
RNA	253	41.8
DNA	108	17.9
People at high risk to develop COVID-19 include (you can choose more than one answer)		
Adults with co-morbidity	245	40.5
Pregnant women and children <5 years	301	49.8
Elderly	59	9.8
The possible side effects of the vaccine include (you can choose more than one answer)		
Allergy, respiratory problems & DOB	362	59.8
Fever, headache, fatigue, & nausea	120	19.8
Getting COVID-19 infection	10	1.7
Heart related problems	104	17.2
Infertility	5	0.8
Neurological problems	3	0.5
Psychological problems	1	0.2
No idea or not sure	362	59.8
COVID-19 vaccination can be fatal due to a possible allergic reaction		
No	108	17.9
Yes	282	46.6
Not sure	215	35.5
COVID-19 can affect humans more than once in his/her life even after the vaccine		
No	21	3.5
Yes	503	83.1
Not sure	81	13.4
Available information about COVID-19 vaccine		
Not sure	58	9.6
Insufficient	455	75.2
Sufficient	92	15.2
COVID-19 vaccination rate can be enhanced by increasing awareness		
Not sure	21	3.5
No	14	2.3
Yes	570	94.2

Note. n=605; F: Frequency; & P: Percentage (%)

Knowledge of Participants About COVID-19 Vaccination

The respondents received information about COVID-19 vaccinations mainly from governmental/official platforms and scientific reports. A minor percentage reported mass media, family and friends, and social media as their source of knowledge. Less than half of the respondents knew the type of genetic material of the SARS-CoV-2 virus (ribose nucleic acid, RNA). Around 40% and 10% of the respondents were aware that the population at high-risk of contracting the virus include adults with co-morbidities and elderly, respectively. More than half of the respondents correctly indicated that allergy or respiratory problems like shortness of breath are possible side effects of COVID-19 vaccines. Smaller group (<20%) knew that fever, headache, fatigue, nausea, and heart-related problems are also some possible side effects. Furthermore, 46.6% of the respondents were aware that the COVID-19 vaccination could be fatal, in case of an allergic reaction. About three-quarters of the respondents reported that the information available about COVID-19 vaccines was insufficient. Most of the respondents (94%) believed that vaccination rates could be improved by increasing public awareness (**Table 3**).

Attitudes of the Participants About COVID-19 Vaccination

Table 4 shows general attitude of the respondents towards vaccinations in general and specifically against COVID-19. The average VAX scale of the respondents was 12.7 out of 19. Most of respondents reported they felt safe after being vaccinated for any infection (75%) or against COVID-19 (65%). Similarly, 75% of those surveyed believed they could rely on vaccinations to mitigate the spread of communicable disease, with 62% believing that COVID-19 vaccination could stop disease spread.

Furthermore, most of the respondents felt protected after getting vaccinated. However, 91% of the respondents believed that there are problems associated with vaccinations in general. In addition, about three-quarters of those surveyed, believed that vaccines including COVID-19 vaccines may cause unforeseen problems in children. Nearly two-thirds believed that vaccinations are a good source of income for pharmaceutical companies. Moreover, 66% of the respondents believed that natural immunity would last longer than immunity from vaccination.

Table 4. Attitude of participants toward COVID-19 vaccination

	No		Yes	
	F	P	F	P
I feel/would feel safe after being vaccinated for COVID-19[§]	215	35.5	390	64.5
Generally, I feel safe after being vaccinated with any vaccine[§]	150	24.8	455	75.2
I can rely on the COVID-19 vaccines to stop serious infection[§]	231	38.2	374	61.8
Generally, I can rely on vaccines to stop serious infectious diseases[§]	150	24.8	455	75.2
I feel protected after getting COVID-19 vaccine[§]	202	33.4	403	66.6
Generally, after receiving any vaccine, I feel protected after getting vaccinated[§]	110	18.2	495	81.8
Although COVID-19 vaccines appear to be safe, there may be problems that we have not yet discovered[*]	31	5.1	574	94.9
Generally, although most vaccines appear to be safe, there may be problems that we have not yet discovered[*]	53	8.8	552	91.2
COVID-19 vaccines can cause unforeseen problems in children[*]	147	24.3	458	75.7
Generally, all or most vaccines can cause unforeseen problems in children[*]	179	29.6	426	70.4
Vaccines make a lot of money for pharmaceutical companies, but do not do much for regular people[*]	198	32.7	407	67.3
Natural immunity lasts longer than a vaccination[*]	209	34.5	396	65.5
Natural exposure to viruses and germs gives the safest protection against infections[*]	252	41.7	353	58.3
I have refused a recommended vaccine in the past[*]	519	85.8	86	14.2
I am very happy with my government for providing free COVID-19 vaccinations to all[§]	59	9.8	546	90.2
I feel/ will feel safe when almost half of the population is vaccinated against COVID-19[§]	98	16.2	507	83.8
Regular vaccination (possibly yearly) is the way forward to fight COVID-19[§]	103	17.0	502	83.0
I do not need to wear a face mask or keep a social distance after getting the COVID-19 vaccine[*]	536	88.6	69	11.4
Generally, vaccines provide lifelong protection[§]	380	62.8	225	37.2

Note. [§]Positive attitude; [*]Negative attitude; n=605; F: Frequency; & P: Percentage (%)

Table 5. Practices of participants following COVID-19 vaccination

	Frequency (n)	Percentage (%)
Do you avoid/will avoid going to crowded places after COVID-19 vaccination?		
No	78	12.9
Yes	527	87.1
Do you practice/ will practice social distancing after COVID-19 vaccination?		
No	61	10.1
Yes	544	89.9
Do you avoid/ will avoid contact with COVID-19 infected cases after COVID-19 vaccination?		
No	30	5.0
Yes	575	95.0
Do you avoid/will avoid touching or shaking hands after COVID-19 vaccination?		
No	86	14.2
Yes	519	85.8

Table 6. Perceived stress scale during the COVID-19 pandemic [n (%)].

	Never	AN	S	FO	VO	Yes*
In the last month, how often have you been upset because of something that happened unexpectedly?	71 (11.7)	54 (8.9)	272 (45.0)	137 (22.6)	71 (11.7)	480 (79.3)
In the last month, how often have you felt that you were unable to control the important things in your life?	82 (13.6)	62 (10.2)	280 (46.3)	118 (19.5)	63 (10.4)	461 (76.2)
In the last month, how often have you felt nervous and "stressed"?	45 (7.4)	31 (5.1)	242 (40.0)	170 (28.1)	117 (19.3)	529 (87.4)
In the last month, how often have you felt confident about your ability to handle your personal problems?	28 (4.6)	51 (8.4)	232 (38.3)	224 (37.0)	70 (11.6)	526 (86.9)
In the last month, how often have you felt that things were going your way?	59 (9.8)	93 (15.4)	281 (46.4)	151 (25.0)	21 (3.5)	453 (74.9)
In the last month, how often have you found that you could not cope with all the things that you had to do?	45 (7.4)	90 (14.39)	310 (51.2)	123 (20.3)	37 (6.1)	470 (77.7)
In the last month, how often have you been able to control irritations in your life?	43 (7.1)	84 (13.9)	284 (46.9)	167 (27.6)	27 (4.5)	478 (79.0)
In the last month, how often have you felt that you were on top of things?	46 (7.6)	104 (17.2)	255 (42.1)	169 (27.9)	31 (5.1)	455 (75.2)
In the last month, how often have you been angered because of things that were outside of your control?	25 (4.1)	61 (10.1)	254 (42.0)	196 (32.4)	69 (11.4)	519 (85.8)
In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	161 (26.6)	233 (38.5)	0 (0.0)	137 (22.6)	74 (12.2)	211 (34.9)
Mean±SD of PSS[b]	21.5±5.11					

Note. AN: Almost never; S: Sometimes; FO: Fairly often; VO: Very often; *No: Never or almost never; Yes: Very often, fairly often, or sometimes; & Mean±standard deviation (SD) score of the PSS

On the other hand, a fairly high percentage (58%) believed that natural exposure to viruses and germs would give the safest protection against infections. About 15% of the respondents refused to receive a recommended vaccine in the past. More than 90% of the respondents were very happy with the government for providing free COVID-19 vaccinations. Most of the respondents (83%) believed that periodic vaccination was the way forward to fight COVID-19. Only 11% believed that there was no need to follow hygienic practices such as wearing face masks or maintaining social distance after getting vaccinated against COVID-19 (**Table 4**). Mean and standard deviation of VAX scores are 12.68 and 2.69, respectively.

Practices of Participants Following COVID-19 Vaccination

The vast majority of the respondents (86-95%) practiced or intended to practice good preventive measures after receiving the vaccine. This includes avoiding or intending to avoid crowded places, practicing, or intending to practice social distancing, avoiding, or intending to avoid contact with COVID-19 infected people and avoiding or intending to avoid touching hands after receiving the COVID-19 vaccine (**Table 5**).

Perceived Stress of Participants About the COVID-19 Vaccination

The perceived stress items and scale about the COVID-19 vaccination are presented in **Table 6**. The average PSS scale of the respondents was moderate with a value of 21.5/40. On average, about one-third of the respondents had been upset fairly often/very often or because of an incident that happened unexpectedly, respectively. Most of the respondents had felt nervous or stressed in the last month, they could not cope with all the things that they had to do, and they are being angered due to things outside of their control. In contrast, 75-87% of the respondents felt confident about their ability to handle their personal problems, felt things were going their way, were able to control irritations in their life and or felt that they were on top of things. Only 34.9% of the participants felt difficulties were piling up so high that they could not overcome them.

Perceived Stress Among COVID-19 Vaccinated and Unvaccinated Participants

Table 7 represents the comparison of perceived stress amongst vaccinated and unvaccinated participants. In general, fully or partially vaccinated individuals scored significantly (p=0.03) lower on the PSS (20.97) in comparison to unvaccinated people (21.87), although both groups were in the same category on PSS. The vaccinated participants were more likely to be less upset, stressed, angered, or nervous and were better capable to control or handle problems and challenges faced in everyday life during COVID-19. Most of the unvaccinated participants reported being unable to control important things in their life and reported not being able to cope with all tasks. Furthermore, 77-89% of the unvaccinated participants were angered because of things that were outside

Table 7. Perceived stress scale among vaccinated and unvaccinated participants during the COVID-19 pandemic

	Not vaccinated (n=358)	Fully/partially vaccinated (n=247)	OR	95% CI		p-value
	n (%)	n (%)		Lower	Upper	
In the last month, how often have you been upset because of something that happened unexpectedly?						
Never	65 (18.2)	60 (24.3)	0.69	0.46	1.02	0.06
Sometimes/often	293 (81.2)	187 (75.7)				
In the last month, how often have you felt that you were unable to control the important things in your life?						
Never	70 (19.6)	74 (30.0)	0.56	0.39	0.83	0.003
Sometimes/often	288 (80.4)	173 (70.0)				
In the last month, how often have you felt nervous and "stressed"?						
Never	38 (10.6)	38 (15.4)	0.65	0.40	1.05	0.08
Sometimes/often	320 (89.4)	209 (84.6)				
In the last month, how often have you felt confident about your ability to handle your personal problems?						
Never	53 (14.8)	26 (10.5)	1.47	0.89	2.43	0.12
Sometimes/often	305 (85.2)	221 (89.5)				
In the last month, how often have you felt that things were going your way?						
Never	102 (28.5)	50 (20.2)	1.57	1.06	2.30	0.02
Sometimes/often	256 (71.5)	197 (79.8)				
In the last month, how often have you found that you could not cope with all the things that you had to do?						
Never	70 (19.6)	65 (26.3)	0.68	0.46	1.00	0.05
Sometimes/often	288 (80.4)	182 (73.7)				
In the last month, how often have you been able to control irritations in your life?						
Never	85 (23.7)	42 (17.0)	1.52	1.00	2.29	0.04
Sometimes/often	273 (76.3)	205 (83.0)				
In the last month, how often have you felt that you were on top of things?						
Never	91 (25.4)	59 (23.9)	1.08	0.74	1.58	0.66
Sometimes/often	267 (74.6)	188 (76.1)				
In the last month, how often have you been angered because of things that were outside of your control?						
Never	41 (11.5)	45 (18.2)	0.58	0.36	0.91	0.02
Sometimes/often	317 (88.5)	202 (81.8)				
In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?						
Never	81 (22.6)	80 (32.4)	0.61	0.42	0.87	0.008
Sometimes/often	277 (77.4)	167 (67.6)				
Mean±SD of PSS[a]	21.87±5.24	20.97±4.89				0.03

Note. Mean±standard deviation (SD) score of the PSS

their control and felt difficulties were piling up so high that they could not overcome them compared to 67-82% of the vaccinated participants. On the other hand, 80% of the vaccinated participants felt things were going their way compared to 72% of unvaccinated participants.

DISCUSSION

In this study, 605 participants completed the survey and the majority of them were females, married, young, and did not have any known or diagnosed illness. Little more than half of the participants had not yet been vaccinated. Additionally, 28.6% were not willing to receive the COVID-19 vaccine and this may be due to inadequacy of the available information about COVID-19 vaccine as reported by the majority of the participants. A comparatively higher vaccination acceptance rate of 57% in Oman was reported [20]. Several factors may contribute to the willingness to be vaccinated including safety, efficacy, convenience, side effects, price, beliefs, insufficient testing, and rushed development of vaccines. Furthermore, different socio-demographic variables such as gender (female), being young, less educated, of low income, with no medical insurance, and being from rural communities were associated with increased hesitancy [7]. It is of interest that 68.8% of the participants in this study reported never receiving the flu vaccine. Similarly, in a previous study, Assaf et al. [21] reported that only 27.5% of adult Jordanians received the influenza vaccine. Recently, Ababneh et al. [22] reported that only 1.2%

of older Jordanians (≥65 years) received the seasonal influenza vaccine. It was reported that 9.4% of Jordanian individuals received the influenza vaccine in 2020 [2]. It is evident from the above-mentioned studies that a fairly low percentage of the Jordanian population recognizes the importance of getting vaccinated against viral infections. It is, therefore, necessary to educate the general population in Jordan and increase their awareness of the effectiveness and benefits of vaccination against infections including COVID-19 and seasonal influenza.

More than half of the participants had no idea or were not sure about the possible side effects of COVID-19 vaccine. General population in Jordan may have lower access and chance to receive information about COVID-19 vaccine, particularly at the beginning of vaccination. Similarly, It was reported that 34% of the Omani participants had concerns regarding the COVID-19 vaccine, with only 17% believing that the COVID-19 vaccine was safe and had only some side effects [20]. Although post-vaccination anaphylaxis is rare, severe allergic reactions after the administration of the COVID-19 vaccine has been reported [23]. The Centers for Disease Control and Prevention reported that two of 1,893,360 individuals (11.1 cases/million doses) suffered from anaphylaxis after receiving the first dose of the Pfizer-BioNTech COVID-19 vaccine [24]. Most participants (83.1%) were aware there was a possibility of infection even after the vaccine had been administered. Research suggests unvaccinated people were 2.34 times more likely to be infected compared to those who were fully vaccinated [25].

Although this study observed a low percentage of vaccinated participants, most of them reported that they felt or would feel safe after being vaccinated. A general trend of a higher positive attitude toward other vaccines compared to COVID-19 vaccine was observed in this study. However, the WHO reported that approved COVID-19 vaccines were safe and effective in preventing the population from suffering more serious symptoms of the disease and experienced decreased mortality by a considerable margin [26]. It was reported that only 36.7% of immigrants in South Korea agreed that the COVID-19 vaccines were safe [27]. Astonishingly, It was reported that only half of the healthcare professionals (51.1%) in Ethiopia believed that the second dose of the COVID-19 vaccine was safe [28]. The lack of confidence, poor knowledge, and disbelief in effectiveness of vaccines are the common reasons that influenced the vaccine hesitancy among healthcare workers in Jordan [11]. In other study, only 20% of the Jordanian young adults were willing to receive a COVID-19 vaccine [4].

In the current study, 91.0% of the participants believed that long-term side effects of vaccines including the COVID-19 vaccine have not been adequately evaluated/documented and 70.4% of participants believed that these vaccines may cause unforeseen problems in children. It was reported that 28% and 55% of healthcare profession students and faculty in Qatar had strong or moderate concerns about unforeseen side effects of COVID-19 vaccine, respectively [17]. In another study [29], it was reported that 52.9% of participants in Jordan had vaccine anxiety and were hesitant in being vaccinated; while after vaccination, 95.5% recommended the vaccine to others, 80% felt more comforted, and 67% agreed that COVID-19 vaccines were safe in the long term. In this study, the majority of participants strongly believed that vaccinations were promoted by pharmaceutical companies because the latter are profit motivated. In Qatar, about half of the healthcare profession students and faculty had strong (7.7% of participants) or moderate (39.8%) concerns about commercial profiteering from vaccines [17]. Regardless of the perception, results from this study indicated that the majority of participants would feel safe when about half the population had been vaccinated.

The belief by a substantial proportion (58.3%) of participants in this study that natural exposure to viruses and germs was safer than vaccination could be a possible explanation for the observation that 54.4% of the participants did not receive a COVID-19 vaccination. Another possible reason for the lower coverage could be incorrect information or myths about the impact of the vaccine on long-term health such as fertility within the Jordanian community. It was reported that a massive 48% and 60% of healthcare professionals represented by both faculty and students in Qatar preferred to be exposed naturally and develop their own active immunity rather than be vaccinated [17].

One of the key findings in this study was that most participants (88.6%) believed that vaccinated people should still follow preventive measures even after getting vaccinated and avoid crowded places (87.1%), implement social distancing (89.9%), avoid contact with COVID-19 infected individuals (95.0%), and avoid touching or shaking hands (85.8%). This is in line with the recommendation that fully vaccinated individuals should wear masks in public if they are in an area of substantial or high transmission [25]. Protective practices were highly followed by general population in Jordan

with a median of practice score is seven out of 10 [3]. Furthermore, Jordan is a Muslim-majority country where Islamic jurisprudence places a significant importance on the human life safety of and livelihoods protection which may influence vaccine receiving [30].

Furthermore, it was suggested by modelling studies that preventive measures including wearing masks and implementing social distancing should continue even after vaccine administration [31]. About one-third (37.2%) of the participants believed that vaccines could provide lifelong protection. Generally, the protection offered by a vaccine depends on its type, and in some instances, booster shots may be required to maintain adequate immunity [32].

In general, more than three-quarters of the participants experienced stress, and nervousness or were upset during the pandemic. They felt unable to control the important things in their lives and were not able to cope with all the things that they had to do. However, vaccinated participants were less upset, stressed, angered, or nervous and they had a significantly greater ability to control or handle problems and challenges in their lives during the COVID-19 pandemic. This pandemic has been associated with high levels of stress among populations [33-35].

In the current study, a substantial percentage of participants showed a high level of confidence regarding their ability to handle their personal problems or control irritation in their lives. In another study, moderate stress feelings about COVID-19 were found among healthcare students in Jordan [14]. The discrepancy in the perceived stress among different populations could be due to the wide range of severity in COVID-19 symptoms and differences in the progression of the epidemic in different countries or differences in the times the studies were conducted [35]. However, vaccinated participants were more confident that things were going their way compared to unvaccinated participants. Recently, it has been reported that unvaccinated people were 11 times more likely to die from the SARS-Cov-2 delta variant [36], 10 times more likely to be admitted to hospital, and 5 times more likely to be infected compared to unvaccinated individuals [37].

This study offers several strengths, some of which include a good sample size and evaluation of the participants, KAP and associated stress. This web-based research provided an easy to access stable platform for the university students. Some limitations in this study should be considered. The questionnaire survey was disseminated via online platforms which may produce bias in the proportion of the participants' socio-demographic variables. In addition, this study involved only people who had Internet connections, and that meant people in remote areas would not have been able to be involved in this study. It was not easy to include participants from all cities in Jordan due to the inadequate resources and the time-sensitive nature of the subject matter during the pandemic.

CONCLUSIONS

The reluctance of people to get vaccinated is a major problem. A better understanding of their KAP will aid in suitably addressing the reasons for this apparent failure in communication. In this study, although the vaccination coverage was low, the respondents showed an acceptable attitude towards getting a COVID-19 vaccine. The study

observed that unvaccinated people were more likely to be stressed than their vaccinated counterparts. The results of the current study may be useful to influence the COVID-19 vaccination magnitude in Jordan and reduce the spread of infection.

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