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University students' perspectives on COVID-19 vaccination

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Abstract

Background and objective: Community immunity to bring the COVID-19 pandemic to an end will be achieved by a successful vaccination against COVID-19. All university students in Kurdistan Regional Government were required to receive the COVID-19 vaccines. The aim of this study is to identify the university students' perspectives about the COVID-19 vaccination and their willingness to receive a COVID-19 vaccine.

Methods: A quantitative cross-sectional study using self-administered online survey was conducted among the university students from 14th to 28th February 2022. All undergraduate students at different Colleges of Hawler Medical University were invited to take part in the study. A convenience sampling method was applied to reach the sample through using Google form.

Results: In total, 644 students participated in the study; around half (47.5%) of them have received the vaccine. There were significant statistical associations between selected students' characteristics and their COVID-19 vaccination status. The following factors were associated with high rate of vaccination: students aged older than 20 years old (P = 0.01), being male (P = 0.037), senior students (P <0.001), being infected with the COVID-19 infection (P = 0.048), and having family members with chronic disease (P = 0.003).

Conclusion: The current study revealed significant findings as the majority of students were still unvaccinated at a time where the COVID-19 vaccines were available to them. Having concern about serious side effects of the vaccine and its safety were the main reasons for vaccine avoidance, whereas, requiring students to be vaccinated by the place where they study was the main reason to take the vaccine. Future studies further exploring the factors contributing to vaccine hesitancy and avoidance seems essential.

Keywords: COVID-19; Vaccination; University students; Perspectives

Introduction

The COVID-19 (SARS-CoV-2) pandemic has resulted in more than 364million confirmed cases and over 5 million deaths worldwide, as of 28 January2022. In Iraq, 2,183,402 confirmed cases and 24,330 deaths were reported so far.[1] However, the total confirmed cases in the Kurdistan Regional Government (KRG) were 408,297 with 7,224 total deaths, as of 30 January 2022.[2] The rapid spread of COVID-19 all over the world lead health authorities and medical organizations to consider vaccination as a crucial step in decreasing or eradicating the burden of coronavirus disease 2019 (COVID-19).[3] Community immunity to bring the COVID-19 pandemic to an end will be achieved by a successful vaccination against COVID-19 which is considered an essential component of such immunity. The World Health Organization (WHO) identified vaccine hesitancy as a main threat to global health, and it is also a substantial barrier towards vaccine uptake.[4] In Kurdistan Region of Iraq (KRI), at the beginning of the pandemic, various control measures were implemented to mitigate and contain the

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spread of this disease[5,6] and with the development and rollout of vaccine against COVID-19, KRI soon commenced to distribute the vaccines.

Worldwide, a total of 9,854,237,363 vaccine doses have been administered, as of 28 January 2022.[1] The vaccination for COVID-19 in Iraq commenced on May 10, 2021.[7] In KRG, 2,049,565 doses of COVID-19 vaccines were used (first dose: 1,170,380; second dose: 872,660; third dose: no data is yet available).[2] On 4th January 2022, the KRG's High Committee to Combat COVID-19 introduced new preventive measures to control the spread of COVID-19 in the region. It states that from 1st February 2022, in order to be allowed to enter public premises, individuals will be required to either show a prove that they received the COVID-19 vaccine (i.e., a COVID-19 Vaccination Card) or a negative COVID-19 result from a valid test taken within the past 48 hours. Accordingly, the Ministry of Higher Education and Scientific Research (MHE) of the region released that entrance to the Ministry's premises will be denied to those who cannot possess a COVID-19 vaccination card from 1February 2022. In addition, the MHE also issued an order following the decision of the Ministry's Council number 118, on 27 October 2021, detailing that all university students and staff should receive COVID-19 vaccination by 31 December 2021.[8] Thus, subsequently, it is of particular importance to identify student's perceptions regarding COVID-19 vaccination in the universities of KRG.

University-aged students differ from older adults in terms of disease experiences and habits of using information and media, which makes them a distinct demographic group. Earlier investigations of such group and vaccines have reported low uptake of seasonal flu vaccine among students.[9-11] Numerous studies have been available regarding university students' perception of the COVID-19 vaccine.[12-18] In addition, few studies have been conducted to explore the prevalence and associated factors of the COVID-19 vaccine hesitancy of the general population in Iraqi Kurdistan.[7,19] Yet, to my best knowledge, no studies have been conducted to assess the university student's perceptions regarding COVID-19 vaccination and their intention to receive the vaccine especially after the MHE's decision demanding students to receive the vaccine. Therefore, the aim of this study is to identify the university students' perspectives about COVID-19 vaccination and their willingness to receive a COVID-19 vaccine.

Methods

Design of the study: A quantitative cross-sectional study was applied for the current study.

Sample and sampling technique:

All undergraduate students at different Colleges of Hawler Medical University were invited to take part in a self-administered online survey. A convenience sampling method was applied to reach the sample through using Google form. The total number of undergraduate students studying at different colleges of HMU were 3,500 students. In total, 644 students participated in the study giving the response rate of 18.4%.

Method and tool of data collection:

A self-administered online survey was conducted among the university students at Hawler Medical University, Kurdistan Region of Iraq. The survey questionnaire was designed and developed based on reviewing the literature[6,17] and on experts' views. The survey link was initially sent to a number of students to test the clarity of the content/questions and the practicality of completing and submitting the online questionnaire.

The questionnaire composed of three main parts, the first part involved questions regarding socio-demographic characteristics such as age, gender, residence area, college, stage of study, marital status…. etc. The second part related to COVID-19 infection among

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the COVID-19 infection, severity of the infection, having chronic disease, having family members with chronic disease or the COVID-19 infection, having family members suffered from severe or deadly COVID -19. This part consisted of six questions which were mainly asked based on yes, no, or I do not know options except for the severity of the infection question where the response options were mild, moderate, severe.

The last part of the questionnaire consisted of seven questions regarding COVID-19 infection and its vaccination among students. The questions concerning the risk perception of COVID-19 and related worries were asked based on a seven-point scale from no risk/worry to extreme risk/ worry. The remaining questions were about COVID-19 vaccination detailing whether students received it or not, reasons for receiving or not receiving it, and the readiness to take the vaccine among non-vaccinated students.

Duration of data collection: The online survey was available for two weeks from 14th to 28th February 2022. The survey was carried out just after the MHE's deadline requiring students to receive COVID-19 vaccination.

Recruitment of participants: Potential participants were recruited through the author sharing the survey link with student representatives and colleagues and using social media channels.

Statistical analysis:

The data were analyzed through the application of the statistical package of social science program (version 25). Descriptive and inferential statistics were applied based on the nature of the variables. Frequency and percentages were used to describe the variables and Chi square test was used to find the association between the variables of interest. *P* value ≤0.05 was considered statistically significant level.

Ethical considerations:

Ethical approval was obtained from the Scientific Committee of College of Nursing, Hawler Medical University. Survey participants were provided with a Letter of Information including full details of the study objectives, data protection, and confidentiality. Consent was indicated by participants reading the Letter of Information on the opening page of the survey and clicking through to the second page of the survey and answering questions. All information were kept confidential.

Results

The total number of students who participated in the survey was 644 students, more than half (65.5%) of them aged 20 years old and younger, 64.9% were female, and the majority (97.5%, 96.6%) were single and Muslim, respectively. The percentage of students who received the COVID-19 vaccine (47.5%) was lower compared to those who did not receive the vaccine (52.5%). Among those students who aged 20 or younger, 56.2% of them did not receive the vaccine, and 43.8% received the vaccine. With regard to those aged older than 20, the figures show that more than half (54.5%) of them received the vaccine. This result is highly significant statistically at *P* = 0.01. There was a significant association (*P* = 0.037) between student's gender with their COVID-19 vaccination status, as it was revealed that 53.1% of males received the vaccine, while, 46.9% of them did not. More than half (55.5%) of females did not receive the vaccine and 44.5% of them received the vaccine. Regarding religion, 53.2% of Muslim students did not receive the vaccine, while, 68.2% of non-Muslim students received the vaccine and this was also statistically significant (*P* = 0.048).

Regarding student's study programs, the highest percentage of participation was among nursing students (31.8%), whereas the lowest percentage of participation was among students studying pharmacy (13%). First stagers had the highest percentage of participation (45.3%), while senior stagers

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(5th and 6th stages) had the lowest participation. In addition, more than half (66.8%) lived inside city and only 21.3% of them lived in dormitory.

There was a significant statistical association (*P* <0.001) between college and stage of study with COVID-19 vaccination status. The highest percentage (70.5%, 51.4%, and 59.5%) of students studying medicine, dentistry, and pharmacy received the COVID-19 vaccine, respectively. Under the quarter (69.3%) of students studying nursing did not receive the vaccine and 55.2% of students studying health sciences did not also receive the vaccine. The highest percentages of students at their early years of studies, such as first, second, and third stages, did not receive the vaccine. The highest percentages of students studying their pre and final years (i.e., fourth to sixth stages) received the vaccine.

In addition, there was a significant statistical association (*P* = 0.02) between living in dormitory or not and vaccination status, as 61.3% of those students who lived in dormitory did not receive the COVID-19 vaccine compared to 38.7% of them who received the vaccine as shown in Table 1.

Table 1 Students' socio-demographic characteristics and their association with COVID-19 vaccination status

Variable	COVID-19 vaccination status						*P* value
	Not received		Received		Total		
	No.	(%)	No.	(%)	No.	(%)	
Age groups (years)							
≤ 20	237	(56.2)	185	(43.8)	422	(100)	0.010
> 20	101	(45.5)	121	(54.5)	222	(100)	
Gender							
Male	106	(46.9)	120	(53.1)	226	(100)	0.037
Female	232	(55.5)	186	(44.5)	418	(100)	
Religion							
Muslim	331	(53.2)	291	(46.8)	622	(100)	
Non-Muslim	7	(31.8)	15	(68.2)	22	(100)	0.048
College							
Medicine	31	(29.5)	74	(70.5)	105	(100)	
Dentistry	52	(48.6)	55	(51.4)	107	(100)	
Pharmacy	34	(40.5)	50	(59.5)	84	(100)	<0.001
Nursing	142	(69.3)	63	(30.7)	205	(100)	
Health Sciences	79	(55.2)	64	(44.8)	143	(100)	
Stage of study							
First stage	165	(56.5)	127	(43.5)	292	(100)	
Second stage	62	(62.0)	38	(38.0)	100	(100)	
Third stage	60	(54.5)	50	(45.5)	110	(100)	<0.001
Fourth stage	37	(39.8)	56	(60.2)	93	(100)	
Fifth/Sixth stages	14	(28.6)	35	(71.4)	49	(100)	
Marital status							
Single	330	(52.5)	298	(47.5)	628	(100)	0.840
Married	8	(50.0)	8	(50.0)	16	(100)	
Residence area							
Inside city	222	(51.6)	208	(48.4)	430	(100)	0.537
Outside city	116	(54.2)	98	(45.8)	214	(100)	
Living in dormitory							
No	254	(50.1)	253	(49.9)	507	(100)	0.020
Yes	84	(61.3)	53	(38.7)	137	(100)	

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Information regarding students' characteristics based on COVID-19 infection and association with their vaccination status is illustrated in Table 2.

More than half (53.1%) of the students were not infected with the COVID-19 virus. The majority (84%) of them had family members infected with the COVID-19 virus, while only (38.4%) of them had family member infected with severely or deadly COVID-19. The majority of students (89%) did not have chronic disease, and 56.7% of their family members did not also have chronic disease.

A statistically significant association (P = 0.048) was found between being infected with the virus and the vaccination status. More than half (56.1%) of those students who were not infected with the virus, did not receive the vaccine. More than half (51.7%) of those who were infected with the virus, received the vaccine. Similar results were noticed when students had family members with chronic disease, they were appeared to be vaccinated. It is evident that 54.1% of those students with family members having chronic disease received the vaccine, whereas, 57.5% of those who did not have any chronic disease among their family members did not receive the vaccine. No significant association was found between the other variables and the COVID-19 vaccination status.

Table 2 Association between students' characteristics based on COVID-19 infection with vaccination status

Variable	COVID-19 vaccination status				Total		P value
	Not received		Received				
	No.	(%)	No.	(%)	No.	(%)	
Being infected with COVID-19 infection							
No	192	(56.1)	150	(43.9)	342	(100)	0.048
Yes	146	(48.3)	156	(51.7)	302	(100)	
Having family member infected with COVID-19 infection							
No	35	(53.8)	30	(46.2)	65	(100)	0.756
Yes	281	(51.9)	260	(48.1)	541	(100)	
I don't know	22	(57.9)	16	(42.1)	38	(100)	
Having family member infected with severely or deadly COVID-19 infection							
No	215	(54.2)	182	(45.8)	397	(100)	0.281
Yes	123	(49.8)	124	(50.2)	247	(100)	
Having chronic disease or at high risk							
No	300	(52.4)	273	(47.6)	573	(100)	0.224
Yes	13	(41.9)	18	(58.1)	31	(100)	
I don't know	25	(62.5)	15	(37.5)	40	(100)	
Having family members with chronic disease							
No	210	(57.5)	155	(42.5)	365	(100)	0.003
Yes	128	(45.9)	151	(54.1)	279	(100)	

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The association between students' COVID-19 risk perception and their vaccination status is illustrated in Table 3.

A statistically significant association (P = 0.007) was found between the risk of getting infection and whether students received COVID-19 vaccine or not. Fifty six percent of those students who rated their risk perception of getting infection as low did not receive the vaccine compared to 44% of them who received it. Around 55% of those students who rated their risk perception as high received the vaccine. Approximately 53% of those students who considered the risk of dying from COVID-19 as low did not receive the vaccine, while, the rest (47.2%) received it. The majority of students (76.9%) who rated their risk of dying from COVID-19 as high did not receive the vaccine, this result is statistically significant at P = 0.006. In addition, almost 55% of students with low anxious status did not receive the vaccine, while, the majority (78%) of those students who rated their anxiousness as high received the vaccine, this was also statistically significant at P = 0.003.

No statistical association was found between the risk of getting severe COVID-19 infection and students' vaccination status.

In general, the majority of students regardless of their vaccination status, rated their risk perception of getting COVID-19 infection, getting severe COVID-19 infection and dying from it, and anxious about COVID-19 as low risk.

Table 3 Association between students' COVID-19 risk perception and their vaccination status

Variable	COVID-19 vaccination status				Total		*P* value
	Not received		Received				
	No.	(%)	No.	(%)	No.	(%)	
Risk of getting COVID-19 infection*							
Low risk	272	(56.0)	214	(44.0)	486	(100)	0.007
Moderate risk	52	(40.9)	75	(59.1)	127	(100)	
High risk	14	(45.2)	17	(54.8)	31	(100)	
Risk of getting severe COVID-19 illness*							
Low risk	287	(53.6)	248	(46.4)	535	(100)	0.366
Moderate risk	42	(45.7)	50	(54.3)	92	(100)	
High risk	9	(52.9)	8	(47.1)	17	(100)	
Risk of dying from COVID-19*							
Low risk	289	(52.8)	258	(47.2)	547	(100)	0.006
Moderate risk	29	(40.8)	42	(59.2)	71	(100)	
High risk	20	(76.9)	6	(23.1)	26	(100)	
Anxious about COVID-19 on a daily basis*							
Low anxious	318	(54.6)	264	(45.4)	582	(100)	0.003
Moderate anxious	17	(34.0)	33	(66.0)	50	(100)	
High anxious	3	(25.0)	9	(75.0)	12	(100)	

*Likert scale based on a seven-point scale (Low risk/anxious=1-3; Moderate risk/ anxious= 4,5; High risk/ anxious= 6,7)

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Table 4 illustrates the reasons students believe that were the main reasons for avoiding COVID-19 vaccine. Out of 596 students who answered this question, 37.4% of them responded that taking COVID-19 vaccine will cause serious adverse effects, followed by insufficient testing (14%), 'I don't believe in it' (12.3%), and 'it is not safe' (9.6%). Few students (0.5%) mentioned that social media and people discourage to take the vaccine.

Table 5 illustrates the reasons for receiving the COVID-19 vaccine and it reveals that the highest percentage (29.7%) of students mentioned that 'it was required by the place where they study' (i.e., following Ministry's order), followed by approximately 30% of them who stated to avoid catching COVID-19 and illness, collectively. Living with people who are high risk was another reason stated by 8.4% of students and being at high risk was stated by 1.6% of them. Only 7.9% of students mentioned that it is safe to take the vaccine.

Table 4 Reasons for avoiding the COVID-19 vaccine (n=596)

What do you think is the main reason for avoiding the COVID-19 vaccine?	No.	Percentage
It will not work/it is ineffective	36	(5.6)
Insufficient testing	90	(14.0)
Worried it will cause serious side-effects	241	(37.4)
Worried it will cause troublesome side-effects	59	(9.2)
I don't believe in it	79	(12.3)
It is not safe	62	(9.6)
It is unnecessary	8	(1.2)
I didn't have time to get the vaccine	14	(2.2)
Due to health condition	4	(0.6)
Social media/people encourage not to get the vaccine	3	(0.5)
No answer	48	(7.5)
Total	**644**	**(100)**

Table 5 Reasons for receiving the COVID-19 vaccine (n=553)

What do you think is the main reason for getting the COVID-19 vaccine?	No.	Percentage
To avoid catching COVID-19	162	(25.2)
To avoid illness	30	(4.7)
It is safe	51	(7.9)
Worried about becoming seriously ill	30	(4.7)
COVID-19 is deadlier than seasonal flu	16	(2.4)
I live with people who are high risk	54	(8.3)
I am high risk	10	(1.6)
Required by the place where I study/Ministry's order	191	(29.7)
For travel/entry to governmental premises	7	(1.1)
Parents enforced to get the vaccine	2	(0.3)
No answer	91	(14.1)
Total	**644**	**(100)**

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Discussion

Understanding students' perspectives regarding COVID-19 vaccine and their hesitancy or uptake is essential in devising appropriate strategies by governments. Since students studying medicine and health related specialties are likely to be exposed to COVID-19 infection during their studies, vaccination coverage is necessary among this group.[20] This study aimed to identify the university students' perspectives about COVID-19 vaccination and their willingness to receive the COVID-19 vaccines.

The current study highlighted that the COVID-19 vaccination rate among university students was low as the minority of them were vaccinated. The percentage of students who were unvaccinated was higher compared to other studies, for instance, 50% of students in a study conducted in a public university in Indiana in the United States reported to be vaccinated.[21] In addition, another study conducted in Colombia found that students' attitude toward the COVID-19 vaccination was still negative.[22] Although the percentage of unvaccinated students was also high in another study conducted on medical students at a Caribbean medical school,[23] the findings of the current study is a bit worrying as almost after a year of vaccination distribution in the KRI, a substantial number of students were unvaccinated or still were indecisive to take the vaccine. The current findings are significant alarm for educational and health authorities to better design measures to improve the COVID-19 vaccination uptake among university students.

A study[7] reported that with increasing the participants' level of education, the intention to receive their COVID-19 vaccine was increased. However, it is disappointing that the majority of students in the current study were unvaccinated despite being freely available to them. Students are considered to be educated, open-minded, and apparently knowledgeable group of society[24, 25] and yet the majority of them being unvaccinated is worth deep investigation by policy makers as students will be future decision makers and remarkable influencers for their community. Although the main reason for receiving the vaccine was mentioned to be compliance with the ministerial order, yet, the majority of students did not receive the vaccine. Again, health policy makers need to further investigate and explore the underlying factors since various groups influence people's uptake of the vaccine such as decision makers, community leaders, and health authorities. They have a great role in either encouraging or discouraging the vaccination uptake.[26] It is essential that the government or MHE devise different measures or policies to tackle this issue. For instance, follow-up and periodic check-ups about vaccine coverage rate by the health and safety units in the universities might be useful tools. Another reason for receiving the COVID-19 vaccine stated by the students in the present study was to avoid catching the virus and becoming ill and this is in agreement with the findings of earlier studies.[17,27]

Having concern about the side effects of the vaccine, its safety, being ineffective, and no sufficient testing were among the reasons students believed they may hinder the vaccine uptake. Saied et al.[20] also documented similar findings as 96.8% of their participants had concern about the negative effects of the vaccine, and 93.2% of them had concern about its ineffectiveness. Other studies also reported that the aforementioned factors predicted hesitancy concerning COVID-19 vaccination and make students to not intend to take the vaccine.[3,4,21,27-31] Having such kind of concerns almost after a year from the COVID-19 vaccines first distribution in the KRI is problematic as these students could be seen as role models by their communities and in turn will encourage people to avoid the vaccine. Such perspectives could be diminished by conducting regular scientific workshops and disseminating evidence-based

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information regarding the vaccine for those students who did not receive the vaccine. Alzubaidi et al.[30] concluded that in order to enhance the uptake of the COVID-19 vaccination, reducing concerns about side effects of the vaccine could be the focal point.

The high percentage of vaccine uptake was predictably associated with high-risk perception of getting COVID-19 infection. Other studies have also shown that there is a relationship between the risk perception of being infected with the virus and the vaccine uptake.[26,28,29,31] However, Saied et al[20] found contrary results as those students with increased risk perception of getting COVID-19 were hesitant to take the vaccine. Another important finding was that the higher percentage of those students who were anxious (moderate to high) received the vaccine compared to low anxious group. On contrary, Alshehry et al.[29] found that when the students anxiety level is high, they tended to decline the vaccination.

The higher percentage of those who have been infected with the virus received the vaccine compared to those who have not been infected previously. This is in accordance with Hossain's[3] findings in which students with history of infection were more acceptant while students with no previous history of infection were more hesitant and resistant towards the COVID-19 vaccination.

The current findings indicate that junior students were less appeared to take the vaccine compared to senior students. Saied et al.[20] similarly reported that the majority of graduate students tend to accept the vaccine while the majority of junior students tend to be hesitant and refuse the vaccine. Therefore, in order to increase the COVID-19 vaccination uptake among such group of students, conducting customized educational seminars and workshops are quite essential on a university level. In addition, on a ministry level, there should be some policies in place with regard to newly enrolled students or even prior to enrolment to encourage or enforce students to receive the vaccine by making it a requirement prior to their university registration.

The findings also revealed that the higher percentage of male students received vaccinations compared to female students and this was statistically significant association. Likewise, a study[30] found that the proportion of male students who got the vaccine were higher compared to their female counterparts but this was not statistically significant. In addition, another study[32] also found that male students were more likely willing to get the vaccine. Furthermore, Hossain et al.[3] reported that female students were more susceptible to be vaccine hesitant.

With regard to students age and their vaccination status, the higher percentage of older students were appeared to be vaccinated compared to younger students and there was statistically significant association. Another study[30] also reported that younger students were less appeared to be vaccinated.

It is important to mention that this study is not free of limitations since the current study investigated the university students' perspectives studying at health-related colleges, thus, the findings are not generalizable to students studying at non-health-related colleges. Therefore, further studies seem essential to investigate such students' perspectives.

Conclusion

The current study revealed significant findings as the majority of students were still unvaccinated at a time where the COVID-19 vaccines were available to them. Having concern about serious side effects of the vaccine and its safety were the main reasons for vaccine avoidance, whereas, requiring students to be vaccinated by the place where they study was the main reason to take the vaccine. Future studies further exploring the factors contributing to vaccine hesitancy and avoidance seems essential.

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Competing interests

The author declares that he has no competing interests.

References

1. WHO. WHO Coronavirus (COVID-19) Dashboard. 2022 [cited 2022 January 29]; Available from: https://covid19.who.int/.
2. KRG. Dashboard Coronavirus (COVID-19). 2022 [cited 2022 30 January]; Available from: https://gov.krd/coronavirus-en/dashboard/.
3. Hossain ME, Islam MS, Ghose TK, Jahan H, Chakrobortty S, Hossen MS, et al. COVID-19 vaccine acceptability among public university students in Bangladesh: Highlighting knowledge, perceptions, and attitude. Hum Vaccin Immunother. 2021; 17(12):5089–98. https://doi.org/10.1080/21645515.2021.2010426.
4. Silva J, Bratberg J, Lemay V. COVID-19 and influenza vaccine hesitancy among college students. J Am Pharm Assoc. 2021; 61(6):709–14.e1. https://doi.org/10.1016/j.japh.2021.05.009.
5. M-Amen K, Mahmood KI, Shabu SA, Shabila NP. Exploring perspectives on COVID-19 risk, protective behavior and control measures. J Risk Res. 2021; 1–13. https://doi.org/10.1080/13669877.2021.1936607.
6. Shabu SA, M-Amin K, Mahmood KI, Shabila NP. Risk Perception and Behavioral Response to COVID-19: A Survey of University Students and Staff in the Iraqi Kurdistan Region. Soc Work Public Health. 2021; 36(4):474–85. https://doi.org/10.1080/19371918.2021.1915909.
7. Abdulah DM. Prevalence and correlates of COVID-19 vaccine hesitancy in the general public in Iraqi Kurdistan: A cross-sectional study. J Med Virol. 2021; 93(12): 6722–31. https://doi.org/10.1002/jmv.27255.
8. MHE, Covid-19 vaccination. 2021, Ministry of Higher Education and Scientific Research, Health and Safety Directorate.
9. Poehling KA, Blocker J, Ip EH, Peters TR, Wolfson M. 2009–2010 seasonal influenza vaccination coverage among college students from 8 universities in North Carolina. J Am Coll Health. 2012; 60(8):541–7. https://doi.org/10.1080/07448481.2012.700973.
10. Ryan KA, Filipp SL, Gurka MJ, Zirulnik A, Thompson LA. Understanding influenza vaccine perspectives and hesitancy in university students to promote increased vaccine uptake. Heliyon. 2019; 5(10):e02604. https://doi.org/10.1016/j.heliyon.2019.e02604.
11. Bednarczyk RA, Chu SL, Sickler H, Shaw J, Nadeau JA, McNutt L-A. Low uptake of influenza vaccine among university students: evaluating predictors beyond cost and safety concerns. Vaccine. 2015; 33(14):1659–63. https://doi.org/10.1016/j.vaccine.2015.02.033.
12. Jain L, Vij J, Satapathy P, Chakrapani V, Patro B, Kar SS, et al. Factors Influencing COVID-19 Vaccination Intentions Among College Students: A Cross-Sectional Study in India. Front Public Health. 2021; 9. https://doi.org/10.3389/fpubh.2021.735902.
13. Biswas B, Ullah MN, Roy SK, Roy F. Students' Perception towards COVID-19 Vaccination Program in Bangladesh: A Study on University Students. BirLE-Journal. 2021; 4(2):911–21. https://doi.org/10.33258/birle.v4i2.1949.g2367.
14. Taye BT, Amogne FK, Demisse TL, Zerihun MS, Kitaw TM, Tiguh AE, et al. Coronavirus disease 2019 vaccine acceptance and perceived barriers among university students in northeast Ethiopia: A cross-sectional study. Clin Epidemiol Glob Health. 2021; 12:100848. https://doi.org/10.1016/j.cegh.2021.100848.
15. Barello S, Nania T, Dellafiore F, Graffigna G, Caruso R. 'Vaccine hesitancy' among university students in Italy during the COVID-19 pandemic. Eur J Epidemiol. 2020; 35(8):781–3. https://doi.org/10.1007/s10654-020-00670-z.
16. Kanyike AM, Olum R, Kajjimu J, Ojilong D, Akech GM, Nassozi DR, et al. Acceptance of the coronavirus disease-2019 vaccine among medical students in Uganda. Trop Med Health 2021; 49(1):37. https://doi.org/10.1186/s41182-021-00331-1.
17. Mant M, Aslemand A, Prine A, Jaagumägi Holland A. University students' perspectives, planned uptake, and hesitancy regarding the COVID-19 vaccine: A multi-methods study. PLoS One. 2021; 16(8):e0255447. https://doi.org/10.1371/journal.pone.0255447.
18. Shahwan M, Suliman A, Jairoun AA, Alkhoujah S, Al-Hemyari SS, Al-Tamimi SK, et al. Prevalence, Knowledge and Potential Determinants of COVID-19 Vaccine Acceptability Among University Students in the United Arab Emirates: Findings and Implications. J Multidiscip Healthc. 2022; 15:81. https://doi.org/10.2147/JMDH.S341700.
19. Tahir AI, Ramadhan DS, Piro SS, Abdullah RY, Taha AA, Radha RH. COVID-19 vaccine acceptance, hesitancy and refusal among Iraqi Kurdish population. Int J Health Sci (Qassim) 2022; 16(1):10–6.
20. Saied SM, Saied EM, Kabbash IA, Abdo SAE. Vaccine hesitancy: Beliefs and barriers associated with COVID-19 vaccination among Egyptian medical students. J Med Virol. 2021; 93(7):4280–91. https://doi.org/10.1002/jmv.26910.
21. Wotring AJ, Hutchins M, Johnson MK, Ferng SF, Strawser C, Pfrank H, et al. COVID-19 Vaccine Uptake Among College Students at a Midwest University. J Community Health. 2021:1–6. https://doi.org/10.1007/s10900-021-01051-7.

22. Campo-Arias A Pedrozo-Pupo JC. COVID-19 vaccine distrust in Colombian university students: Frequency and associated variables. Acta bio-medica: Atenei Parmensis. 2022; 92(6):e2021367. https://doi.org/10.23750/abm.v92i6.11533.
23. Gala D, Parrill A, Patel K, Rafi I, Nader G, Zhao R, et al. Factors impacting COVID-19 vaccination intention among medical students. Hum Vaccin Immunother. 2022:1–6. https://doi.org/10.1080/21645515.2022.2025733.
24. Bou Hamdan M, Singh S, Polavarapu M, Jordan TR, Melhem NM. COVID-19 vaccine hesitancy among university students in Lebanon. Epidemiol Infect. 2021; 149:e242. https://doi.org/10.1017/S0950268821002314.
25. Sallam M, Dababseh D, Eid H, Hasan H, Taim D, Al-Mahzoum K, et al. Low COVID-19 Vaccine Acceptance Is Correlated with Conspiracy Beliefs among University Students in Jordan. Int J Environ Rese Public Health. 2021; 18(5):2407. https://doi.org/10.3390/ijerph18052407.
26. WHO. Behavioural considerations for acceptance and uptake of COVID-19 vaccines: WHO technical advisory group on behavioural insights and sciences for health, meeting report, 15 October 2020. World Health Organization 2020; Available from: https://www.who.int/publications/i/item/9789240016927.
27. Manning ML, Gerolamo AM, Marino MA, Hanson-Zalot ME, Pogorzelska-Maziarz M. COVID-19 vaccination readiness among nurse faculty and student nurses. Nurs Outlook. 2021; 69(4):565–73. https://doi.org/10.1016/j.outlook.2021.01.019.
28. Jain J, Saurabh S, Kumar P, Verma MK, Goel AD, Gupta MK, et al. COVID-19 vaccine hesitancy among medical students in India. Epidemiol Infect. 2021; 149:e132. https://doi.org/10.1017/S0950268821001205.
29. Alshehry AS, Cruz JP, Alquwez N, Alsharari AF, Tork HMM, Almazan JU, et al. Predictors of nursing students' intention to receive COVID-19 vaccination: A multi-university study in Saudi Arabia. J Adv Nurs. 2022; 78(2):446–57. https://doi.org/10.1111/jan.15002.
30. Alzubaidi H, Samorinha C, Saddik B, Saidawi W, Abduelkarem AR, Abu-Gharbieh E, et al. A mixed-methods study to assess COVID-19 vaccination acceptability among university students in the United Arab Emirates. Hum Vaccin Immunother. 2021; 17(11):4074–82. https://doi.org/10.1080/21645515.2021.1969854.
31. Alfageeh EI, Alshareef N, Angawi K, Alhazmi F, Chirwa GC. Acceptability of a COVID-19 Vaccine among the Saudi Population. Vaccines. 2021; 9(3):226. https://doi.org/10.3390/vaccines9030226.
32. Khalis M, Boucham M, Luo A, Marfak A, Saad S, Mariama Aboubacar C, et al. COVID-19 Vaccination Acceptance among Health Science Students in Morocco: A Cross-Sectional Study. Vaccines (Basel). 2021; 9(12). https://doi.org/10.3390/vaccines9121451.