



COVID-19 Vaccination Perception and Acceptance Among Female Medical and Nursing Students at Al-Azhar University, Egypt

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Background: There are still many concerns related to various types of COVID-19 vaccines, which may result in individuals' hesitancy presenting a problem for public health authorities to achieve coverage for population immunity. As trustworthy health-care workers, medical and nursing students' perception towards COVID-19 vaccines may greatly influence the future population's uptake of vaccines; however, studies related to the vaccine acceptance rates among them are limited.

Objective: To identify the perception of medical and nursing students toward COVID-19 vaccines and the factors acting either as motivators or barriers to be vaccinated.

Methods: A cross-sectional comparative study was conducted on 500 undergraduate students aged ≥ 18 years from medical and nursing faculties. Data were collected via a semi-structured self-administered questionnaire that consisted of questions on general characteristics of the participants and source of information about the vaccine. Also, it includes items assessing the perception and acceptance of COVID-19 vaccines. Descriptive statistics, chi-squared, *t*-test and multiple logistic regressions were performed using SPSS version 22.

Results: Positive perception was detected among more than half of overall students. Although medical students had significant higher positive perception toward COVID-19 vaccines than nursing students (54.9% vs. 41.1%, $p < 0.05$), they were more hesitant to get vaccinated than nursing students (25.7% vs. 19.6%, $p > 0.05$). While, medical students had a higher intention to encourage family members or friends to get vaccinated than did nursing students (47.7% vs. 43.8%, respectively) ($p > 0.05$). Furthermore, participants were more likely to accept vaccination if they reported higher levels of positive perception especially for vaccine safety and increasing recovery rate.

Conclusion: Academic medical and nursing leaders should consider female students' vaccine concerns, and future efforts are needed to reduce their hesitancy and raise awareness about vaccinations that may eventually improve perception and acceptance of COVID-19 vaccines.

Keywords: COVID-19, medical students, vaccine acceptance, nursing students, Egypt

Introduction

Coronavirus disease (COVID-19) might be seen as a transient shock to life expectancy, however, the evidence of potential long-term morbidity as well as widening inequalities due to the social and economic disruption of the pandemic suggest that the impact of COVID-19 on health and every aspect of life may be longer-lasting.¹

Although several global preventive efforts (physical distancing, face masks, travel constraints, and quarantine) have been executed to mitigate the spread of this pandemic, nevertheless, the rate of new infections and deaths is still on the rise. By 21th June 2022, the WHO reported that the confirmed COVID-19 cases were over 520 million globally with 6.3 million deaths, while in Egypt, 513,944 confirmed COVID-19 cases with 24,718 deaths were recorded.²

As there is no definite therapeutic treatment for COVID-19 infection, the world's hopes are attached to vaccination as a successful and cost-effective preventive measure to cope with the pandemic.³ Nine COVID-19 vaccines have been approved for marketing worldwide. The Egyptian authorities applied great efforts to provide all of them free of charge for all citizens and sort the vaccination as a priority for health-care workers (HCWs), college students, and older people especially with chronic diseases.⁴

The variability in COVID-19 vaccines has resulted in different directions, perceptions, and attitudes toward them.⁴ Vaccine hesitancy is present in different countries and represents significant challenges for governments and public health experts in accomplishing the vaccination coverage required for population immunity.⁵

Throughout the current pandemic health-care workers continue to remain on the frontline. However, there have been increasing reports of hesitancy of some HCWs in receiving the vaccine.⁶ The average prevalence of COVID-19 vaccination hesitancy globally in a total sample of 76,471 HCWs from 21 countries was 22.51%, ranging from 4.3–72%.⁷

Studies across different countries have shown different vaccine acceptance rates among HCWs. For example, in France, vaccine acceptance rate reached 75%⁸ among medical (physicians, pharmacists, nurses) and non-medical personnel. It reached 70% among physicians, nurses, midwives, and medical technicians in Saudi Arabia.⁹ While in Turkey, acceptance rate reached 68.6%¹⁰ among physicians, nurses, midwives, and medical/nursing students. A previous multi-national Egyptian study reported that only 24% of HCWs were willing to receive COVID-19 vaccine.¹¹ A meta-analysis study reported that the overall prevalence of COVID-19 vaccine uptake was 83.6% and 77.4% for physicians and nurses, respectively which was higher than that detected in the general population, 67.6%.¹² Accordingly, it is not surprising that acceptance of the vaccine is low in Egypt as vaccine hesitancy exists worldwide.

Notably, medical and nursing students' ability to volunteer in health-care assistant positions that can significantly benefit health-care systems during times of emergency has been demonstrated by experience with the current pandemic.¹³ They are also at risk of COVID-19 during hospital training and clinical practice. Vaccinating students is also of high importance as they can use their personal expertise based on better knowledge to educate their relatives, friends in the neighborhood and the public regarding the vaccine.¹⁴ Furthermore, students are an excellent target for instructional advertising because they are still in school and are willing to change their habits, and they can set an example for other faculty students to improve the COVID-19 vaccination rate.¹⁵ Therefore, understanding the student's perspective about future COVID-19 vaccines and supporting their health engagement and awareness may be useful in planning adequate response and management strategies in the post-pandemic period.

According to the World Directory of Medical Schools,¹⁶ there are a total of 11,000 students studying medicine in Egypt, which has 31 colleges of medicine and about 22,000 nursing students.

However, after reviewing the existing literature, there is a lack of existing studies in Egypt on the perspectives of medical and nursing faculty students on vaccine readiness.

Thus, this study aimed to assess medical and nursing female students' perception toward the COVID-19 vaccine and to detect their acceptance for it as well as to determine the potential influencing factors for hesitancy.

Methods

Study Design

A cross-sectional comparative study based on a semi-structured self-administered questionnaire designed by the researchers after reviewing of the available literature (see [Supplementary File](#)).

Study Population

The study was carried out among undergraduate Egyptian students distributed through faculties of Medicine and Nursing for girls, Al-Azhar University, Cairo, Egypt, during the academic year 2021–2022 (from March to May 2022).

Sampling

The minimum calculated sample size with expected outcome (vaccination acceptance is 50%), based on recently published literature¹¹ to provide statistical validity at the 95% confidence level and the margin of error 5%, was 384.

The study was conducted on 500 students to overcome any shortage in completing the study questionnaire taking into consideration the ratio between nursing and medical students $\approx 1:3$.

A simple random sampling technique was employed to recruit the participants in the study and their agreement was considered as informed consent.¹² All responses were kept confidential.

All procedures were in accordance with the Declaration of Helsinki. The protocol was reviewed and approved by the local Ethics Committee of the Faculty of Medicine for Girls, Al-Azhar University, Cairo, Egypt. No.1363.

Survey Questionnaire

The mean duration to complete the questionnaire was 6–8 min which includes the following parts.

Firstly

Questions covered demographic characteristics, whether they were infected with COVID-19 and the sources of COVID-19 vaccine information.

Secondly

A total of 11 items assessed COVID-19 vaccination perception. The outcome was defined as (1 = “disagree”, 2 = “somewhat agree” and 3 = “completely agree”), the total score ranged from 11–33. Those who scored above mean were considered a positive response towards the vaccine, whereas those with a score below were negative perception.

Finally

To measure the acceptance we asked 2 questions to state students’ intention to undergo COVID-19 vaccination or motivate others. The term vaccine hesitancy refers to “delay in acceptance or refusal of vaccines despite availability of vaccination services” as defined by the WHO.⁴ Still, it is used variably in various studies. In our study, we used the term hesitant for ‘No/undecided group’ in the question “Will you get vaccinated with the COVID-19 vaccine?”

Also, the respondents were allowed to provide multiple reasons for their having received or not received the COVID-19 vaccine (Open-ended question).

The questionnaire was piloted with faculty members and revisions were done to improve clarity.

Statistical Analysis

Quantitative data were expressed in term of mean \pm standard deviation (SD). Qualitative data were expressed in number and percentage. To describe differences in variables between medical and nursing students, we conducted a series of chi-squared tests (for categorical variables) and t-tests (for numeric variables). Multiple logistic regressions was applied to identify factors associated with intention to accept vaccination. For the dependent variable (intention to be vaccinated), yes, willing or already vaccinated were considered as the reference group, while any other responses such as “no”, “not sure” or “undecided” were considered as comparative groups. A p value of ≤ 0.05 was considered significant.

Results

All participants were females; 77.6% ($n = 388$) of them were medical students and 22.4% ($n = 122$) nursing students, as listed in Table 1. The students were between 18–25 years, with nearly equal average age of medical 20.8 ± 2.1 and nursing students 21.2 ± 1.1 . The majority (90.8%) of them were single without chronic diseases (94.2%) and nearly two-thirds (64.2%) were residing in rural areas; 38.2% had prior Covid-19 infection. In all cases no significant differences were found between both sets of students ($p > 0.05$).

The most frequent sources of information regarding vaccination were scientific websites and social media, reported by 68.6% and 69.2% of students, respectively, followed by health-care workers (60.2%) and national media such as TV and radio (46.8%). It was observed that medical students reported a scientific website (72.2%), and announcements by the Ministry of Health (53.9%) as main sources at a significantly higher level compared with nursing students (56.3%, 43.8%, respectively, $p < 0.05$). Whereas nearly three-quarters of nursing students acquired their information through social media platforms at a non-significant higher level than medical students (74.1% vs. 67.8%) and from health-care workers at a significantly higher level (69.6%) than medical students (57.5%).

Table 1 General Characteristics of Medical and Nursing Students

Studied Students Variables	Total Sample (No.=500)		Medical (No.=388)		Nursing (No.=112)		Test of Sig.	P-value
	No.	%	No.	%	No.	%		
Residence								
-Urban	179	35.8	136	35.1	43	38.4	$\chi^2= 0.4$	0.5
-Rural	321	64.2	252	64.9	69	61.4		
Marital status								
-Single	454	90.8	353	91.0	101	90.2	$\chi^2= 0.1$	0.7
-Married	46	9.2	35	9.0	11	9.8		
Chronic illness								
-Yes	29	5.8	24	6.2	5	4.5	$\chi^2= 0.5$	0.5
-No	471	94.2	364	93.8	107	95.5		
Previous COVID-19 infection								
-Yes	191	38.2	151	38.9	40	35.7	$\chi^2= 0.4$	0.5
-No	309	61.8	237	61.1	72	64.3		
Main source of COVID-19 Vaccine information (multiple choice):								
-Social media	346	69.2	263	67.8	83	74.1	$\chi^2=1.6$	0.2
-Scientific website	343	68.6	280	72.2	63	56.3	$\chi^2=10.5$	0.000*
-Health-care workers	301	60.2	223	57.5	78	69.6	$\chi^2=5.3$	0.02*
-Ministry of Health reports	285	51.6	209	53.9	49	43.8	$\chi^2=3.5$	0.05*
-Pharmaceutical company reports	244	48.8	192	49.5	52	46.4	$\chi^2=0.32$	0.6
-National media (TV/radio)	234	46.8	177	45.6	57	50.9	$\chi^2=0.9$	0.3
-Friends	184	36.8	142	36.6	42	37.5	$\chi^2=0.3$	0.8

Note: * $p \leq 0.05$ is significant.

Concerning perception to vaccines, medical students displayed significantly higher positive response than did nursing students (54.9% vs 41.1%, respectively), specifically completely agree regarding safety and effectiveness of vaccines (20.9% vs. 14.3%), decreasing rate of infection (35.1% vs. 21.4%) as well as complications (43.3% vs. 33.9%) and increasing recovery rate from infection (41.5% vs. 31.3%). The majority (92.8%) of medical students disagree with the role of COVID-19 vaccine in preventing infection and they agree with necessity of preventive measures beside vaccination (89.2%) versus (75.0%, 64.3%), respectively among nurses. Whereas, nursing students had higher significant concern regarding herd immunity for ending the pandemic (29.5% vs 19.5%). Consequently, more than half of all students expressed positive perception with significantly higher mean score of medical students (24.8 ± 2.9) than nursing (20.0 ± 2.7) ($p < 0.05$) (Table 2).

Furthermore, 70% of students had received COVID-19 vaccine, (5.6%) were willing to take it while (24.4%) were undecided/refused, without significant difference between student groups. However, medical students were more hesitant compared with nursing students (25.7% vs. 19.6%, respectively). While, the willingness to encourage family members or friends to be vaccinated was much higher among medical than nursing students (47.7% vs. 43.8%, respectively) ($p > 0.05$) (Table 3).

The main reasons stated by students who get vaccinated were university obligation for vaccination (93.9%), no complication of vaccines among vaccinated persons (79.9%), authority support for vaccination (50.3%) and official advertisements on social media (48.9%) (Figure 1).

The reasons declared by those who did not get the COVID-19 vaccine were inadequate data about the safety (86.9%), followed by possibility of getting infected after vaccination (78.7%), their concern about complications (77.9%), and repeated mutations of the COVID-19 virus (74.6%). While, accessibility or personal reasons such as difficulty in

Table 2 Perception of Medical and Nursing Students Toward COVID-19 Vaccines

In Your Opinion	Studied Students		Total Sample (No.=500)		Medical (No.=388)		Nursing (No.=112)		Test of Sig.	P-value
	No.	%	No.	%	No.	%				
The vaccines are safe and effective? - Completely agree - Somewhat - Disagree	97 267 136	19.4 27.2 53.4	81 191 116	20.9 49.2 29.9	16 76 20	14.3 67.8 17.9	$\chi^2= 12.2$	0.000*		
COVID-19 vaccine can prevent infection? - Completely agree - Somewhat - Disagree	13 43 444	8.6 2.6 88.8	9 19 360	2.3 4.9 92.8	4 24 84	3.6 21.4 75.0	$\chi^2= 31.2$	0.000*		
There are fewer side effects from available COVID-19 vaccines - Completely agree - Somewhat - Disagree	187 285 28	37.4 57.0 5.6	146 217 25	37.7 55.9 6.4	41 68 3	36.6 60.7 2.7	$\chi^2= 2.5$	0.2		
Rate of infection will decrease after vaccination - Completely agree - Somewhat - Disagree	160 244 96	32.0 48.8 19.2	136 200 52	35.1 51.5 13.4	24 44 44	21.4 39.3 39.3	$\chi^2= 38$	0.000*		
Post vaccination immunity is better than post-infection immunity - Completely agree - Somewhat - Disagree	180 185 130	36.0 37.0 27.0	138 138 112	35.6 35.6 28.8	42 47 23	37.5 40.0 20.5	$\chi^2= 3.2$	0.2		
Complications of COVID-19 infection will decrease after vaccination - Completely agree - Somewhat - Disagree	206 215 79	41.2 43.0 15.8	168 165 55	43.3 42.5 14.2	38 50 24	33.9 44.6 21.5	$\chi^2= 4.8$	0.1		
Recovery rate of COVID-19 infection will increase after vaccination - Completely agree - Somewhat - Disagree	196 212 92	39.2 42.4 18.4	161 167 60	41.5 43.0 15.5	35 45 32	31.3 40.1 28.6	$\chi^2= 10.6$	0.000*		
Herd immunity achieved through vaccination is the key to stop the pandemic - Completely agree - Somewhat - Disagree	109 224 167	21.8 44.8 33.4	76 169 143	19.5 43.6 36.9	33 55 24	29.5 49.1 21.4	$\chi^2= 10.6$	0.000*		
Vaccination is the community responsibility - Completely agree - Somewhat - Disagree	309 85 106	61.8 17.0 21.2	249 54 85	64.2 13.9 21.9	60 31 21	53.6 27.7 18.7	$\chi^2= 11.6$	0.000*		
Preventive measures are sufficient to fight COVID-19 - Completely agree - Somewhat - Disagree	98 184 218	19.6 36.8 43.6	169 146 73	43.6 37.6 18.8	49 38 25	43.8 33.9 22.3	$\chi^2= 0.9$	0.6		

(Continued)

Table 2 (Continued).

Studied Students In Your Opinion	Total Sample (No.=500)		Medical (No.=388)		Nursing (No.=112)		Test of Sig.	P-value
	No.	%	No.	%	No.	%		
Even with vaccination other preventive measures are necessary							$\chi^2= 11.6$	0.000*
- Completely agree	418	83.6	346	89.2	72	64.3		
- Somewhat	63	12.6	24	6.2	39	34.8		
- Disagree	19	3.8	18	4.6	1	0.9		
Overall Mean ± SD	24.6 ± 2.9		24.8 ± 2.9		20.0 ± 2.7		T=2.5	0.01*
Level of Perception							$\chi^2= 6.7$	0.01*
-Positive	259	51.8	213	54.9	46	41.1		
-Negative	241	48.2	175	45.1	66	56.9		

Note: *p ≤0.05 is significant.

Table 3 Acceptance of COVID-19 Vaccines Among Medical and Nursing Students

Items	Total Sample (No.=500)		Medical (No.=388)		Nursing (No.=112)		Test of Sig.	P-value
	No.	%	No.	%	No.	%		
Will you to take the vaccine at the earliest available date?							$\chi^2= 1.9$	0.4
- Hesitant (No/Undecided)	122	24.4	100	25.7	22	19.6		
- Yes, I am willing	28	5.6	22	5.7	6	5.4		
- Already vaccinated	350	70.0	266	68.6	84	75.0		
Will you motivate others to be vaccinated ?							$\chi^2= 0.8$	0.7
- Yes	234	46.8	185	47.7	49	43.8		
- Not sure	196	39.2	148	38.1	48	42.8		
- No	70	14.0	55	14.2	15	13.4		

reaching the vaccination place (30.3%), fear of needles’ injection (24.6%), as well as no time (18.0%), and there is no need for the vaccine because I was already infected before (16.4%) were the least ones (Figure 2).

Accordingly, multiple logistic regression showed that the strongest positive factors significantly associated with acceptance of COVID-19 vaccine were safety and effectiveness of vaccines (OR: 3.7, 95% CI: 1.13–5.1, p <0.05),

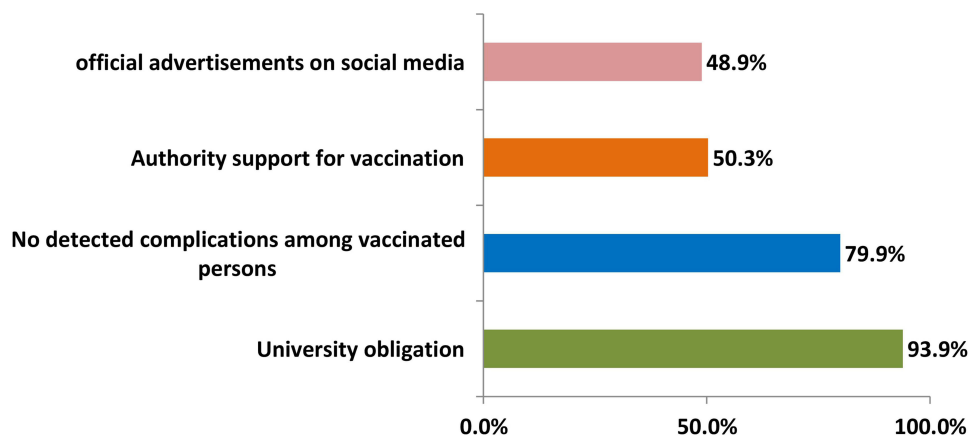


Figure 1 Reasons for getting COVID-19 vaccines as reported by vaccinated students (350).

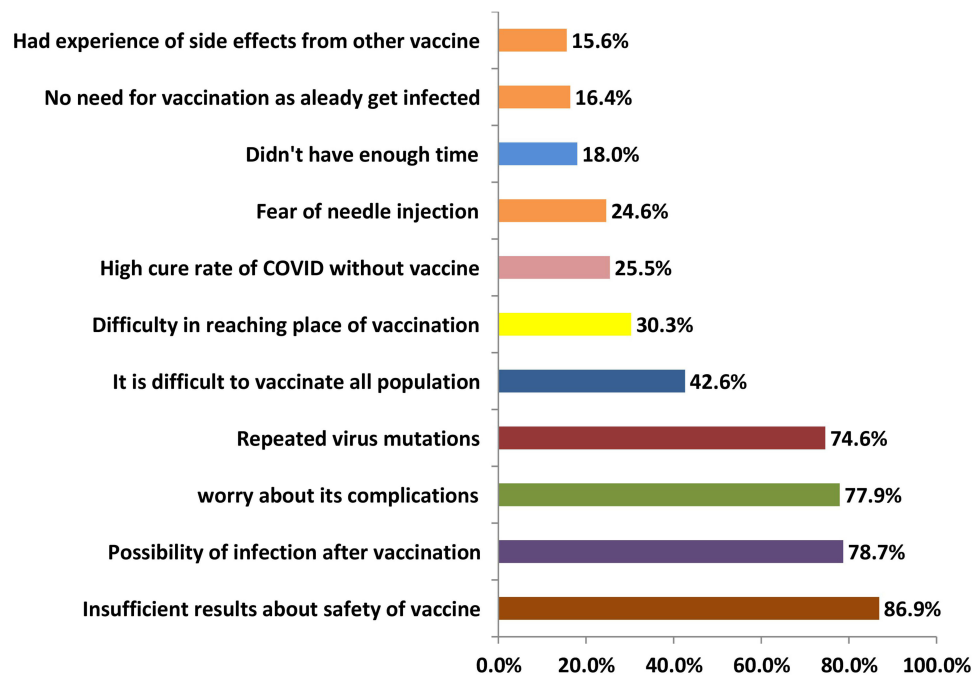


Figure 2 Reasons for not getting COVID-19 vaccines as reported by not vaccinated students (150).

consideration of COVID-19 vaccination as a community responsibility (OR: 2.7, 95% CI: 1.54–4.9, $p < 0.05$) and the overall positive perception towards vaccines (OR: 3.3, 95% CI: 1.87–5.86, $p < 0.05$). While, those with previous infection and who think the preventive measures beside vaccination are still important would be associated negatively with acceptance (Table 4).

Discussion

COVID-19 fully vaccinated people in Egypt reached nearly 31% of the total population by June 2022 which is a large number but this needs to increase.²

The present study was conducted to describe the existing profile of COVID-19 vaccine perception among Egyptian college students with full respect for their vaccination willingness which is crucial in preparation for a suitable post-pandemic approach. The study showed homogeneity of medical and nursing students demographically.

The current study revealed a considerable low positive perception (51.8%) for COVID-19 vaccine. Nevertheless, medical students expressed higher significant positive perception compared with nursing students, which is a matter of

Table 4 Logistic Regression of Factors Associated with COVID-19 Vaccination Acceptance

Factors Affecting COVID-19 Vaccination Acceptance (Vaccinated/ Not Vaccinated)	β Coefficient	Wald	Odds Ratio (95% CL)	P-value
Previous COVID-19 infection	- 0.871	10.688	1.4 (0.9–2.1)	0.000*
The vaccines are safe and effective	0.902	5.21	3.7 (1.13–5.1)	0.023*
Vaccination is the community responsibility	1.005	11.648	2.7 (1.54–4.9)	0.001*
Recovery rate will increase after vaccination	1.158	7.626	1.4 (0.9–2.1)	0.04*
Necessity of preventive measures beside vaccination	-1.950	9.877	0.9 (0.77–1.06)	0.002*
Level of Perception	1.192	16.892	3.3 (1.87–5.86)	0.007*

Note: * $p \leq 0.05$ is significant.

concern and suggests vaccination communication efforts to target this subgroup. To some extent, these findings are compatible with Rosental and Shmueli who reported that vaccine perception among medical students (88.1%) was significantly higher than nurses (76.2%).¹⁵ However, this perception level is higher than reported by a study conducted in Ethiopia (24.2%).¹⁷

The present study identified inadequate levels of agreement related to the vaccine's effectiveness and safety, fewer side effects, reducing the possibility of infection, higher recovery rate from infection, and vaccination as community responsibility that were higher in medical students, whereas nursing students revealed herd immunity is enough to combat this pandemic. The same concerns were detected frequently in other studies.^{17,18} Also, Rubin reported that re-infection with COVID-19 for the vaccinated individuals is possible but with relatively mild symptoms and reduced rate of hospitalization.¹⁹ Moreover, Graeber et al stated that 86% of people should be vaccinated to reach herd immunity.²⁰ Hence, the vaccine should be obligatory for everyone if the threat to the public is serious and there should be confidence in the safety and efficacy of the vaccine.

In accordance with a previous study²¹ nursing students non-significantly believed that vaccine immunity is superior compared with immunity acquired by natural infection more than medical students. Whereas, another study revealed more nursing students with an attitude supporting natural immunity rather than vaccines versus medical students.¹⁵ Su et al concluded that both natural and artificial immunity are likely to play a role in reducing the spread of COVID-19 and its associated mortality.²² Therefore, students needed to be given information on the risk–benefit ratio of vaccination.

This discrepancy between students may be attributed to the source of information about vaccines that may influence their belief. Noticeably, in this study, medical students relied more on information coming from scientific websites and Ministry of Health reports, while nursing students were influenced non-significantly by social media platforms. Similarly, a study was done in South Carolina among medical students and found only half received information about vaccines from health agencies.²³ There is evidence regarding the role of social media in spreading negative information about COVID-19 vaccination. It drives fake news and conspiracy theories about the infection and the vaccine. This condition is known as an “infodemic” which has a strong impact on public health response to the COVID-19 pandemic.²⁴ Furthermore, Meyer et al clarified that the presence of anti-vaccination movement especially in the social media could have contributed in negative perception.²⁵ As a result, identifying the sources of information about COVID-19 vaccines that people trust the most is crucial to the success of any future national immunization program.

Positively, overall, more than two-thirds of our students at time of data collection had already taken the COVID-19 vaccine (70.0%) with a slightly higher rate among nursing students (75.0%). In accordance, a meta-analysis was conducted on medical students and reported varied prevalence among countries from 2.0–91.9%. The study attributed these disparities due to country development, availability of vaccine, financial support and variable impact of COVID-19 among countries.²⁶

On the contrary, Kregar Velikonja et al detected vaccination among 25% of their studied nursing students, which is considered low in terms of vaccine coverage.²⁷ The studied vaccinated students mentioned university obligation and knowing that vaccination of others has gone well without complications as main reasons. These are in line with both National Institutes of Health and Centers for Disease Control and Prevention guidelines on COVID-19 vaccine communication, which advocate sharing the encouraging experience of vaccinated people to enhance popular confidence in the vaccine.^{28,29}

On assessing acceptability of COVID-19 vaccination, although more than half of the current studied students agreed with vaccination as a population duty, however, a low level of intention to take the vaccine (5.6%) and a considerably high ratio of hesitancy (nearly one-quarter) was observed; this intention to vaccinate was slightly higher non-significantly among medical students compared with nurses that reflects the overall perception. In agreement, Sue et al conducted an investigation in Beijing and found that one-third of medical students would not get vaccinated or were unsure of whether they would get vaccinated.³⁰ Also, Lucia et al found nearly one-quarter of medical students in Southeast Michigan were unwilling to get the COVID-19 vaccine.³¹ Similarly, Saied et al reported high hesitancy (46%) among another sample of Egyptian medical students.³² Our findings are also supported by a systematic review which reported wide variability in COVID-19 vaccine acceptance rates in different countries with low rates in the Middle East.³³ However, studies conducted on medical students from Poland and India detected lower hesitancy (4.1%, 10.6%, respectively).³⁴ With regard to professionals, Puertas et al reported only 15% of physicians disagreed with getting a COVID-19 vaccine compared with one-third of nurses.³⁵ Ramachandran et al revealed that health-care students from high-income countries were more likely

to accept a COVID-19 vaccine than those from low-income counterparts despite the vaccine becoming compulsory in many countries.³⁶ This controversy may relate to authority support and official advertisement for vaccination at the time the study was carried out, as reported by students. Additionally, most of the studied medical students (89.2%) agreed that safety preventive measures are still important for protection even after availability of vaccination compared with nearly two-thirds among nurses which associated positively with likelihood of being vaccinated similar to another study.²² Moreover, the rumors in different websites and social media about fertility issues after a COVID-19 vaccination could be another explanation for students' hesitancy as the students were females, consistent with the study by Akarsu et al that previously identified that women are more reluctant to get vaccinated than men.³⁷

Of interest, what cannot be ignored is that studied students still have uncertainties about the safety aspect and effectiveness of COVID-19 vaccines, thinking that it may lead to infection, and worry about potential adverse effects; these issues negatively affect people' acceptability of vaccines that are in agreement with similar studies concerning university students which revealed that doubts about vaccine safety and distrust of vaccine effectiveness, complications of vaccine administration and lack of clear information about vaccines were the major reasons for vaccination hesitancy.^{15,32} Also, this is similar to the factors reported in pandemic influenza A (H1N1) vaccine studies.³⁸

These students' doubts can be explained by Kregar Velikonja et al who stated that fast production of COVID-19 vaccines coupled with worry about testing vaccines rigorously, in addition to different types of vaccines that were utilized among countries, and adverse effects varying from type to type, could influence vaccine hesitancy from one study to another one.²⁷

It is worth mentioning that some students reported individual reasons for vaccine refusal as fear from needles, or lack of time and previously been infected that was associated negatively with likelihood of being vaccinated. Similar to Yassin et al who reported acquiring natural immunity from previous infection and dislike of injections as rationales.³⁹ On the other hand, Spinewine et al found personal history of COVID-19 infection was not associated with vaccine acceptance; that suggested vaccination acceptance is a habit of an individual.²⁸ Thus, alleviation of any concerns related to vaccination is essential.

Another feature in the current study, was that medical students were more likely to accept vaccination for others non-significantly compared with nearly two-fifths of nursing. This finding is consistent with Raja et al who revealed that 55.8% of the medical students accepted the COVID-19 vaccine for others.⁴⁰ Moreover, that positive perception was associated significantly with the acceptability of COVID-19 vaccine has also been reported in another study.¹⁵ Spinewine et al stated that a positive attitude is considered an essential factor in controlling the outbreak and receiving the COVID-19 vaccine.²⁸ However, the present finding was higher in contrast to other studies conducted on medical students from Uganda (37. 3%)³² and Egypt (35. 0%).⁴¹

It should be noted that these discrepancies could also be explained by the difference in the time of conducting the study as we conducted this research after the situation of the pandemic was better controlled, also the mass vaccination for COVID-19 had started in Egypt leading to students being less wary due to beliefs that the chance of infection is small.

In view of this, MacDonald stated that it is important to discuss the actual psychological and physiological effects of the vaccine not only conveying theoretical knowledge, thus eliminating fear and enhancing the willingness of medical and nursing students to be vaccinated who can act as role models in their communities to increase trust about safety and effectiveness of the vaccine.⁴²

Conclusion

This study has shown high positive perception among medical than nursing students regarding COVID-19 vaccination. We found that the willingness to encourage others to get vaccinations among medical students was higher than among nursing students. However, medical students expressed considerably higher hesitancy to be vaccinated than nursing students. These findings highlight the importance of paying attention and establishing intervention plans to deal with female medical and nursing college students who expressed considerably low vaccine acceptance.

Specifically, the most common concerns regarding the vaccine were safety and quality. It is essential to convey evidence-based information by university educational staff members and expert groups of health professionals that should target the most relevant issues as safety and efficacy of the vaccine using appropriate trusting channels to ensure that future students have accurate information for achieving high vaccine uptake not only to protect themselves, but also to reduce transmission of the disease in their community. This study can be considered a reference for policymakers to

recognize the vaccination willingness of medical workers and young people, hence establishing intervention plans to deal with those students who are representative of other college students with a focus on female gender.

Disclosure

The authors declare that they do not have any conflict of interest.

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