

Perception, Preventive Practice, and Attitude toward Vaccine against COVID-19 among Junior Nursing Students at Menoufia University

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Abstract: Background: Knowledge, perception, and preventive behavior should be considered in the planning of effective educational interventions for COVID-19 pandemic. **Purpose:** to identify the perception, preventive practice, and attitude toward vaccine against COVID-19 among junior nursing students at Menoufia University. **Design:** A cross-sectional descriptive quantitative design was used. **Setting:** The study was carried out at the Medical-Surgical Nursing Department, Faculty of Nursing, Menoufia University. **Subjects:** A convenience sample of 656 undergraduate nursing students of both genders who were enrolled in the fundamental of nursing and medical surgical nursing courses. **Instruments:** Three instruments were utilized I: Self-administered questionnaire, II: COVID-19 preventive practice questionnaire and III: Attitude towards COVID-19 vaccination scale. **Results:** 76.2%, 76.5% of the study students had a satisfactory knowledge level of COVID-19 and its preventive measures respectively with mean knowledge scores 15.62 ± 4.10 ; furthermore most of the studied students reported a positive attitude towards vaccine of COVID-19 and practiced preventive measures. **Conclusion:** Most of the junior nursing students had satisfactory knowledge level regards COVID-19. Moreover; there is a relationship between the students' age, gender and their total knowledge level. The majority of them demonstrated a positive attitude toward COVID-19 vaccination and reported an accepted level of satisfaction regarding preventive practice. **Recommendations:** Appropriate vaccination strategies are essential through educational interventions via reliable sources for wider coverage of the university students, a proper training program would enable students to better combat COVID-19 and replication of the study using larger probability samples from different geographical areas to help for generalization of the results.

Keywords: Perception, Preventive Practice, Attitude, Vaccine against COVID-19

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Introduction

The coronavirus pandemic is an international health catastrophe that has a serious and greater effect on the global world. Individuals who engaged with or provide care for COVID-19-infected persons are those who are at risk for getting the infection. Healthcare professionals (HCPs) are at the vanguard to fight against the pandemic which places them at high risk of infection (Remuzzi and Remuzzi, 2020). Compared to the community population, healthcare personnel are typically at higher risk of increased exposure to infectious diseases and they may even act as vectors for virus transmission (Kim et al., 2020).

The World Health Organization (WHO) and Centers for Disease Control and Prevention (CDC) have reported that COVID-19 infections can be controlled through social isolation, usage of appropriate face masks, adherence to physical distancing rules, and proper hand-washing practice. Additionally, vaccination, practicing appropriate preventive measures, and understanding the mode of transmission are the most vital and life-saving strategies for controlling the disease (Wang et al., 2020; Umakanthan, Sahu, and Ranade, 2020; Richmond et al., 2021).

However, the repercussions of the natural infection can be seriously dangerous; therefore, the virus must infect a large number of people. Mass vaccination has been a very effective, potent strategy for preventing the spread of different types of infectious diseases by creating herd immunity. Therefore, vaccination looks to be one of the most effective and promising measures to control COVID-19 spread (Detoc et al., 2020; Lurie et al., 2020).

The fundamental concept of managing epidemics is herd immunity, and vaccination is one of the most affordable measures that have made the most impact on human health worldwide (Randolph and Barreiro, 2020). Presently, according to World Health Organization reports "nine vaccines for Coronavirus have been approved worldwide"; and more than 360

million doses of COVID-19 vaccines have been administered as of March 15, 2021" (World Health Organization (WHO), 2021a, and WHO, 2021b).

In most countries, healthcare professionals were given priority to take vaccines due to a considerably higher occupational risk of infection in their working environment (Dooling et al., 2020). With hesitation over vaccine usefulness, safety, and efficacy, rapid development, and vaccine acceptance and approval also vary by clinical discipline and context internationally (Li et al., 2021; Shekhar et al., 2021; Hajure et al., 2021; Hall et al., 2021 and Tulloch et al., 2021).

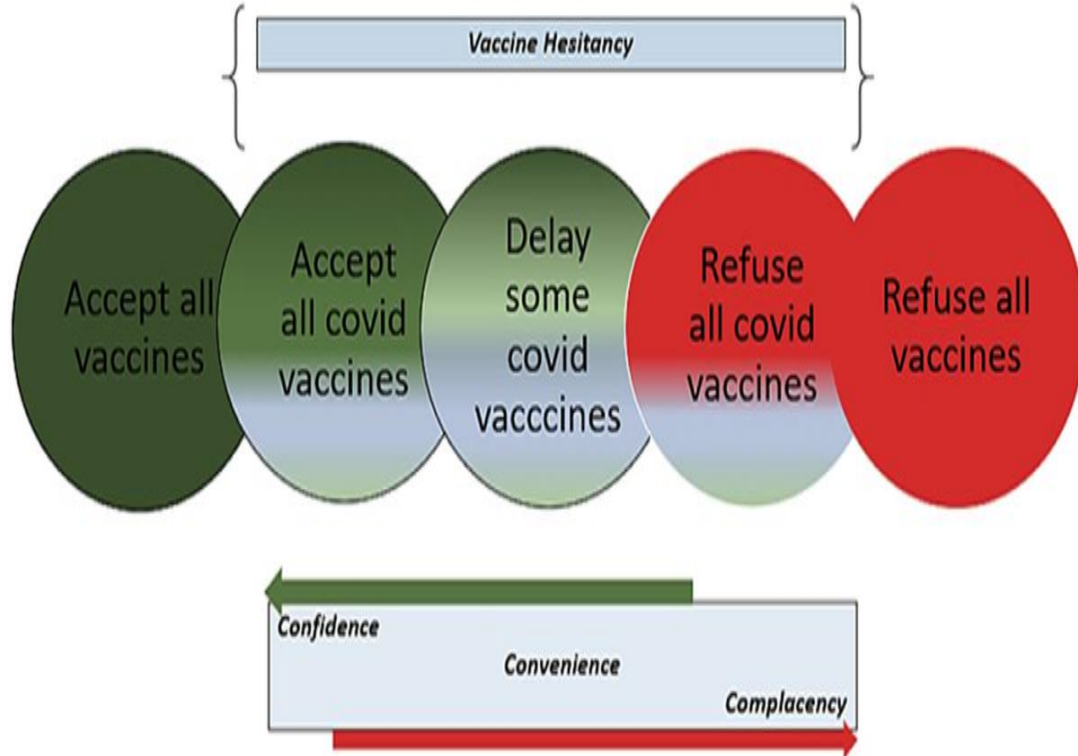
In addition to university medical students, nursing students have a greater possibility of infection with the COVID-19 virus and/or spreading the viral infection to those who are susceptible, this refers to different reasons: close contact among large students' numbers, the use of public transportation, and frequent contact among students during their everyday lives (Lee, 2020). Additionally, the high transmissibility of the COVID-19 infection combined with the involvement of students in patient care during their clinical training raises the possibility of this subpopulation acquiring and transmitting the infection, especially to vulnerable individuals like those who suffer from chronic diseases, cardiovascular disease, or cancer (Bani Hani et al., 2021; Brooks-Pollock et al., 2021).

However, nursing students often still have limited professional experience than medical professionals, and often have decreased awareness levels and less knowledge about the hazards of the diseases that may be transmitted to others, particularly those who seek healthcare in hospitals and healthcare centers. Furthermore, during the COVID-19 pandemic university students are suffering from higher levels of stress, anxiety, and depression than others, and they are increasingly being recognized as a susceptible group (Browning et al., 2021).

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The term "vaccine hesitancy" describes the spectrum between accepting and rejecting all vaccines that are offered to people. However, the decisions made before and after vaccination couldn't be comparable (Nomhwange et al., 2022). Although immunization is one of the most affordable and effective measures to prevent the infection by COVID-19 virus, the acceptance rate of vaccination varies crossways all people and countries.

Nursing students, and healthcare personnel' knowledge and attitudes, plus their willingness to obtain the vaccine for COVID-19 may have a significant impact on the population's current and future rates of vaccine acceptance (WHO, 2021a, and WHO, 2021b). Hence the current study aimed to identify the perception, preventive practice, and attitude toward a vaccine against COVID-19 among junior nursing students at Menoufia University.



Significance of the study:

Globally, as of October 2021, the virus had infected over 244 million individuals, and the COVID-19 pandemic caused 4.95 million deaths worldwide. Africa alone recorded an estimated 8.5 million COVID-19 infections and over 217 000 deaths. While the cases of COVID-19 increased to more than 270 million by December 2021 worldwide, causing 5.3 million deaths. Even though, effective vaccines are currently available, their distribution is still broadly inequitable and new waves of cases and mutations keep emerging (Our World in Data, 2021; and The Lancet Infectious Diseases, 2021). Vaccination against COVID-19 has significantly altered the progression of the pandemic, saving millions of lives globally.

Crosswise republics and nations, the real-world COVID-19 vaccine efficiency has largely been reliable with estimates of efficacy observed in clinical trials. Vaccines may also have more advantages of decelerating the transmission of the disease and decreasing the rate of infection and its related morbidity and mortality, in addition to the individualized level effect on disease risk and progression (Self et al., 2021; Hall et al., 2021; and Haas et al., 2021).

So the current study aimed to identify the perception, preventive practice, and attitude toward a vaccine against COVID-19 among junior nursing students at Menoufia University.

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Purpose of the study:

To identify the perception, preventive practice, and attitude toward a vaccine against COVID-19 among junior nursing students at Menoufia University

Study questions:

1. What is the perception toward COVID-19 among junior nursing students?
2. What is the preventive practice of COVID-19 among junior nursing students?
3. What is the attitude towards vaccination against COVID-19 among junior nursing students?

Methods

Research design:

Cross-sectional descriptive quantitative research

Research setting:

The study was carried out at the Medical-Surgical Nursing Department-Faculty of Nursing during the first semester of the academic year 2021-2022, Menoufia University, Shebin El Kom, Menoufia governorate.

Subjects:

A convenience sample consisted of 656 undergraduate nursing students of both genders who were enrolled in the fundamental of nursing course (first-year nursing students) and the medical surgical nursing course (second-year nursing students) 224 and 432 students respectively. Their ages ranged from 18-20 and willing to share in the study were recruited for the study. The sample size was statistically calculated by using the following equation:

$$\text{Sample size} = \frac{\frac{Z^2 \times P(1-P)}{e^2}}{1 + \frac{Z^2 \times P(1-P)}{e^2 N}}$$

N = size of population = 1886 students (1195 second year nursing students + 691 first year nursing students)

e = Error margin (decimal form percentage)

z score = corresponding standard class of significance at 95% = (1.96).

(z-score is the number of standard deviations that reflects the deviation from the mean).

The size of the sample was calculated to be 320 students, while the study's instrument form was completed by 656 students that hence in boost the power of the study.

Instruments:

The study had three instruments utilized by the researchers to gather the required data. These were as follows:

Instrument I: Self-administered questionnaire:

It has been developed by the researchers based on a relevant literature (Singh et al., 2021) and used to collect demographic data of all students and assess students' knowledge regarding COVID-19, its symptoms, mode of transmission, etc. it is divided into two parts as follows:

- **Part (1):** data related to the demographic as age, academic year, and gender.
- **Part (2):** it consists of 22 closed-ended questions divided into; seven questions about the perception of knowledge toward COVID-19, five questions about symptoms, five questions about transmission, and five questions about the prevention of COVID-19. A score of one was

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given to every correct answer and a score of zero was given to each unknown or incorrect answer. The total knowledge score ranged from zero to 22 then if the total knowledge score $\geq 65\%$ considered a satisfied knowledge level, the score ranging from 50% to $> 65\%$ was considered average or fair knowledge while the total knowledge score $< 50\%$ was considered as unsatisfactory knowledge level.

Instrument II: COVID-19 preventive practice questionnaire:

It was developed by the researchers on a relevant literature (Singh et al., 2021) and used to assess students' preventive practices for COVID-19. It included seven questions related to prevention practices such as wearing a mask and hand hygiene etc. It was a three points Likert scale: (0) never, (1) sometimes, and (2) always. The total scores ranged from 0 to 14 then total scores were categorized into the following categories:

- Satisfactory performance: $> 65\%$
- Unsatisfactory performance: $< 65\%$

Instrument III: Attitude towards COVID-19 vaccination scale:

It was developed by the researchers on a relevant literature (Singh et al., 2021) and used to assess students' attitudes towards COVID-19 vaccination. It was a three-point Likert scale that included five questions related to attitude towards COVID-19 vaccination such as availability and the effectiveness of the vaccine etc. The students' responses were categorized as (0) disagree, (1) uncertain and (2) agree. The total score ranged from 0 to 10. Then if a total score was $> 65\%$ indicated a positive attitude while a total score of $< 65\%$ indicated a negative attitude towards vaccination.

Methods:

• Written approval:

Written approval was obtained from the ethical committee (ethical approval No. 877) to carry out the study; then an authorized letter from the Faculty of Nursing Menoufia University was delivered to the responsible authorities to obtain official approval from them to carry out this study after explaining the purpose of the present study.

• Validity:

All instruments were tested for content validity by a jury of five experts in the field of Medical-Surgical Nursing, Faculty of Nursing, Menoufia University and modifications were done to ascertain relevance and completeness.

• Reliability:

All instruments were tested using a test-retest method and a Pearson correlation coefficient formula was used. The period between each test was two weeks. Test-retest reliability was done by the researchers for examining the instruments' internal consistency. It is the administration of the same instrument to the same participant under similar conditions in two or more instances. The reliability of all instruments was demonstrated to be 0.76, 0.83, and 0.71 for part (2) of the instruments I, II, and III respectively indicating that the scale has some reliability.

• Ethical Consideration:

Written and verbal participation agreement was obtained from all students after an explanation of the study purpose. Each student was reassured that any information obtained would be confidential and would only be used for the study purpose. The researchers emphasized

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that participation in the study was entirely voluntary, and the anonymity of the students was assured through the coding of data.

• **Pilot study:**

Before the conduction of the actual research, a pilot study on 10% of the study sample was to assess the feasibility and applicability of the instruments and estimate the time needed to collect data. Data obtained from the pilot study were excluded from the current study.

• **Data collection procedure:**

1. Data was collected in a period extended over two months from the beginning of October 2021 to the end of November 2021.
2. An online survey was used for data collection; students responded to a survey that was conducted utilizing a Google form to describe their experiences and perceptions.
3. Participants were thanked for their valuable participation and time.
4. After the data were completed the researchers download the study participants' responses in a form of a spreadsheet (excel sheet) and then transported them to the SPSS sheet to perform data statistical analysis

• **Statistical Analysis:**

The current data were tabulated, organized, and statistically analyzed using Statistical Package for the Social Sciences (SPSS) version 25. Two types of statistics were done:

Descriptive statistics: These describe a set of categorical data by frequency, percentage, or proportion of each category, are stated as mean and standard deviation ($X \pm SD$) for quantitative data or number and percentage (No & %) for qualitative data.

Analytical statistics: The Chi-square test (X^2) was used to examine the relationship between two qualitative variables. The Pearson correlation coefficient (r) was used to assess the relationship between the variables. Significance was adopted at $p < 0.05$ for the interpretation of results of tests of significance (Dawson and Trapp, 2012).

Results:

Table (1): showed that; the age of 67.5% of the studied students was between 19 and 21 years old and the mean age was 19.53 ± 0.963 years. More than half of the studied students were at the second academic level. Furthermore, 74.5 % of them were female.

Table (2): Revealed that; about three-fourths of the study students (76.2%, 76.5%) had a satisfactory knowledge level of COVID-19 and its preventive measures respectively, while 53.2% and 40.8% of the study students have satisfactory knowledge about COVID-19 symptoms and its mode transmission respectively. The mean total knowledge scores for studied students were 15.62 ± 4.10 .

Figure (1): Illustrated the students' total knowledge scores of COVID-19. The results revealed that 70.9% of students have a satisfied knowledge level about COVID-19.

Table (3): The findings revealed that; there was a significant difference between total knowledge regarding COVID-19 and age groups. Moreover; the results presented that females were having a satisfactory level of knowledge than male students with existed highly significant difference. While there was no statistically significant difference existed between academic year and levels of total knowledge.

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Table (4): Results cleared that; more than two-thirds of studied students (72.4%, 73.1%) always used masks, and performed hand cleaning before and after currently attending to each patient respectively. While 76.4% of them sometimes have been staying at home, practicing social distancing, in-addition to 70.7% sometimes have never been in crowded public gatherings currently respectively.

Figure (2): Illustrated the distribution of the studied students regarding their total practice towards the prevention of COVID-19. The results revealed that 92.7% of students have satisfied practice levels toward the prevention of COVID-19.

Table (5): Revealed that there was a highly statistically significant difference between gender and levels of total practice at a P-value 0.003. While there was no statistically significant difference existed between age and academic year and levels of total practice.

Table (6): Showed that; the attitude of the studied students towards vaccination against COVID-19, the results revealed that 71.8% and 83.2% of studied students agree with the statement in favor of vaccine against

COVID-19 because it is effective and safe and the vaccine is available free of cost respectively. While 19.2% of the study sample agreed with the statement of vaccination is not required because immunity will be acquired naturally by infection.

Figure (3): Showed the distribution of the studied students regarding their total attitude scores towards vaccination against COVID-19. The results revealed that 85.8% of the studied students reported a positive attitude towards vaccination against COVID-19.

Table (7): Showed that there was a highly statistically significant difference existed between gender and total attitude at a P-value 0.049. While there was no statistically significant difference existed between age and academic year and total attitude scores of studied students.

Table (8): and Figure (4): showed that there was a positive correlation between students' total knowledge scores of and practice regarding prevention and attitude regarding COVID-19 vaccination, and between total practice scores and attitude of students toward vaccination.

Table (1): Distribution of the studied students according to their demographic characteristic (N=656)

Items	No.	%
Age in years		
• 17-< 19	100	15.2
• 19-< 21	443	67.5
• 21- 22	113	17.2
Mean ± SD = (19.53 ± 0.963)		
Academic Year		
• First level	224	34.1
• Second level	432	65.9
Gender		
• Male	167	25.5
• Female	489	74.5

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Table (2): Distribution of the studied students according to their perception toward COVID-19 (N=656)

Knowledge subscales	Satisfactory		Average		Unsatisfactory		Mean ± SD
	No.	%	No.	%	No.	%	
Perception toward COVID-19	500	76.2	92	14.0	64	9.8	5.37 ± 1.34
• Perception toward COVID-19 symptoms	349	53.2	117	17.8	190	29.0	3.12 ± 1.81
• Perception toward COVID-19 transmission	268	40.8	230	35.1	158	24.1	3.14 ± 1.19
• Perception toward COVID-19 prevention	502	76.5	78	11.9	76	11.6	3.99 ± 1.32
Total knowledge score	465	70.9	112	17.1	79	12.0	15.62 ± 4.10

Figure (1): Total knowledge level toward COVID-19 among studied students (N=656)

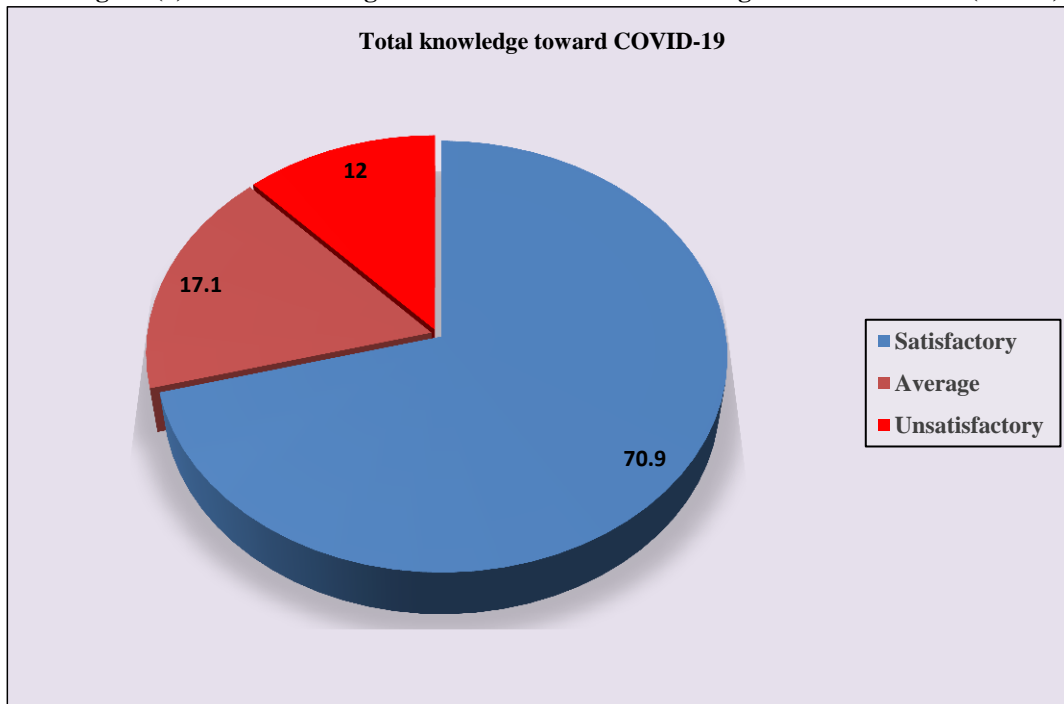


Table (3): Relationship between studied students' demographic data and their total knowledge level toward COVID-19 (N=656)

Demographic characteristics		Levels of total knowledge level						X ²	P-Value
		Satisfactory (N=465)		Average (N=112)		Unsatisfactory (N=79)			
		No.	%	No.	%	No.	%		
Age (years)	• 17-< 19	66	14.2	20	17.9	14	17.7	9.076	0.044*
	• 19-< 21	306	65.8	81	72.3	56	70.9		
	• 21- 22	93	20.0	11	9.8	9	11.4		
Academic year	• First level	156	33.5	41	36.6	27	34.2	0.376	0.829
	• Second level	309	66.5	71	63.4	52	65.8		
Gender	• Male	94	20.2	37	33.0	36	45.6	26.96	0.000*
	• Female	371	79.8	75	67.0	43	54.4		

* P value < 0.05 denoted that statistically significant.

** P value < 0.01 denoted that highly statistically significant.

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Table (4): Distribution of practice towards prevention of COVID-19 among the studied students (N=656)

Items	Always		Sometimes		Never	
	No.	%	No.	%	No.	%
Have never been in crowded public gathering currently	141	21.5	464	70.7	51	7.8
Have used mask whenever attended any patients currently	475	72.4	148	22.6	33	5.0
Have restrained from shaking hands currently	186	28.4	402	61.3	68	10.4
Have cleaned hands before and after attending every patient currently	480	73.1	144	22.0	32	4.9
Have used mask whenever went out of the home	382	58.2	244	37.2	30	4.6
How often do you wear a mask when leaving your home?	353	53.8	289	44.1	14	2.1
Have you been staying at home and practicing social distancing?	0	0.0	501	76.4	155	23.6

Note: More than one answer has been chosen

Figure (2): Distribution of the total practice scores towards prevention of COVID-19 among studied students (N=656)

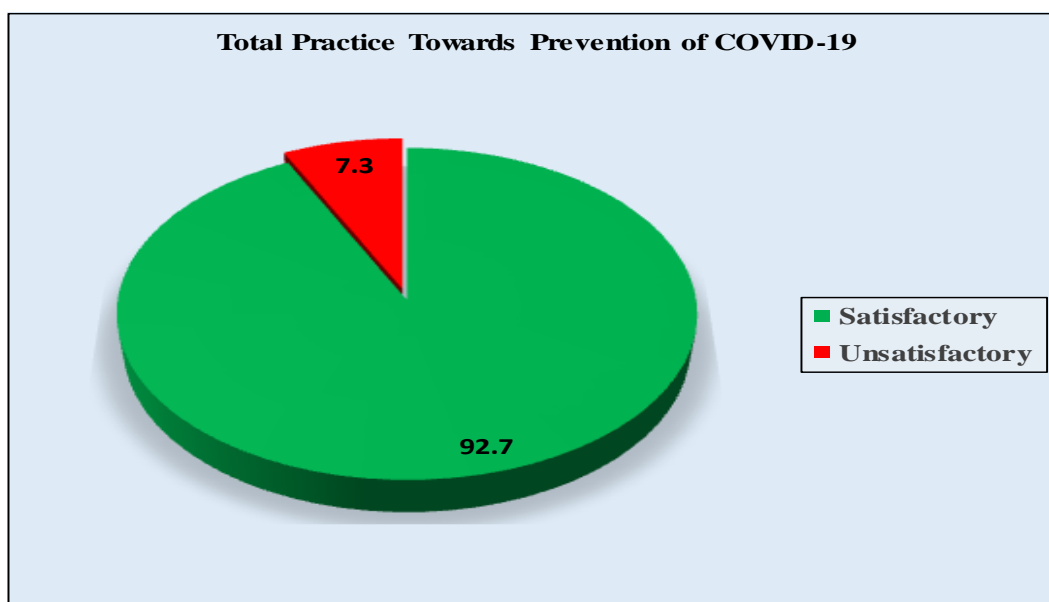


Table (5): Relationship between demographic characteristics of the studied students and their total practice towards prevention of COVID-19 (N=656)

Demographic characteristics		Levels of total practice				X ²	P-Value
		Satisfactory (N=608)		Unsatisfactory (N=48)			
		No.	%	No.	%		
Age (years)	• 17-< 19	90	14.8	10	20.8	2.467	0.291
	• 19-< 21	410	67.4	33	68.8		
	• 21- 22	108	17.8	5	10.4		
Academic year	• First level	205	33.7	19	39.6	0.681	0.409
	• Second level	403	66.3	29	60.4		
Gender	• Male	146	24.0	21	43.8	9.132	0.003**
	• Female	462	76.0	27	56.3		

** P value < 0.01 denoted that highly statistically significant.

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Table (6): Distribution of attitude of the studied students towards vaccination against COVID-19(N=656)

Items	Agree		Uncertain		Disagree	
	No.	%	No.	%	No.	%
In favor of vaccine against COVID-19, because it is effective and safe	471	71.8	74	11.3	111	16.9
Vaccine against COVID-19 is available free of cost	546	83.2	55	8.4	55	8.4
Children do not require to get COVID-19 vaccination	258	39.3	270	41.2	128	19.5
Do not rely on COVID-19 vaccine due to emergency development during pandemic	294	44.8	164	25.0	198	30.2
Vaccination is not required because immunity will be acquired naturally by infection	126	19.2	417	63.6	113	17.2

Note: More than one answer has been chosen

Figure (3): Distribution of the studied students according to their total attitude towards vaccination against COVID-19(N=656)

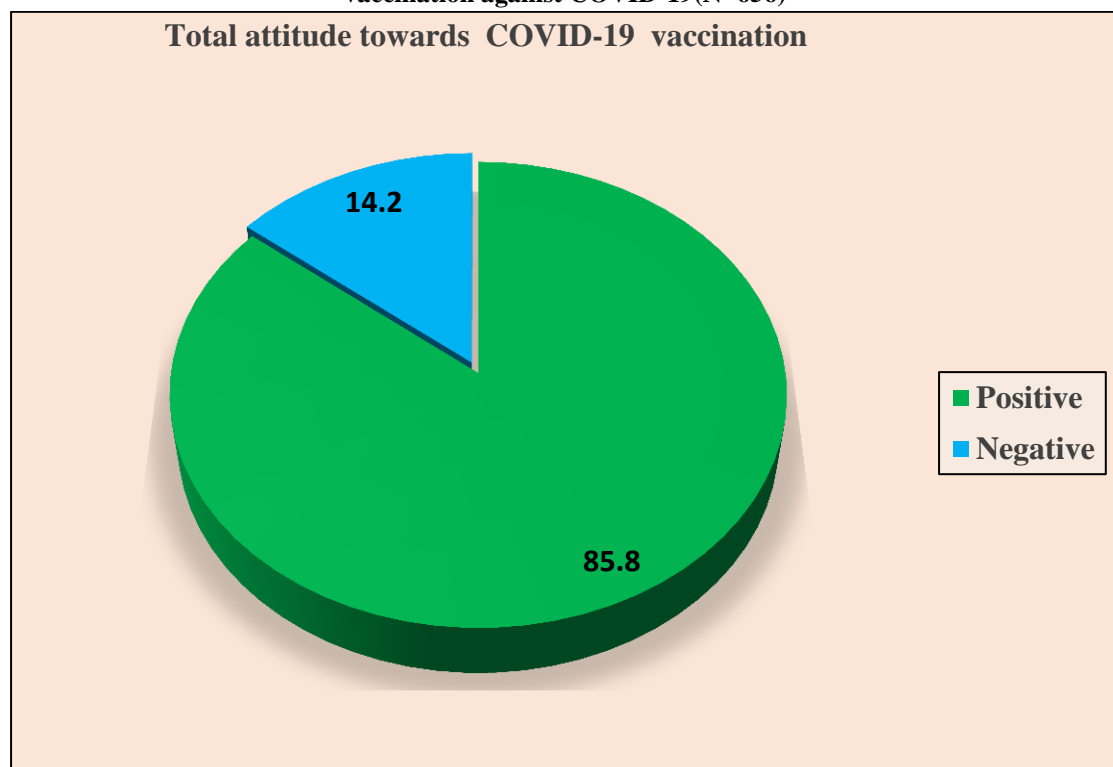


Table (7): Relationship between demographic characteristics of the studied students and their total attitude towards COVID-19 vaccination (N=656)

Demographic characteristics		Total attitude				X ²	P-Value
		Positive (N=563)		Negative (N=93)			
		No.	%	No.	%		
Age (years)	• 17-< 19	86	15.3	14	15.1	1.505	0.471
	• 19-< 21	376	66.8	67	72.0		
	• 21- 22	101	17.9	12	12.9		
Academic year	• First level	188	33.4	36	38.7	1.004	0.316
	• Second level	375	66.6	57	61.3		
Gender	• Male	136	24.2	31	33.3	3.542	0.049*
	• Female	427	75.8	62	66.7		

* Statistically significant at $p < 0.05$.

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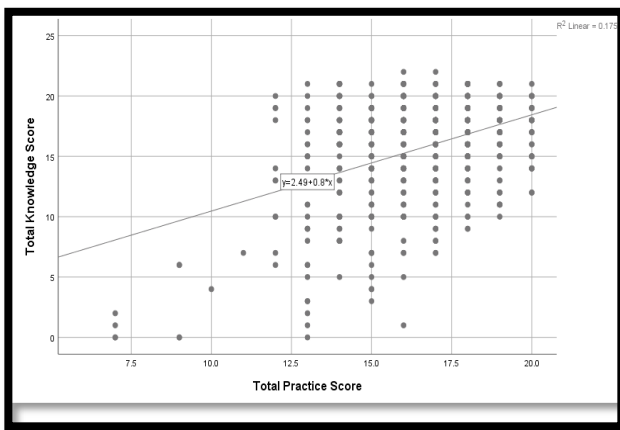
Table (8): Correlation between students' knowledge, practices and attitude towards COVID-19 (N=656)

Variables	Total knowledge		Total practices	
	r	p-value	r	p-value
Total practices	0.418	0.000**		
Total attitude	0.462	0.000**	0.324	0.000**

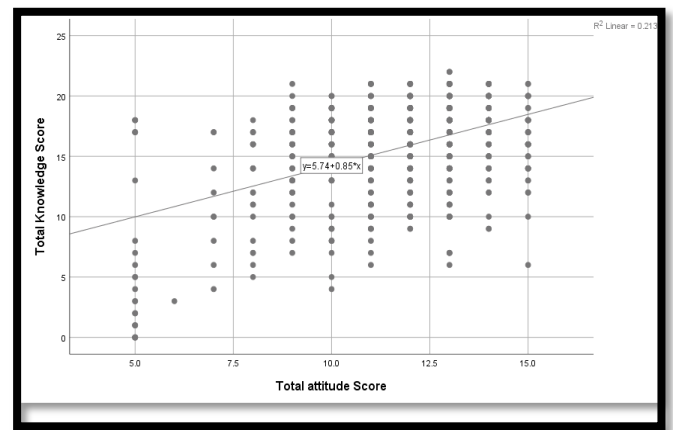
r= Pearson correlation test.

** P value < 0.01 denoted that highly statistically significant.

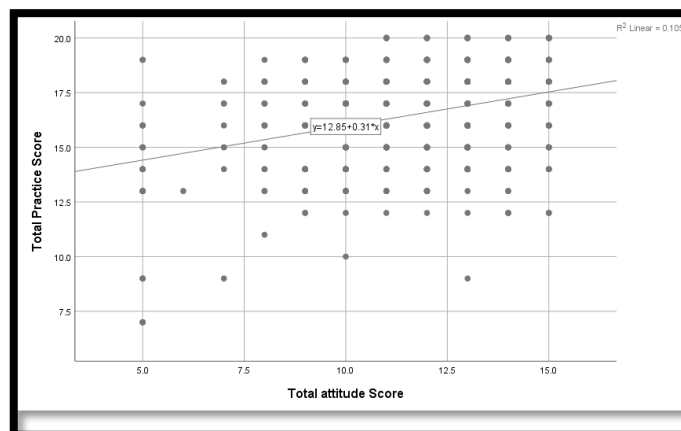
Figure (4): Correlation between students' knowledge, practices and attitude towards COVID-19 (N=656)



Correlation between total knowledge score and total practice score



Correlation between total knowledge score and total attitude score



Correlation between total practice score and total attitude score

Discussion:

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COVID-19 or Coronavirus pandemic is the newest outbreak having a significant global morbidity and mortality rate. This outbreak has threatened global public health also it has had a devastating socio-economic impact. Emergencies like these can alter the academic functioning and psychophysical well-being of nursing students. The current study focused on identifying the junior nursing students' perception, preventive practices, and attitude toward COVID-19 vaccination.

The existing study results revealed that the almost two thirds of participants was obtained from second-year students. The students were between 17–22 years old (Mean \pm SD= 19.53 \pm 0.963). around three-quarters of the students were female. These results were consistent with Albaqawi et al., (2020) who reported that the highest number of respondents was obtained from the age group between 18–45 years old (Mean \pm SD = 21.62 \pm 2.06), and over two-thirds of the students enrolled in the study were female.

The student's perception toward COVID-19

The existing study results revealed that the mean of COVID-19 knowledge scores were 15.62 (SD: 4.10) which indicated a satisfactory level of knowledge of COVID-19 among junior nursing students. The reported results were consistent with the results reported by Zhong et al. (2020) who studied the perception of COVID-19 among residents in China which cleared that the mean COVID-19 knowledge score was 10.8 (SD: 1.6). Furthermore Clements, (2020) reported that the mean knowledge score was 9.72 (SD: 1.93) for an overall correct percentage of approximately 80% among US residents using the same questionnaire.

In another study that examine the attitude and knowledge among healthcare workers regards toward COVID-19 Huynh et al. (2020) added that the majority of their study sample from healthcare workers was nurses and they demonstrated a positive attitude and good knowledge level. However, almost two-thirds of the study population was aware of the virus transmission mode, isolation duration, and the course of treatment. Furthermore; An et al., (2022) stated that the majority of participants possessed adequate knowledge about COVID-19 and revealed that the majority of those were aware of key information, including that COVID-19 was brought on by the SARS-CoV-2 virus, its transmission, common symptoms, and specific medication for treatment.

The findings are similar to those of an earlier study conducted on students by Le An et al., (2021) in terms of knowledge, which found that the most of students had good knowledge as regard Coronavirus, transmission, signs, medication, and preventive measures. Besides, the total knowledge score was greater than the knowledge score reported by Chen et al., (2021), which found that only 63.7% of their participants had good knowledge (2021). Tadesse et al., (2021) and Ahdab (2020) added, around two-thirds of university students had a good level of knowledge regarding the COVID-19 pandemic although the knowledge scores were less than the knowledge scores of the present study participants.

From the researchers' point of view, the satisfied knowledge level of students may have been a consequence of the measures of the government, and related authorized ministries (health ministry, higher education, etc.) to enhance the awareness of the people

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through information broadcasting through news outlets, social media, flyers, and posters. Also, universities and faculties had implemented measures to ensure the adequate knowledge and protection of all students. The effectiveness of such efforts can be supported by the current study results. While the discrepancy in the results may be referred to differences in knowledge level categorization values, sample size, and sociodemographic variables between study settings.

Moreover, results in the current study showed that females had better knowledge than males. These results were supported by Zhong et al. (2020) and Clements, (2020) in which this difference was also observed between genders residence in China and the US, where females scored higher than male students. Furthermore, differences in knowledge scores concerning gender existed among Saudi nursing students as mentioned by Cruz (2019) and Cruz and Bashtawi (2016) in their study titled "predictors of hand hygiene practice among Saudi nursing students". Additionally, Olaimat et al., (2020) and Albaqawi et al., (2020) support these findings and added; female students scored higher than male students and older individuals. Also, the current results revealed that the age groups between 19–21 years have higher knowledge scores than younger students. This may be attributed to the fact of older students' knowledge scores were significantly higher than those of younger and junior students because they had a greater capacity to learn and highly retention span.

The student's preventive practice of COVID-19

Concerning preventive practices performed by students, the present study results indicated that the most of studied students practiced preventive practices and followed infection control rules for example using a face mask, cleaning hands, practicing physical distancing, and being away from crowded areas. These results were in agreement with An et al., (2022) who reported that the majority of their study participants would accept isolation if they contracted COVID-19, granted that washing hands and wearing masks could prevent the transmission of COVID-19 and most of them had good practices, which over 80% of the participants had appropriate hygiene habits and social distancing. Moreover, the results were also supported by other previous studies by Le An et al., (2021); Zhang et al., (2021), and Huynh et al., (2020) who added that their studies participants during the COVID-19 outbreak demonstrated a high level of performance as regards preventive practice that indicated the effectiveness of education that delivered by massive public education strategies. Moreover, Tadesse et al., (2021) results revealed that more than two-thirds of studied students demonstrated a positive attitude towards the COVID-19 pandemic preventive strategies.

From the researchers' point of view, the satisfaction level of preventive practice for students may have been a result of the nature and field of the study nursing program, and knowledge level which is significantly associated with the attitude of students towards COVID-19 prevention practice. In addition; measures approved by authorized ministries for improving awareness and practice to overcome the spread of COVID-19 infection.

The student's attitude towards COVID-19 vaccination

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According to the study findings regarding the attitude of the studied students towards COVID-19 vaccination, the results revealed the majority of studied students had a positive attitude towards COVID-19 vaccination because it is effective, safe and the vaccine is available free. Although they reported that, as the results of the immunity will be acquired spontaneously through infection, vaccination is not necessary. Furthermore; females of second-year students had more positive attitudes than male students in the same academic year and students of another academic year (first-year students).

These results were in the same line with the earlier study findings which indicated that nursing students had a positive perception regarding the vaccination of COVID-19 and agreed to receive it (An et al., 2022, and Jiang et al., 2021), Furthermore; previously mentioned findings revealed that older students' attitude scores were higher than those of students in lower grades. This may be related to the older students would be exposed to various patients every day and thus their risk of contracting COVID-19 was much higher than the risk of students from other grades. So, their attitudes toward the COVID-19 vaccine were more positive.

According to the regression analysis, gender, and academic background; the findings of Jiang et al., (2021), showed that female students were willingness to receive vaccination than male students, which is in contrast to the findings of other studies' results (Freeman et al., 2020; Unroe et al., 2021). This might be because that nursing has historically been a female-dominated profession. This discrepancy may be related to the fact that the pandemic is now better controlled and students are less anxious and decreased chance of

infection. This data implies that vaccine acceptability was lower when COVID-19's perceived severity and fear were lower, which is validated and supported by other findings (Qiao et al., 2020; Graffigna et al., 2020; Reiter et al., 2020).

Conclusion:

- Most of the junior nursing students had a satisfactory level as regards the perception of knowledge about symptoms, transmission, and prevention of COVID-19.
- There is a statistical significant difference between demographic characteristics as regards the age and gender of the studied students and their total knowledge level toward COVID-19 but there was no significant difference as regards the academic year.
- The majority of the studied sample has a satisfied level as regards preventive practice level for the prevention of COVID-19.
- Most of the studied nursing students reported a positive attitude toward vaccination against COVID-19.

Recommendation:

- Appropriate vaccination strategies are essential and required via educational interventions through authentic sources for wider coverage of the whole university students.
- A proper training program would enable university students to fight better in preventing COVID-19.
- Replication of the study using a larger probability sample from different geographical areas to help for generalization of the results.

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