

EFFECT OF AN EDUCATIONAL PROGRAM REGARDING COVID 19 VACCINATION ON MATERNITY STUDENT NURSES' KNOWLEDGE, ATTITUDE AND BEHAVIOR

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Abstract: Background: The control of the Coronavirus Disease 2019 (COVID-19) pandemic may be dependent on widespread receipt of an effective vaccine. The success of the COVID-19 vaccination program is dependent on people's knowledge, attitude and behaviour regarding the vaccination program.. **Aim:** the study aimed to assess the effect of an educational program regarding COVID 19 vaccination on maternity student nurses' knowledge, attitude and behaviour. **Study design:** A Quasi-experimental using in our study, one group (pre/post-test) were studied. **Setting:** The study was carried out in the Faculty of Nursing at Benha University. **Sampling:** A purposive sample of 246 maternity student nurses were included in our study. **Tools of data collection :** Data collected through using 3 tools 1) A self-administered questionnaire.2) Attitude likert scale.3) maternity student nurses' behaviour regarding COVID 19 vaccines **Results:** 81.3% of the studied maternity student nurses' age between 19-21 years, 69.1% were females, and 60.2% lived in a rural area, there were a highly statistically significant difference regarding knowledge about COVID 19 vaccination between pre and post educational program p value < 0.001. About half (49.6%) of studied maternity student nurses' negative attitude preprogram while that the majority (79.7%) positive attitude post program. 84.6% studied maternity student nurses' had behavior intended to receive vaccination post educational program compared to preprogram 19.9%..**Conclusion:** Education programs for maternity student nurses' regarding COVID 19 vaccination had a significant role in improving their knowledge, attitude and behavior regarding COVID 19 thus become more acceptable than before program implementation. **Recommendations:** Educational classes for all student nurses about COVID-19 vaccination.

Keywords: Attitude, Behaviour. COVID-19 vaccination, Educational program, Knowledge, Maternity Student Nurses.

Introduction:

Novel-coronavirus (COVID-19) pandemic disease is currently a worldwide health threat and public health emergency of global concern and is caused by the SARS-CoV-2 virus [wang *etal.*,2020].The transmission route of COVID-19 is made directly between humans through droplets and respiratory secretions and indirectly through contact with contaminated surfaces and can also be transmitted by asymptomatic individuals. The main symptoms of the disease are essentially fever, dry cough and tiredness. Based on epidemiological investigations, the incubation period is 1–14 days. Complications of the disease include pneumonia, acute severe respiratory distress syndrome, renal failure, or even death in certain cases The elderly and chronically ill are at the highest risk of COVID-19 infection [WHO,2020].

Despite the global preventive efforts (physical distancing, facemask, travel constraints, and quarantine) to control the infection, COVID-19 is continuing with its devastating consequences on health, life, and economics , the COVID-19 vaccine is critical in controlling and potentially ending this pandemic. The Egyptian government exerts great efforts to provide the COVID-19 vaccines and sort the vaccination as a priority for healthcare workers (HCWs) and older people, especially with chronic diseases [Marco,2020].

Vaccination is one of the most cost-effective preventive interventions . Many countries have accelerated vaccine research and developed vaccination programs against COVID-19; as of early 2021, there were more than 170 vaccines in pre-clinical development and over 60 vaccines in clinical development [Lurie *etal.*,2020].

The world's hopes are attached to a successful preventive measure that is the vaccination which has proved its capability to stop infections and save lives over the years. Near the end of 2020, several vaccines started to arise; there are about 100 candidate vaccines [WHO COVID-19 candidate vaccines ,2020].

Several vaccines are in the clinical trial phases, and few have already gained Emergency Use Authorization (EUA). The most distributed 6 candidate vaccines are currently in the 3rd phase trial. They differ in composition, storage requirements, and effectiveness (70.4%-95%). No serious adverse effects were reported from those vaccines [Ferbeyre *etal.*,2020]. The acceptability of a newly introduced vaccine is

an important factor to consider with its coverage within the population for an effective immunization program [**Bhartiya et al, 2021**].

Health care providers are directly involved in diagnosing, treating, and taking care of patients, they are at high risk of infection. Most countries have started their vaccination programs. Vaccination has been shown to be effective (to a varying extent) in reducing the severity of complications [**Paudel et al.,2021**].

Nurses play important role in the vaccine uptake process. They spend considerable time counseling patients, parents, families, and the public about the benefits, risks, and safety of vaccines, as well as administering them. Additionally, the nurses remain the most trusted advisor and influencer of vaccination decisions [**Manning , 2021**].

Significance of the study:

The novel coronavirus disease 2019 (COVID-19) has been recognized as one of the most critical pandemics and disastrous diseases that happened in human history, with many fatalities and morbidities globally that happened daily since its arise in December 2019 and are still occurring these days [**Wadood,etal.,2020**]. Globally; Over 104 million confirmed cases of COVID-19 and 2.29 million deaths until (February 6, 2021), as reported by World Health Organization (WHO). In Egypt, there have been 169 640 confirmed cases of COVID-19, with 9651 deaths till February 8, 2021. [**WHO COVID 19,2021**].

In this study, we are targeting the maternity student nurses to measure their perception and attitude toward the COVID- 19 vaccines. We selected the nurses as our study population because they are among the priority groups for COVID-19 vaccination. Also, nurses represent the guidance and the trusted source of information of the vaccine for the general population. They can shield against misleading and confusing information. So, their attitude will impact their and others' health. In addition.

College students are vulnerable to SARS-Cov-2 infection due to a multitude of factors: communal residency in on-campus and off-campus housing, the reopening of college campuses and activities, and the necessity to travel between their home and campus. Furthermore, college campuses have been identified as at risk to develop cases of COVID-19 and have the potential to become “super spreaders” with likely impacts on neighboring communities [**Weintz et al.,2020**].

In fact we need tailored education messages for college students to emphasize the severity of COVID-19, particularly potential long-term negative consequences on

health, address the concerns of side effects of general vaccines by dispelling the misconception, and target the most vulnerable subgroups who reported high level of risk exposures while showed low intention to take the vaccine. Efforts are warranted to increase college students' perceived susceptibility and severity and promote their self-efficacy in health management and encourage them to take protective behaviors including vaccine

Aim:

The study aimed to assess the effect of an educational program regarding COVID 19 vaccination on maternity student nurses' knowledge, attitude and behavior. This aim was achieved through:

- Assessing maternity student nurses' knowledge regarding COVID 19 vaccines
- Assessing maternity student nurses' attitude regarding COVID 19 vaccines.
- Assessing maternity student nurses' behavior regarding COVID 19 vaccines.
- Design , implement and evaluate effect of educational program regarding COVID 19 vaccination on university student nurses' knowledge, attitude, and behaviour .

Research Hypotheses:

- Maternity student nurses who receive educational program regarding COVID 19 vaccination will have higher knowledge score level compared to pre program
- Maternity student nurses who receive educational program regarding COVID 19 vaccination will have more positively attitude toward COVID 19 vaccination compared to preprogram.
- Maternity student nurses who receive educational program regarding COVID 19 vaccination will have more intention behaviors to COVID 19 vaccination compared to preprogram.

Subjects and Methods:

The methodology followed for achieving the aim of this study was discussed under the following four main designs:

- I. Technical design
- II. Operational design
- III. Administrative design
- IV. Statistical design

I-Technical design

The technical design was used for this study, it included four categories; research design, setting of the study, sampling of the study and tools used for data collection.

Research Design: A quasi experimental design was used for conducting the study. one group (pre/post-test) were studied

Setting: The study was carried out in the Faculty of Nursing at Benha University.

Sampling:

Type: A purposive sample.

Size: Sample size was 246 maternity student nurses. All student nurses in the third academic year who agree to participate in the study.

Inclusion criteria:

- (1) Undergraduate student nurses.
- (2) Egyptian ethnicity;
- (3) Students in the third academic year whose curriculum maternal and neonatal nursing and practical training in Obstetric and Gynecological Department.

Tools of data collection:

Three tools were utilized for data collection, prepared by the researchers after reviewing a related literature and tested by a panel of experts for validity.

First Tool: A self-administered questionnaire: Include two parts;

Part 1: Socio demographic characteristics of the study maternity student nurses:

Included age, marital status, sex, residence, previous educational program.

Part 2: Assessment of maternity student nurses' knowledge regarding COVID 19 vaccines

Which include (definition , safety of COVID 19 vaccines , benefits of COVID 19 vaccines ,types , effectiveness of COVID 19 vaccines , target groups who need COVID 19 vaccines,contra indication of COVID 19 vaccines, Mechanism of action of COVID 19 vaccines, how to take the vaccine and how many doses taken , advices pre and post COVID 19 vaccination , side effects and how to deal with them).

Scoring System

The questions were scored as the following; score (1) was given for the correct answer, score (0) for the incorrect or don't know before and after application of the program. The total knowledge score was classified as the following:

- Good knowledge: $\geq 75\%$
- Average knowledge: $60 - < 75\%$
- Poor knowledge: $< 60\%$

Second Tool: Attitude likert scale: Adapted from (*Yaqub ,etal.2020*).

Attitude of maternity student nurses towards COVID 19 vaccines was determined using 3 points likert scale (agree, disagree, uncertain). Attitude comprised of 12 items.

Standardized 12 items were used to measure attitude were

- (1) COVID-19 is a dangerous disease
- (2) Student nurses must be worried about being infected with COVID-19
- (3) COVID-19 vaccines are effective
- (4) The newly discovered COVID-19 vaccines are safe
- (5) Needing the vaccine to build immunity
- (6) Natural immunity does not consider enough to protect from Covid-19
- (7) COVID-19 vaccines could protect you from COVID-19
- (8) Encourage your family and friends to receive a COVID-19 vaccine
- (9) Side effects of vaccination do not prevent me from getting vaccinated to prevent corona virus
- (10) Vaccines are important for me to stay healthy as a future health care provider.
- (11) General trust of vaccine benefit
- (12) The vaccine the only solution for covid-19

Scoring system

Participants with overall lower score indicate negative attitude towards COVID 19 vaccines.

Third Tool: Maternity student nurses' behaviour regarding COVID 19 vaccines:

This tool including intention of maternity student nurses about their behavior towards COVID-19 vaccines: "Do you intend to have a COVID-19 vaccine in the future?"

Also, comprise causes of their willingness and lack of willingness to have COVID-19 vaccines,

Reasons for intended willingness to receive vaccination:

- protect my family, myself, my patients and my community
- Allow me to feel safe around other people
- Life won't be back to normal until most people are vaccinated
- It would be the best way to avoid getting seriously ill from COVID-19
- I have a chronic condition, such as asthma or diabetes, so it is important that I receive a COVID-19 vaccine

Reasons for lack of intended willingness to receive the vaccine

- The vaccine will likely be developed too quickly to be safe
- I would be concerned about side effects of the vaccine
- I don't trust the COVID-19 vaccine development process
- I'm in a low-risk group for getting seriously ill from COVID-19
- I would be concerned about getting infected with COVID-19 from the vaccine
- I've had a COVID-19 infection, so I likely have antibodies to the disease
- The COVID-19 outbreak is not as serious as some people say it is
- I don't think vaccines work well
- I am allergic to vaccines
- I don't like needles

Scoring system:

Intention to get vaccinated was determined by (yes or no).

- **A guide booklet:** was designed by the researchers using simple Arabic languages and different illustrated pictures in order to facilitate students understanding.

Ethical Considerations

All ethical issues were assured, Approval of the faculty ethics committee for scientific research was obtained for fulfillment of the study, maternity student nurses who participate in the study were given explanations about the purpose of the study, and they were also informed that they could withdraw from the study at any time before the completion of the study. Confidentiality of participants' information was assured and the data were collected only for research purpose.

Tools validity:

The tools of data collection were thoroughly reviewed by three experts, two in Obstetrics & Woman's health nursing and community health medicine to test the

content validity, modifications were carried out according to the panel' judgments on clarity of sentences and the appropriateness of content.

Tools Reliability:

Reliability of tools was tested by using Cronbach's alpha coefficient test, which revealed that the tools consisted of relatively homogenous items as showed by the moderate to high reliability of each tool. Cronbach's alpha of knowledge sheet was 0.75 , attitude was 0.87 and behaviour was 0.85).

The Pilot Study

The pilot study was conducted on 24 college student nurses (10% of 246 student nurses) to test the clarity and the applicability of the tool, find out the possible obstacles and problems that might face the researchers and interfere with data collection. The study sample included in the pilot study was included also into the study due to no modification done in the tool.

Results of the pilot study: After conducting the pilot study, it was found that:

- The tools were clear and applicable; however, few words were modified.
- Tools were relevant and valid.
- No problem that interferes with the process of data collection was detected.
- Following this pilot study the tools were made ready for use.

II-Operational design

Field work:

The process of data collection was carried out in the period from beginning of December 2020 until the end of April 2021 covering 5 months .

The educational program:

was designed and implemented through four sequential phases:

- First Phase: Assessment of the knowledge, attitude and behavior of the maternity student nurses about COVID19 vaccines through using the developed tools as a pre-test. The researchers explained to students the aim of the study and procedures and obtain oral consent. the researchers visited the research setting two days (Sunday and Tuesday) per week from 9.00 A.M. to 1.00 P.M. The researcher collected students in small group about 6 students in the day for each group with taking precautionary and preventative measures during collected data
- Second phase: - Analysis of the pretest findings to detect university student nurses needs regarding COVID19 vaccines according the finding of a pretest.

-Third Phase :(Planning &Implementation of the program) General and specific objectives of the educational program was constructed. implementation of educational program includes 3 sessions the first session: Introduction about COVID 19 vaccines, safety, benefits, effectiveness, Target groups who need COVID 19 vaccines and contraindication. The second session included types of vaccine available and mechanism of action, how to take the vaccine and how many doses taken and advices pre and post COVID 19 vaccination. The third session contained side effect of COVID 19 vaccine and How to deal with side effects of COVID 19 vaccine .The time of each session take about 30 minutes, different teaching methods e.g. (Lectures, group discussion, role play and demonstration and re-demonstration) were used. Student nurses' knowledge, attitude and behaviors evaluated by the end of the sessions as a post- test.

III. Administrative design:

The necessary official permissions for data collection were obtained from dean of Faculty of nursing at Banha University, The title and objectives of study were illustrated.

IV- Statistical design:

The Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 21 and then the data were explored. Descriptive statistics and correlation coefficients were used to test the research hypothesis. Descriptive statistics (frequency, percentage, arithmetic mean, and standard deviation) were used to describe characteristics of the studied nurses. Qualitative variables were compared using a Fisher's Exact test (FET) as the tests of significance. Paired (t) test was used to compare between mean differences before and after the intervention. The p-value is the degree of significance. A statistically significant difference was considered at p-value ≤ 0.05 .

Results:

Table (1): Frequency distribution of studied maternity student nurses regarding socio-demographic characteristics (n=246).

Socio-demographic characteristics	No	%
Age		
19-21	200	81.3
21-23	42	17.0

> 23	4	1.7
Mean ±SD	20.4±1.02	
Social status		
Single	200	81.3
Married females	46	18.7
Married males	0	0.0
Sex		
Female students	170	69.1
Male students	76	30.9
Residence		
Rural	148	60.2
Urban	98	39.8
Previous contact with patient covid 19		
Yes	99	40.2
No	147	59.8
Previous acquired covid 19		
Yes	73	29.7
No	173	70.3
Previous received educational program		
No	246	100.0

Table 1: shows personal characteristics of studied maternity student nurses. It was clear that 81.3% of the studied student nurses their age were 19-21 years, with the mean age of 20.4±1.02. , regarding social status, 81.3% were single, 60.2% lived in a rural area. Moreover, 59.8% of the studied students had no previous contact with patient COVID 19, 70.3% had no previous acquired COVID 19 and 100% no receive educational program.

Table (2): Frequency distribution of studied maternity student nurses regarding their knowledge about COVID 19 Vaccination pre and post program (n=246).

Variables	Preprogram				Post program				X ²	p-value
	Correct		Incorrect		Correct		Incorrect			
	No	%	No	%	No	%	No	%		
Definition of COVID 19 vaccines.	72	29.3	174	70.7	221	89.8	25	10.2	187.33	.000
Safety of COVID 19 vaccines	48	19.5	198	80.5	196	79.7	50	20.3	178.09	.000
Benefits of COVID 19 vaccines	14	5.9	100	40.7	221	89.8	25	10.2	60.32	.000
Types of COVID 19 vaccines.	0	0.0	246	100.0	221	89.8	25	10.2	401.22	.000
Effectiveness of COVID 19 vaccines	49	19.9	197	80.1	221	89.8	25	10.2	242.83	.000
Target groups who need COVID 19 vaccines	48	19.5	198	80.5	246	100.0	0	0.0	331.34	.000
Contra indication of COVID 19 vaccines	0	0.0	246	100.0	221	89.8	25	10.2	401.22	.000
Mechanism of action of COVID 19 vaccines	0	0.0	246	100.0	221	89.8	25	10.2	401.22	.000
How to take the vaccine and how	0	0.0	246	100.0	246	100.0	0	0.0	492.00	.000

many doses taken										
Advice pre and post covid 19 vaccinations.	24	9.8	222	90.2	246	100.0	0	0.0	404.53	.000
Sid effects of COVID 19 vaccines	98	39.8	148	60.2	246	100.0	0	0.0	211.67	.000
How to deal with side effects of COVID 19 vaccine.	0	0.0	246	100.0	196	79.7	50	20.3	325.78	.000

Table 2 reveals a highly statistically significant difference regarding knowledge about COVID 19 Vaccination between pre and post educational program p value < 0.001.

Figure (1): **percentage distribution of studied maternity student nurses regarding their source of information (n=246).**

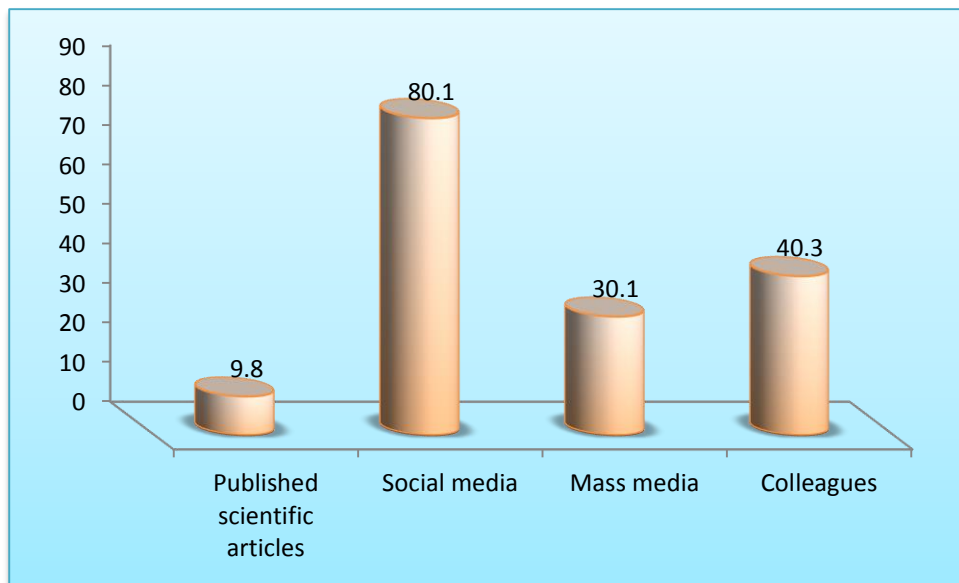


Figure 1 illustrates that 80.1% of studied students sources of information regarding covid 19 vaccination are social media followed by colleagues 40.3%, mass media 30.1% while the least source of information is 9.8% on published scientific articles.

Figure (2): **percentage distribution of studied maternity student nurses regarding their total knowledge level about COVID-19 vaccination pre and post program**

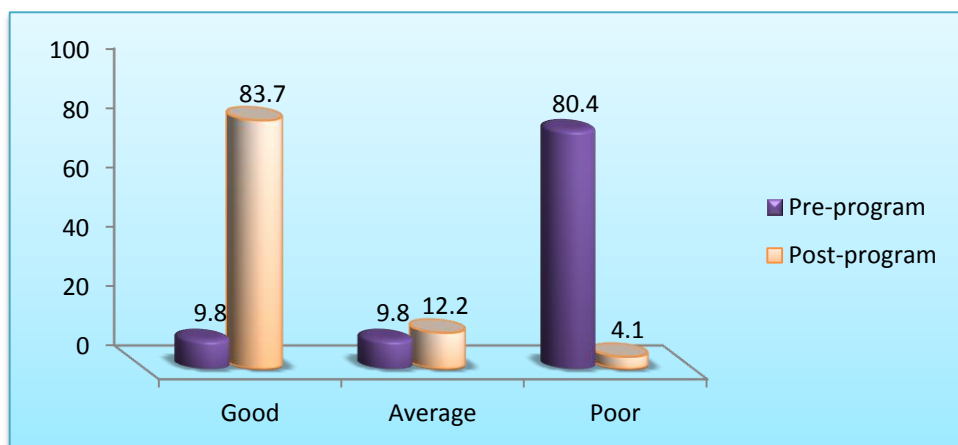


Figure 2 illustrates that 83.7% of studied maternity student nurses had good regarding total knowledge level about COVID-19 vaccination post educational program compared to preprogram 9.8%.

Table (3): Frequency distribution of studied maternity student nurses regarding their attitude about COVID 19 Vaccination pre and post program (n=246).

Variables	Preprogram						Post program						X ²	p-value
	Agree		Uncertain		disagree		Agree		Uncertain		disagree			
	No	%	No	%	No	%	No	%	No	%	No	%		
COVID-19 is a dangerous disease	221	89.8	0	0.0	25	10.2	246	100.0	0	0.0	0	0.0	26.33	.000
Student nurses must be worried about being infected with COVID-19	147	59.8	49	19.9	50	20.3	197	80.1	0	0.0	49	19.9	57.26	.000
COVID-19 vaccines are effective	24	9.7	148	60.2	74	30.1	172	69.9	74	30.1	0	0.0	210.42	.000
The newly discovered COVID-19 vaccines are safe	0	0.0	147	59.8	99	40.2	196	79.7	50	20.3	0	0.0	342.76	.000
Needing the vaccine to build immunity	24	9.7	74	30.1	148	60.2	147	59.8	99	40.2	0	0.0	240.08	.000
natural immunity does not consider enough to protect from Covid-19	0	0.0	123	50.0	123	50.0	147	59.8	99	40.2	0	0.0	272.59	.000
COVID-19 vaccines could protect you from COVID-19	0	0.0	49	19.9	197	80.1	195	79.3	24	9.7	27	11.0	332.58	.000
Encourage your family and friends to receive a COVID-19 vaccine.	0	0.0	122	49.6	124	50.4	172	69.9	74	30.1	0	0.0	307.75	.000
Side effects of vaccination do not prevent me from getting vaccinated to prevent corona virus	24	9.7	73	29.7	149	60.6	122	49.6	124	50.4	0	0.0	227.98	.000
Vaccines are important for me to stay healthy as a future health care provider.	24	9.7	149	60.6	73	29.7	196	79.7	50	20.3	0	0.0	256.72	.000
General trust of vaccine benefit	0	0.0	74	30.1	172	69.9	196	79.7	50	20.3	0	0.0	372.64	.000
the vaccine the only solution for covid-19	0	0.0	148	60.2	98	39.8	172	69.9	74	30.1	0	0.0	294.66	.000

Table 3: reveals a highly statistically significant difference regarding attitude about COVID 19 Vaccination between pre and post educational program p value < 0.001.

Figure (3): percentage distribution of studied maternity student nurses regarding their total attitude level about COVID-19 vaccination pre and post program

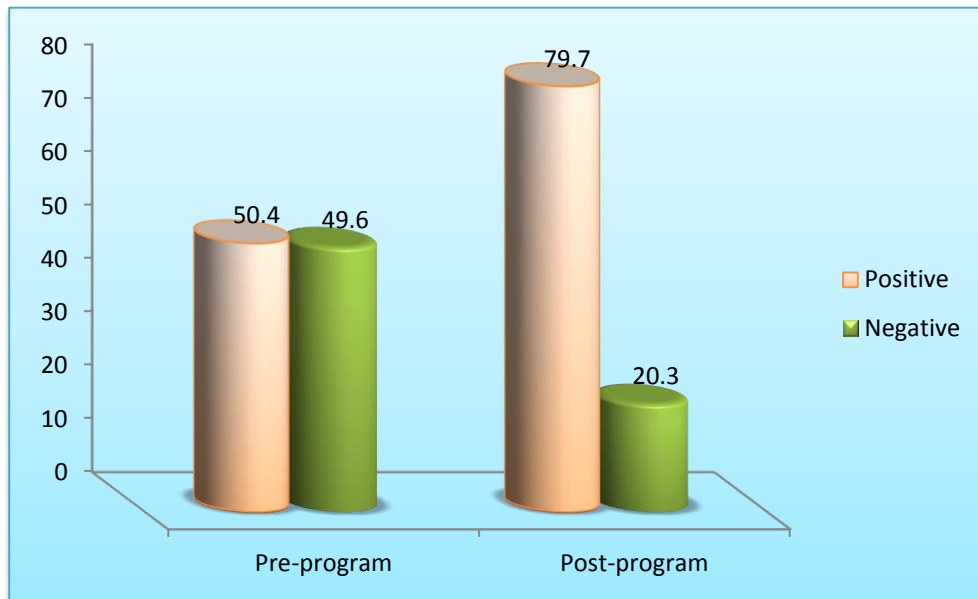


Figure 3 illustrates that about half (49.6%) of studied maternity student nurses negative attitude preprogram while that the majority (79.7%) positive attitude post program .

Figure (4): percentage distribution of studied students regarding their behaviors about intention to take vaccination pre and post program (n=246).

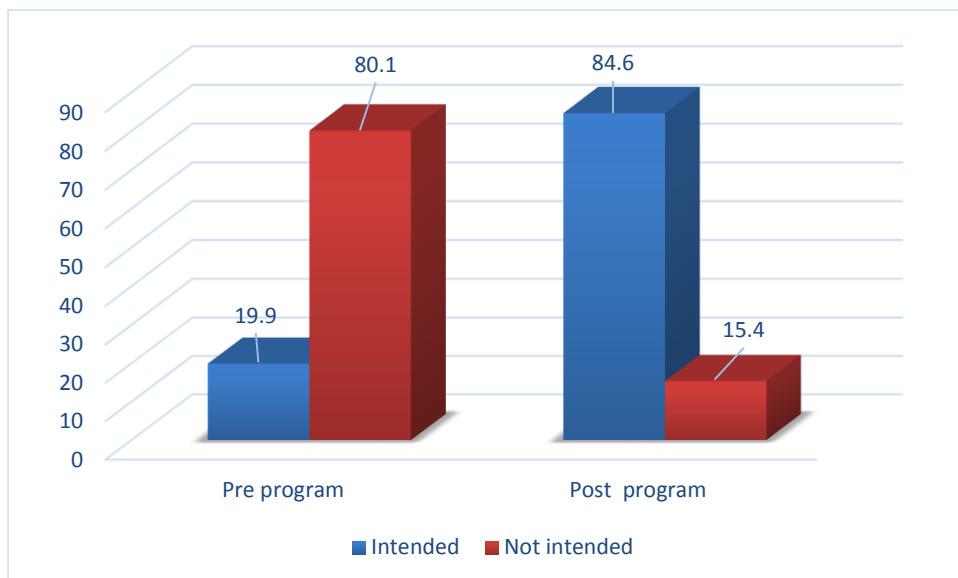


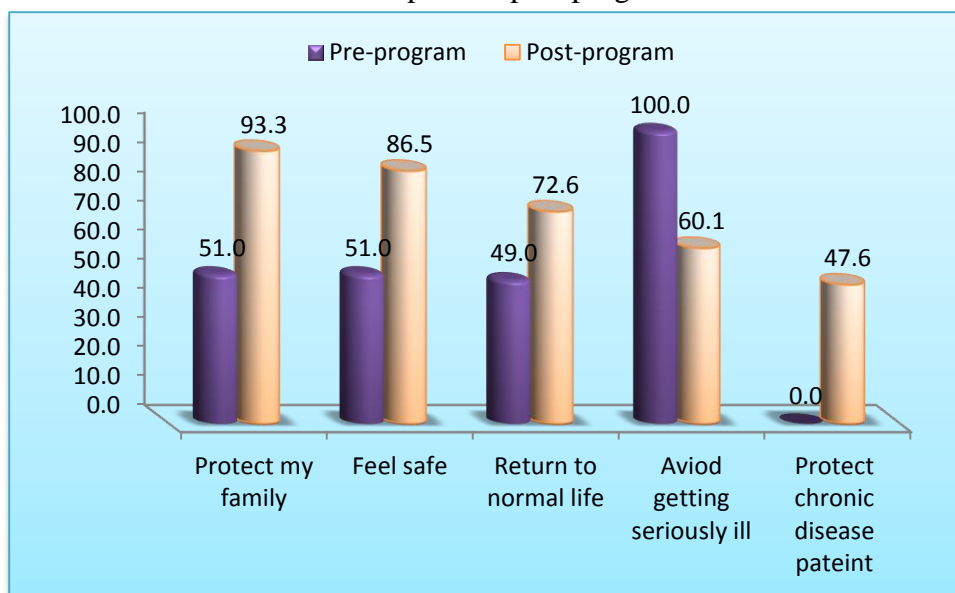
Figure 4 illustrates that 84.6% of studied maternity student nurses had behavior intended to receive vaccination post educational program compared to preprogram 19.9%.

Table (4): Frequency distribution of studied maternity student nurses regarding their reasons for behavior intended willingness to receive vaccination pre and post program (n=246).

Variables	Preprogram (n=49)				Post program (n=208)				X ²	p-value
	Yes		No		Yes		No			
	No	%	No	%	No	%	No	%		
Protect my family, myself, my patients and my community	25	51.0	24	49.0	194	93.3	14	6.7	56.18	0.000**
Allow me to feel safe around other people	25	51.0	24	49.0	180	86.5	28	13.5	30.99	0.000**
Return to normal life	24	49.0	25	51.0	151	72.6	57	27.4	10.18	0.001**
Avoid getting seriously ill from COVID-19	49	100.0	0	0.0	125	60.1	83	39.9	28.88	0.000**
Protect chronic disease patient	0	0.0	49	100.0	99	47.6	109	52.4	37.93	0.000**

Table 4 demonstrates that a highly statistically significant difference regarding Reasons for behavior intended willingness to receive vaccination between pre and post educational program p value <0.001

Figure (5): percentage distribution of studied maternity student nurses regarding their intention to receive vaccination pre and post program.



*pre-program (n=49)

post program (n=208)

Figure 5 illustrates that 100% of studied maternity student nurses reason of intended receive vaccination preprogram avoid getting seriously ill while most of studied

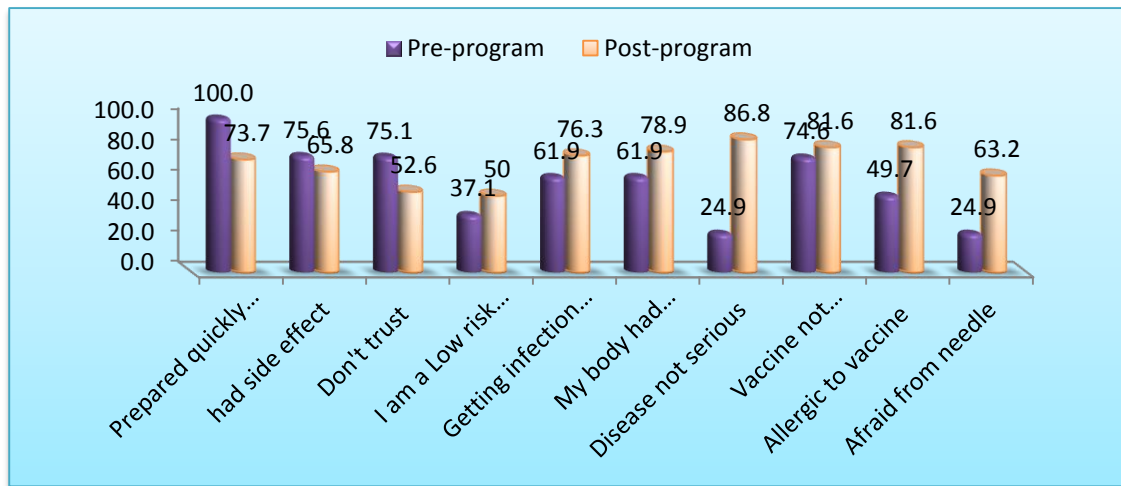
student nurses reasons of intended receive vaccination post program 98.5% & 91.4%
protect my family and feel safe

Table (5): frequency distribution of studied maternity student nurses regarding reasons **lack of intended** willingness to receive the vaccine pre and post program (n=246).

Variables	Pre (n=197)				Post (n=38)				X ²	p-value
	Yes		No		Yes		No			
	No	%	No	%	No	%	No	%		
The vaccine will likely be developed too quickly to be safe	197	100.0	0	0.0	28	73.7	10	26.3	54.14	0.000**
I would be concerned about side effects of the vaccine	149	75.6	48	24.4	25	65.8	13	34.2	1.606	0.205
I do not trust the COVID-19 vaccine development process	148	75.1	49	24.9	20	52.6	18	47.4	7.909	0.005*
I'm in a low-risk group for getting seriously ill from COVID-19	73	37.1	124	62.9	19	50.0	19	50.0	2.240	0.134
I would be concerned about getting infected with COVID-19 from the vaccine	122	61.9	75	38.1	29	76.3	9	23.7	2.871	0.090
I've had a COVID-19 infection, so I likely have antibodies to the disease	122	61.9	75	38.1	30	78.9	8	21.1	4.039	0.044*
The COVID-19 outbreak is not as serious as some people say it is	49	24.9	148	75.1	33	86.8	5	13.2	53.84	0.000**
I don't think vaccines work well	147	74.6	50	25.4	31	81.6	7	18.4	0.840	0.359
allergic to vaccines	98	49.7	99	50.3	31	81.6	7	18.4	13.03	0.000**
I don't like needles	49	24.9	148	75.1	24	63.2	14	36.8	21.80	0.000**

Table 5 shows insignificant statistical difference between pre and post program regarding side effects of the vaccine, a low-risk group for getting seriously ill from COVID-19 , concerned about getting infected with COVID-19 from the vaccine and vaccines not work well p value >0.05 while there is statistical difference regarding not trust the COVID-19 vaccine development process and getting antibodies from COVID 19 infection p value <0.05. moreover, highly statistical difference other items p value <0.001.

Figure (6): percentage distribution of studied maternity student nurses regarding their reason lack of intention to receive vaccination pre and post program



*pre-program (n=208)

post program (n=38)

Figure 6 illustrates that 100% of studied maternity student nurses reason lack of intention to receive vaccination preprogram the vaccine prepared quickly while post program 86.8% , 81.6% reason lack of intention to receive vaccination; COVID 19 is not serious disease , vaccine not work well and allergic to vaccine

Table (6): Correlation matrix between total knowledge, attitude and intention to receive vaccine pre and post program.

Variables		Preprogram Knowledge	Attitude	Intention to receive vaccine	Post program Knowledge	Attitude	Intention to receive vaccine
Knowledge	R	1	.876	-.109-	1	.877	-.154-*
	p-value		.000**	.087		.000	.016*
	N	246	246	246	246	246	246
Attitude	R	.876	1	-.181-	.877	1	.129
	p-value	.000**		.004*	.000**		.043*
	N	246	246	246	246	246	246
Intention to receive vaccine	R	-.109-	-.181-	1	-.154-	.129	1
	p-value	.087	.004*		.016*	.043*	
	N	246	246	246	246	246	246

Table 6 shows that highly statistically positive correlation between knowledge and attitude pre and post program while insignificant correlation between knowledge and Intention to receive vaccine preprogram compared to significant positive correlation post program. Moreover, statistically positive correlation between attitude and Intention to receive vaccine pre and post program.

Discussion

Vaccines are the most important public health measure and most effective strategy to protect the population from COVID-19, since SARS-CoV-2 is highly contagious virus and affects populations widely and globally (**Islam et al., 2021**). Healthcare providers are essential to the success of mass vaccination programmes. Not only are they at the forefront of vaccine administration; they are also key to changing hearts and minds in relation to vaccine acceptance amongst the general public (**Mantel et al., 2020**). Of all healthcare providers, nurses provide the closest patient facing care and as such possess a real opportunity to advocate for and promote important public health messages (**Bajnok et al., 2018**).

The current study aimed to assess the effect of an educational program regarding COVID-19 vaccination on maternity student nurses' knowledge, attitude and behavior. This aim was achieved through assessing maternity student nurses' knowledge, attitude and behavior regarding COVID-19 vaccination then design, implement and evaluate the effect of educational program on maternity student nurses' knowledge, attitude, and behaviour regarding COVID-19 vaccines. The results of the present study achieved the aim of the study and supported the hypotheses as the maternity student nurse who had received the educational program regarding COVID-19 vaccines had significantly higher knowledge score level, more positively attitude and had intention behavior regarding COVID-19 compared to preprogram.

Regarding the socio-demographic characteristics of the studied maternity student Nurses, the present study showed that majority of the studied student nurses their age were 19-21 years, with the mean age of 20.4 ± 1.02 , most of them were single and more than two thirds of them were females, less than two thirds lived in a rural area. Moreover, more than half of the studied maternity student nurses had no previous contact with COVID-19 patient, also the majority of the studied students had no previous acquired COVID-19 and none of them receive educational program regarding COVID-19 vaccines.

These findings were in the same line with **Bai et al., (2021)** study which entitled "Attitudes toward COVID-19 vaccines in Chinese college students" and mentioned

that The mean age of participant was 19.83 years and 1,920, 66% were females and 45.9% of them lived in urban residents and in contrast with **Biswas et al., (2021)** study entitled "Students' Perception towards COVID-19 Vaccination Program in Bangladesh" and reported that 51.6% of University Students are female in which 86.3% are aged 21-25 years while agree with most of studied samle (94.0%) were not infected by COVID-19 this may be due to university students nurses were young population and their education had a role in following precautionary measures to prevent COVID 19 infection.

While these findings were in contrast with **Spinewine et al., (2021)** study entitled "Attitudes towards COVID-19 Vaccination among Hospital Staff—Understanding What Matters to Hesitant People" they report that Almost 60% of respondents had previous or ongoing contact with COVID-19 patients, and 20.5% never had contact with patients. Regarding experience **Spinewine et al., (2021)** study entitled "Attitudes towards COVID-19 Vaccination" agree with the present study that 23.3% of the respondents had been infected with COVID-19 while 86.7% knew at least one colleague who had been infected.

Concerning total knowledge level about COVID-19 vaccination, the current study showed that the majority of the maternity student nurses had poor knowledge pre-program compared to post program where the majority of them become good knowledge with highly statistically difference between pre and post program. From the researcher point of view this may be due to effectiveness of educational program and the recent discovery of vaccination against COVID-19 in addition to lack of vaccination awareness programs.

This result agree with **Fares et al., (2021)** study entitled "COVID-19 Vaccination Perception and Attitude among Healthcare Workers in Egypt" mentioned that most responders (75.06%) did not get sufficient information about the COVID-19 vaccine, and 79% do not trust their information. Furthermore similar with **Jiang, et al., (2021)** study entitled "Nursing students' attitudes, knowledge, and willingness to receive the COVID-19 vaccine: A cross-sectional study" and reported that the scoring rate of knowledge dimension was 80.70%, indicating that most students had a good grasp of the knowledge of COVID-19

vaccine.

Regarding studied maternity student nurses sources of information about COVID 19 vaccination. The current study showed that the majority of studied students' sources of information about COVID 19 vaccination are social media followed by colleagues, mass media while the least source of information was published scientific articles Perhaps the reason in our point of view is the spread of social media in Egypt. this result agrees with **Ali et al., (2020)** study entitled "Trends and Predictors of COVID-19 Information Sources and Their Relationship with Knowledge and Beliefs Related to the Pandemic: Nationwide Cross-Sectional Study" showed that during the COVID-19 pandemic, people used multiple information resources to gain knowledge and health information about the disease, including television, radio, newspapers, social media, friends, co-workers, healthcare providers, scientists, governments. Also agree with **Abebe et al., (2021)** study entitled "Understanding of COVID-19 Vaccine Knowledge, Attitude, Acceptance, and Determinates of COVID-19 Vaccine Acceptance Among Adult Population in Ethiopia" and found almost one-fourth, 22.8% , 28.7% and 20.5 of the respondents had heard about the COVID-19 vaccine from their family members and relative, and friends and neighbors and mass media respectively

Regarding maternity student nurses attitude towards COVID 19 vaccination the present study showed that the majority of studied student sample had positive attitude post program implementation with high statistically significant difference between pre and post program .this result in the same line with **Bai, et al., (2021)** study entitled "Attitudes toward COVID-19 vaccines in Chinese college students" they found that students who worried about being infected with COVID-19, who previously heard about COVID-19 vaccines, who thought that COVID-19 vaccines could provide protection, who thought that vaccines are safe, and who encouraged their family to get vaccine were more likely to get a COVID-19 vaccine in future. Also consistent with **Mascarenhas,(2021)** study entitled "Dental students' attitudes and hesitancy toward COVID-19 vaccine", found that early, all participants had positive attitudes toward COVID-19 vaccines in general.further more consistent with **Elhadi and Alsoufi (2021)** study entitled "Knowledge, attitude, and acceptance of healthcare workers and the public regarding the COVID-19 vaccine: a cross-sectional study" found an adequate level of knowledge, attitude, and acceptance regarding COVID-19 vaccinations. Approximately, 60.6% of the study population were willing to receive

the COVID-19 vaccine with an efficacy of 70% or more and 79.6% with an efficacy of 90%.

Concerning maternity student nurses behaviour regarding COVID 19 vaccination The current study results showed that the majority of studied student nurses had behaviour intended to receive vaccination post educational program compared to minority pre-program. These results are similarly with a prior anecdotal report showing that 80% of New York State's community- and hospital-based physicians plan to become immunized with the COVID-19 vaccine **Medical Society of the State of New York,(2020)**. Also consistent with **Padureanu,et al., (2021)** study entitled "Perceptions of COVID-19 Vaccination Among Healthcare Professionals In Romania" found that A total of 365 respondents (69%) agreed with the COVID-19 vaccine. But contrast with **Gadoth et al.,(2020)** study entitled "Assessment of COVID-19 vaccine acceptance among healthcare workers in Los Angeles" found that 66.5% of health care professionals at UCLA (University of California, Los Angeles) intended to delay vaccination this may be due to unsure and want to delay vaccination until others are vaccinated

Concerning reasons of intention to receive vaccination and lack of intention to receive vaccination pre and post program, the current study showed all studied maternity student nurses reason of intended receive vaccination preprogram; avoid getting seriously ill while about half the reason protect family, myself, my patients and my community and feel safe around other people with high statistically significant difference between pre and post program. also the present study demonstrated that the majority of studied maternity student nurses had reason lack of intention to receive vaccination preprogram example all of studied student nurses said the vaccine prepared quickly with high statistically significant difference between pre and post program and that the majority the reason fear of side effects of the vaccine with insignificant difference between pre and post program may be due to decrease knowledge about vaccine preprogram.

This result agree with **Solís Arce ,et al., (2021)** study entitled "COVID-19 vaccine acceptance and hesitancy in low- and middle-income countries " found considerably higher willingness to take a COVID-19 vaccine in our low- and middle-

income countries samples (mean 80.3%; median 78%; range 30.1 percentage points) compared with the United States (mean 64.6%) and Russia (mean 30.4%) and Vaccine acceptance is primarily explained by an interest in personal protection against COVID-19, while The most commonly stated reason for vaccine refusal is concern about safety (side effects). Also similar with **Silva, et al., (2020)** they found that the medical staff who think they have a higher risk of getting the disease are more intention to received vaccine, but the most common fear is related to the vaccine safety (side effect). Moreover consistent with **Cordina, et al., (2021)** study entitled “Attitudes towards COVID-19 vaccination, vaccine hesitancy and intention to take the vaccine “ and found that the main issue for not wanting to take the vaccine is related to the belief that it may not be safe (85.2%, N=132). Oddly, fear of injections was cited as the major reason for being unsure of taking the vaccine (82.5%, N=275) followed by 56% who declared that they wanted more information about the vaccine and 50.1% who would not be willing to be among the first to take the vaccine.

The current study showed that highly statistically positive correlation between knowledge and attitude pre and post program while insignificant correlation between knowledge and Intention to receive vaccine preprogram compared to significant positive correlation post program. Moreover, statistically positive correlation between attitude and intention to receive vaccine pre and post program. these results were agree with **Ciardi,et al., (2021)** study entitled” Knowledge, Attitudes and Perceptions of COVID-19 Vaccination among Healthcare Workers of an Inner-City Hospital in New York” reported that a strong correlation between the subject’s knowledge about COVID-19 infection and personal experience with someone with COVID-19 with a positive attitude towards vaccination.

Also, these findings consistent with **Sherman et al., (2021)** study entitled“COVID-19 vaccination intention in the UK: results from the COVID-19 vaccination acceptability study (CoVAccS), a nationally representative cross-sectional survey” they reported that vaccine attitudes and beliefs and clear information about the safety and effectiveness of the vaccine may be needed to increase vaccination intentions. Also congruent with **Wirunpan , (2021)** study entitled“ Knowledge, attitudes, and willingness of adolescents towards coronavirus disease 2019 vaccine in

Bangkok, Thailand” found statistically significant positive correlations shown between attitude towards COVID-19 vaccine and the level of willingness to vaccinate against COVID-19 vaccine ($\beta = 0.384$, $P < 0.01\%$).

Conclusion :

Based on the study findings, it was concluded that there were a highly statistically significant difference regarding knowledge about COVID 19 vaccination between pre and post educational program p value < 0.001 , about half of studied student nurses had negative attitude preprogram while the majority of them had positive attitude post program. Most of studied maternity student nurses had behavior intended to receive vaccination post educational program compared to preprogram. Highly statistically positive correlation between knowledge and attitude pre and post program. Moreover, statistically positive correlation between attitude and Intention to receive vaccine pre and post program. Finally the findings of the current study supported the hypotheses and achieved aim of the study.

Recommendations :

- 1-Developing awareness programs for all student nurses regarding COVID19 vaccination to enhance their knowledge about COVID vaccines and increase their intention to COVID19 vaccination.
- 2-Guidelines about COVID19 vaccination should be available to all student nurses and disseminated on social media to enhance acceptance of COVID 19 vaccines.
- 3-Porchors regarding COVID 19 vaccines should be available in COVID 19 vaccination settings and illustrated contraindication cases to vaccines .
- 4- Educational classes for all student nurses about COVID-19 vaccination

Further researches:

- 1- Acceptability of a COVID-19 vaccine among adults.
- 2- Barriers and facilitators regarding COVID-19 vaccine.
- 3- Awareness programs regarding contraindications of COVID 19 vaccination

Acknowledgement:

The authors would like to thank faculty ethics committee, jury committee and all studied maternity student nurses for their participants in completion of this study.

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