

Undergraduate Nursing Students' Knowledge, Attitude, and Willingness regarding Covid-19 Vaccination

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Abstract

The vaccine is one of the most efficient ways to protect against COVID-19. Attitudes, knowledge, and willingness to receive the COVID-19 vaccine may have a significant impact on the nursing student's vaccine acceptance now and in the future. **The aim** was to investigate undergraduate nursing students' knowledge, attitude, and willingness regarding covid-19 vaccination. **Subjects and method: Design:** A cross-sectional descriptive research design was utilized to achieve the aim of this study. **Setting:** the research was conducted at the Faculty of Nursing, Fayoum University. **Subjects:** A convenient sample of 2438 undergraduate nursing students from all fourth academic years was included using an online self-administered questionnaire via Google Form. **One tool was used:** Tool (I) Attitude, Knowledge, and vaccination Willingness for the COVID-19 vaccine (AKW). **Results:** The scoring rate of attitude, knowledge and vaccination willingness were 70.07%, 80.70%, and 84.38% respectively. The majority of (85%) of them like to receive the COVID-19 vaccine. **Conclusion:** COVID-19 vaccinations were found to have a high percentage of acceptability among undergraduate nursing students. Concerns regarding vaccination safety and efficacy, on the other hand, may restrict vaccine uptake. The major reasons for vaccination hesitancy are fear of negative effects and a general refusal of vaccines. **Recommendations:** Establishing intervention strategies for vaccination initiatives against the COVID-19 pandemic which will need addressing these concerns and increasing public confidence in vaccines.

Keywords: Covid-19 vaccination, knowledge, attitude, and willingness, Undergraduate nursing students

Introduction:

COVID-19 is a global public health concern that has had a significant impact on the international society. Vaccination is one of the most efficient and low-cost methods of COVID-19 prevention. Currently, nine COVID-19 vaccines have been approved for marketing internationally, and more than 360 million doses of COVID-19 vaccinations have been delivered globally as of March 15, 2021. Herd immunity is related to vaccination rates, and population immunity can only be established if the vast majority of people are vaccinated. However, research has revealed that vaccination willingness differs among nations and communities following the introduction of the COVID-19 vaccine and is impacted by a variety of circumstances (WHO, 2021).

In a survey of adults in the United States, **Kreps et al. (2020)** discovered that 69 percent of those polled were willing to embrace the COVID-19 vaccination. They were more likely to get the vaccine if their doctor advised it and if the disease's perceived risk and severity were greater than the vaccine's negative effects. Vaccines with excellent efficacy, long protection periods, and low adverse response rates were well received by the public (**Reiter et al., 2020**).

Furthermore, **Lin et al. (2020)** conducted a survey of 3,541 residents in China on vaccination intention and willingness to pay and found that 83.3% of the residents were willing to be vaccinated and that willingness to be vaccinated was influenced by socioeconomic factors.

Also, **Yuda and Katsuyama (2021)** conducted a poll of 1,100 Japanese residents

and discovered that 65.7 percent were willing to be vaccinated, with higher willingness among the elderly, those living in rural regions, and those with underlying conditions, but more hesitation among women. Vaccine acceptance rates among healthcare workers ranged from 23.4 percent in Taiwan to 95 percent in the Asia-Pacific area (Sallam, 2021; Szymd et al., 2021). The main concerns of healthcare workers were side effects after immunization, long-term protective efficacy, and safety (Shaw et al., 2021). Disease prevention, fear of transmitting the disease to family members, clinical workplace, older age, and male gender were all common reasons for reducing healthcare workers' willingness to be vaccinated, while disease prevention, fear of transmitting the disease to family members, clinical workplace, older age, and male gender were all common reasons for reducing healthcare workers' willingness to be vaccinated were the main reasons for promoting vaccination (Unroe et al., 2021).

Qiao et al. (2020) questioned 1,062 South Carolina college students and found that high vaccination acceptance was positively associated with perception and fear of the epidemic, while low vaccine acceptance was associated with higher exposure risk and negative views toward the vaccine. In an online poll of 647 college students, Graupensperger et al. (2021) discovered that 91.64 percent of students were willing to take the vaccine, showing a strong readiness to receive the vaccine. Participants, on the other hand, believed that other young people were less likely to obtain the vaccine and that vaccination was not necessary.

Sun et al. (2020) surveyed 1,912 Chinese university students, with 64.01 percent saying that they would be willing to take part in a COVID-19 vaccine study. The main factors that promoted willingness to be vaccinated were low socioeconomic status, female, perceived risk of contracting the disease, and prosocial behavior, while the main factors that hindered willingness to be vaccinated were hesitation to sign the informed consent form, time required to participate in the study, and perceived social

stigma of COVID-19 (Yang et al. 2021). Males, unmarried/cohabiting, faculty, trust in vaccine safety, and clarity on possible side effects were important predictors of acceptance of the COVID-19 vaccine in Di Giuseppe et al., (2021). vaccination willingness survey involving a university population in southern Italy, 84.1% of participants were willing to be vaccinated, while males, unmarried/cohabiting, faculty, trust in vaccine safety, and clarity on possible side effects were important predictors of acceptance of the COVID-19 vaccine. China is conducting free vaccination for all, and the willingness of the population to receive vaccines is key to achieving reasonable vaccination coverage (wang et al., 2020).

Significance of the study:

As future medical personnel who will be working in hospitals, nursing college students have both the professionalism of medical personnel and the special characteristics of school students. As reserve nurses, if they have better knowledge of the COVID-19 vaccine, they can use their expertise to educate their relatives and friends in the neighborhood, the patients they will serve after working in the hospital, and the public regarding the vaccine. Furthermore, as students, if they have good vaccination attitudes and behaviors, they can set an example for other faculty students to improve the COVID-19 vaccination rate. Therefore, it is significant to understand nursing students' fear, knowledge attitudes toward vaccination, and related influencing factors of COVID-19 vaccines, which can assist educational institutions in developing effective interventions to increase the vaccination rate. Upon reviewing the existing literature, we found that only a few studies have been conducted on college students' vaccination intentions, with nursing college students being rarely studied; thus, an investigation is imperative. This cross-sectional study aimed to investigate undergraduate nursing students' knowledge, attitude, and willingness regarding covid-19 vaccination.

Aim of the study:

This study aimed to investigate undergraduate nursing students' knowledge, attitude, and willingness regarding covid-19 vaccination through:

- Assessing undergraduate nursing students' knowledge regarding covid-19 vaccination
- Assessing undergraduate nursing students' attitudes regarding covid-19 vaccination
- Assessing undergraduate nursing students' willingness regarding covid-19 vaccination

Research questions:

1. What are the undergraduate nursing students' knowledge, attitude, and willingness to covid-19 vaccination?
2. Is there a relation between undergraduate nursing students' knowledge, attitude, and willingness covid-19 vaccination and their demographic characteristics?

Subjects and Methods:**Research design:**

A cross-sectional descriptive research design was utilized to achieve the aim of this study. In a cross-sectional study, the investigator measured the outcome and the exposures in the study participants at the same time. This type of research can be used to describe characteristics that exist in a community, but not to determine cause-and-effect relationships between different variables. This method is often used to make inferences about possible relationships or to gather preliminary data to support further research and experimentation (Chikaodili et al., 2020).

Setting:

This study was applied in the Faculty of Nursing, Fayoum University.

Subjects:

A convenient sample of 2430 undergraduate nursing students from all fourth academic years was included using an online self-administered questionnaire via Google Form.

Tool for data collection:**Tool (I): Attitude, Knowledge, and vaccination Willingness for the COVID-19 vaccine (AKW):**

Based on the Guidelines for COVID-19 Vaccination (1st edition) issued by the National Health Commission of the People's Republic of

China [China NHC] (2021), the WHO's "Vaccine Explained" series featuring illustrated articles on vaccine development and distribution (2021) and the guiding principles for immunization activities during the COVID-19 pandemic from the Chinese Center for Disease Control and Prevention (2021), and the related literature (Qiao et al., 2020; Lin et al., 2020), we developed a questionnaire entitled "Attitude, Knowledge and vaccination Willingness for the COVID-19 vaccine (AKW)" (Supplemental file 1). This questionnaire comprised the following four parts:

1. Demographic data (4 items): gender, age, academic year, residence.
2. Attitudes toward the COVID-19 vaccine (11 items): influences of COVID-19, risk perception, vaccine acceptance, and concerns about the vaccine. Each item was rated on a 5-point Likert scale and the total score ranged from 11 to 55; a higher total score indicated amore positive attitude.
3. Knowledge on the COVID-19 vaccine (9 items): (a) priority groups for vaccination, recommended age group for vaccination, correct methods, contraindications, adverse reactions, matters needing attention, and herd immunity. This domain included single-choice and multiple-choice questions. Each correct answer to the single-choice questions obtained a score of 5, while each correct answer to the multiple-choice questions obtained a score of 1. The total score ranged from 1 to 46, with a higher total score indicating a better mastery of knowledge; and (b) The sources of acquired knowledge included mobile phone, TV, radio, network, newspaper, school/community pamphlet/bulletin board, relatives/friends and others.
4. Vaccination willingness (8 items): vaccine selection, vaccination form, duration of protection, willingness, reasons, and vaccine prices. Two of these items were scored to determine the level of vaccination willingness, with scores ranging from 1 to 8; a higher score indicated a stronger vaccination intention. The rest of the items were rated using percentages.

Validity of the tools:

Face and content validity of the tools for clarity, comprehensiveness, appropriateness, and relevance by a board of five experts professors, three professors in community health nursing and two professors in psychiatry health nursing with more than ten years of experience in the fields were assessed; the board ascertained the face and content validity of the tools. No modifications were done according to the judge of the board. The content validity index (I-CVI) for the questionnaire was 0.98.

Reliability of the tools:

Reliability was assessed through Cronbach's alpha reliability test $\alpha = 85\%$ which revealed that the tool, consisted of relatively homogenous items as indicated by high reliability, $\alpha = 82\%$ which revealed the reliability of the tool. The tools' reliability was estimated by using the Pearson correlation coefficient test to compare variables. The Pearson correlation coefficient for the variables ranged between ($P. < 0.5$) and ($P. < 0.001$), which indicated a highly significant positive correlation between the variables of the subjects.

Ethical considerations:

Each undergraduate nursing student was informed about the aim and benefits of the study in the first part before starting the questionnaire where every undergraduate nursing student could not be starting the questionnaire without consent to participate in data collection in the current study. Each undergraduate nursing student was informed that participation in the study was voluntary and that they had the right to withdraw from the study at any time before completing the questionnaire with no consequences, without giving any reason and that their responses would be held confidentially.

Methods of data collection:**Pilot study:**

A pilot study was conducted on 10% of the total sample (243 undergraduate nursing students) of the total sample to test the clarity and feasibility of the research process. No modifications were carried out to develop the final form of the tools. Those who were in the pilot were included in the research study.

Fieldwork:

As known the Egyptian Government guidelines for the undergraduate nursing student are to reduce face-to-face communication and home isolation, we used an online administered questionnaire to collect data from undergraduate nursing students during the period from 10 to 30 May 2021. A structured questionnaire was designed using Google forms, then; we shared the link of the questionnaire to numerous academic WhatsApp groups. On the first page of the questionnaire, the undergraduate nursing students were informed about the background, objectives, and expected outcomes of the study. All questions and responses were according to the recent recommendations by the WHO.

The average time spent for undergraduate nursing students' completion of the online administered questionnaire was approximately 30 minutes. Each undergraduate nursing student involved in the study was informed about the purpose of the study, the components of the tools, and how to answer the online questionnaire and the scale.

Statistical analysis:

The SPSS software (version 19.0; SPSS Inc.) was used for statistical analysis. Students' demographic and information-sourcing characteristics were expressed as means with standard deviations and frequencies with percentages. Independent sample *t*-tests/one-way analysis of variance (normal distribution) and Mann-Whitney *U* tests/Kruskal-Wallis *H* tests (skewness distribution) were carried out to distinguish the differences in the sociodemographic characteristics between participants. The relationships among AKW were examined using Pearson or Spearman correlation analysis. A *p*-value of < 0.05 was considered significant (two-tailed).

Results:

Table (1) shows the characteristics of the studied undergraduate nursing students. Concerning gender of them, it was observed that 52% of the studied undergraduate nursing students were females. As regards, age, (66%) of the studied undergraduate nursing students was in the age range from 19 < 21 years with a mean age of 20.2±2.3 years. Concerning the Academic

year, (35%) of them were in the academic year, and (53%) of them were living in rural areas.

Figure (1): Illustrated that all of the study participants had information about the COVID-19 vaccine, (47%) of study undergraduate nursing students were know about the COVID-19 vaccine from television and (38%) of them were heard from social media (i.e. Facebook and Telegram).

(Table 2, 3, 4): Showed the distribution of the knowledge, attitude, willingness scores among undergraduate nursing students, and it was observed that the knowledge scores showed a skewed distribution. The mean score of the attitude dimension was 38.55 ± 4.47 and the scoring rate was 70.06%. In this dimension, "Infection with COVID-19 has a high impact on the surrounding people or environment" (77.62%) garnered the highest score, while "Perceived high risk of infection with COVID-19" garnered the lowest score (49.21%). The scoring rate in the knowledge dimension was 80.71%. In this dimension, "contraindications for the COVID-19 vaccine" (89.41%) had the highest score, while "correct method of vaccination" (63.76%) had the lowest score. The mean score of the willingness to be vaccinated was 82.52 ± 8.57 with a scoring rate of 86.63%.

Figure (2): Showed that the top three reasons for unwillingness to be vaccinated with the COVID-19 vaccine among undergraduate nursing students were reported as follows: COVID-19 vaccine causes side effects (56%), not

reliable (18%), and think that the antibodies have been formed (13%).

Figure (3): Showed that the top three reasons for willingness to be vaccinated with the COVID-19 vaccine among undergraduate nursing students were reported as follows: Fear of infecting my family with the COVID-19 (46%), fear of infecting my family with the COVID-19 (39%), and believing in the effectiveness and safety of the vaccine (9%).

Table (5) portrayed the association between demographic characteristics, knowledge, attitude, and willingness, it was observed a significant influence on attitude and showed the differences in mean scores of attitudes were significant and the scores of attitudes toward vaccines were significantly higher among fourth-grade students than among first-grade students ($: 39.34$ vs. 39.15 and 38.30 , $p < 0.002$). Concerning the knowledge dimension, significant differences were observed in the scores in terms of gender, age, grade, and academic educational level. In terms of knowledge, the differences in scores were statistically significant in terms of gender, age, and academic educational level. The knowledge scores of female students were higher than those of male students (e.g. females vs. males: 82.35% vs. 71.91% , $p < 0.001$), and the knowledge mastery level increased significantly with age ($p < 0.001$). The willingness to be vaccinated was much higher among females versus males (e.g. females vs. males: 6.79 vs. 6.52 , $p < 0.001$).

Table (1): Distribution of the studied undergraduate nursing students according to their demographic characteristics (n=2430)

Demographic characteristics	NO.	%
Gender		
Male	1166	48.0
Female	1264	52.0
Age(years):		
19- <21	1604	66.0
21-<24	826	34.0
Mean and SD (20.2±2.3)		
Academic year		
First-year	146	6.00
Second-year	851	35.00
Third-year	680	28.00
Fourth-year	753	31.00
Residence		
Urban	1142	47.00
Rural	1288	53.00

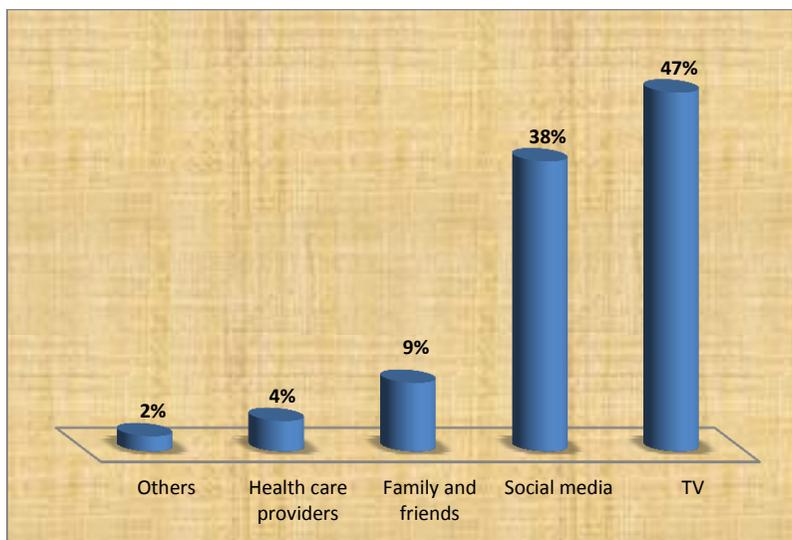


Figure (1): Distribution of the studied undergraduate nursing students according to their source of information about the COVID-19 vaccine

Table (2): Distribution of the studied undergraduate nursing students Scores regarding knowledge about COVID-19 vaccine (N = 2430)

Items		Mean (SD)	Scoringrate (%)
Knowledge		3.83±0.78	76.42
	Do you know who the priority groups for vaccination are?	6.74±1.09	80.71
	What is the recommended age group for the vaccination?	5.02±0.86	79.64
	What is the correct method of vaccination?	6.76±1.08	63.76
	What are the contraindications of the vaccine?	5.03±0.84	89.41
	What are the correct adverse reactions to vaccination?	6.76±1.08	86.01
	Vaccination precautions	5.03±0.84	88.42
	How to create population immunity through vaccination?	6.74±1.06	84.39
	In general, how familiar are you with the COVID-19 vaccine?	5.02±0.83	83.34

Table (3): Distribution of the studied undergraduate nursing students Scores regarding attitude toward COVID-19 vaccine (N= 2430)

Items		Mean (SD)	Scoringrate (%)
Attitude	Do you think that contracting COVID-19 has a significant impact on your health?	38.55±4.47	70.06
	Do you think it will affect the people around you or the environment if you get COVID-19?	3.86±1.18	77.62
	Do you think the current outbreak is serious?	3.17±0.83	663.62
	Do you think the outbreak will recur?	3.23±1.02	664.23
	How much has the outbreak affected your life in the past 5 months?	3.53±0.87	754.83
	How much is the outbreak expected to affect your life in the next 5 months?	2.96±0.82	559.82
	Do you think you are at high risk of contracting COVID-19?	2.44±0.96	49.21
	Do you think you can prevent COVID-19 by vaccination?	3.56±0.67	71.61
	Do you think the vaccines available on the market today are safe?	3.74±0.64	75.42
	Do you think the vaccine is effective?	3.57±0.67	71.63
	How much do you care about vaccine-related information?	3.68±0.63	73.22

Table (4): Distribution of the studied undergraduate nursing students Scores of regarding willingness to COVID-19 vaccine (N = 2430)

Items	Mean (SD)	Scoringrate (%)
Vaccination willingness		
Would you like to receive the COVID-19 vaccine?	1.75±0.43	87.02
Would you be willing to receive the COVID-19 vaccine if you arecharged for it in the future?	2.41±8.53	77.02

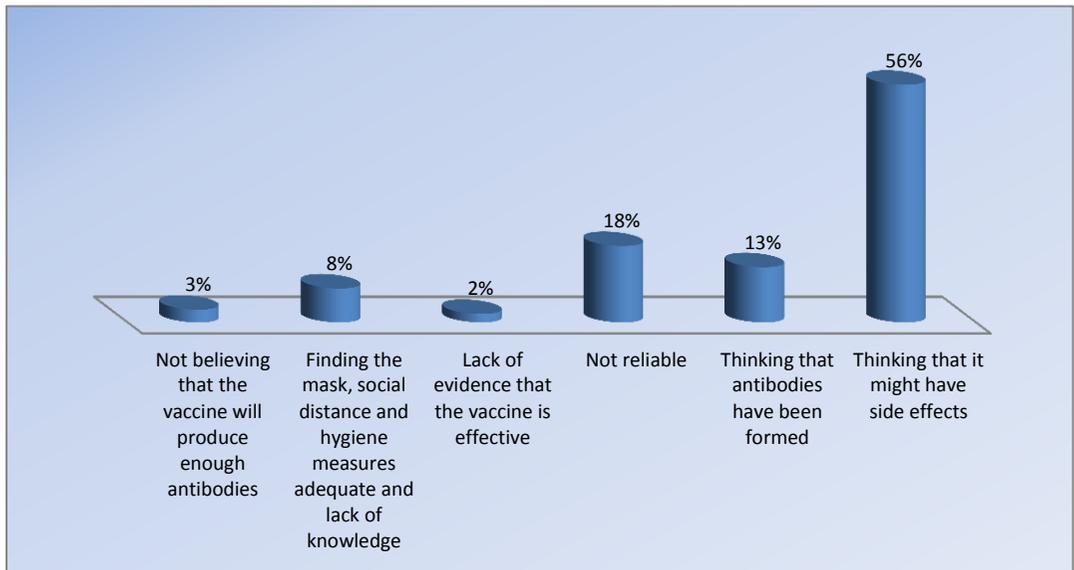


Figure (2): Reasons for unwillingness to be vaccinated with the COVID-19 vaccine among undergraduate nursing students (n = 2430).

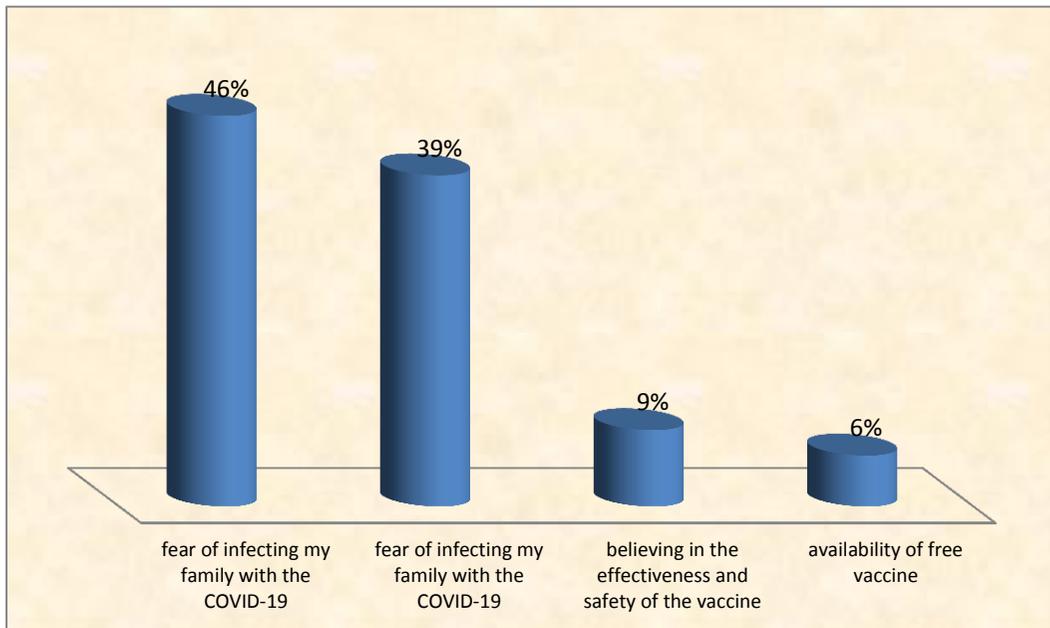


Figure (3): Reasons for willingness to be vaccinated with COVID-19 vaccine among undergraduate nursing students (n = 2430).

Table (5): Association between undergraduate nursing students' attitudes, knowledge, and willingness of COVID-19 vaccine and their demographic characteristics (N = 2430)

Demographic characteristics	Knowledge	Attitudes	Willingness	t-test	P-value
Gender					
Male	36.33 ± 5.18	38.31 ± 5.07	6.52 ± 1.28	4.33	≤0.001**
Female	39.59 ± 3.56	38.59 ± 4.35	6.79 ± 1		
Age(years):					
19- <21	34.73 ± 3.56	38.80 ± 3.70	6.80 ± 1.10	4.67	≤0.001**
21-≤24	38.39 ± 4.57	38.49 ± 4.85	6.53 ± 1		
Academic year					
First-year	37.45 ± 4.33	39.34 ± 4.65	6.58 ± 0.90	15.17	≤0.001**
Second-year	38.42 ± 4.64	38.22 ± 4.58	6.76 ± 1.04		
Third-year	39.23 ± 4.53	39.15 ± 4.24	6.95 ± 0.97		
Fourth-year	40.20 ± 4.38	38.30 ± 4.40	6.70 ± 1.15		

**Highly Statistical Significant at P≤0.001

Discussion:

Individuals may always need vaccination throughout their lives, from infancy to old age. Vaccination is an effective health practice developed to protect human life. In this context, the undergraduate nursing students who take firm steps in the light of science should set an example with the right health behaviors. After all, those who professionally administer vaccines are nurses. In this study, the researchers aimed to investigate undergraduate nursing students' knowledge, attitude, and willingness regarding covid-19 vaccination.

Out of the seven knowledge items tested, five (contraindications of vaccination, important vaccinated groups, precautions following vaccination, herd immunity, and adverse responses) scored in the majority, showing that most students had a good understanding of the COVID-19 vaccine. The low scores on the correct manner to vaccinate and the appropriate age group for vaccination, on the other hand, revealed that these were weak points that needed to be addressed.

When compared to previous research by **Di Giuseppe et al., (2021)**, the vaccination willingness of the 2430 students interviewed was in the middle-to-upper range, showing that nursing students were more likely to be vaccinated. Based on their professional basis, nursing students could have a certain degree of awareness of the necessity, effectiveness, and safety of the COVID-19 vaccine, according to the

examination of the reasons for willingness/unwillingness to get vaccinated. Furthermore, their faculties are preparing to organize group vaccinations, indicating that they are enthusiastic about immunization. What cannot be overlooked is the fact that students continue to have concerns regarding their safety and effectiveness. If these concerns regarding vaccination are not addressed before immunization, the number of students who get vaccinated may be reduced, and cause psychological pressure as well as unnecessary distress after vaccination (**Lucia & Afonso, 2020; Qiao & Li, 2020**).

Concerning the top three reasons for unwillingness to be vaccinated with the COVID-19 vaccine among undergraduate nursing students, results of the current study revealed that more than half of them reported that reasons for unwillingness to be vaccinated with the COVID-19 vaccine because it causes side effects, less than one fifth stated that COVID-19 vaccine not reliable and more than ten percent think that the antibodies have been formed. This may explain that students had insufficient knowledge about this new disease and its treatment which caused more fear for them. The finding is in agreement with studies conducted in Addis Ababa by **Dereje et al., (2021)** about COVID-19 Vaccine hesitancy and found vaccine hesitancy among the population.

The results are in the same line as **Kanyike et al., (2021)** who studied "Acceptance of the coronavirus disease-2019 vaccine among medical

students in Uganda" and found that medical students reported vaccine hesitancy. The result is supported by **Jain et al., (2021)** who conducted a study about "COVID-19 vaccine hesitancy among medical students in India" and reported the same findings.

Similarly, another studied researcher found the same results **Al-Mohaithef et al., (2020)** who conducted a study about "Determinants of COVID-19 Vaccine Acceptance in Saudi Arabia" and **Wang et al., (2020)** who studied Acceptance of covid-19 vaccination during the covid-19 pandemic in china". The possible justification might be due to the vaccine development period were not taken the adequate time which might affect its effectiveness, and the competition of the countries to discover the vaccine and control the economy might lead them to the unproductive finding regarding the vaccine, thus it might create fear to the study participants

Results of the current study showed that the top three reasons for willingness to be vaccinated with the COVID-19 vaccine among undergraduate nursing students were reported as follows: Fear of infecting my family with the COVID-19, fear of infecting my family with the COVID-19, and belief in the effectiveness and safety of the vaccine.

The finding is congruent with a study conducted in Uganda by **Kanyike et al., (2021)** and among results in a study among Egyptian medical students conducted by **Saied et al., (2021)** who studied "Vaccine hesitancy: Beliefs and barriers associated with COVID-19 vaccination among Egyptian medical students". The finding is supported by a meta-analysis entitled 'anticipated regret and health behavior states that despite the availability of the vaccination service if a person did not take vaccination service and he might get infected with the disease and the transmit it to their friends and family members (**Brewer et al., (2016)**).

Similarly, in their study "COVID-19 vaccination intention and vaccine reluctance among nurses," **Kwok et al. (2021)** found that hospital nurses' willingness to be vaccinated against COVID-19 reduced as the situation of the COVID-19 pandemic tended to improve. To be able to enhance vaccination rates, faculties should strengthen education on the COVID-19 vaccine and emphasize the necessity of vaccination

among students, while speeding the vaccination process while fully respecting students' vaccination willingness.

The present study findings indicated the differences in mean scores of attitudes, knowledge, and willingness were significant and the scores of attitudes toward vaccines were significantly higher among fourth-grade students than among first-grade students. From the researchers' point of view, it reflected the higher education associated with high knowledge which lead to improve in the attitude and increase the willingness to be vaccinated with the COVID-19 vaccine among the studied students.

Undergraduate nursing students' attitude scores were much higher than those of the other grades. It was stated that because undergraduate nursing students were completing a hospital internship, they would be exposed to a variety of patients daily, and hence their risk of getting COVID-19 would be significantly higher than the other three classes. As a result, they had a more favorable opinion of the COVID-19 vaccine.

Female students' vaccination willingness was much higher than male students in this study, which contradicts some previous research (**Freeman et al., 2020**). The explanation for this could be that nursing is typically a female-dominated profession, and male students in nursing schools may feel ashamed or lonely and be hesitant to participate in group activities (**Power et al., 2018**), which could lead to a decline in vaccination willingness (**Christensen, Welch & Bar, 2018**).

Knowledge scores were significantly higher than those of lower age and junior students. Girls can master better knowledge than boys. This gender difference may have something to do with the nursing profession (**Albaqawi et al., 2020**), or with gender itself (**Zhong et al., 2020**).

Conclusion:

Based on the results of the present study, the study findings concluded that the mean score of the attitude was high to be vaccinated among undergraduate nursing students. In this dimension, "Infection with COVID-19 has a high impact on the surrounding people or environment" garnered the highest score. The scoring rate in the knowledge dimension was also, high. In this dimension, "contraindications

for the COVID-19 vaccine” had the highest score. COVID-19 vaccinations were found to have a high percentage of acceptability among undergraduate nursing students. Regarding willingness to be vaccinated with the COVID-19 vaccine among undergraduate nursing students, there were top reasons for were reported as follows: Fear of infecting my family with the COVID-19, followed by belief in the effectiveness and safety of the vaccine. There were significant differences observed in the mean scores of undergraduate nursing students' demographic data, attitude, knowledge, and willingness to be vaccinated with the COVID-19 vaccine.

Recommendations:

The following recommendations are made in light of the current study's findings:

- Provide a well-planned health program for undergraduate nursing students to improve their knowledge of Covid -19.
- Pay close attention to the fears among undergraduate nursing students to detect mental abnormalities regarding their health.
- Establishing intervention strategies for vaccination initiatives against the COVID-19 pandemic will need to address these concerns and increase public confidence in vaccines
- Replication of the current study with a larger sample of students in different settings is required for generalizing the results.

References:

Albaqawi, H.M., Alquwez, N., Balay-Odao, E., Bajet, J.B., Alabdulaziz, H., Alsolami, F., Tumala, R.B., Alsharari, A.F., Tork, H., Felemban, E.M., Cruz, J.P. (2020): Nursing students' perceptions, knowledge and preventive behaviors toward COVID-19: a multi-university study. *Front. Public Health* 8, 573390.

Al-Mohaithef M, Padhi BK. (2020): Determinants of COVID-19 Vaccine Acceptance in Saudi Arabia: A web-based National Survey. *Journal of multidisciplinary healthcare*; 13:1657 <https://doi.org/10.2147/JMDH.S276771> PMID: 33262600

Brewer, N.T., DeFrank, J.T., Gilkey, M.B. (2016): Anticipated regret and health behavior: A meta-analysis. *Health Psychology*. Nov; 35(11):1264.

Chikaodili, N., Ihudiebube-Splendor, A., & Paulina, C. (2020): A Descriptive Cross-Sectional Study: Practical and Feasible Design in Investigating Health Care-Seeking Behaviors of Undergraduates, *SAGE Research Methods Cases: Medicine and Health*, DOI: <https://dx.doi.org/10.4135/9781529742862>

Chinese Center for Disease Control and Prevention [China CDC] (2021): Vaccines for COVID-19. Retrieved from <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/index.html>.

Christensen, M., Welch, A., Barr, J. (2018): Men are from Mars: the challenges of communicating as a male nursing student. *Nurse Educ. Pract.* 33, 102–106.

Dereje N, Tesfaye A, Tamene B, Alemshet D, Abe H, Tesfa N. (2021): COVID-19 Vaccine hesitancy in Addis Ababa, Ethiopia: A mixed-methods study. *medRxiv*. Jan 1.

Di Giuseppe, G., Pelullo, C.P., Della Polla, G., Pavia, M., Angelillo, I.F. (2021): Exploring the willingness to accept SARS-CoV-2 vaccine in a university population in Southern Italy, September to November 2020. *Vaccines* 9 (3), 275.

Freeman, D., Loe, B.S., Chadwick, A., Vaccari, C., Waite, F., Rosebrock, L., Jenner, L., Petit, A., Lewandowsky, S., Vanderslott, S., Innocenti, S., Larkin, M., Giubilini, A., Yu, L.M., McShane, H., Pollard, A.J., Lambe, S. (2020): COVID-19 vaccine hesitancy in the UK: the Oxford coronavirus explanations, attitudes, and narratives survey (Oceans) II. *Psychol. Med.* 1–15.

Graupensperger, S., Abdallah, D.A., Lee, C.M. (2021): Social norms and vaccine uptake: college students' COVID vaccination intentions, attitudes, and estimated peer norms and comparisons with influenza vaccine. *Vaccine* 39 (15), 2060–2067.

- Jain J, Saurabh S, Kumar P, Verma MK, Goel AD, Gupta MK, et al. (2021): COVID-19 vaccine hesitancy among medical students in India. *Epidemiology & Infection*. May 20:1–28.
- Kanyike, AM, Olum R, Kajjimu J, Ojilong D, Akech GM, Nassozi DR. (2021): Acceptance of the coronavirus disease-2019 vaccine among medical students in Uganda. *Tropical Medicine and Health*. Dec; 49 (1):1–1.
- Kreps, S., Prasad, S., Brownstein, J.S., Hswen, Y., Garibaldi, B.T., Zhang, B., Kriner, D.L. (2020): Factors associated With US adults' likelihood of accepting COVID-19 vaccination. *JAMA Netw. Open* 3 (10), 2025594.
- Kwok, K.O., Li, K.K., Wei, W.I., Tang, A., Wong, S., Lee, S.S. (2021): Editor's Choice: influenza vaccine uptake, COVID-19 vaccination intention, and vaccine hesitancy among nurses: a survey. *Int. J. Nurs. Stud.* 114, 103854.
- Lin, Y., Hu, Z., Zhao, Q., Alias, H., Danaee, M., Wong, L.P. (2020): Understanding COVID-19 vaccine demand and hesitancy: a nationwide online survey in China. *PLoS Negl. Trop. Dis.* 14 (12), 0008961.
- Lucia, V.C., Kelekar, A., Afonso, N.M. (2020): COVID-19 vaccine hesitancy among medical students. *J. Public Health* fdaa230.
- National Health Commission of the People's Republic China [China NHC], 2021. Incidence of adverse reactions to COVID-19 vaccine in China. Retrieved from https://www.sohu.com/na/441626009_115362
- Powers, K., Herron, E.K., Sheeler, C., Sain, A. (2018): The lived experience of being a male nursing student: implications for student retention and success. *J. Prof. Nurs.* 34 (6), 475–482.
- Qiao, S., Tam, C.C., Li, X. (2020): Risk exposures, risk perceptions, negative attitudes toward general vaccination and COVID-19 vaccine acceptance among college students in South Carolina. *medRxiv Prepr. Serv. Health Sci.*
- Reiter, P.L., Pennell, M.L., Katz, M.L. (2020): Acceptability of a COVID-19 vaccine among adults in the United States: How many people would get vaccinated? *Vaccine* 38 (42), 6500–6507.
- Saied SM, Saied EM, Kabbash IA, Abdo SA. (2021): Vaccine hesitancy: Beliefs and barriers associated with COVID-19 vaccination among Egyptian medical students. *Journal of medical virology*. Jul; 93 (7):4280–91.
- Sallam, M. (2021): COVID-19 vaccine hesitancy worldwide: a concise systematic review of vaccine acceptance rates. *Vaccines* 9 (2), 160.
- Shaw, J., Stewart, T., Anderson, K.B., Hanley, S., Thomas, S.J., Salmon, D.A., Morley, C. (2021) Assessment of US healthcare personnel attitudes towards coronavirus disease 2019 (COVID-19) vaccination in a large university healthcare system. *Clin. Infect. Dis.* ciab054.
- Sun, S., Lin, D., Operario, D. (2020): Interest in COVID-19 vaccine trials participation among young adults in China: willingness, reasons for hesitancy and demographic and psychosocial determinants. *medRxiv Prepr. Serv. Health Sci.* <https://doi.org/10.1101/2020.07.13.20152678>.
- Szmyd, B., Karuga, F.F., Bartoszek, A., Staniecka, K., Siwecka, N., Bartoszek, A., Błaszczuk, M., Radek, M. (2021): Attitude and behaviors towards SARS-CoV-2 vaccination among healthcare workers: a cross-sectional study from Poland. *Vaccines* 9 (3), 218. <https://doi.org/10.3390/vaccines9030218>
- Unroe, K.T., Evans, R., Weaver, L., Rusyniak, D., Blackburn, J. (2021): Willingness of long-term care staff to receive a COVID-19 vaccine: a single state survey. *J. Am. Great. Soc.* 69 (3), 593–599.
- Wang J, Jing R, Lai X, Zhang H, Lyu Y, Knoll M. (2020): Acceptance of covid-19 vaccination during the covid-19 pandemic in China. *Vaccines*. Sep; 8(3):1–14. <https://doi.org/10.3390/vaccines8030482> PMID: 32867224

- WHO, (2021): Coronavirus (COVID-19) Dashboard. Retrieved from <https://covid19.who.int/>
- Yang, K., Liu, H., Ma, L., Wang, S., Tian, Y., Zhang, F., Li, Z., Song, Y., Jiang, X. (2021): Knowledge, attitude, and practice of residents in the prevention and control of COVID-19: an online questionnaire survey. *J. Adv. Nurs.* 77 (4), 1839–1855.
- Yoda, T., Katsuyama, H. (2021): Willingness to receive COVID-19 vaccination in Japan. *Vaccines* 9 (1), 48.
- Zhong, B.L., Luo, W., Li, H.M., Zhang, Q.Q., Liu, X.G., Li, W.T., Li, Y. (2020): Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. *Int. J. Biol. Sci.* 16 (10), 1745–1752.