

Perception and Practices of the Students and Employees of Nursing College at Misr University for Science and Technology regarding COVID-19

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Abstract

Background: COVID-19 and its novel strains have spreads everywhere worldwide, which require positive attitudes and sustainability of preventive practices measures among people. **Aim:** The study aimed to assess perception and practices of Nursing College students and employees at Misr University for Science and Technology regarding COVID-19. **Design and Setting:** A 802 participants of cross-sectional population survey study was conducted at the College of Nursing at Misr University for Science and Technology. **Tool of Data Collection:** Questionnaire consisted of four sections; The 1st section was about the demographic characteristics of study participants and vaccination data; the 2nd section was to assess knowledge about COVID-19; the 3rd section was to assess the study participants attitudes toward COVID-19, while the 4th section was about the practices of the prevention and control measures of COVID-19. **Results:** 62.5% of the participants were males, with the mean age of 22. Seventy-two of the study participants had received COVID-19 vaccines, 98.6 % was having a satisfactory level of knowledge and 99.4% showed positive attitude, meanwhile 100% of the participants revealed satisfactory level of practice. **Conclusion:** the majority of the study participants were having satisfactory level of knowledge and practices, as well positive attitudes regarding COVID-19. **Recommendation:** A continuous awareness raising, vaccination and practices the activities of health promotion are highly recommended to prevent and control infection of COVID-19.

Key words: COVID-19, perception, practice, nursing students; Misr University for Science and Technology

Introduction

The first WHO announced that COVID-19 as a global pandemic was on March 2020 (WHO, 2020). The devastating effect of the virus was started from Wuhan, China and then around the world (Abdel hafiz, et al., 2020 & CDC, 2020 & Wang, et al., 2020). As the rise of COVID-19 cases in Wuhan, China started to close the public places, stopped the public transportation, start also to isolate, and manage the infected persons, all such measured were aiming to control the spread of SARS-CoV-2 (Zhong, et al., 2020). Coronavirus disease 2019 (COVID-19) is still creating havoc globally. The novel coronavirus, also known as severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), causes serious respiratory illness known as

coronavirus disease (COVID-19). (Abdel hafiz, et al., 2020 & Shrikrushna, et al., 2020).

COVID-19 pandemic had come to be a public health challenge worldwide, the countries around the world taking unprecedented infection prevention and control (IPC) measures to urgently curtail the spread of the virus. People's perceptions and practices towards COVID-19 are the key to understand the epidemiological dynamics of the disease, compliance, the effectiveness, and success of IPC measures countries taken (Reuben, et al., 2020).

On May 2021, The WHO was reported 3,482,907 mortality and 167,492,769 confirmed cases worldwide. On the other hand, on September 2021, Egypt was reported 515,645 confirmed cases of COVID-19

with 24,613 mortality and 442,182 cured cases since the pandemic began. (WHO report 2021)

Since the outbreak of the disease, WHO published COVID-19 guidelines protocols, which the ministries of health in several countries have been adopted to prevent COVID-19 transmission (WHO., 2020). Information included in these protocols covered the signs and symptoms of the disease, prevention, and protective measures against virus infection. The CDC ,2020 emphasized that everybody could protect himself and community to prevent the spread of the infection through; hand hygiene properly, maintain social distance, face masking, keep coughing and sneezing etiquette, and disinfection of surfaces. In addition of case detection, contact tracing, and quarantine were recommended to reduce transmission of infection (Adhikari, et al., 2020).

The fight against COVID-19 still ongoing all over the world, especially due to absence of conclusive treatment, the success of the measures implemented put closely related to public action and people's adherence to prevention controls. Populations perception of knowledge, precautions and risk concerning COVID-19 are related to the scope and effectiveness of public action. (Faasse, et al., 2020 & Qiu, et al., 2020). Abdalqwi, et al., 2020, was surveyed population in the US to study their willing to engage in preventive behavior, e.g., hand hygiene and disinfectants. They found that 74 percent were adapting the preventive and control behavior needed with adequate knowledge, right perception, and positive attitudes, meanwhile they developed the model of Knowledge–Attitudes–Behavior (KAB).

Concerning disease-avoidance mechanisms, fear and anxiety are linked with attitudes have a highly impact on preventive behavior. Maladaptive behaviors developed in individuals with high levels of anxiety, such as extreme avoidance and the repetitive, persistent, and excessive seeking of medical support, which is an added burden on healthcare system during the pandemic. While People with very low health anxiety may fail to take part in basic hygiene or other advised health measures because they do not perceive their health to be at risk. Such people in times of a pandemic, likely to spread infections. In the situation of planning to apply a preventive measures guideline in order to reduce the scope of

the epidemic, such psychological elements faced when considered within the context of medical diseases (Taylor, 2019).

There are many different information sources the nursing students and healthcare workers gather their information about COVID-19, such as the governmental agencies, the websites, social media, friends, and family members. On practical situation, the social media use had an influence on the students' knowledge about the infection and the preventive measures. However, students should be responsible and focus on real information, and nurse educators should assist students in selecting the right sources of information, provide student-centered resources, and correct myths (Albaqawi, 2020). Information about public perception could be influential to the design of effective policies to curb present and future health disasters (Reuben, et al., 2020).

The WHO has approved eight vaccines for emergency use (Sharma, et al., 2021). Large-scale vaccination programs planned to reach herd immunity against COVID-19. However, such a program's success is based upon the public response toward the vaccine (WHO; 2021).

Increase the general commitment of the COVID-19 vaccine linked with the overall perception about COVID-19 and its newly developed vaccines, the recognition of the risk of COVID-19 and the advantages of vaccination. Perceived susceptibility and severity towards COVID-19 and the myths correction are vital factors that might impact the public response and acceptance of the newly developed vaccines. Major barriers for the population acceptance of COVID-19 vaccines worldwide are questions about the vaccine effectiveness, safety, and usefulness. In France, twenty-five percent of the population refusing the vaccine due to safety concerns (Fridman, et al., 2021). While thirty- six percent in Saudi Arabia, showed no interest in the vaccine, while in the USA, the Food and Drug Administration's (FDA) emergency use authorization was associated with a lower probability of accepting the vaccine. The willingness to be vaccinated in UK was linked to more positive general vaccination beliefs and attitudes, also there are weaker beliefs about the vaccine being unsafe or it causes severe side effects; but the well-informed subjects had a

positive perception about the benefits of the vaccine and the risk of COVID-19 (Bitar et al. 2021 and Haque et al 2021).

The importance of risk perception in behavior modification for disease control has become important to assess the perception and practices regarding COVID-19. An assessment of the perception and practices of community members was important to reduce the risk for COVID-19 infection so as to epidemics management of COVID-19 in Egypt. This calls up on enhancing the publics' levels of knowledge, attitude, and practices about the COVID-19 at this significant time. Therefore, aim of this study was **to assess perception and practices of Nursing College students and employees at Misr University for Science and Technology regarding COVID-19.**

Significance of the Study

Coinciding with the beginning of the third year in a row for the emergence and spread of COVID-19 pandemic that did not stop over the past months, and the virus is still claiming human lives globally, it was necessary for the College of Nursing at Misr University for Sciences and Technology to survey the knowledge, attitudes, and practices of the college community to determine what should be done more to reduce infection of the virus that causes disease and death.

Aim of the Study:

The study aimed to assess perception and practices of Nursing College students and employees at Misr University for Sciences and Technology regarding COVID-19

Materials and Methods

Study Design: A cross sectional population survey was utilized to conduct the present study.

Study Setting: The study was implemented in the Nursing College at Misr University for Science and Technology, 6th October City, Egypt. The university is a private sector affiliated to the ministry of higher education and existed for more than 25 years as one of the best private University in Egypt that involves 14 colleges, the university is internationally competitive distinguished with the electronic system of online learning and rated

as one of the top universities from QS Stars in 2020.

Study Participants: A total of 802 population represented all students and employees of the nursing college. The employees were including all of the academic staff, lab technicians and administrators.

Tool of Data Collection:

A questionnaire was designed by the scientific committee of the nursing college based on the study of recent literature reviews and similar research articles on COVID-19 epidemic. The questionnaire was structured in English language and translated into Arabic language, then backward the translated version was made to ensure the intended meaning of each statement

The questionnaire consisted of four sections as described:

Section one was assessing demographic data of the study participants which included gender, social status, age, residency, and work status, in addition to the vaccination data, which included four questions about either participant were vaccinated or not, the willingness of being vaccinated and type of vaccine received.

Perception of the study participants was assessed through knowledge of section two and attitude of section three. Section two was assessing the study participants knowledge about COVID-19. It composed of 7 questions, about; modes of transmission, common symptoms of the disease, identification of the susceptible persons, quarantine types and period necessary for patients with COVID-19, the common medications used and types of vaccine available for COVID-19 in Egypt, benefits of COVID- 19 vaccine, and the preventive practices measures to COVID-19. The scoring system was 3 points for correct and complete answer, 2 points for the correct and incomplete answer and 1 point for the incorrect or unknown. The cut off score was 15 grades; the overall grade were categorized as; $\geq 70\%$ was considered as satisfactory and $<70\%$ was considered as unsatisfactory level of knowledge. While **Section three was assessing the study participants attitudes towards COVID-19.** It constituted of 9 statements about: using of disinfectant, up-to-date information, available resources for information, COVID-19 pandemic deserves close attention, COVID-19

could be prevented through practicing the precautionary measures, following the preventive practices of COVID-19 could reduce infection attack, vaccine could reduce symptoms, and vaccine could prevent infection transmission. The scoring system was three points Likert scale categorized as agree = 3 points, uncertain = 2 points and disagree = 1 point. The cut off score was $\geq 70\%$ considered as positive attitude and $< 70\%$ considered as negative attitude.

Section four was assessing practices related to the application of the precautionary measures of COVID-19, and the general preventive practices of infection control. The precautionary measures of COVID-19 comprised of 5 statements included: wear a mask; wash hands; avoid touching eyes, nose, and mouth; cover nose and mouth when sneezing and use of disinfectants. While the general preventive practices of infection control comprised of 14 statements about; exercise, balanced diet, hygiene, use of disinfection, sleep enough hours, avoid crowded places, go to the hospital when have symptoms, dispose shopping bags immediately, avoid shaking hands, avoid kissing, keep social distance, sanitize hands, disinfect personal belongings, and disinfect surfaces. The scoring system of this section was checklist which categorized as: done = 3 points, sometimes = 2 points and never done = 1. The total score is 40. The cut off score was $\geq 70\%$ considered as satisfactory and $< 70\%$ considered as unsatisfactory level of practices.

Validity and Reliability

Face and content validity of the data collection tools were checked by two internal assistant professors from the nursing college and one professor of obstetrics & gynecology nursing department from Ain Shams University. No modifications were done on the scale.

As regard to the reliability, computed Cronbach's alpha test was used to test the internal consistency of the data collection tools. The Reliability Coefficients estimated in range from 0.69 to 0.89 for the three main subscales of knowledge, attitudes, and practices.

Work Field

The Scientific Committee of the College of Nursing sponsored the process of preparing the research tool, in addition to obtaining the study's

approval from the College Board and the University's Board. The final questionnaire form had been put up on the college's electronic platform for the possibility of running the questionnaire. Subsequently, the committee authorized the academic advisors of the College of Nursing to contact their students to access the website and use the created link to fill out the questionnaire. Student participation in the study was voluntary and as was further promoted by the Scientific Committee. The time taken to collect data for most of the participants was three weeks during December 2021.

Ethical Considerations:

The aim of the study was discussed among the academic advisors of the college, who had disseminated the voluntary participation in addition to maintaining anonymity and confidentiality of data through the formal web of the university.

Pilot Study

The data collection tool was piloted on 10% (80 of the study participant). The piloted groups had expressed the clarity and simplicity of the questionnaire as well to estimate time needed to fill in the study tools.

Statistical Analysis

Normal distribution of data in the form of number and percentages was calculated for the scale electronically. Moreover, internal consistency for the reliability of the tool was tested by the use of SPSS version 20.

Results:

Table (1) represents the total study sample including 62.5% from males, the age mostly was less than 24 years old (91.2%), regarding the social status 94.2% were singles. More than half of the students lived in urban areas (52.4%), and 94.8% of them were from students.

Figure (1) illustrates the number and percentages of vaccinated and not vaccinated participants, as shown 72% of the study participants had received the vaccines, 57% of them were desired to take the vaccine and 15% were enforced to take the vaccine, while 28% did not take the shots of covid-19 vaccine.

Figure (2) illustrates in order from largest to smallest numbers of participants who received the

vaccines according to the type; respectively Sinovac 34%, AstraZeneca 17%, Sinopharm 14%, Pfizer 5%, and Johnson 2%.

Table (2) indicates the total study participants level of knowledge of that mostly was correct and complete. The highest percentages were demonstrated in, quarantine is necessary for patients with COVID-19, modes of transmission, common symptoms, and identification of susceptible person to be infected by COVID-19 (96.8%, 89.3%, 83.5%, respectively). While the lowest percentages were participants knowledge that related to questions about the availability of medicines, vaccine and benefits of COVID- 19 vaccine respectively.

Table (3) shows that all (100%) participants agreed on using of disinfectant to inhabit COVID-19 infection transmission, COVID-19 vaccine could reduce symptoms of the disease, COVID-19 vaccine could prevent infection, and COVID-19 infection could be prevented through practicing the precautionary measures. Whereas most of participants (91.3) agreed that COVID-19 as pandemic deserved close attention. On the negative side, 76.6 % of the participants disagreed about following the preventive practices of infection control could reduce COVID-19 attack.

Table (4) reveals that the response rate of participants' self-evaluation shown that all the participant (100.0%) sometimes used disinfectants. Meanwhile, most of participants were always wash their hands and covered their noses and mouth when sneezing, and wearing mask, while the majority were avoiding touching their eyes, nose and mouth (92.3%, 89.5%, 85.3%, 73.4 % respectively).

Table (5) shows that all of the study participants **802 (100%) were having with Satisfactory** level in the practice related to the general preventive practices of infection, hand washing, keeping household hygiene and disinfected, immediately dispose shopping bags, go to the hospital when have symptoms of COVID-19, and use alcohol outside the home to sanitize hands. Additionally, most participants disinfect personal belongings items, disinfect surfaces such as doorknob, avoid kissing, leave enough distance between themselves and others. Meanwhile doing exercises showed little bite less practices, sleep enough hours, avoid shaking hands, avoid crowded places, and eat a balanced diet.

Table (1): Demographic Data of the Study Participants (N=802)

Socio-demographic Data		N	%
Gender	Male	501	62.5
	Female	301	37.5
Social Status	Single	755	94.2
	Married	42	5.2
	Widow	2	0.2
	Divorced	3	0.4
Age	less than 24	731	91.2
	24 -33	49	6.1
	34 -43	6	0.7
	≥44	16	2.0
	Mean ± SD	21.83± 5.21	
Residency	Urban	420	52.4
	Rural	382	47.6
Working Status	Student	760	94.8
	College Staff	34	4.2
	Employee	8	1.0

Figure (1): Reported Data about Vaccination Status among Participants (N=802)

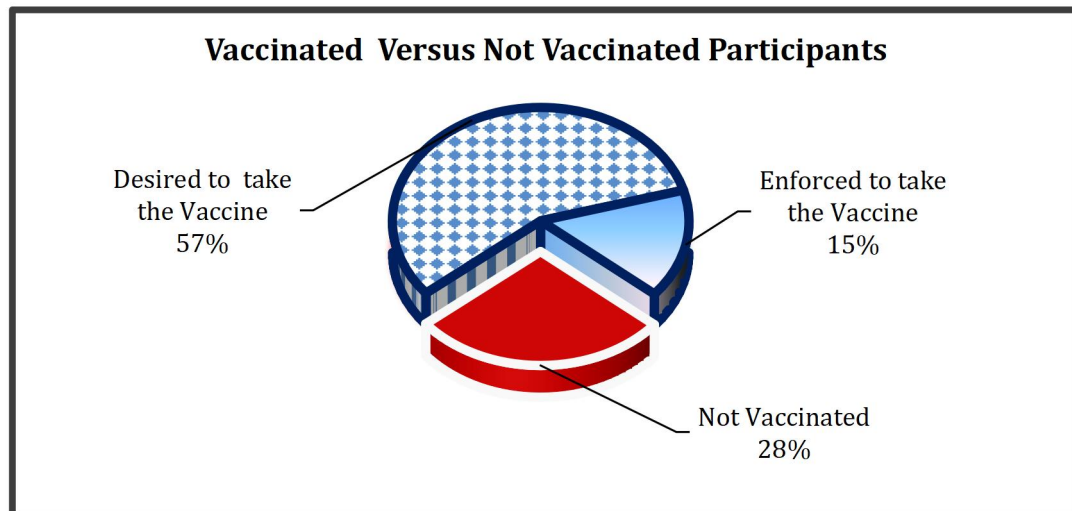


Figure (2): Types of COVID-19 Vaccines Received by the Vaccinated Study Participants (N=578, 72%)

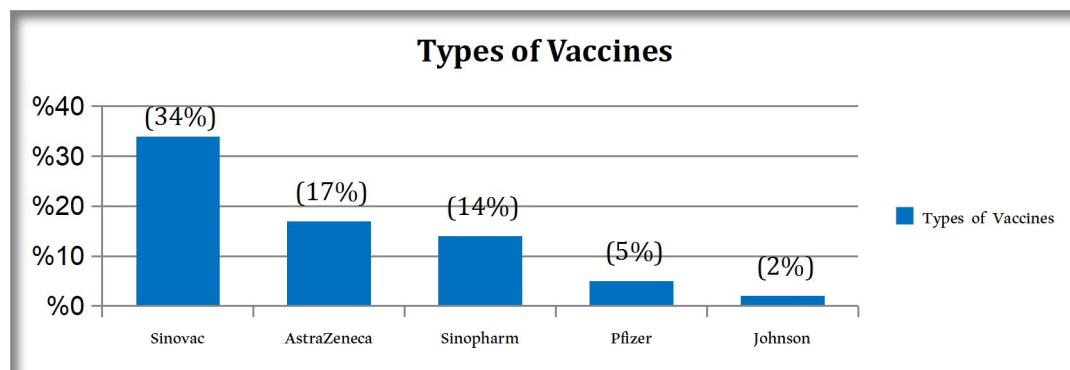


Table (2): Knowledge level about COVID-19 among the Study Participants (N=802)

Questions	Answers N (%)		
	Correct/ Complete	Correct/ Incomplete	Incorrect/ Unknown
1. What are modes of transmission of COVID-19 infections?	716 (89.3)	80 (10.0)	6 (0.7)
2. What are the common symptoms of COVID-19 infection?	716 (89.3)	80 (10.0)	6 (0.7)
3. Who are susceptible persons for COVID-19 infection?	670 (83.5)	96 (12.0)	36 (4.5)
4. Why quarantine is necessary for COVID-19 patients?	776 (96.8)	24 (3.0)	2 (0.2)
5. What are the common medicines and vaccine available for COVID-19 in Egypt?	507 (63.2)	236 (29.4)	59 (7.4)
6. What are the benefits of COVID- 19 vaccine?	478 (59.6)	228 (28.4)	96 (12.0)
7. What are the preventive practices of COVID-19?	614 (76.6)	138 (17.2)	50 (6.2)
Total Knowledge Level	791(98.6)		11(1.4)
	Satisfactory		Unsatisfactory

Table (3): Attitudes of the Study Participants towards COVID-19 (N=802)

Questions	Agree N (%)	Uncertain N (%)	Disagree N (%)
1. Using of disinfectant inhabit the COVID-19 infection transmission	802 (100.0)	-	-
2. Always I got up-to-date information about COVID-19	477 (59.5)	257 (32.0)	68 (8.5)
3. There are many available information resources about COVID-19	576 (71.8)	175 (21.8)	51 (6.4)
4. Always I'm sharing my information about COVID-19 vaccine with others	493 (61.5)	201 (25.0)	108 (13.5)
5. The COVID-19 pandemic deserves close attention	732 (91.3)	53 (6.6)	17 (2.1)
6. COVID-19 could be prevented through practicing of precautionary measures	802 (100.0)	-	-
7. COVID-19 vaccine could reduce disease symptoms	802 (100.0)	-	-
8. COVID-19 vaccine could prevent infection	802 (100.0)	-	-
9. Following the preventive practices of infection control could reduce COVID-19 attack	50 (6.2)	138 (17.2)	614 (76.6)
Attitude Level	797 (99.4)		5 (0.6)

Table (4): Self-evaluate the Practicing Precautionary Measures of COVID -19 among Study Participants (N=802)

Practicing Precautionary Measures	Always done N (%)	Sometimes N (%)	Never done N (%)
1. Wear a mask outside home and in public places	684 (85.3)	104 (13.0)	14 (1.7)
2. Wash hands	740 (92.3)	54 (6.7)	8 (1.0)
3. Avoid touching my eyes, nose and mouth with hands	589 (73.4)	190 (23.7)	23 (2.9)
4. Cover my nose and mouth when sneezing	718 (89.5)	52 (6.5)	32 (4.0)
5. Use of disinfectants	0	802 (100.0)	0

Table (5): Study Participants Self-evaluate regarding application of the General Preventive Practices of Infection Control (N=802)

General Preventive Practices	Always done N (%)	Sometimes N (%)
1. Do exercise	547 (68.2)	255 (31.8)
2. Eat a balanced diet	512 (63.8)	290 (36.2)
3. Keep household hygiene and disinfected	721 (89.9)	81 (10.1)
4. Sleep enough hours	543 (67.7)	259 (32.3)
5. Avoid crowded places	524 (65.3)	278 (34.7)
6. Go to the hospital when have symptoms of COVID-19	691 (86.2)	111 (13.8)
7. Dispose shopping bags immediately	703 (87.7)	99 (12.3)
8. Avoid shaking hands	528 (65.8)	274 (34.2)
9. Avoid kissing	589 (73.4)	213 (26.6)
10. Leave enough distance between themselves and others	567 (70.7)	235 (29.3)
11. Use alcohol outside the home to sanitize hands	682 (85.0)	120 (15.0)
12. Wash hands with soap and water	770 (96.0)	32 (4.0)
13. Disinfect personal belongings such as mobile phone	632 (78.8)	170 (21.2)
14. Disinfect surfaces such as doorknob frequently	608 (75.8)	194 (24.2)
Total Practice	802 (100%) Satisfactory Practice	

Discussion

The present study aimed to assess perception and practices of the students and employees of Nursing College at Misr University for Science and Technology regarding COVID-19.

The current study revealed that the nearly two thirds of participants were males. The majority of them were single and their age was

less than 24 years old. Result of the current study is vice versa with **Spinewine, et al. (2021)** who reported that the majority of the participants were female, students and received COVID-19 vaccine. So, they are the basic targets in our institution. Similarly, a study conducted by **Elnaem, et al. (2021)** reported that more than two thirds of the participants were vaccinated against COVID-19.

The current study finding, found that one third of the participants received Sinovac and less than one quarter of the participants received AstraZeneca vaccine. While the minority received Pfizer and Johnson vaccines. On the other hand; Elnaem, et al. (2021) in their study found that half of the participants received Pfizer, while one quarter of them received AstraZeneca vaccine. In addition, Al Khames Aga, et al. (2021) reported that majority of the participants in their study received Pfizer and AstraZeneca vaccines.

Regarding to the willingness of receiving the vaccine, more than half of the current study participants showed their readiness to receive the vaccine while the minority was obligated to receive it. Similarly, Spinewine, et al. (2021) in their study found that more than half of the participants were certain about vaccination against COVID-19. On the contrary, a study conducted by Unroe, et al. (2021) found that half of the participants were not willing to be vaccinated against COVID-19. From the researcher point of view, there should be continuous public education and awareness about types of vaccines and how the vaccine works to encourage vaccination and immunization.

Regarding the survey about the total knowledge, almost all of the participants disclosed high perception of knowledge towards COVID-19 including modes of transmission, disease symptoms, vulnerable group or cases susceptible to infection, this finding might may be explained due to diversified sources of information encompass students education to infection control and epidemiology curricula, knowledge obtained from college and university awareness, community broadcast by the Egyptian ministry of health, television, internet and social media. In this subject, the majority of the college participants had information about COVID-19 disease transmission and associated symptoms, similarly to study done by Singh et al., (2020), which displayed satisfactory level of knowledge about COVID-19 symptoms, mode of transmission and preventive measures, for around three quarters of the university students and two thirds knew about treatment approaches, while the main sources of their information were social media and TV.

The majority of participants were knowledgeable about the most vulnerable cases to COVID-19, which agree with a study under the title "Egyptian general public COVID-19 survey, (2020)" whereas the majority of the general public assured that the disease is very risky for elderly people. Also, Olaimat et al., (2020) reported that most of the students were aware that elderly and immunocompromised persons are at higher risk to develop severe symptoms of COVID-19. The author also reported satisfactory level of knowledge for more than half of the undergraduate students of large sample recruited from various universities, governmental and private in Jordan during the first stage of COVID-19.

Almost all of college participants thought that quarantine is necessary for patients with COVID-19 either at home or hospital for severe cases required closed attention and care, therefore, around half of the college participants were knowledgeable about the general hospitals which are ready to admit patients with COVID-19. these finding is paralleled to the finding of two studies done in Egypt, the first study, was the Egyptian general public COVID-19 survey, (2020) which confirmed that around two third of participants were ready to remain in the hospital if they contacted directly to an infected person. While the second study conducted by Abd El Fatah et al, (2020) which performed on a large sample of medical students whose majority reported that confirmed cases must be isolated at home not at hospital quarantine, these two poles of opinion were due to the experimental knowledge about the healthcare associated infection that lead to hospital morbidity and mortality, versus the general public who consider the hospital is a sanctuary of life. At the same time, the medical educational background makes difference and influence positively on the students' attitudes and behaviors about methods of COVID-19 disease transmissions, isolation procedures and approaches of treatment.

Less than two thirds of college participants appreciated that vaccination for COVID-19 is beneficial, and concurrently the availability of the medicines and vaccinations. Therefore, more than three quarters of the college participants had received the vaccines

depend on their willing and readiness. Also, about three-quarters of the participants recognized that the precautionary measures applied at the university level, in addition to the availability of the vaccine. Conversely, shown in study done by Singh et al., (2020), who found that nearly all students were aware with the unavailability of the COVID-19 vaccine since few months ago. This discrepancy explores the fast progression of efforts and information made by the ministry of health at every country to protect their citizens' from COVID-19 disease.

Regarding the survey about the attitudes, the majority of participants positively perceived authentic facts towards covid-19, as less than two thirds of the college participants were always asking for updating their knowledge about COVID-19, while around three quarters were always ready to find out more about COVID-19. In similar study performed by Adam et al., (2021) on the students from applied medical science faculty in Saudi Arabia, the study declared positive attitude towards COVID-19. A similar result demonstrated positive attitudes towards COVID-19 among nursing students through a study applied in four Egyptian universities namely Cairo, Mansoura, Port Said, and Beni-Suef ELmetwaly, et al (2020).

Additionally, less than two thirds of the college participants have confidence and were always share their vaccination information with others. At the same time, almost all the college participants emphasized that COVID-19 pandemic deserves close attention as the disease is highly contagious as mentioned by the majority of the students in study done by Singh et al., (2020).

Regarding the practices survey of the precautionary measures towards covid-19, the majority of the current study participants showed strong adherence. However, the majority of college participants committed to wearing a mask when entering and exiting, this finding is in the same line with Singh et al., (2020), study, who reported compliance of all students with the advisories of governmental health. In the same direction this was similar to the results of the survey conducted by the General Egyptian Public COVID-19, (2020)

where three quarters of the participants considered that wearing a face mask keeps them safe from infection. Moreover, a Chinese study done by Zhong, et al. (2020), reported that almost all participants don face masks when step out during the spread of COVID-19 disease.

The present study revealed that, almost all the college participants were self-assured that they always wash hands with soap and water, this behavior from the majority of participants proved that they have knowledge about disease transmission and the precautionary measures that eliminate the spread of infection. Despite that a little more than half avoid shaking hands. In addition, about three quarters of the students avoid touching their eyes, nose and mouth with hands, use alcohol outside the home to sanitize their hands and avoid kisses. In this subject, **Singh et al., (2020)**, had reported that, most of the students washing and sanitizing hands on a regular basis, keep mouth and nose covered when sneezing or coughing, and avoid close contact with cases show signs, and adhere to recommendations to stay home.

Results of the current study showed that the vast majority of the participants cover their nose and mouth on sneezing. This result is on the same line with **Yue, et al. (2021)**, who reported that more than two third of the participants use tissue during sneezing to cover their mouth and nose. In congruent to the study conducted on Egyptian nursing students by **ELmetwaly, et al (2020)** and also study done by **Alzoubi et al, (2020)** which applied on medical and non-medical university students in Jordan, the results of both studies proven highly positives attitudes and goodness in practices which indicated to the adequate use of the precautionary measures such as washing hands, use of alcohol hand rubbing, avoid hand shacking and kissing, following respiratory etiquette when coughing and sneezing, these preventive measures could eliminate the transmission of various infectious disease, in particular COVID-19.

Meanwhile in the present study, more than two thirds of the participants visit the hospital when suspect infection. **Yue, et al. (2021)** also, reported that two third of the participants undergo checkup when suspect

COVID-19 infection. In the same context the majority of Indian university students had asserted to take their family to the hospital if symptoms of corona disease appeared (**Singh et al., 2020**). Most of the college participants are keeping household hygiene and disinfection and their majority immediately dispose of shopping bags, less than three quarters disinfect personal belongings items such as mobile phone and almost two thirds were frequently disinfected surfaces such as doorhandles.

The Center for Disease Control and Prevention (CDC) had recommended that, COVID-19 spreads mainly from infected person to another one by close contact within a distance of about two meters (**CDC, 2019**). According to the current college participants, more than half of them avoiding crowded places, meanwhile less than two thirds leave enough distance between themselves and other people. In this regard, **Singh et al., (2020)**, also, proclaimed that about all students had willing to keep social distance. A little more than half of the college participants agreed on doing exercises within daily activities, getting a balanced diet meanwhile a little less than half reported that they don't get enough hours of sleep.

Most of students of the current study adhered to the precautionary measures for COVID-19. Adam et al., (2021) had recommended the undergraduate of the applied medical sciences at Saudi Arabia to study infection control program curriculum. This recommendation is highly requisite need in this era of pandemics to acquaint students with important knowledge and skills for patients' safety as well as themselves as a part of the multidisciplinary healthcare team. Moreover, elimination of healthcare associated infection is a robust accountability of every individual in the paradigm healthcare facilities, as well as it is one of the patient safeties goals which recommended by Join Commission for Accreditation JCI.

Conclusion

It can be concluded that the majority of the study participants were having satisfactory level of knowledge and practices, as well as positive attitudes regarding COVID-19.

Recommendations

Based upon the study finding the following recommendations suggested:

- A continuous awareness raising, vaccination and practices of the activities of the health promotion are highly recommended to prevent and control infection of COVID-19.
- Further mixed research methods are needed to study the following factors in a large scale; learned lessons from the COVID-19 epidemics from the perspective of the population; their readiness to the vaccine continuity; their behavior changes after several epidemics' waves.

Conflict of interest statement

The authors declare that they have no conflict of interest.

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