Knowledge and Practices of Nurses Regarding Corona Virus (COVID-19): An Educational Intervention

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Abstract

Background: COVID-19 it is the new coronavirus and most cases appeared in the Chinese city, Wuhan at the end of December 2019 in the form of acute pneumonia. It was identified through genetic sequences. It is believed that the originated in animals and most cases appeared in the seafood and animal market in Wuhan. The virus can spread from the infected person to another person through close contact without protection. **Aim** was to evaluate the effect of an educational intervention nurses' knowledge and practices regarding Corona virus (COVID-19). Quasi-experimental **design** (pre and post intervention) was utilized. A total **sample** of (70) staff nurses were recruited in the study. The study was conducted at General Farasan Hospital. Data were collected through two main **tools:** A structured self-administered questionnaire, and nurses' practices toward COVID-19.

Results: Revealed that 55.7% of nurses had poor knowledge before intervention. However, 88.6% of them had good knowledge after intervention. As well as, only 7.1% of the studied nurses had competent practices toward covid 19 before training. Meanwhile, after training the competent practices changed to 94.3%.

Conclusion: The implementation of an educational intervention was effective and significantly improved nurses' knowledge and practices towards covid 19.

Keywords: *Corona virus (COVID-19), Nurses practices, Educational Intervention.*

Introduction

COVID-19 It is the new coronavirus and most cases appeared in the Chinese city, Wuhan at the end of December 2019 in the form of acute pneumonia. The virus was identified through genetic sequences. It is believed that the COVID-19 originated in animals and most cases appeared in the seafood and animal market in Wuhan. The virus can spread from the infected person to another person through close contact without protection. The common symptoms of COVID-19 include: fever, cough, shortness of breath and sometimes develops into pneumonia. It may cause severe complications in persons with immunodeficiency, the elderly and persons with chronic diseases such as cancer, diabetes and lung diseases.[1]

The novel coronavirus infection (COVID-19), also termed SARS-CoV-2, which emerged in December 2019 has become a global public health emergency and was declared a pandemic by the World Health Organisation on the 11th March 2020. Symptoms of COVID-19 are nonspecific although most typically involve cough, shortness of breath and fever, and the disease presentation can range from no symptoms (asymptomatic) to severe pneumonia and death. Most people infected with COVID-19 virus have mild disease and recover. Approximately 80% of those infected have mild to moderate disease, 13-14% has severe disease and around 6% develop critical disease. Individuals at highest risk for severe disease and death include people aged over 60 years and those with underlying conditions such as hypertension diabetes and cardiovascular disease; mortality rates increase with age and disease in children seems to be both rare and mild . [2]

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A comprehensive understanding of infection prevention and control is mandatory for nurses while seeking to protect themselves, patients, colleagues and community. So taking it after the hand hygiene, understanding the key component of the proper use of PPE is when and how to put it on (don) and how to take it off (doff) again comes under lead responsibilities. The nurses should select the appropriate personal protective equipment like before undertaking any clinical intervention according to the provision of ministry of health.26 Preventing the spread of infection to and from nurses and patients depends totally on your prompt actions by the effective and proper use of personal protective equipment's such as cover all gowns or plastic aprons, Triple layer medical mask or N-95 Respirator mask, goggles, face shields and gloves, head and shoe cover. [3]

Nurses play a vital role in health care system and health team. All health care providers especially nurses are on the frontline battling against this pandemic and providing services to patients which is helpful to prevent and control COVID-19 pandemic. Nurses should properly arrange critically ill patients with COVID-19; complete the evaluation in the shortest time possible. In the meanwhile, urgent care, such as wheelchair/ flatbed transfer, oxygen inhalation, electrocardiogram monitoring, sputum suction, and establishment of venous access, should be completed. The evaluation should include three components: general condition assessment should include age, present history illness, past medical history, allergic history, vital signs, oxygen saturation, breath, consciousness state, and systemic symptoms, such as fever, cough, expectoration, chest congestion, hypodynamia, muscle soreness, and diarrhoea., self-care ability assessment, and specialized assessment. The evaluation's specific content should be reasonably selected according to the nursing human resources available and the critical degree of the patient's condition. [4]

Specialized assessment should include cognitive functional assessment, nutritional status assessment, and venous thromboembolism (VTE) risk assessment. The Mini-Cog Test **(Milian M etal 2012)** is recommended for the evaluation of cognitive function as it is brief, minimally influenced by language and education level, and easily accepted by patients. The Nutrition Risk in Critically Ill (NUTRIC) Scale may be used to evaluate the nutritional status of critically ill elderly patients. However, considering elderly patients are prone to suffering from malnutrition, nutritional support should be provided immediately after admission in the case of insufficient medical staff. VTE risk assessment varies depending on different clinical situations: For medical patients, the Padua Scale is recommended, while for surgical patients, the Cabrini Risk Assessment Model is recommended**.** [5]

Critically ill patients with COVID-19 are more likely to have psychological panic and anxiety due to insufficient knowledge of the disease and lack of access to information. The following measures should be considered in these cases. First, evaluate the patient's cognitive changes, emotional responses, and behavior changes, and provide appropriate emotional support. For patients with anxious and depressed tendencies, self-rating scales, such as an anxiety self-rating scale and a depression self-rating scale, can be used for assessment, and professional psychological personnel can be asked to help patients according to the situation. Second ,various means, such as cognitive behavioral therapy, positive psychology, explaining COVID-19 in simple and understandable language, and providing continuous information support, may help elderly patients to a timely transition to the psychological stage of treatment, and to build up the confidence to overcome the disease. Third, relaxation training, such as meditation, hypnosis, music therapy, and other ways to relieve patients' anxiety and depression, should be provided if possible. [6]

Discharge instructions should consist of the following: Select appropriate breathing rehabilitation exercises and teach them to patients, such as airway clearance training, breathing exercises, pursed-lip breathing, and abdominal breathing, advise patients to strengthen nutritional support, eat more high-protein, high-vitamin, high-calorie food, and more fresh vegetables, fruits, milk, and so on. Likewise, instruct patients to work and rest regularly and to get adequate sleep, it is recommended that patients continue to be monitored for 14 days after discharge and continue to wear masks. If possible, it is recommended to live in a single room with good ventilation, reduce close contact with others, eat separately, carry out hand hygiene thoroughly, and avoid outdoor activities. And it is recommended that patients return to the hospital for re-examination 2 and 4 weeks after discharge. During the period after discharge, if the patient has fever, dyspnoea, or the reappearance of other uncomfortable symptoms, or if a family member with close contact has a new novel

coronavirus infection or suspected infection symptoms, they should go to the hospital immediately. [7]

Significance of the Study: The novel coronavirus detected in China in 2019 is closely related genetically to the SARS-CoV-1 virus. SARS emerged at the end of 2002 in China, and it caused more than 8 000 cases in 33 countries over a period of eight months. Around one in ten of the people who developed SARS died. As of 30 March 2020, the COVID-19 outbreak had caused over 700 000 cases worldwide since the first case was reported in China in January 2020. Of these, more than 30 000 are known to have died. Elderly people above 70 years of age and those with underlying health conditions (e.g. hypertension, diabetes, cardiovascular disease, chronic respiratory disease and cancer) are considered to be more at risk of developing severe symptoms. Men in these groups also appear to be at a slightly higher risk than females.[8] In addition, from the researchers' clinical experiences, they found Nurses are lacking knowledge and skills required for caring of those patients. Best practices intervention protocols are not available for nurses working in the hospital. So, the current educational intervention was developed for nurses to update and upgrade their knowledge, skills and to be reference guide whenever needed, also, it should be utilized and integrated through educational modalities, in order to assist nurses to be competent in nursing care, therefore this study conducted to improve maternity nurses' knowledge and skills regarding corona virus by applying an educational intervention.

Aim of the Research: To evaluate the effect of an educational intervention on nurses 'knowledge and practices regarding covid 19. This aim was achieved through:

1. Assessing nurses' knowledge and practices regarding covid 19
2. Designing and implementing nursing educational intervention regarding coping with covid 19 & international standards infection control.
3. Evaluating nursing educational intervention after application it

Research Hypotheses: Nurses who received an educational intervention would have improved knowledge and practices toward covid 19 & international standards infection control than before intervention.

Materials and Method

Research Design: Quasi-experimental design (pre and post intervention) was utilized to fulfil the aim of this study.

Setting:

This study was conducted at General Farasan Hospital.

Sampling:

Sample type: A convenient sample.

Sample size and technique: All nurses working in the above mentioned setting at the time of the data collection were included in the study. The sample size was completed three days per week during four months. Total number was 70 staff nurses.

Tools of data collection:

Two main tools were used for data collection:

I- A structured self-administered questionnaire: It was designed by the researcher after reviewing related literature. It was written in an Arabic language in the form of close and open-ended questions. It encompassed two major parts:

First part included personal and socio demographic data such as (age, educational qualifications, occupation, residence and years of experience in the hospital).

Second part included nurses' knowledge about corona virus (covid 19). It consisted of;

(Definition, aetiology, incubation period, signs symptoms, mode of transmission, most dangerous groups vulnerable for covid 19,self-assessment tool, signs of recovery from covid 19 complications, methods of personal protective for preventing spreading the virus, precautions of infection control, priorities of nursing care for this infection and healthy life style following during covid 19).

Knowledge Scoring: Each item was assigned a score of (2) given when the answer was correct and a score (0) was given when the answer was incorrect or do not know. Nurses total knowledge score was 24 and classified as the following; poor when total score was < 60%, average when total score was 60% < 75% and good when total score was ≥ 75%.

II- Nurses practices towards corona virus (covid 19): This tool was developed by the researcher after reviewing related literatures to assess nurses skills pertaining corona virus (covid 19) and consisted of (20) items such as (Placing patients with potential or confirmed infection with the emerging coronaviruses (Covid 19) in well-ventilated individual rooms or in rooms equipped with airborne infection reserves , reducing the number of health care workers, family members and visitors who come into contact with a patient with a potential or confirmed infection with coronavirus, Applying the "Five Times" approach in which the hands should be cleaned: Before touching the patient; Before any cleaning or disinfection procedure; And after exposure to the risks of body fluids; After touching the patient; After touching the patient's surroundings, including contaminated objects or surfaces, wash hands with soap and water, or use an alcoholic solution to scrub hands, using of personal protective equipment for hand hygiene is not necessary. Hand hygiene is essential when placing these equipment, especially when taking it off etc…….;;;,).

Scoring: The items were judged according to a three point. Not done took (1) score, incompetent done took (2) score and competent done took (3) score. The total practice were divided into competent if the total score above 75 and incompetent if less than 75.

Tools validity and reliability: Tools were reviewed by a panel of three experts in the field of nursing to test its content validity. Modifications were done accordingly based on their judgment. Reliability was done by Cronbach's Alpha coefficient test which revealed that each of the two tools consisted of relatively homogenous items as indicated by the moderate to high reliability (internal consistency) of each tool (knowledge = 0.92 and practices = 0.87) .

Ethical Considerations: An official permission was granted from the directors of the pre mentioned setting with reference number (REC41/5/105). Each nurse was informed about the purpose of the study then an oral consent was obtained before starting the data collection. Confidentiality was ensured throughout the research study process, and the nurses were assured that all data was used only for research purpose. Each nurse was informed that participation is voluntary and free to withdraw from the study at any time.

Pilot Study: The pilot study was carried out on 8 nurses (about 10%percent of the total sample) to test the clarity and applicability of the study tools as well as estimation of the time needed to fill the questionnaire. Required modifications were done in the form of added of some questions. Nurses involved in the pilot were excluded from the study.

Procedure: The following phases were adopted to fulfil the aim of the current study; assessment, planning, implementation, and evaluation phases. These phases were carried out from the beginning of June 2020 to the end of Sempteber2020 covering 4 months. Official approvals and letters to conduct this research were obtained from Dean of researcher Faculty to Directors of the previous mentioned sitting.

Assessment Phase: This phase encompassed interviewing the nurses to collect baseline data, at the beginning of interview the researcher greeted each nurse, explained the purpose, duration, and activities of the study and taken oral consent. Pre-test was done to assess nurses' knowledge and practices regarding corona virus (covid 19). The data obtained during this phase constituted the base line for further comparison to evaluate the effect of an educational intervention. Average time for the completion of each nurse interview was around (25-30 minutes).

Planning Phase: Based on baseline data obtained from pre-test assessment and relevant review of literature, the educational intervention was developed by the researcher in a form of printed Arabic booklet to satisfy the studied nurses' deficit knowledge, and practices regarding corona virus (covid 19).

General objective of the educational intervention was to improve nurses' knowledge and practices about corona virus (covid 19).

Implementation Phase: Implementation of an educational intervention took (16) weeks period. The researcher visited the previous mentioned setting, three days/week. The educational intervention involved (4) scheduled sessions and were implemented according to working circumstances. These sessions were repeated to each subgroup of (3-5) nurses. The duration of each session lasted from half an hour to one hour including periods of discussion according to their achievement, progress and feedback. The researcher followed all

precautionary measures during the training of the nurses, as well as the nurses, they were committed to wearing masks, social distancing, safety and sterilization. At the beginning of the first session an orientation to the educational intervention and its aims took place, Arabic and English language was used to suit the nurses 'level of understanding. Feedback was given in the beginning of each session about the previous one. Different methods of teaching were used such as modified lecture, group discussion, power point and brainstorming. Suitable teaching media were included an educational booklet that distributed to all nurses in the first day of the educational intervention as well as audio-visual aids and videos were used.

Evaluation Phase: After the implementation of the educational intervention, the follow up test for nurses' knowledge and practices were done by the same format of the pre test to evaluate the effect of the implemented educational intervention.

Statistical Design: Data were verified prior to computerized entry. The Statistical Package for Social Sciences (SPSS version 20.0) was used. Descriptive statistics were applied (e.g., mean, standard deviation, frequency and percentages). Test of significance (chi square and paired t test) was applied to test the study hypothesis. Correlation coefficient was calculated between knowledge, and attitude scores. A statistically significant difference was considered at p-value $p \leq 0.05$, and a highly statistically significant difference was considered at p-value $p \leq 0.001$.

Results

Table (1) shows personnel characteristics of the studied nurses. It was found that more half of nurses (74.3%) were aged from 20-30years, with a mean of age 27, 34 ± 5.44years. As far as nurses' qualification, more than half of them (60.0 %) had bachelor of nursing as well as half of them (50.0 %) was nursing specialist. Regarding experience years at the hospital, about half of nurses (51.4%), their experience ranged from 5-10 years, with a mean of 6.36 ± 2.75 years. And (64.3%) of nurses were lived in rural area.

Table (2) represents that total mean scores of studied nurses' knowledge regarding covid 19, indicated that more than half (55.7%) of them had poor level of knowledge before implementation. The mean of the total score of nurses' knowledge was 14.1 ± 3.25 to evaluate the knowledge retention among nurses after implementation the same table proved that 88.6% of the nurses had good knowledge and the mean of total scare was 22.52 ± 1.09.. The same table illustrated that the total nurses' practice, indicated that 7.1% have competent practices before implantation. While after implementation 94.3% have competent practices.

Figure 1 shows that, there was statistically significant difference between pre and after implementation regarding knowledge about covid 19 (p=<0.001)

Figure 2 represent that , there was statistically significant difference between pre and after implementation regarding practices about covid 19 (p=<0.001)

Table (3) reflects that, distribution of the studied nurses total knowledge score in relation to their personnel characteristics, there was a general improvement in all items of knowledge about covid 19 after educational intervention as compared to before educational intervention with highly statistically significant difference between studied nurses total knowledge score, and their personnel characteristics pre and post intervention.

Table (4) demonstrates distribution of the studied nurses total practices score in relation to their personnel characteristics , there was a highly statistically significant difference between studied nurses total performance score, and their personnel characteristics pre and post training, with highly statistically significant difference before, and after implementing educational intervention.

Table (5) clears that correlation between studied nurse's total knowledge and practices score pre and post intervention, there was there was highly statistically significant correlation between knowledge after teaching and practice after training.

Table (1): Distribution of the studied nurses according to their general characteristics (n=70)

Items	No	%
Age (Years)		
<20	6	8,6
20:30	52	74.3
>31	12	17.1
Mean +SD	27 ±5.44	
Educational qualification		
Bachelor of Nursing	42	60.0
Nursing Technician Institute	28	40.0
Occupation		
Nursing specialist	35	50.0
Nurse Head of the department	28 7	40.0 10.0
Residence		
Urban	25	35.7
Rural	45	64.3
Years of experience Less than 5 years 5 to 10 years More than 10 year	 3 36 31	 4.3 51.4 44,3
Mean +SD	6.36 ± 2.75	

Table (2) Total Mean Score of studied sample knowledge & Practices pre and post implementation of the intervention program (n=70)

Items	Pre intervention		Post intervention		t test	P
	No	%	No	%		
Total Knowledge about covid 19: Good Average Poor	 16 15 39	 22.9 21.4 55.7	 62 5 3	 88.6 7.1 4.3	23.93	<0.001
Mean ±SD	14.1 ± 3.25		22.52 ± 1.09			
Total practices: Competent Incompetent	 5 65	 7.1 92.9	 66 4	 94.3 5.7	28.94	<0.001
Mean ±SD	10.15 ± 2.26		19.91± 1.53			

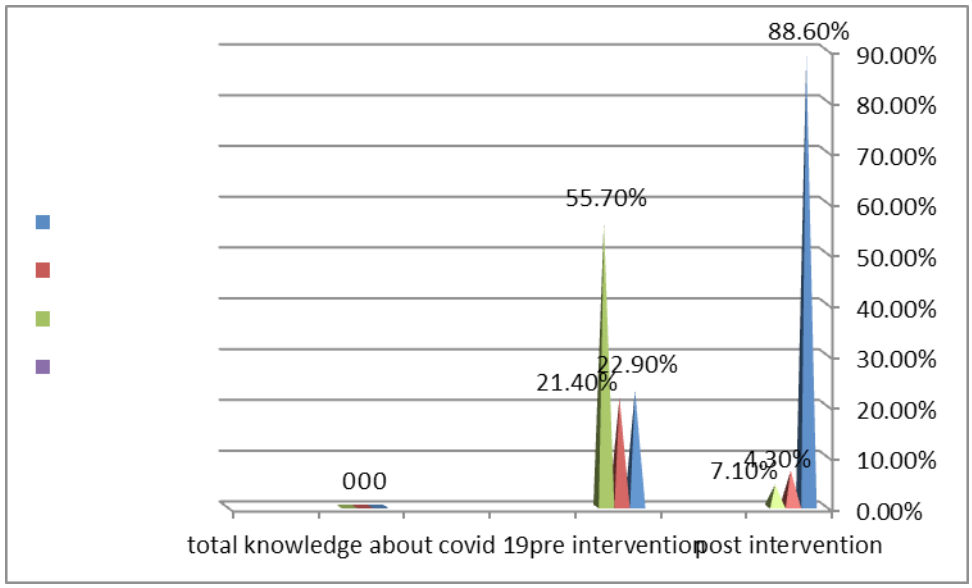

Figure 1 Shows total knowledage about covid 19 pre and post implementation of the intervention

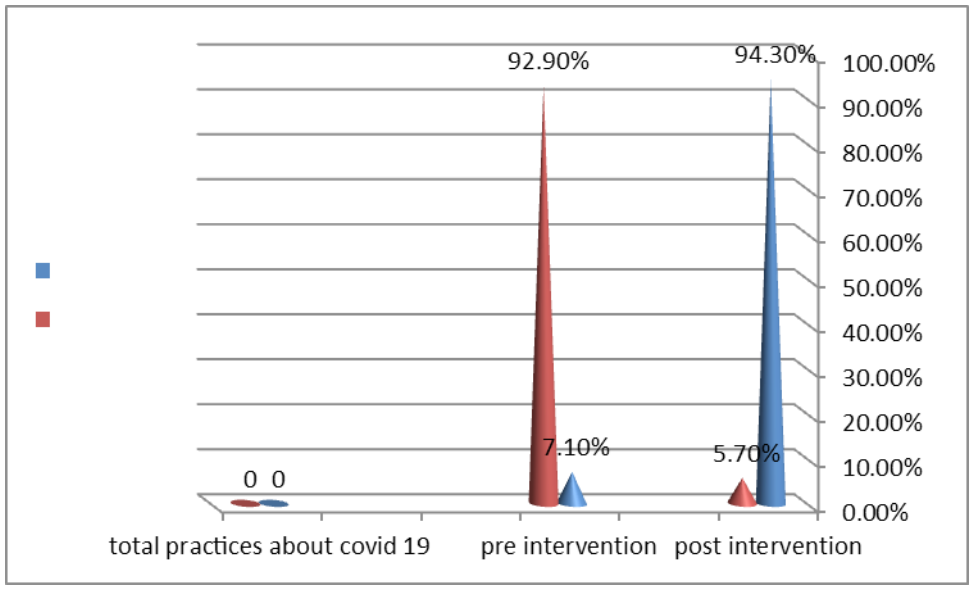

Figure 2: Displyes total practices about covid 19 pre and post implementation of the intervention

Table (3). Distribution of the studied sample total knowledge score pre and post implementation of the intervention program in relation to their personnel characteristics

Variable	Total knowledge score					
	Pre-intervention			Post –intervention		
	Mean ±SD	Statistical test	P value	Mean ±SD	Statistical test	P value
Age in years		0.773 (F)	>0.05		38.83 (F)	<0.001**
<20	3.75±1.48			11.25±1.055		
20:30	4.26±1.28			13.92±1.023		
>31	3.66±1.80			14.11±1.364		

Variable	Total knowledge score					
	Pre-intervention			Post –intervention		
	Mean ±SD	Statistical test	P value	Mean ±SD	Statistical test	P value
Educational qualification		0.100 (F)	>0.05		7.25 (F)	<0.001**
Bachelor of Nursing	4.15±1.174			13.65±1.68		
Nursing Technician Institute	4.20±2.29			15.40±1.26		
Years of experience		0.953 (F)			19.71 (F)	<0.001**
Less than 5 years	4.29±1.34			13.09±1.60		
5 to 10 years	3.73±1.48			14.05±.91		
More than 10 year	4.10±1.79			16.00±.000		
Residence		0.666 (t test)			12.17 (t test)	<0.001**
Urban	3.60±1.81			16.00±.000		
Rural	4.15±1.42			13.60±1.58		

Table (4). Distribution of the studied sample total practice score pre and post implementation of the intervention program in relation to their personnel characteristics

Variable	Total practice score					
	Pre-intervention			Post –intervention		
	Mean ±SD	Statistical test	P value	Mean ±SD	Statistical test	P value
Age in years		0.516 (F)	>0.05		49.33 (F)	<0.001**
<20	12.91±4.46			28.33±.88		
20:30	13.86±5.036			31.89±1.22		
>31	13.22±2.33			32.55±1.74		
Educational qualification		2.64 (F)	>0.05		8.61 (F)	<0.001**
Bachelor of Nursing	14.44±4.13			31.57±2.11		
Nursing Technician Institute	11.90±4.48			34.00±1.69		
Years of experience		0.800 (F)			25.95 (F)	<0.001**
Less than 5 years	13.73±4.79			30.73±1.93		
5 to 10 years	13.31±4.069			32.36±1.11		
More than 10 year	11.70±4.39			34.70±.674		
Residence		0.548 (t test)			10.24 (t test)	<0.001**
Urban	12.80±1.92			34.80±.447		
Rural	13.36±4.68			31.50±2.024		

Table (5). Correlation between studied nurses' total knowledge and practice score pre and post implementation of the intervention program

Variable	Knowledge before teaching		Knowledge after teaching	
	r	P	r	P
Practice before training	.171	>0.05		
Practice After training			.971**	<0.001**

Discussion

Nowadays, COVID-19 is a life-threatening agent with the worldwide spread and it has become an international concern. This disease was first reported on 12 December 2019 from Wuhan (1)**.** Health workers, especially nurses, have close contact with infected patients and have a decisive role in infection control. The health care providers are at the front line of the outbreak response of current pandemic of COVID19 and exposed to hazards that put them at risk of infection. Rapid spread of the COVID-19 pandemic has become a major cause of concern for the healthcare profession in all over the world. All health care professional must stay aware of the latest information on the COVID-19 outbreak**.**[10]

This study was carried out to evaluate the effect of educational intervention on nurses' knowledge and practices regarding corona virus (covid 19). As regard characteristic of the studied sample, it was found that more half of nurses (74.3%) were aged from 20-30years, with a mean of age 27, 34 ± 5.44years. As far as nurses' qualification, more than half of them (60.0 %) had bachelor of nursing as well as half of them (50.0 %) was nursing specialist. Regarding experience years at the hospital, about half of nurses (51.4%), their experience ranged from 5-10 years, with a mean of 6.36 ± 2.75 years. And (64.3%) of nurses were lived in rural area. In this respect **Nemati , et al (2020**) [11] who studied "Assessment of Iranian Nurses' Knowledge and Anxiety Toward COVID-19 During the Current Outbreak in Iran" and found that the demographic characteristics of the participants. More than 75% of the respondents were in the group of less than 40-years-old. Concerning the education level, (56.3%) participants had a high school diploma or less, more than half of them (67%) had associate's or bachelor's degrees, provides data regarding work experience;, 30.6% between 5 and 15 years.

On investigating knowledge of the studied sample regarding corona virus (covid 19), the findings of the current study revealed that before the educational intervention, nurses had poor knowledge about covid 19, their low scores of knowledge may be attributed to the fact that covid 19 are new advanced emerging virus and the nurses, are still deficient in this issue. As well as after graduation, nurse's neglect reading updating their professional knowledge, it was expected to find such low level of knowledge. The present study findings are in congruence with **Joshi, et al (2020)** [12] who studied" Knowledge and awareness among nursing students regarding the COVID-19: a cross sectional study", who concluded that, the study participants showed adequate basic knowledge and awareness of COVID-19. There is a strong need to implement periodic educational interventions and training programs on infection control practices and other updates of COVID-19 across all healthcare professions including nursing students. Additional online education interventions and campaigns are also required. This would definitely improve the knowledge and confidence of nursing students to provide the right care to their patients and protect them self from COVID-19.

Furthermore, after implementing the educational intervention, there was a statistically significant improvement for knowledge scores in relation to covid 19. Such improvement might be accounted on nurses' interest to learn and acquire knowledge about the study topic as well as the written booklet distributed to nurses used as an ongoing reference, which was helpful in nurses' acquisition of knowledge, in addition to encouragement of questions, participation, and interactions along the intervention as well as the use of multimedia. These results are consistent with **CHEN etal .,(2020)** [13]who studied that Nursing Perspectives on the Impacts of COVID-19, and concluded that- Nurses are key members of healthcare teams charged to control and prevent the spread of infectious diseases. Moreover, nurses work on the front line, providing direct care to individuals infected with COVID-19. Further effort is

necessary to develop strategic recommendations and to integrate new knowledge into education. The immediate efforts to control and prevent COVID-19 and to care for those who are infected remain on going.

Concerning nurses' practices towards covid 19, the findings of the current study revealed that about two thirds of the studied nurses had incompetent practices toward covid 19 before intervention. Meanwhile, after intervention the percentage changed to majority of the studied nurses had competent practices toward covid 19. This could be due to the fact that, receiving training from educational intervention and high adherence with training sessions with their active participation improving their knowledge and lead to competent practices.

These findings are in the same line with **Fernandez etal., (2020)[14]** who studied "Implications for COVID-19: a systematic review of nurses' experiences of working in acute care hospital settings during a respiratory pandemic" who concluded that nurses should receive clear, concise and current information about best practice nursing care and infection control, as well as sufficient access to appropriate PPE to optimise their safety. Adequate staffing is essential to ensure that nurses are able to take breaks during shifts, take leave when they are ill and provide appropriate skill mix. Support for nurses to manage competing family responsibilities and maintain safe contact and communication with family members can reduce personal stress and anxiety.

In general, the nurses in the present study demonstrated poor knowledge, with incompetent practices. Implementing educational intervention that met their needs proved successful in fostering their knowledge and improving their skills, thus leading to acceptance of the research hypothesis. The effectiveness of the educational intervention and its independent positive influence on nurses' knowledge and practices towards covid 19 was apparent from the results. The findings are in congruence with the results of ***Chen and Lou, (2013)*** **[15]** systematic review that revealed that such programs are beneficial as they involve multi-dimensional teaching strategies. Furthermore, **Varghese (2013)[16]** added that nurses have an important role in imparting knowledge, therefore, the nursing policy protocol should include the current technologies to update the knowledge regarding recent advances to cope with infection control of covid 19 in addition to structured teaching programme is one of the effective methods to acquire & impart knowledge and practices.

Regarding integrating knowledge into practices, the present study demonstrated a positive statistically significant correlation between knowledge and practices, with improved knowledge being associated with competent practices. This finding is quite expected and is consistent with **McEachan et al., (2016)** **[17]** who studied "Meta-analysis of the reasoned action approach (RAA) to understanding health behaviours" who reported that some health care workers have inadequate awareness of infection prevention practices. Knowledge of a disease may influence health care workers practices, and incorrect practices directly increase the risk of infection. Understanding health care workers knowledge, & practices and possible risk factors helps to predict the outcomes of planned behaviour.

Additionally, the findings of the current study illustrated that there was a highly statistically significant correlation between total knowledge, total practices scores and general characteristics. These findings are supported by **Zhang etal.,(2020)** **[18]** who studied "Knowledge, attitude, and practice regarding COVID-19 among healthcare workers in Henan, China" that emphasized that training regarding protection should be organized according to different factors (work experience, educational attainment, and so on), and medical systems should ensure that frontline workers have enough time to rest between shifts, to avoid overwork and non-conscious errors during epidemic relief efforts. Moreover, to reduce the risk of infection among healthcare professionals who are not in direct contact with patients, policy and education should be implemented to convey the importance of disclosing possible exposure to the virus.

Conclusion

In the light of the study findings, it can be concluded that, there was a statistically significant improvement in nurses 'knowledge mean scores, after intervention, as well as there was a statistically significant difference in nurses' practices scores before, and after intervention. The implementation of an educational intervention was effective and significantly improved nurses' knowledge and practices towards covid 19. Furthermore, the above mentioned findings proved and supported the research hypothesis.

Recommendations:

- Adequately planned in-service training programs related to covid 19 must be established to develop

nurses 'knowledge and practices in order to fit newly developed concepts in care.

- Simple guidelines regarding covid 19 should be available and easily access in all departments of the hospital
- This study can be replicated on a larger sample in other hospitals for generalizing the findings.

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