

Nursing Educational Intervention to Control COVID-19 Vaccine Hesitancy among School Team Members at Beni-Suef City and Benha City, Egypt

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Abstract

Background: Vaccine hesitancy recognized as a major challenge to the effectiveness of public health strategy aimed at eradicating infectious disease. The current study aimed to assess the effect of the nursing educational intervention to control COVID-19 vaccine hesitancy among school team members. Design: Quasi experimental design was used (pre-post educational intervention). **Subjects and method: Setting:** The study was implemented in Beni-suef city and Benha city, Egypt. **Subjects:** Simple random sample was used to select one school from each city then all participants were included according to the inclusion criteria. Sample size was 50 participants. **Tools** of data collection: two tools were used; Tool (1) was an interviewing questionnaire composed of two parts; the first part was personal data questionnaire to assess personal data of the participants, part two was knowledge questionnaire to assess their knowledge regarding COVID-19 vaccine and included 9 items. Tool (2) Scale composed of two parts: the first part was attitude scale to assess the attitude of participants towards the vaccine. The second part was willing scale to assess the willing of participants to take the vaccine. **Results:** The results indicated that; there were significant improvements regarding total level of knowledge and attitude of studied sample post the educational intervention and the average of their willing toward the COVID-19 vaccination improved significantly from 6.4 ± 1.1 to 8.9 ± 0.8 post the intervention. **Conclusion:** the willing to take the vaccine of the studied sample improved post the educational intervention. **Recommendations:** further studies needed to increase people awareness regarding COVID-19 vaccination to build and maintain public trust in COVID-19 vaccines.

Keywords: Vaccine hesitancy, Nursing education intervention, COVID-19 vaccine.

Introduction

According to World Health Organization (WHO), it was observed several cases of pneumonia of unknown cause detected in China at the end of 2019. On the first month of 2020, it was stated that a novel Corona Virus had been discovered in samples of cases and that preliminary examination of virus genetic sequences suggested that this was the source of the outbreak. SARS-CoV-2 is the name of the virus, and COVID-19 is the name of the sickness it causes. About 100 million patients diagnosed around the world at the second month of 2020, with about 2.4 million deaths ^(1,2). COVID-19 is the world's most serious public health threat, and the worldwide community's sickness, and fatality rates are steadily rising. Strong cross-sector collaboration and the development of effective preventative and control techniques, such as avoid crowding areas, social/physical separation, quarantine, early detection, isolation, and case management were recommended. As a result, all governments should develop major COVID-19 preventive and control initiatives at the community level as soon as possible ⁽³⁾. Over 30 million patients in the United States alone, SARS-CoV-2 transmission has tested health systems' capabilities and was considered responsible about more than half million

deaths. The United States Food and Drug Administration has approved the use of two-dose SARS-CoV-2 vaccinations and one single-dose vaccine against SARS-CoV-2 with equivalent efficacy to avoid symptoms of new coronavirus illness (COVID-19) and hospitalization ⁽⁴⁾.

Vaccination is the most effective tool to break the infection cycle. Depending on the disease being targeted, each vaccination will have somewhat different chemicals. A vaccine's active ingredient is a very small amount of the killed or drastically weakening it ⁽⁵⁾. The University of Oxford/AstraZeneca vaccine utilizes an unrelated harmless virus (the viral vector) to deliver SARS-CoV-2 genetic material. COVID-19 from Moderna and Pfizer/BioNTech comprises a portion of the SARS-CoV-2 virus, which causes the disease. Also, COVID-19 inactivated vaccines contain the deceased SARS-CoV-2 virus, and COVID-19 attenuated vaccines as Sinopharm include a weakened SARS-CoV-2 virus, which the immune system recognizes and responds to without causing COVID-19 sickness. This response helps the body remember how to combat SARS-CoV-2 in the future ⁽⁶⁾.

Vaccine hesitancy is a major health challenge because it related to how many individuals are exposed to illnesses that could have been avoided. Vaccine

hesitancy is characterized as a reluctance or refusal to vaccinate despite the availability of vaccines. It has been named one of the ten most serious current health hazards. Vaccination apprehension can be motivated by a variety of factors, including unpleasant medical family experiences associated to immunizations, vaccine safety concerns, awareness, perceived susceptibility to sickness, perceived low severity of illness, and religious or ethical issues ⁽⁷⁾. Determining the factors leading to vaccine hesitancy is a base for developing and implementing effective strategies to improve vaccine intake and ensure a rapid, equitable distribution to the doses of the vaccines ⁽⁸⁾. About 3.51 billion doses have been administered across 180 countries, according to data collected by Bloomberg. The latest rate was about 900 million doses per month. About one quarter of global population were fully vaccinated after administering about 3.51 billion doses ⁽⁹⁾. In Egypt, from 3 January 2020 to 9 months later, there have been about 300,000 confirmed cases of COVID-19 with 16,811 deaths, reported by WHO. As of 5 September 2021, a total of 10,418,988 vaccine doses have been administered and this still low vaccination rate ⁽¹⁰⁾.

Vaccination decisions are still influenced and advised by health care experts, who

are the most trusted consultants and influencers. Patients are more likely to consent to vaccination if a healthcare expert encourages it or takes the time to answer their issues, according to numerous researches. Nurses' participation in all areas of immunizations, particularly in providing vaccine information, is critical in raising vaccination rates and lowering predicted vaccine reluctance. They have the potential to boost public trust in vaccines. For having a skilled dialogue with vaccine apprehensive consumers, motivational interviewing is recommended. It has been around for a while and has shown to be a useful tool in the production process ⁽¹¹⁾.

Aim of the study

The current study aims to assess the effect of the nursing educational intervention to control COVID-19 vaccine hesitancy among school team members through achieving the following objectives:

1. Increase the knowledge of the studied sample regarding COVID-19 vaccines.
2. Improve the attitude of studied sample toward COVID-19 vaccines.
3. Increase the willingness of the studied sample to take the COVID-19 vaccine

Study hypothesis

1. The knowledge of the studied participants regarding COVID-19 vaccine increase significantly at the

post intervention more than pre-intervention.

2. The attitude level of the studied participants regarding COVID-19 vaccine improves significantly at the post intervention more than pre-intervention
3. The studied participants' willing to take the vaccine increases significantly at the post intervention more than pre-intervention

Subjects and Method

The research design:

Quasi experimental design was used (pre-post educational intervention) to achieve the aim of the current study.

Setting:

The study was implemented in Beni-suef city and Benha city in Egypt.

Study subjects:

A simple random sample was used to select one school from 8 secondary schools in Beni-Suef city and one school from 7 secondary schools in Benha city. The researchers included all school team members to the study according to the inclusion criteria. The sample was 50 participants(23 from Beni-Suef city school and 27 from Benha City school) the schools team was selected in the study according to the following inclusion criteria:

1. Accept to participate.

2. Not vaccinated yet.
3. Not registered to take the vaccine.

Tools of data collection:

Two tools were developed by the researchers to achieve the aim of the study after reviewing the literature ^(12,13)

The first tool was an interviewing questionnaire that composed of two parts:

Part one: Personal data:

It was designed to assess personal characteristics of the participants as (age, gender, level of education and residence)

Part two: Knowledge questionnaire:

Questionnaire was designed to determine level of knowledge of participants regarding COVID-19 vaccine, consisted of 9 items; overview about COVID-19, vaccines, mechanism of COVID-19 vaccine, differences between all types, rationales to take the vaccine, the eligible population, side effects, and preparations before vaccination and intervention after being vaccinated.

Scoring system:

The answers of participants scored as (three) points if correct and complete answer, (two) if incomplete response and (one) if don't know. The total points are converted to percentage and divided to three categories, unsatisfactory (<50%), average ($\geq 50\%$ to 74%) and satisfactory ($\geq 75\%$).

The second tool is a scale composed of two parts:

Part one: Attitude scale:

The scale was designed by the researchers to assess the attitude of participants towards the vaccine and consisted of 8 items, each item was given (three) points for sure, (two) points for may be and (one) point for not sure. The total points are converted to percentage and classified to three levels, negative (<50%), average (\geq 50% to 74%) and positive attitude (\geq 75%).

Part two: Willing scale:

The scale was designed by the researchers to assess the willing of participants to take the vaccine. It composed of 4 items, each items was scored three for agree, two for not sure and one for disagree. All scores were summed and converted to mean and standard deviation to be used statistically for comparison after the intervention.

Validity and reliability:

The validity was done through five expertise from community health nursing and medical surgical nursing at Beni-suef and Benha University. According to their opinion, minor modifications were done. Additionally, the reliability of the questionnaire to assess knowledge of the participant regarding the COVID-19 was 0.89 and the reliability of the scale which used to assess the attitude towards the

vaccine was 0.85. Final the reliability of the scale to assess the willing to take the vaccine was 0.91by Cronbach's alpha coefficient.

Approval:

The researchers get the acceptance from the educational administration to collect the data from the two schools at both cities Beni-Suef and Benha city. The aim and the nature of the study were explained.

Ethical consideration:

The researchers give careful attention to the ethical consideration and human rights of the studied sample. The aim of the study and the procedures were explained then verbal consent was taken from each participant. The participants were assured regarding their rights to refuse and regarding the confidentiality of their information and additionally they assured that there are no costs to participate in the study and the study is voluntary and they can refuse to complete the study without any rational.

Pilot study:

A pilot study was carried out on 10 participants to evaluate the content of the tools and measure the time needed to collect data. The researchers made the necessary modifications and exclude the participants in the pilot study.

Procedure of data collection:

- Data collection of the study was started at the beginning of May 2021 and completed by the end of July 2021.
- Official permission was obtained from the directors of the two schools after explanation the aims of the study.

Assessment phase:

- The first session: the researcher explained the aim of the study to the participants and reassures them that information collected will be treated confidentiality and that it will be used only for the purpose of the research.
- The participants divided into small groups according their suitable time, then the researchers collect the pre-test data first by using the interviewing questionnaire to assess the participant knowledge about COVID-19 vaccine. The time of this session ranged from 30 to 35 minutes.
- The second session, the researcher assess the participant' attitude and willing toward taking the vaccine using tool two, and accordingly the researcher prepared the educational intervention including knowledge about COVID-19 and vaccines. The time of this session ranged from 30 to 35 minutes.

Implementation phase:

- The third session: the researchers give health education about the current pandemic, immune system, vaccination

process. (The time taken was 45 to 50 minutes). The fourth session: included health education about COVID-19 vaccine; mechanism of action, types, benefits, side effect, eligible population, preparation to take the vaccine and precaution after vaccination. (45 to 50 minutes).

- The researchers at the fifth session carry out an open discussion with the participants to assess their fears and myths regarding the vaccine then inform them the facts about the vaccine. Then a summary of the essential parts was made and answer the questions of the participants. The time of this session ranged from 45 to 50 minutes.

Evaluation phase:

At the fifth session the post test was performed by using the same pre-test tools.

Statistical Design:

The researchers organized, tabulated, and analyzed the collected data by using SPSS version 19 that created by IBM, Illinois, Chicago, USA. The number and percentage distribution was calculated. Chi square test was used to detect the statistical differences between variables. The level of significant was adopted at $p < 0.05$. The mean and standard deviations were calculated regarding the willing to take the vaccine and. Paired T test was used to detect the statistical differences between

pre and post intervention. Pearson test was used to assess correlation between variables.

Results

Table 1 shows the distribution of personal characteristics of studied participants. The data reveals that 64% of studied sample are females and 34 % their ages ranged from 30 to 40 years old, 26% are less than 30 years and Regarding to the level of education 58 % of the studied sample have high education and 42 % has secondary education. As to the residence 74% of them are living in rural area.

Table 2 reveals the frequency distribution of studied sample regarding their knowledge about the vaccination process of COVID-19. The table shows that 42% of the studied sample has complete and correct answer regarding COVID-19 and 38% have correct answer about the definition of vaccines while regarding mechanism of COVID-19 vaccine and differences between all types of the vaccine only 24% and 22% respectively have complete and correct answer. Regarding rationales to take the vaccine, who are the eligible population, side effects, preparation before vaccination and intervention after being vaccinated (36%, 58%, 52%, 34% and 24% respectively) have correct and complete answer.

Figur1 reveals the myths around the vaccine that being perceived by the studied sample. The figure shows that 76% perceived that the side effects of the vaccine is very dangerous followed by 70% of the studied sample perceived that the COVID-19 isn't effective and 66% reported the vaccine affect the fertility. Moreover 48% reported that the vaccine may cause the infection by COVID-19 and finally 38% for altering the immune system.

Table 3 shows the frequency distribution of studied sample regarding their attitude toward the vaccine (pre- the educational intervention). The table reveals that 30% of studied sample are sure that no harm from taking the vaccine, 34% sure about the contribution of the vaccine in protection from the disease, 42% are sure about the effectively of the vaccine and that the vaccine is the best way to avoid the complication of COVID-19, and only 28% are sure about the benefits of the vaccine out weight the risks. The table also clarifies that 32% of the studied sample think that taking the vaccine is a societal responsibility and sure about the vaccination process not directed for commercial gain for pharmaceutical companies while only 26% are sure that vaccine is developed and approved at the suitable time.

Table (4) reveals the comparison of the studied sample regarding the total level of knowledge about COVID-19 vaccine pre and post the educational intervention. The table shows that there are significant improvements regarding total level of knowledge of studied sample post the educational intervention where 74% of studied sample has satisfactory knowledge post intervention compared to 42% pre the intervention and P value is 0.005.

Table (5) reveals the comparison of the studied sample regarding the total level of attitude toward COVID-19 vaccine pre and post the educational intervention. The table shows that there are significant improvements regarding total level of attitude of studied sample after the intervention where 66% of studied sample has positive attitude after the educational intervention compared to 38% before intervention and P value is 0.01.

Table (6) shows the frequency distribution of studied sample regarding their willing to take the vaccine pre and post - the educational intervention. The table shows that 58% are agree to take the vaccine even they have to pay post the educational intervention compared to 32% pre - the intervention and two third of the participants will take the vaccine when their turn of taking vaccine come compared to only 28% pre- the

intervention, in addition to more than half of them will encourage their family to take the vaccine compared to 34% pre the intervention and 48% are agree to take the vaccine even its protection last for short period of time at post- test compared to only 26% are agree pre -intervention. To summarize the data the table clarifies that the mean scores of the studied sample significantly improved from 6.4 ± 1.1 to 8.9 ± 0.8 and p value is 0.00001.

Table (7) shows the correlation between total levels of willing of studied sample to take the vaccine with level of knowledge and attitude post- the educational intervention. The table summarized that there are significance relation between the willingness of the studied sample to take the vaccine with the level of knowledge and attitude toward the vaccine after the educational intervention.

Figure (2) shows that 76% of the studied sample registered to take the vaccine after implementing the educational program while 24% of them delayed the registration.

Table (1) Frequency distribution of studied sample according to their personal characteristics. (N=50)

Items	N	%
Gender		
Male	18	36
Female	32	64
Age		
Less 30 years	13	26
30-40 years	17	34
41-50	12	24
>50	8	16
Education		
Secondary	21	42
High education	29	58
Residence		
Rural	37	74
Urban	13	26

Table (2) Frequency distribution of studied sample regarding their knowledge about the vaccination process of COVID-19 (pre the educational intervention). (N=50)

Items	Complete answer		Not complete answer		Don't know	
	N	%	N	%	N	%
Over view about COVID-19.	21	42	22	44	7	14
Definition of the vaccine.	19	38	17	34	14	28
Mechanism of work of COVID-19 vaccines.	12	24	8	16	30	60
Motives to get the COVID-19 vaccine.	18	36	16	32	16	32
Eligible population to take the vaccine.	29	58	11	22	20	40
Side effects for the vaccine.	26	52	11	22	13	26
Differences between all types of the vaccine.	11	22	7	14	32	64
Preparation for before taking the vaccine.	17	34	14	28	19	38
Precaution after being vaccinated.	12	24	18	36	20	40

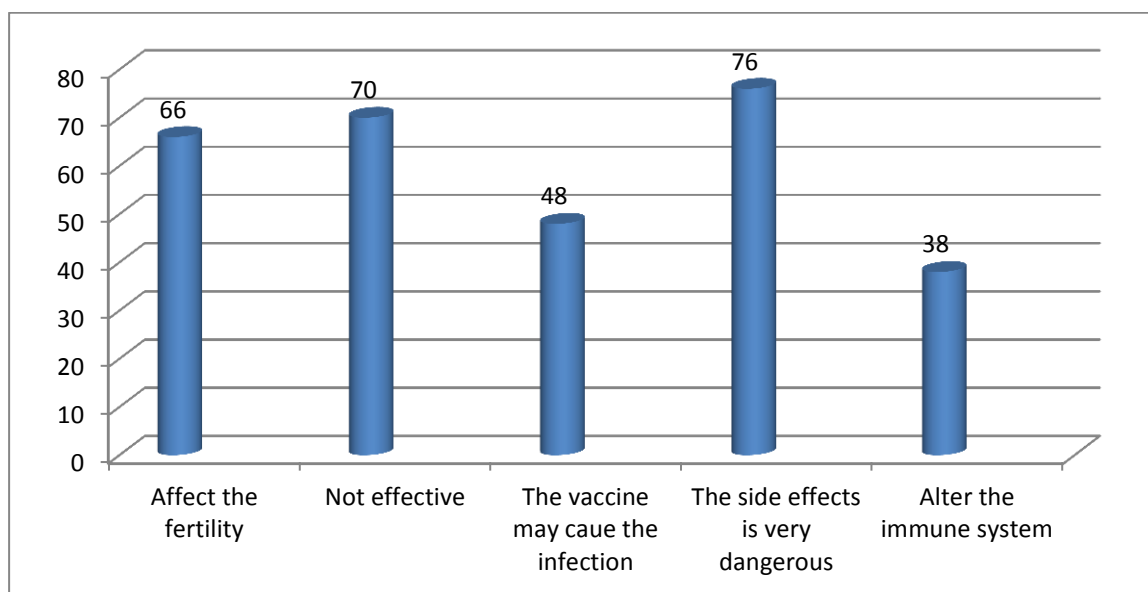


Figure (1) frequency distribution of the studied sample regarding their myths about the vaccine. (N=50)

Table (3) Frequency distribution of studied sample regarding their attitude toward the vaccine (pre- the educational intervention). (N=50)

Items	Sure		May be		No	
	N	%	N	%	N	%
I think there is no harm from taking the vaccine?	15	30	13	26	22	44
I believe covid -19 vaccine will be useful in protecting me from the infection?	17	34	15	30	18	36
I think that the best way to avoid the complications of COVID-19 is by being vaccinated	21	42	11	22	18	36
I feel the benefits are outweighs the the risks of taking the vaccine	14	28	14	28	22	44
The vaccine is highly effective to control the outbreak	21	42	10	20	19	38
I think taking the vaccine is a societal responsibility	16	32	12	24	22	44
I think the vaccination process not directed for commercial gain for pharmaceutical companies	16	32	20	40	14	28
I think the vaccine is developed and approved after the suitable time	13	26	12	24	25	50

Table (4) Comparison of the studied sample regarding the total level of knowledge about COVID-19 vaccine pre and post the educational intervention. (N=50)

Items	Pre the educational intervention		post the educational intervention		X ²	P
	N	%	N	%		
Satisfactory	21	42	37	74	10.8	0.005
Average	14	28	5	10		
Unsatisfactory	15	30	8	16		

Table (5) Comparison of the studied sample regarding the total level of attitude toward COVID-19 vaccine pre and post the educational intervention. (N=50)

Items	Pre the educational		Post the educational		X ²	P
	N	%	N	%		
Positive	19	38	33	66	8.09	0.01
Average	14	28	9	18		
Negative	17	34	8	16		

Table (6) Comparison between the mean score willing to take the vaccine among studies sample pre and post the educational intervention. (N=50)

Items		Pre the educational intervention		Post the educational intervention	
		N	%	N	%
I'm willing to take the vaccine even I have to pay to get it	Agree	16	32	29	58
	Not sure	22	44	8	16
	Disagree	12	24	13	26
When my turn of taking vaccine come I will take the vaccine	Agree	14	28	33	66
	Not sure	25	50	9	18
	Disagree	11	22	8	16
I will encourage my family to take the vaccine	Agree	17	34	26	52
	Not sure	21	42	14	28
	Disagree	12	24	10	20
I will take the vaccine even if its protection last for short time	Agree	13	26	24	48
	Not sure	17	34	18	36
	Disagree	20	40	8	16
Mean		6.4±1.1		8.9±.8	
T		8.09			
P		0.00001			

Table (7) correlation between total levels of willing of studied sample to take the vaccine with level of knowledge and attitude post the educational intervention.

Items	Willing to take the vaccine	
	R	P
Knowledge	0.72	0.006
Attitude	0.83	0.001

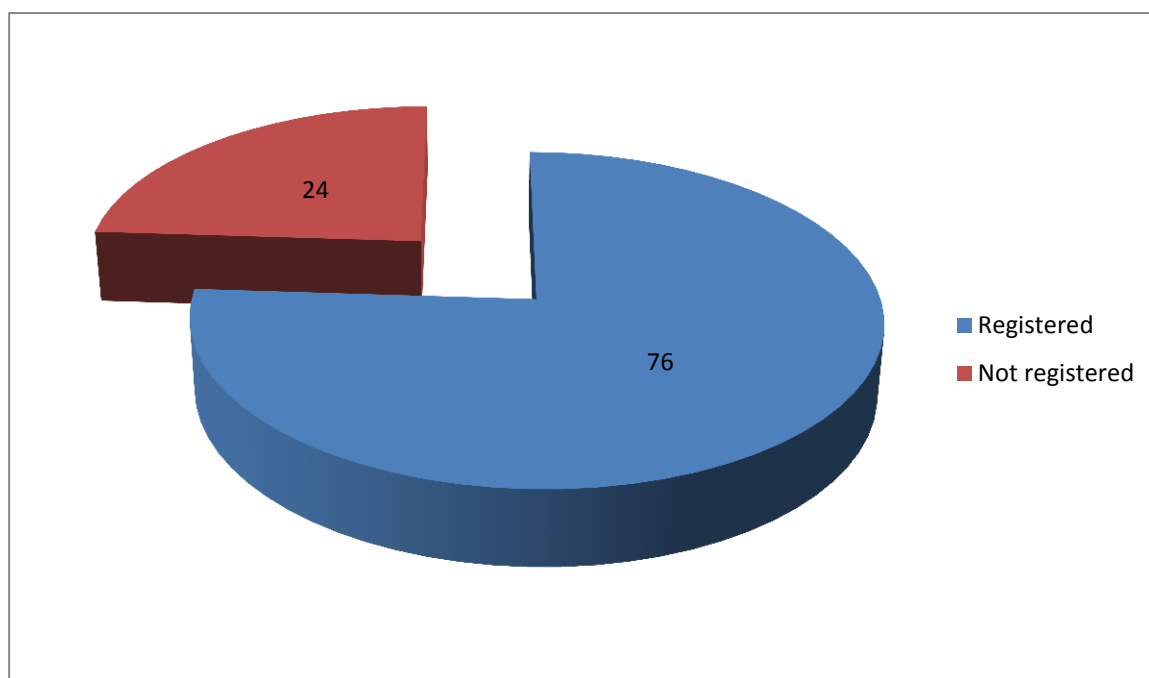


Figure (2) frequency distribution of studied sample who registered to take the vaccine after the educational intervention

Discussion

While the creation of COVID-19 vaccinations has been a huge achievement, vaccinating the majority of the world's population is a huge task. Gaining – and sustaining – public trust in COVID-19 vaccines and immunization will be just as important as the vaccines' effectiveness⁽¹⁴⁾. Therefore the aim of this study was to assess the effect of the nursing educational intervention to control COVID-19 vaccine hesitancy among school team members. The data revealed that about two thirds of studied sample were females and one third of them their ages ranged from 30 to 40 years old, about one quarter were less than 30 years and regarding to the level of education more than half of the studied sample had high education and less than half had secondary education. As regards to the residence about three quarters of them were living in rural area.

The results of current study revealed that about one half of the studied sample had not complete answer regarding overview about COVID-19 and no answer about the vaccine and two thirds didn't know about the mechanism of COVID-19 vaccine and differences between all types of the vaccine. In general about one third only of sample had satisfactory knowledge pre intervention and this indicated that the studied sample lacked knowledge

regarding COVID-19 vaccines which suggests the need for increasing their awareness through programs for dissemination of correct knowledge. These results were consistent with **Mohamed et al. (2021)**⁽¹⁵⁾ who reported that the knowledge of their sample about COVID-19 vaccines was inadequate. On the other hand, the current results were contradicted with **Abebe et al. (2021)**⁽¹⁶⁾ who found that about three quarters of their sample had good knowledge about the vaccine.

The results of current study revealed that there were significant improvements regarding total level of knowledge of studied sample post-the educational intervention where three quarter of the sample had satisfactory knowledge after the intervention compared to less than the half before the intervention and P value is 0.005. The results were supported by **Elashri et al. (2021)**⁽¹⁷⁾ who reported that the COVID-19 knowledge, attitude, and precautionary practices of the studied sample improved statistically significantly after the implementation of the COVID-19 educational bag compared to before it, and that the improvement was still visible across the entire studied sample regardless of their demographic characteristics and clinical data. In the same line **Islam et al. (2021)**⁽¹⁸⁾ reported that immediate health education programs were effective strategy

to improve knowledge initiated before mass vaccination schedule.

The current study revealed that there were several individual differences that could make participants hesitant towards the vaccines, where half of the studied sample was not sure that the vaccine was developed and approved at the suitable time and about the half were not sure about the safety of taking the vaccine. In general there were about one third of the studied sample had negative attitude regarding the vaccine. The results of current study were in harmony with **Issanov et al. (2021)** ⁽¹⁹⁾ who found that there was high COVID-19 vaccine hesitancy among the participants with several associated factors as safety, effectively and vaccines' country of origin. In the same line **Pogue et al. (2020)** ⁽²⁰⁾ reported that about one third of the participants were not supportive of being vaccinated because they had some concerns regarding side effects, efficacy and length of testing. On the other hand **Acharya et al. (2021)** ⁽²¹⁾ revealed that the average attitude toward the COVID-19 vaccination increased after the intervention indicating generally positive attitudes. These differences might be due to the fact that the participants in the Korean study were immigrants.

Moreover the results of the current study revealed that there were significant

improvements regarding total level of attitude of studied sample toward COVID-19 vaccine after the intervention where about two thirds of them had positive attitude after the educational intervention compared to about one third before the intervention. The results were supported by **AL Halabi et al. (2021)** ⁽²²⁾ who reported that targeted efforts necessary to increase acceptance of a COVID-19 vaccine among the Lebanese population to control the COVID-19 pandemic. In the same line **Rutten et al. (2021)** ⁽²³⁾ reported that using of educational interventions within clinical organizations was useful to address this critical gap and improve population trust in COVID-19 vaccination.

The results of current study indicated that on a scale of 4–12, the average willing toward the COVID-19 vaccination of the studied sample improved significantly from 6.4 ± 1.1 to 8.9 ± 0.8 after the educational intervention and this improvement is significantly associated with improved their knowledge and attitude regarding the vaccines, more than two thirds of the studied sample registered to take the vaccine after implementing the educational program while about one quarter of them delayed the registration. The results were supported by **Abebe et al. (2021)** ⁽¹⁶⁾ who reported that health education programs were very crucial

methods to alleviate the negative attitude of the COVID-19 vaccine and added that good knowledge and attitude about COVID-19 vaccine were significantly associated with COVID-19 vaccine acceptance, and increased the willing to take vaccine. In the same line **Mesele (2021)** ⁽²⁴⁾ reported that the prevalence of COVID-19 vaccination acceptance was low and public education is effective strategy to enhance the acceptance of COVID-19 vaccine.

Conclusion

The current study results concluded that the average willing of the studied sample to take the COVID-19 vaccine improved significantly after the educational intervention and this improvement is significantly associated with the significant improvement in their knowledge and attitude about the vaccines. There were significant improvement regarding total level of knowledge between the studied samples about COVID-19 vaccine post-the educational intervention, where three quarter of them has satisfactory knowledge. Moreover, their attitude toward COVID-19 vaccine significantly improved after the intervention, about two thirds of them has positive attitude compared to about one third before the intervention. The impacts of these results were that more than two thirds of the

studied sample registered to take the vaccine after implementing the educational program.

Recommendations

- Further studies are needed to increase people awareness regarding COVID-19 vaccination to build and maintain public trust in COVID-19 vaccines in Egypt.
- Develop other effective instructional methods, and address additional challenges among other settings in the community with regards to vaccine hesitancy.

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