

Student Nurses Perception Regarding Preventive Measures for Coronavirus Infection

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Abstract

Background: The coronavirus disease pandemic is ongoing, and prevention measures in nursing education are essential. However, there are few studies on infection-prevention measures among nursing students. **Aim of the study:** To investigate student nurses perception regarding preventive measures for coronavirus infection. **Research design:** A descriptive design was used in this study. **Setting:** The study was conducted at Maternity and Gynecological Nursing Department at the nursing faculty at; Ain shams university. **Sample:** Purposive sample consisted of 127 male and female nursing students in the 3rd academic year from the previously mentioned setting. **Tools:** 2 tools were used the 1st tool structured interviewing questionnaire. The 2nd tool was student nurses' attitudes regarding preventive measures for coronavirus infection. **Results:** the majority of the studied sample had total correct knowledge and nearly three-quarters of the studied sample had a positive attitude regarding preventive measures for COVID-19 and its preventive measures and there was a weak positive correlation between total knowledge and total attitude regarding preventive measures for coronavirus infection among the studied sample. **Conclusion:** The majority of the study sample had correct knowledge about preventive measures for coronavirus infection. Additionally, nearly three-quarters of the study sample had a positive attitude regarding preventive measures for coronavirus infection. Furthermore, there was a weak positive correlation between the total knowledge and the total student nurses' attitudes. **Recommendations:** Design and implement guidelines for nurses regarding preventive measures for COVID-19 to enhance their knowledge and attitude. **Further research:** Investigate healthcare team compliance with preventive measures for COVID-19 in the clinical settings.

Keywords: student nurse, Coronavirus, Preventive measures, Perception.

Introduction:

In December 2019, a rapidly infectious disease emerged in Wuhan city in China. A member of the coronavirus family caused the disease, finally named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The highly contagious virus, which caused coronavirus disease (COVID-19), spread outside China and has become a global public health emergency. In severe cases, the virus causes fatal pneumonia similar to that caused by severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV), which have emerged in the past 20 years in sporadic countries all over the world (Abdelhafiz et al., 2020).

COVID-19 is primarily spread through the inhalation of droplets or fomites, according to epidemiology. Small droplets produced by an infected person with or without symptoms can be aerosolized and inhaled by those in close contact through coughing, sneezing,

talking, or singing. In addition, poorly ventilated spaces increase the risk of transmission. (Fan et al., 2020).

However, symptoms of coronavirus infection are reported by the centers for disease control and prevention (CDC) to be fever, cough, shortness of breath, fatigue, muscle or body aches, headache, loss of taste or smell, sore throat, congestion, or runny nose, nausea or vomiting, and diarrhea. The elderly and patients with comorbidities such as diabetes mellitus, heart disease, hypertension, and immune deficiency disease are more likely to be infected and are more prone to severe complications, which may be associated with acute respiratory distress syndrome (CDC, 2019).

Bilateral pneumonia, which can progress to acute respiratory distress syndrome (ARDS), sepsis, septic shock, acute kidney injury (AKI), coagulopathy, rhabdomyolysis, hyponatremia, and

acidosis are the most common complications in COVID-19. (Madabhavi et al., 2020). Clinical manifestations, molecular diagnostics of the viral genome by quantitative reverse transcriptase Polymerase Chain Reaction (RT-PCR), chest x-ray or CT scan, and serology blood tests are used to diagnose COVID-19. (Esakandari et al., 2020)

The U.S. Food and Drug Administration (FDA) has approved the first antiviral drug remdesivir (Veklury) to treat COVID-19 in certain situations, but the WHO found that remdesivir does not affect mortality and duration of hospital stay in hospitalized patients. Clinical management of COVID-19 includes infection prevention and control measures and supportive care, including supplemental oxygen and mechanical ventilatory support when indicated. Infection prevention and control is a critical and integral part of the clinical management of COVID 19 patients (FDA & WHO, 2020)

WHO 2020 recommended the following preventive measures to be utilized by healthcare workers which are: applying standard precautions for all patients as hand hygiene with water and soap and disinfection with at least 70% alcohol, respiratory hygiene (cover nose and mouth with a tissue or bent elbow when coughing or sneezing), use of personal protective equipment as wear mask and gloves, environmental cleaning (clean surfaces thoroughly with water and detergent and apply a disinfectant solution either 0.1% (1000 ppm) sodium hypochlorite or 70-90% ethanol are effective) (WHO, 2020).

Additionally, waste management includes using appropriate personal protective equipment (PPE) while managing infectious waste and performing hand hygiene after taking off the PPE. It also includes isolation and cohorting of patients with suspected or confirmed COVID-19. Patients should be placed in well-ventilated single rooms if feasible, contact and droplet precautions should be taken through perform hand hygiene before putting on and after removing PPE and using appropriate PPE) and airborne precautions (performing procedures in an adequately ventilated room). Therefore, implementing administrative controls and implementing

environmental and engineering controls (WHO, 2020)

Moreover, health care workers, which included physicians, nurses, medical students, and hospital aids are at the frontline of COVID- 19 pandemic defense and are exposed to infection with COVID-19 due to their frequent exposure to infected individuals. They must comply with the previously mentioned preventive measures by WHO, 2020, to reduce infection and morbidity, and mortality among clients, patients, and health care workers in the Egyptian community. Additionally, the Ministry of Health and Population has addressed the previously mentioned preventive measures to utilize all health services and clients in the Egyptian community (CDC,2020).

Perception is the conceptual impression that is developed of “reality” which in turn affects the individual’s behavior and actions towards that object. The perception of student nurses regarding preventive measures for coronavirus infection is referred to the way how student nurses think about preventive measures for coronavirus infection. Student nurses are the future workforce in providing health care and working with COVID-19 cases, therefore it is important to investigate their perception to ensure the effectiveness of preventive measures on COVID-19 outbreaks and community (Elhadi et al.,2020).

Significance of the Study:

In Egypt, 106877 confirmed covid 19, including 6222 deaths, but morbidity and mortality confirmed healthcare workers and student nurses are estimated by the Ministry of Health till nowadays (WHO, 2020).

Moreover, 570,000 health workers have fallen ill, and more than 2,500 deaths are reported in the United States. So, it is observed from the relevant data that coronavirus infection is the killer number one among health workers and clients in the community (Pan American Health Organization, 2020). However, preventive measures for coronavirus infection can reduce transmission of the virus and reduce morbidity

and mortality among student nurses and all people in the community. So, the current study will investigate student nurses perception regarding preventive measures for coronavirus infection.

Aim of the study:

This study aimed to investigate student nurses perception regarding preventive measures for coronavirus infection.

Research Questions:

1. What is the student nurse's knowledge regarding preventive measures for coronavirus infection?
2. What is the student nurse's attitude regarding preventive measures for coronavirus infection?
3. What are barriers prevent student nurses to comply with preventive measures regarding coronavirus infection?

Subjects and methods:

Technical design: The Technical design for the study included: setting, research design, subjects, tools used for data collection, and ethical considerations.

Research design:

A descriptive design was used in this study.

Setting:

The study was conducted at the central laboratory of maternity and gynecological nursing at the nursing faculty; of Ain shams university.

Subjects:

Sample type: purposive sample

Inclusion Criteria:

- All male and female student nurses in the 3rd academic year at the maternity and gynecological nursing department in 2021-2022.

Sample size: the estimated sample size was 127 student nurses at the 3rd academic year (2021-2022), at a confidence level of 95% and a precision rate of 0.05 by using the steven equation, 2012 (Steven., 2012)

$$n = \frac{Nxp(1-p)}{[N-1x(d^2 \div z^2)] + p(1-p)]}$$

P= 0.5

N= Total population

Z= Z value "1.96"

D= Standard Error

n= sample size.

Tools of data collection:

Two tools were used in the study to achieve the aim as the following:

Tool 1: A structured interviewing questionnaire: including 43 multiple choice questions which were adapted from (WHO, 2020) and included three parts:

Part 1: student nurses' general characteristics such as age, sex, and area of residence.

Part 2: Student nurse knowledge about COVID-19, source of information, and its preventive measures (causes, mode of transmission, signs and symptoms, incubation period, risk factors, complications, screening tests, treatment, vaccine, source of information, and preventive measures for coronavirus infection).

Part 3: Barriers that prevent student nurses to comply with preventive measures for coronavirus infection adapted from Houghton et al. (2020) as (organizational barriers, environmental barriers, and individual barriers that prevent student nurses to comply with preventive measures for coronavirus infection.

❖ Scoring system:

The Scoring system for evaluating student nurse knowledge was designed as the following:

Each question was scored 2 for the correct answer and 1 for an incorrect answer, while the total Knowledge score was calculated as the following:

Student nurse knowledge was considered correct if the total correct is equal to or more than 60%, while incorrect if it is less than 60%.

Tool 2: Student nurses' attitude regarding preventive measures for coronavirus infection

Was adapted from Abdel Elhafiz, 2020 to be matched the aim of the study investigating student nurses' attitude regarding preventive measures for coronavirus infection, which included 10 statements. The student nurse responded either agree, disagree, or uncertain.

❖ Scoring system:

Each item was scored as follows; (Agree response scored 3, uncertain scored 2, and disagree scored 1).

The total score was 10 points, which was graded as equal to or more than (18-30)60% positive attitude, while less than (18)60% negative attitude.

Validity: tools were reviewed by a jury (3 expertise) in maternity and gynecological specialty to test the content of validity of tools then necessary modification was done accordingly, it results in some modification and rephrasing of the statement of student nurses' attitude regarding preventive measures for coronavirus infection questionnaire.

Reliability:

Cronbach's alpha was acceptable: student nurses' knowledge (0.729), barriers that prevent compliance with preventive measures (0.747), and student nurses' attitude (0.844).

Ethical Considerations

The ethical research considerations in this study included the following:

Ethical approval was obtained from the Scientific Research Ethical Committee in the Faculty of Nursing at Ain Shams University before starting the study. Official permission was obtained from the Dean of Faculty and the Maternity and Gynecological Department Head Faculty of Nursing at Ain Shams University, in which the study was conducted. Besides, the researcher clarified the study's objective and aim for student nurses included in the study. Oral consent was obtained from each participant

before data collection. They were assured that anonymity and confidentiality would be guaranteed with no harm. The right of student nurses to withdraw from the study at any time.

Operational design:

The operational design for the study included a pilot study and Fieldwork.

Pilot study:

A pilot study was carried out on 10% of the total sample size to test the content validity of the tools used; according to the statistical analysis no modifications were done. Student nurses included in the pilot study were included in the total sample.

Fieldwork:

Phase 1: The researcher reviewed the national and international related literature and then developed tools for data collection.

Phase 2:

- The researcher attended the previously mentioned study setting to interview students in the first term of the 3rd academic year (2021-2022) at the maternity and gynecological department according to the predetermined criteria and the power analysis.
- Data collection was started from the end of October 2021 to the beginning of January 2022 and was collected 3 days per week.
- The researcher attended to interview 10 student nurses every week on the clinical training day or in between lectures.
- The researcher introduced herself to student nurses and explained the study's aim to gain their trust and obtain oral consent from the participants to participate in the study.
- Firstly, the researcher distributed the interviewing questionnaire to student nurses to investigate their general characteristics, their knowledge regarding COVID-19 preventive measures, and barriers that prevent student nurses to comply with preventive measures for coronavirus infection using a structured interviewing questionnaire. The time needed for filling in the questionnaire was 30 minutes.

- Secondly, the researcher investigated student nurses' attitudes regarding preventive measures for coronavirus infection using the attitude tool for each student nurse. The time needed for filling in the attitude tool was 10 minutes.
- This was repeated the next week till the sample size would be reached the predetermined size.

3. Administrative Design:

Official permission was obtained from the Dean of Faculty of Nursing at Ain Shams University in which the study was conducted as a letter would be sent explaining the aim of the study.

4. Statistical design:

Data collected from the studied sample was revised, coded, and entered using Personal Computer (PC). Computerized data entry and Statistical analysis were fulfilled using the Statistical Package for Social Sciences (SPSS) version 25. Data were presented using descriptive statistics in the form of frequencies, and percentages. The Chi-square test (X^2) was used for comparisons between qualitative variables.

Results:

Table (1): showed that (57.5%) of the studied sample age are less than 21 years with the Mean \pm SD of age being 20.61 ± 0.90 years. As regards sex, 63% of the studied sample are female. Also, 55.1% of them reside in urban areas.

Table (1): Distribution of the studied sample according to their general characteristics (n = 127).

General characteristics	N	%
Age (years)		
< 21	73	57.5
21-22	49	38.6
> 22	5	3.9
Mean SD	20.61\pm0.90	
Sex		
Male	47	37
Female	80	63
Residence		
Urban	70	55.1
Rural	57	44.9

Figure (1): showed that 41.7% of the studied sample has information about COVID-19 from the internet. Also, 17.3% and 14.2% of them have information from social media and the World Health Organization, respectively. 4.7% of them have information about COVID-19 from a medical article.

Figure (2): showed that 80.3% of the studied sample has correct knowledge regarding COVID-19 and its preventive measures. While 19.7% of them have incorrect knowledge.

Figure (3): revealed that 72.4% of the studied sample have a positive attitude regarding preventive measures for coronavirus infection. While 27.6% of them have a negative attitude.

Table (2): showed that 80.3% of the students face environmental barriers to comply with the preventive measures for COVID-19 infection as lack of disinfectant and hand washing supplies. 66.9% of the students face organizational barriers such as a lack of training programs about preventive measures and how to use personal protective equipment. 55.1% of them face individual barriers such as fear of being infected with coronavirus infection due to occasionally unavailable of authorized personal protective equipment.

Table (3): indicated that there is a weak positive correlation between total knowledge and total attitude regarding preventive measures for coronavirus infection among the studied sample at ($P = < 0.01$).

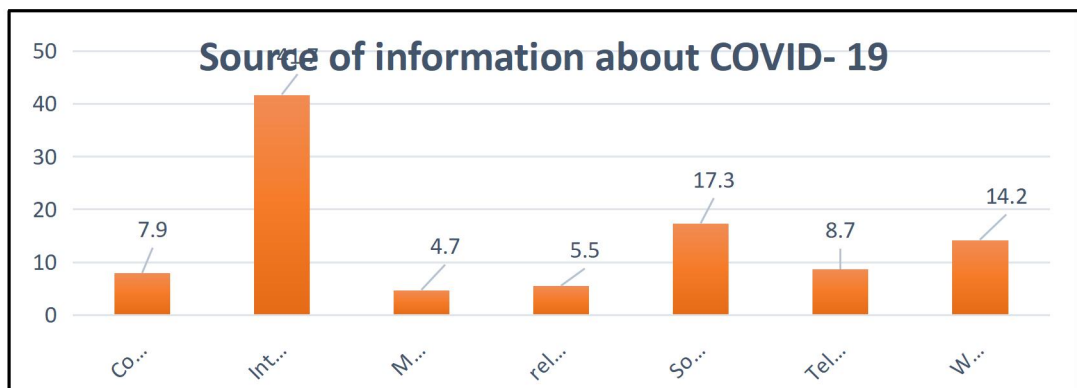


Figure (1): Percentage distribution of the studied sample according to the source of information about COVID- 19 (n = 127).

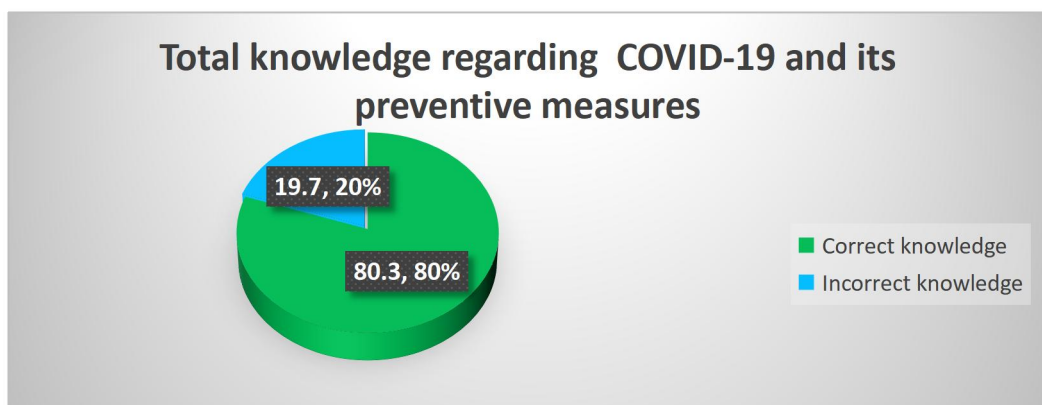


Figure (2): Percentage distribution of the studied sample according to their total knowledge regarding preventive measures for COVID-19 (n = 127).

Figure (3): Percentage distribution of the studied sample according to their total attitude regarding preventive measures for coronavirus infection (n = 127).

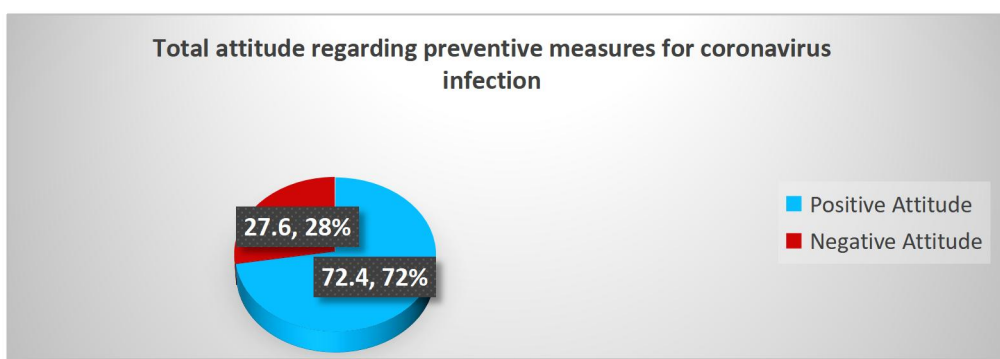


Table (2): Distribution of the studied sample according to the barrier that prevents compliance with preventive measures for COVID -19 infection (**n = 127**).

Items	Yes N	%	No N	%
Organizational barriers				
No monitoring system for assessing the utilization of preventive measures for COVID- 19	29	22.8	98	77.2
No guidelines or protocol or brochures or standard of care related to preventive measures for COVID- 19	83	65.4	44	34.6
Lack of training programs about preventive measures and how to use personal protective equipment.	85	66.9	42	33.1
Lack of health team specializes in monitoring the utilization of preventive measures for COVID -19.	34	26.8	93	73.2
Environmental barriers				
Lack of isolation rooms	67	52.8	67	52.8
Lack of disinfectant and handwashing supplies.	102	80.3	25	19.7
No availability of personal protective equipment.	51	40.2	76	59.8
Individual barriers				
Fear of being infected with coronavirus infection due to occasionally unavailable of authorized personal protective equipment.	70	55.1	57	44.9
Absent of nurses due to sick leave.	53	41.7	74	58.3
The healthcare team always refuse to wear personal protective equipment such as mask, and gloves.	44	34.6	83	65.4

Table (3): Correlation between total knowledge and total attitude regarding preventive measures for coronavirus infection among the studied sample (**n=127**).

Items	Total knowledge
Total attitude	r =. 524 P =. 000**

Discussion:

COVID-19 is rapidly spread worldwide and was declared a pandemic by the World Health Organization (WHO, 2020). the present study aimed to investigate student nurses perception regarding preventive measures for coronavirus infection. This aim was significantly approved within the framework of the present study's research questions.

The first research question was "What is the student nurse's knowledge regarding preventive measures for coronavirus infection?" this question was significantly answered through the current study findings as it was showed that the majority of the study sample had correct knowledge about the preventive measure for coronavirus infection, the present study findings revealed that majority of the studied sample had total correct knowledge about COVID-19 and its preventive measures. This result was similar to Zhang et al. (2020) who studied (Knowledge, attitude, and practice regarding COVID-19 among healthcare workers in Henan, China) and

concluded that the majority of the studied sample had correct knowledge. Also, these findings were supported by Lang et al. (2021) who found that majority of the participants knew preventive measures about COVID19.

As regards sources of information about COVID- 19 and its preventive measures the current study showed that more than one-third of the study sample knew from the internet. These results agreed with the study performed by (Magklara et al., 2021) about (The Role of Medical Students During COVID-19 Era) who stated that more than one-third of the studied sample knew from the internet. Also, these findings are supported by Ali (2021) who studied (COVID-19 related knowledge and practice and barriers that hinder adherence to preventive measures among the Egyptian community).

These findings also agreed with the study performed by Nemat et al. (2021) to assess student knowledge about COVID-19 at different Jordanian universities and determine where they sourced their information stating

that more than one-third of the study sample had a source of information from the internet. This is because mobile internet is easily accessible by most student nurses at home and on the faculty.

On the other hand, these findings disagreed with **Noreen et al. (2020)** who stated that the majority of the studied sample had information sources from television.

Concerning the second research question “What is the student nurse's attitude regarding preventive measures for coronavirus infection?” this question was achieved through the present findings as it was revealed that nearly three-quarters of the studied sample had a positive attitude regarding preventive measures for COVID19. This finding was in the same line with **Ferdous et al. (2020)** who studied Knowledge, attitude, and practice regarding the COVID-19 outbreak in Bangladesh: An online-based cross-sectional study reported nearly three-quarters of the studied sample had a positive attitude toward preventive measures about COVID-19.

These results also agreed with the study done by **Shrivastava et al. (2021)** about the Assessment of knowledge and attitude of allied healthcare professionals about COVID-19 across Saudi Arabia. These findings also were consistent with **Aynalem et al. (2021)** who found that majority of the healthcare workers in Yemen had a positive attitude toward preventive measures for COVID-19.

Regarding the third research question “What are barriers that prevent student nurses to comply with preventive measures regarding coronavirus infection?” this question was answered through the current study findings as it revealed that the main barrier according to the present findings among the majority of the studied sample was environmental barriers as lack of disinfectant and hand washing supplies.

The findings were in the same line as those (**Saqlain, et al.,2020**) who studied Knowledge, attitude, practice, and perceived barriers among healthcare professionals

regarding COVID-19: A Cross-sectional survey from Pakistan)reported that the studied sample faces environmental barriers to comply with the preventive measures for COVID -19 infection such as lack of disinfectant and hand washing supplies.

These findings disagreed with **Abed Alah et al. (2021)** who studied (Compliance and barriers to the use of infection prevention and control measures among health care workers during the COVID-19pandemic in Qatar: A national survey) and reported that less than one-quarter of the study sample face environmental barriers to comply with the preventive measures for COVID- 19 infection as lack of disinfectant and hand washing supplies.

The second main barrier according to the current study was an organizational barrier as a lack of training programs about preventive measures and how to use personal protective equipment. This finding was in the same line with **Birihane, et al. (2020)** who studied perceived Barriers and Preventive Measures of COVID-19 Among Healthcare Providers in Debreabor, North Central Ethiopia, 2020 stated that the studied sample face organizational barriers such as a lack of training programs about preventive measures and how to use personal protective equipment.

Also, in addition to the organizational barrier, the current study findings revealed that more than half of the study sample face no guidelines or protocols or brochures, or standard of care related to preventive measures for COVID-19. These findings were similar to those **Odikpo, et al. (2021)** who found that nurses who work in health institutions in Nigeria had a lack of knowledge standard of care about preventive measures.

According to the current findings, the third main barrier was the individual barrier as fear of being infected with COVID-19 due to occasionally unavailable of authorized personal protective measures. This finding was in the same line as **Haq et al. (2020)** who studied (Potential Barriers amongst Health Care Professionals of Pakistan in managing COVID-19 patients) reported that the studied sample fear of being infected due to occasionally

unavailable of authorized personal protective measures. Also, these findings were agreed with **Odikpo et al. (2021)** who reported that nurses had fear of being infected as COVID-19 is highly infectious due to occasionally unavailable of authorized personal protective measures.

Regarding the correlation between total knowledge and total attitude, the current study showed that there was a weak positive correlation between total knowledge and total attitude regarding preventive measures for coronavirus infection among the studied sample. This correlation may be explained by the reasoned action theory.

This theory states that a person's behavior is determined by their intention to perform the activity, which is a function of their attitude toward the behavior (**Alrubaiee et al., 2020**).

This finding was similar to **Sari et al., 2020** who studied Positive Correlation Between General Public Knowledge and Attitudes Regarding COVID-19 Outbreak 1 Month After First Cases Reported in Indonesia, reported there was a weak positive correlation between knowledge and attitude. Also supported by **Saqlain et al., 2020** who studied Knowledge, attitude, practice, and perceived barriers among healthcare workers regarding COVID-19: a cross-sectional survey from Pakistan reported correlation significant positive linear correlations between knowledge and attitude.

This finding disagreed with **Galal et al., 2021** who studied Coronavirus Disease 2019: Knowledge, Attitude, Practice, and Perceived Barriers among Health care Workers at Cairo University Children Hospital, Egypt reported that there was a significant negative correlation between knowledge and attitude.

Conclusion:

Based on the findings the current study concluded that the majority of the study sample had correct knowledge about preventive measures for coronavirus infection. Additionally, nearly three-quarters of the study sample had a positive attitude regarding preventive measures for coronavirus infection.

Moreover, the main barrier that prevents student nurses to comply with the preventive measures for COVID-19 was an environmental barrier such as a lack of disinfectant and hand washing supplies. Furthermore, there was a weak positive correlation between the total knowledge and the total student nurses' attitude.

Recommendations:

- Design and implement guidelines for nurses regarding preventive measures for COVID-19 to enhance their knowledge and attitude.

Further research:

Investigate healthcare team compliance with preventive for COVID-19 in the clinical settings.

References:

- Abdel Hafiz, A. S., Mohammed, Z., Ibrahim, M. E., Ziady, H. H., Alorabi, M., Ayyad, M., & Sultan, E. A. (2020).** Knowledge, Perceptions, and Attitude of Egyptians towards the Novel Coronavirus Disease (COVID-19). *Journal of Community Health*, 45(5), 881–890. <https://doi.org/10.1007/s10900-020-00827-7>
- Abed Allah, M., Abdeen, S., Selim, N., Hamdani, D., Radwan, E., Sharaf, N., Al-Katheeri, H., & Bougmiza, I. (2021).** Compliance and barriers to the use of infection prevention and control measures among health care workers during COVID-19 pandemic in Qatar: A national survey. *Journal of Nursing Management*, 29(8), 2401–2411. <https://doi.org/10.1111/jonm.13440>
- Ali RAE, Ghaleb AA, Abokresha SA. (2021).** Covid-19 related knowledge and practice and barriers that hinder adherence to preventive measures among the Egyptian community. An epidemiological study in upper Egypt. *J Public health Res*.10(1). doi:10.4081/jphr.2021.1943
- Alrubaiee GG, Al-Qalah TAH, Al-Aawar MSA, (2020).** Knowledge, attitudes, anxiety, and preventive behaviors towards COVID-19 among health care providers in Yemen: an online cross-sectional survey. *BMC Public Health*. 1-11. doi:10.1186/s12889-020-09644-y
- Aynalem YA, Akalu TY, Gebregiorgis BG, Sharew NT, Assefa HK, Shiferaw WS. (2021).** Assessment of undergraduate student knowledge, attitude, and practices towards COVID-19 in Debre Berhan University,

- Ethiopia. *PLoS One*. 1-13. Doi: 10.1371/journal.pone.0250444
- Birihane, B. M., Bayih, W. A., Alemu, A. Y., & Belay, D. M. (2020).** Perceived barriers and preventive measures of COVID-19 among healthcare providers in debretabor, north-central Ethiopia, 2020. *Risk Management and Healthcare Policy*, 13, 2699–2706. <https://doi.org/10.2147/RMHP.S287772>
- Elhadi, M., Msherghi, A., Alsoufi, A., Buzreg, A., Bouhuwaish, A., Khaled, A., Alhadi, A., Alameen, H., Biala, M., Elgherwi, A., Elkhafeefi, F., Elmabrouk, A., Abdulmalik, A., Alhaddad, S., Khaled, A., & Elgzairi, M. (2020).** ‘Knowledge, preventive behavior and risk perception regarding covid-19: A self-reported study on college students’, *Pan African Medical Journal*, 35(Supp 2), pp. 1–10. DOI:10.11604/pamj.supp.2020.35.2.23586.
- Esakandari, H., Nabi-afjadi, M., Fakkari-afjadi, J., Farahmandian, N., Miresmaeili, S., & Bahreini, E. (2020).** *A comprehensive review of COVID-19 characteristics*. 2, 1–10.
- Fan, S., Wu, M., Ma, S., & Zhao, S. (2020).** A Preventive and Control Strategy for COVID-19 Infection: An Experience from a Third-Tier Chinese City. *Frontiers in Public Health*, 8(October), 1–6. <https://doi.org/10.3389/fpubh.2020.562024>
- Ferdous MZ, Islam MS, Sikder MT, Mosaddek ASM, Zegarar-Valdivia JA, Gozal D. (2020).** Knowledge, attitude, and practice regarding COVID-19 outbreak in Bangladesh: An online-based cross-sectional study. *PLoS One*.1-17. Doi: 10.1371/journal.pone.0239254
- Galal YS, Abdelhamid WA, Hamid TAA, Elsayed NR. (2021).** Coronavirus disease 2019: Knowledge, attitude, practice, and perceived barriers among health care workers at Cairo university children’s hospital, Egypt. *Open Access Maced J Med Sci*. 9(E):80-88. doi:10.3889/oamjms.2021.5703
- Haq IU, Shafiq F, Sheikh H. (2020).** Potential barriers amongst health care professionals of Pakistan in managing COVID-19 patients. *Pakistan J Med Sci*. 36(COVID19-S4):17-21. doi:10.12669/pjms.36. COVID19-S4.2753
- Houghton, C., Meskill, P., Delaney, H., Smalle, M., Glenton, C., Booth, A., Xhs, C., Devane, D., Lm, B., Houghton, C., Meskill, P., Delaney, H., Smalle, M., Glenton, C., Booth, A., Xhs, C., Devane, D., & Lm, B. (2020).** Infectious diseases: a rapid qualitative evidence synthesis. *Cochrane Database of Systematic Reviews*, 4, CD013582. <https://doi.org/10.1002/14651858.CD013582.w> www.cochranelibrary.com
- <https://covid19.who.int/region/emro/country/eg>
- <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html>
- <https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>
- <https://www.fda.gov/news-events/press-announcements/fda-approves-first-treatment-covid-19>
- <https://www.paho.org/en/news/2-9-2020-covid-19-has-infected-some-570000-health-workers-and-killed-2500-americas-paho>
- <https://www.who.int/publications/i/item/WHO-2019-nCoV-IPC-2020.4>
- Lang R, Benham JL, Atabati O, et al. (2021).** Attitudes, behaviors, and barriers to public health measures for COVID-19: a survey to inform public health messaging. *BMC Public Health*. 1-15. doi:10.1186/s12889-021-10790-0
- Madabhavi, I., Sarkar, M., & Kadakol, N. (2020).** CoviD-19: A review. *Monaldi Archives for Chest Disease*, 90(2), 248–258. <https://doi.org/10.4081/monaldi.2020.1298>
- Magklara, E., Angelis, S., Solia, E., Katsimantas, A., Kourlaba, G., Kostakis, G., Tsakotos, G., Zaoutis, T., & Filippou, D. (2021).** The role of medical students during COVID-19 era. A review. *Acta Biomedical*, 92(1), 1–9. <https://doi.org/10.23750/abm.v92i1.10873>
- Nemat A, Raufi N, Sediqi MF, Rasib AR, Asady A. (2021).** Knowledge, attitudes, and practices of medical students regarding COVID-19 in Afghanistan: A cross-sectional study. *Risk Manage Health Policy*. 14:1491-1497. doi:10.2147/RMHP.S308039
- Noreen K, Zil-E- Rubab, Umar M, Rehman R, Baig M, Baig F (2020).** Knowledge, attitudes, and practices against the growing threat of COVID-19 among medical students of Pakistan. *PLoS One*. 1-12. Doi: 10.1371/journal.pone.0243696
- Odikpo, L. C., Onyekaoonwu, V. I., & Afonne, A. J. (2021).** Perception and factors affecting practice of preventive measures of coronavirus disease among nurses in tertiary health institutions in Anambra State, southeast Nigeria. *Journal of education and*

- health promotion, 10, 444.
https://doi.org/10.4103/jehp.jehp_1639_20
- Saqlain M, Munir MM, Rehman SU, et al. (2020).** Knowledge, attitude, practice and perceived barriers among healthcare workers regarding COVID-19: a cross-sectional survey from Pakistan. *J Hosp Infect.* 105(3):419-423. Doi: 10.1016/j.jhin.2020.05.007
- Sari DK, Amelia R, Dharmajaya R, Sari LM, Fitri NK. (2021).** Positive Correlation Between General Public Knowledge and Attitudes Regarding COVID-19 Outbreak 1 Month After First Cases Reported in Indonesia. *J Community Health.* 46(1):182-189. doi:10.1007/s10900-020-00866-0
- Shrivastava, D., Alduraywish, A. A., Srivastava, K. C., Alsharari, A. F., Al-Johani, K., Sghaireen, M. G., & Alam, M. K. (2021).** Assessment of knowledge and attitude of allied healthcare professionals about COVID-19 across Saudi Arabia. *Work.* 68(2):305-315. doi:10.3233/WOR-203377.
- Steven K. Thompson., (2012):** Sampling' 3rd ed, John Wiley & Sons, p59-60
- WHO (2020)** 'WHO EMRO | Questions and answers | COVID-19 | Health topics', *Eastern Mediterranean Regional Office*. Available at: <http://www.emro.who.int/health-topics/coronavirus/questions-and-answers.html>.
- World Health Organization. (2020).** Infection prevention and control during health care when COVID-19 is suspected. *Who Health Organization, March*, 1–5.
- Zhang, J., Yin, Y., Dean, J., Zhang, X., Zhang, Y., Wang, J., & Zhang, Y. (2020).** Knowledge, Attitude, and Practice Survey of COVID-19 Among Healthcare Students During the COVID-19 Outbreak in China: An Online Cross-Sectional Survey. *Front Public Heal.* 1-9. doi:10.3389/fpubh.2021.742314