

In-service training program for nurses regarding prevention and control COVID-19

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Abstract

The current study aimed to evaluate the effect of Inservice training programs for nurses regarding prevention and control of COVID-19. A Quasi-experimental research design was used in this study. This study was conducted on the nursing staff in the isolation hospitals affiliated with the Directorate of Health Affairs in Beni Suef. A convenient sample consisted of 300 nurses working in isolation hospitals. Structural Interviewing Questionnaire, it was contained four parts: Part I: Nurses' demographic characteristics. Part II: Nurses' knowledge Part III: Nurses' attitude. Part IV: nurses' reported Practice about COVID-19. 47.7% of the studied nurses had a satisfactory level of knowledge pre-program which improved to 93.3% post-program, 62.7% of the studied nurses had a positive attitude toward COVID-19 pre-program which improved to 98.7% post-program, and 53.3% of the studied nurses had adequate reported practice level at pre-in-service training program which improved to be 96.7% post-program, with highly statistically significant difference between pre and post-program. In addition, there was a positive correlation between total knowledge level, attitude, and total reported practice level after the program. Nurses' knowledge, attitude, and practice regarding the prevention and control of COVID-19 improved after an in-service training program. Develop in-service training programs and workshops regarding COVID-19 for nurses to increase awareness and practices for the control& prevention of covid-19.

Keywords: In-service Training Program, COVID-19, Nurses, Prevention and Control, COVID-19.

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1. Introduction

Since March 2020, the world has faced a severe threat called COVID-19. According to the WHO, the COVID-19 pandemic is currently the most critical health crisis in the world and the most significant challenge and threat facing the world and humanity. This disease is a public health problem that has claimed the lives of many men, women, and children worldwide (Mohammad *et al.*, 2022). There were two previous outbreaks of coronaviruses; SARS-CoV and Middle East respiratory syndrome-corona virus (MERS-CoV) in 2003 and 2012, which resemble the novel coronavirus. Due to the rapid spread of this highly transmitted virus to many countries, world health organization (WHO) declared it as a "public health Saber *et al.*, 2023

emergency of international concern" on January 30, 2020. Later, due to the continual rise in the number of affected countries, cases, and fatalities, WHO declared COVID-19 as a global pandemic on 11 March 2020 (WHO, 2020).

The virus spreads in most cases when an infected individual coughs, sneezes, or talks, where the virus is mostly disseminated by saliva droplets or nasal secretions. Drops cannot extend more than six feet (almost two meters). It may float in the air for up to three hours while still being intact and contagious in droplets (Zhu *et al.*, 2020). Additionally, tainted droplets may settle down on materials including plastic, stainless steel, copper, and cardboard. When a person touches surfaces that have the COVID 19 virus on them and then touches mucous membranes like the

eyes, nose, or mouth, they risk contracting the disease (WHO, 2020). COVID-19, caused by severe acute respiratory syndrome, was considered a global pandemic epidemic, deemed by the World Health Organization as a public health emergency of international concern. Efforts made by all nations in concert to stop the COVID-19 virus's fast spread (Zhou et al., 2020). Infections frequently manifest as respiratory symptoms, fever, cough, shortness of breath, and breathing difficulties. In more serious instances, the infection may result, severe acute respiratory syndrome, renal failure, pneumonia, and other complications and mortality (Zegarra et al., 2020).

Nurses play an important role in promoting health and overcoming delays in receiving appropriate healthcare services related to the COVID 19 situation by improving awareness about diagnosis, treatment, disease management and research into preventive measures towards coronavirus by providing much-needed support and information (Srichan et al., 2020). Nurses help in providing care including promotion, prevention, treatment, and rehabilitation. Also share health information, carryout infection prevention and control measures, work in intensive care units, and make sure routine services are still provided (Choi et al., 2020). The goal of the training program is to increase the level of nurses' management and support patients who are infected with the Corona virus by ensuring that these services are linked to primary care and encouraging greater awareness of this illness among all nurses who come into contact with patients (Gomaa et al., 2021). Therefore, the main aim of the training program is to take action to enhance the level of nurses to empower them, through immediate efforts by incorporating new educational knowledge into practice for the control and prevention of COVID-19 and the care of infected patients through compliance with preventative measures and, one should always wash their hands before eating and after using the restroom, and should also avoid close contact with others (WHO (3), 2020).

1.1 Significance of the study

Globally, there have been 755 786 confirmed deaths and 21 026 758 confirmed cases within the COVID-19 pandemic (WHO, 2020). In Egypt, changes every day of life have been rapid, with virus outbreaks, and an increasing death rate. COVID-19 considered a pandemic in Egypt as part of an ongoing worldwide COVID-19 pandemic. The Ministry of Health and Population in Egypt confirmed that the first case of COVID-19 in Egypt was on February 14, 2020. As of the evening of June 15, there were 46289 confirmed cases of Covid-19 and 1672 deaths in Egypt (Ministry of Health and Population Egypt, 2020). Worldwide, there is no consistent record of the number of healthcare workers and nurses who have COVID19 infection. But the International Council of Nurses' analysis, depend on data from National Nursing Associations, media reports, and official figures from different countries, designates that more than 230,000 healthcare workers have constricted the disease, and more than 600 nurses have died from the virus. International Council of Nurses' analysis displays that on a regular 7% of all Covid-19 cases worldwide are among healthcare workers, which means that nurses are at great risk for infection (International Council of Nurses, 2020).

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Nurses are in direct contact with contaminated patients and suspects, may be on the front lines of the COVID-19 epidemic and are at risk of contamination due to their exposure to the threats. Worldwide Council of Nurses reported that 2.195% of all verified COVID-19 cases—260 nurses who had died—were among the more than 90 000 health-care workers worldwide who were infected with the virus (Nguyen et al., 2020). Nurses are the frontline healthcare professionals who have multiple roles and functions during the COVID-19 pandemic, which include: providing inservice training program, screening services, and support for the public and individuals in high-risk groups, Nosocomial infection prevention and surveillance, Implementing standard precautions (hand hygiene, personal protective equipment, respiratory hygiene, medication storage, and injection safety); and educate, train patients and families, deliver direct life-sustaining care to patients with COVID-19 who are in an acute or critical condition, provide emotional and psychological support to individuals required home quarantine restrictions (Ammar & Ramadan, 2020).

1.2 Aim of the study

This study aims to evaluate the effect of service training program for nurses regarding prevention and control COVID-19 through:

1. Assessing the nurses' knowledge, attitude and reported practices regarding prevention and control COVID-19.
2. Planning and implementing in-service training program for nurses regarding prevention and control COVID-19.
3. Evaluating the effect of in-service training program for nurses to prevention and control COVID-19.

1.3 Hypothesis

In-service training program for nurses will improve nurses' knowledge, attitude and reported practices regarding prevention and control COVID- 19.

2. Subjects and Methods

2.1 Research design

A Quasi experimental research design was used in this study.

2.2 Setting

This study was conducted on the nursing staff in the isolation hospitals affiliated to the Directorate of Health Affairs in Beni Suef, Egypt (Al- Wasta, Nasser, Fever, Al-chest, Somasta, Al- Fasfin).

2.3 Subjects

A convenient sample was used in this study. The sample consisted of 300 nurses working in isolation hospitals, and the sample was taken from nurses working in isolation hospitals.

2.4 Tools of data collection

2.4.1 Tool: Structural Interviewing Questionnaire

It was developed by the researcher after reviewing the national and international related literature. It was contained two tools: the first tools contain to four parts:

2.4.1.1 Part I: Nurses demographic characteristics

It was concerned with age, sex, marital status, level of education, position, years of experiences and residence.

2.4.1.2 Part II: Nurses' knowledge regarding COVID-19

It was constructed to assess the nurse's knowledge regarding COVID-19 such as meaning, manifestation, incubation period, predisposing factors, modes of transmission, high risk groups, diagnostic measures, complications, types of vaccination used in Egypt, cases needed home isolation, time of hand washing, and precautions to prevent infection.

2.4.1.2.1 Knowledge scoring system

It included 12 ended questions, each correct answer was given (2 mark), and incorrect was given (1mark) and don't know was given (0). The total score ranged from 0-24, the total knowledge level considered satisfactory $\geq 60\%$ (≥ 15), and unsatisfactory $<60\%$ (<15).

2.4.1.3 Part III: Nurses' reported Practice about COVID-19

It was included nurses' reported practice regarding COVID-19 such as general practices it was included cases sorted for the presence of respiratory symptoms at the entrance to the hospital, dealing with all body fluids of the patient as an infection Committed to washing hands before and after touching the patient minimize the time spent with the novel covid-19 patient as much as possible.

2.4.1.3.1 Reported Practice scoring system

It included 30 items, each item had three choices to be answered always (3mark), sometimes (2mark), and never (1 mark). The total score ranged from 1-90, the total practice level considered adequate practice $\geq 60\%$ (≥ 54), and inadequate practice $<60\%$ (<54).

2.4.1.4 Part IV: Nurses' attitude regarding COVID-1

It was constructed to assess the nurses' attitude regarding COVID-19 such as covid-19 is a serious disease, fear can hinder recovery from illness, the information published by the Ministry of Health about covid-19 must be followed, nursing has an important role in controlling covid-19, it is possible to limit the spread of covid-19 in hospitals by applying infection control standards, a dose of vaccination must be obtained to prevent infection with covid-19, health education about covid-19 is important to raise awareness and prevent it.

2.4.1.4.1 Attitude scoring system

It included 10 items, each item had three choices to be answered agree (3mark), neutral (2mark), and disagree (1 mark). The total score ranged from 1-30, the total attitude level considered positive attitude $\geq 60\%$ (≥ 18), and negative attitude $<60\%$ (<18).

2.4.1.4.2 Tool Validity

The revision of the tools for clarity, relevance, comprehensiveness understanding and applicability was done by a panel of five experts from Faculty of Nursing Helwan University to measure the content validity of the tools and the necessary modification was done accordingly.

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2.4.1.4.2 Reliability

Reliability coefficients was calculated for the study tool by using calculating cronbach Alpha which was (0.804), for knowledge (0.604), for attitude (0.823) and (0.775) for reported practice.

2.5 Ethical Consideration

Prior to the study ethical approval was obtained from the Scientific Research Ethical Committee of Faculty of Nursing Helwan university, an official permission was taken from the authoritative personnel in the mentioned hospital and informal consent was obtained from all nurses, the purpose and the nature of the study was explained to them prior the interview. The researcher was emphasis that the participation in the study is entirely voluntary; anonymity and confidentiality were assured through coding the data and he has the right to withdraw at any time.

2.6 Operational items

The operational design includes preparatory phase, pilot study, and field work.

2.6.1 Preparatory phase

The researcher was reviewed current and past, local and international related literature and theoretical knowledge of various aspects of the study using books, articles, journals, and internet to prepare the tools of data collection.

2.6.2 Pilot Study

A pilot study was conducted on 10% (30 nurses) of the nurses under study to assess the feasibility of the study as well as clarity and objectivity of the tools. Not modification was done in tool so, pilot study sample were included in the actual study sample.

2.6.3 Field work

Before conducting the study, an official permission was obtained from the Dean of Faculty of Nursing, Helwan University to the director of health in Beni Suef. Before conducting of the study, permission was obtained from the directors of the hospitals. The researcher met the nurses and the aim of the study was explained to them. Their informed verbal consent was secured before collecting data.

The questionnaire was distributed and completed by the researcher from studied nurses for knowledge, attitude and reported practices at preprogram. The researcher educates nurses about covid-19 after divided into twelve group each group was educated about sessions in services training program was developed based on the result of pretest. The plan of program was prepared, implemented and evaluate the degree of improvement of study group. The educational methods were used in the study include active discussion, brain storming, demonstration and red demonstration. The researcher used supportive material as papers, colored markers, flip chart, laptop, colored posters, power point, handouts, pamphlet prepared by the researcher. By the end of each session the researcher told the nurses about the content and time of the next date of meeting. Data was collected during six months from (beginning of March 2022 to the end of August 2022). At the end of the

inservices training program was assessed at post program phase by using the same tool at preprogram. In-service training program was conducted through four phases: preparatory, assessment, planning & implementation and evaluation.

2.6.3.1 Preparatory phase

Tool of data collection development review of past and current related literature covering various aspects of COVID 19 using available books, articles and magazine. The aim is acquainted with the research hypothesis to develop the study tool.

2.6.3.2 Assessment phase

Before start the designed inservice training program, the study tool was applied to assess nurses' knowledge, attitude and reported practices regarding prevention and control COVID-19 pre-test questionnaire was administered to the study sample to assess level of nurses' knowledge, attitude and reported practices regarding prevention and control COVID-19. The data obtained during this phase were considered the basics for content of in-service training program.

2.6.3.3 Planning & implementing phase

This study objective to evaluate the effect of in-service training program for nurses regarding prevention and control COVID-19 through the studied nurses were 300 nurses divided into twelve groups, each group 25 nurses, it was taken from each isolation hospital 50 nurses, the studied nurses in each isolation hospital was divided into 2 groups, each group of 25 nurses. each group took 4 days of training, each group took 8 sessions, every day 2 training sessions from 10 am to 10,45 and from 11 am to 11, 45. The place of training is meeting room in hospitals from Sunday to Wednesday per/week in every hospital, the training lasted for six months. In-services training program include 8 sessions (six theoretical sessions, one session reported practical and last session to evaluated and make post-test).

The theoretical part includes the first session started with greeting and covering the feeling of acceptance to participant nurses, after than orientation to the program and it is aims took place, using simple words to identify the program, reduce anxiety level and develop sense of trust, the content of each session was given. At the end of the session, nurses were asked for their feedback in discussion.

At the beginning of the first session, an orientation to the objective of the study and the goal of the in-service training program. Also, nurses were oriented about program session time, duration, place and contents. The researcher stressed on the importance of continuous attendance and active participation.

Different teaching and learning methods were used during the sessions which included lecture, discussion and brain storming. Instructional media includes booklet. The program was presented in a clear and concise form to be used as memorial references. Each session started with a summary about the previous session and the objective of the new session, using a very simple language that suit the level of nurses without ignoring motivation and reinforcement techniques. Direct reinforcement in the form of a copy from booklet pamphlet was given as a reward for each nurse to use it as a future reference. Nurses were allowed to ask any

interpretation, elaboration or explanation of any item included in the sessions. At the end of every session, the nurses were discussed to correct any misunderstanding.

2.6.3.4 Evaluation phase

After implemented of in-service training program, post-tests were done to evaluate the effect of the program; the post test was done immediately by end of the sessions using the same tool of pretest evaluation.

2.7 Administrative items

An official permission approval was obtained from the Dean of Faculty of Nursing at Helwan University and official permission from the Directorate of Health Affairs in Beni Suef to conduct the study and implement the in-services program and explain the purpose and the nature of the study.

2.8 Statistical items

Data entry and data analysis were done using statistical package for the social science (SPSS) version 26. Data were presented as number, percentage means and standard deviation. T-test used to compare mean. X2 test was used to show difference between variables in pre and posttest, Pearson test was used to show correlation between variables. P-value considered statistically significant when <0.05 and highly statistically significant when <0.0 .

3. Results

Table 1 clarifies that 56.7% of the studied nurses were in age group from <30 years with $\bar{x} \pm SD$ of 29.23 ± 7.14 , 96.7% of them were female. 68.7% and 72.0% of the studied nurses were married and lived at rural areas respectively. Concerning educational level, 45.7% of them had technical nursing institute, 76.7% of them were nurses. Figure (1): illustrates that, 29.3%, 32%, and 38.7% of the studied nurses had <5 years, 5-10 years, and >10 years of experience respectively. **Figure 1** illustrates that, 29.3%, 32%, and 38.7% of the studied nurses had <5 years, 5-10 years, and >10 years of experience respectively. **Figure 2** illustrates that, 47.7% of the studied nurses had a satisfactory level of knowledge preprogram which improved to be 93.3% at post program, with highly statistical significant difference between pre and post program at p-value <0.01 . **Figure 3** demonstrates that 62.7% of the studied nurses had a positive attitude toward Covid-19 at preprogram which improved to be 98.7% post program, with highly statistical significant difference between pre and post program at p-value $=0.001$. **Figure 4** reveals that 53.3% of the studied nurses had adequate reported practice level at preprogram which improved to be 96.7% post program, with highly statistical significant difference between pre and post program at p-value <0.01 . Table (10) illustrates that there was positive correlation between total knowledge level, attitude and total reported practices level before and after program.

4. Discussion

COVID-19 was declared a pandemic by the World Health Organization (WHO), which emerged in late 2019, spread almost all over the world and was seen in thousands of people and caused thousands of people to die. The professional practice of infection prevention and control has long been a responsibility of health-care facilities, although typically considered in relation to patient protection (Kurt *et al.*, 2022).

Protection of healthcare workers are important steps in the infection, the understanding or having enough information control of sources, clinical manifestations, transmission routes, and prevention ways among healthcare workers can play roles for this goal assessment. Since nurses are in close contact with infected people, they are the main part of the infection transmission chain and their knowledge of 2019-nCoV prevention and protection procedures can help prevent the transmission chain (Wang *et al.*, 2020). Regarding to demographic characteristic, the present study finding showed that, more than half of the studied nurses' were in age group from <30 years with $\bar{x} \pm SD$ of 29.23 ± 7.14 . This result was supported with Saqlain *et al.*, (2020), in Pakistan (n= 414) entitled "knowledge, attitude, and practice regarding COVID-19 among health care workers" who denoted that 55.6% of the studied nurses were aged less than 30 years. Regarding to gender, the present study illustrated that the majority of the studied nurses were female and more than two thirds of them were married respectively. This result was in accordance with Semerci *et al.* (2020) in Turkey (n=163) entitled "assessed Turkish oncology nurses' knowledge regarding novel coronavirus (COVID-19) during the current outbreak" who stated that 89.7% of the study sample were females and 67.2% of them were married respectively. Also, this result was supported with Elhadi *et al.* (2021) in Libya (n=200) entitled "Knowledge, attitude, and acceptance of healthcare workers and the public regarding the COVID-19" and found that 90.7% of the studied subject were females and 68.9% of them were married. This may be due to the nature of nursing profession worldwide and in Egypt, where the predominance is for females, also females were empathic and more flexible as well as stronger in interpersonal skills than males

The present study finding showed that, less than three quarters of the studied nurses lived at rural areas. This result was contrasted with Tien *et al.* (2021) in Vietnam (n=963 participants) entitled "Knowledge, attitudes, and practices regarding COVID-19 prevention among Vietnamese healthcare workers in 2020" who showed that 20.1% of the studied subjects lived at rural areas. Concerning educational level, the present study revealed that more than two fifths of the studied nurses had technical nursing institute and more than three quarters of them were nurses. This finding incongruent with Nemati *et al.* (2020) study done in Iran (n=85 nurses) whose conducted study about "assessment of Iranian nurses' knowledge and anxiety toward COVID-19 during the current outbreak" who denoted that 67.1% of the studied nurses had a bachelor's degree. Also, the result disagreed with Semerci *et al.* (2020) who found that 52.4% of the studied nurses were staff nurse. From the investigator point of view, this may be because many bedside nurses in governmental hospitals graduated from the nursing technical institute

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According to their years of experience, more than one third of the studied nurses had >10 years of experience. This result was approved with the study done in Ethiopia (n=404 participants) by Adane *et al.* (2022) entitled as "Knowledge, attitudes, and perceptions of COVID-19 vaccine and refusal to receive COVID-19 vaccine among healthcare workers in northeastern Ethiopia" who found that 43.6% of the healthcare workers had work experience more than 10 years. As regard to total knowledge level of the studied nurses' about Covid -19 at pre and post program, the current study result illustrated that, less than half of the studied nurses had a satisfactory level of knowledge pre-program which improved to be the majority of them at post program had satisfactory knowledge, with highly statistical significant difference between pre and post program at p-value <0.01.

These findings in agreement with Qadah (2020) who showed that, 88 % of participants displayed satisfactory knowledge towards COVID-19. Also, this result was in the same line with Reuben *et al.*,(2020) who applied study (n=589 nurses) entitled "Knowledge, attitudes and practices towards COVID-19: an epidemiological survey in North-Central Nigeria" who revealed that 99.5% of health care workers had sufficient knowledge towards COVID-19 post program. These current results were supported with Mbachu *et al.* (2020) who conducted study in Nigeria (n= 403 participants) entitled "COVID-19 infection: Knowledge, attitude, practices, and impact among healthcare workers in a South-Eastern Nigerian state" who mentioned that 88.59% of the participants had good knowledge of COVID-1 at post program. Also, the result in accordance with the study done in In Egypt (n= 70 nurses) by Abd ElAziz *et al.* (2021) entitled "Effect of Nursing Educational Program on Nurses' Knowledge and Practices regarding Pandemic Covid-19 in Isolation Unit" who showed 56.4% of studied sample had unsatisfactory knowledge pre-program while post program improved to 96.7% of them had satisfactory knowledge with highly statistically significance differences P-value. This result reflects the effectiveness of in-services training program to enhance knowledge of nurses regarding coronavirus.

Concerning total attitude level toward Covid-19 in pre and post program, the present findings showed that less than two thirds of the studied nurses had a positive attitude toward Covid-19 at pre-program which improved to be the majority of them post program had positive attitude, with highly statistical significant difference between pre and post program at p-value =0.001. This result was supported with study done in India (n=190 nurses) by Kundu *et al.* (2023) entitled as "Attitude of the staff nurses toward COVID care and work challenges faced by them" who showed that 98.2% of staff nurses had positive attitude, Also the result comes in the same line with Kamacooko *et al.* (2021) who conducted study entitled "Knowledge, Attitudes, and practices regarding COVID-19 among healthcare workers in Uganda" and showed that 78.4% of the studied nurses had a positive attitude. While contrasted with Al-Dossary *et al.*, (2020) who applied study entitled "Awareness, Attitudes, Prevention, and Perceptions of COVID-19 Outbreak among Nurses in Saudi Arabia" and mentioned that 60.4% of the nurses had high positive attitudes toward caring for COVID-19 patients. From the researcher point of view, this result

may be due to increase nurses' knowledge about covid-19 can lead to improve attitude toward covid-19.

As regard to total reported practices level toward covid – 19 in at pre and post program, more than half of the studied nurses had adequate practice level at preprogram which improved to be the majority of them had adequate practice at post program, with highly statistical significant difference between pre and post program at p-value <0.01. This result was in the same line with *Asemahagn (2020)* who applied study in Ethiopia (n=442 participants) entitled "Factors determining the knowledge and prevention practice of healthcare workers towards COVID-19 in Amhara region, Ethiopia: a cross- sectional survey" and found that the studied participants had good COVID -19 practices at post program. Also, these results congruent with *Abd-Elhamed and Hasab Allah (2022)* in Egypt (n=70 nurses) entitled "Effect of Educational Program on Nurses' Knowledge, Practice and Attitude Regarding Covid -19 at Maternity Care Units" who revealed that 15.7% of the studied sample had competent level of practice pre-program while post-program improved to 81.4% of them with highly statistically significance differences P – value.001. While contrasted with *Abd ElAziz et al. (2021)* who showed that, 45.7% of the studied nurses had inadequate level of practice regarding Pandemic Covid-19 before educational program while improved to 67.3% of them post program. From the researcher point of view, up to date knowledge and nursing skills can play important roles in improve nurses practice and improve infection control. Nurses should have the

opportunity to practice infection control on a day-to-day basis as an integral part of patients' care.

Concerning correlation between the studied nurses' total knowledge level, attitude and total reported practices level at post program, the finding of these study revealed that that there was positive correlation between total knowledge level, attitude and total reported practices level before and after program. This result was supported with study In Egypt (n= 150 participants) by *Elshenawie et al.,(2020)* entitled "Guidelines on Nurses' Knowledge, Attitude and Practice toward COVID-19 "who showed that there was a positive, statistically significant difference between pre & post-educational programs regarding safety measures on studied nurses' knowledge, attitude, and practice. This result was in accordance with *Moustafa et al. (2021)* in Egypt (n=30 nurses) entitled "Efficacy of COVID-19 Prevention Educational Program on Nurses' knowledge and Practices at Hemodialysis Unit" who showed that there was positive correlation between nurses' knowledge and practices post the educational program $r = (0.276)$. While there was a negative correlation between the score of nurses' knowledge and practices pre the educational program $r =(-0.595)$. This result may be due to correct knowledge enhance level of practice that reflects on attitude level among studied nurses.

Table 1: Frequency distribution of the studied nurses according to their demographic characteristics (n=300)

Demographic characteristics	No.	%
Age/ years:		
< 30 years	170	56.7
30 -< 40 years	67	22.3
40 -< 50 years	57	19.0
≥ 50 years	6	2.0
Age ($\bar{x}\pm SD$)	29.23±7.14	
Sex:		
Male	13	4.3
Female	287	96.7
Marital status:		
Single	70	23.3
Married	206	68.7
Divorced	14	4.7
Widowed	10	3.3
Place of residence:		
Urban	84	28.0
Rural	216	72.0
Education level:		
Nursing Diploma	82	27.3
Technical Nursing Institute	137	45.7
Bachelor of Nursing	77	25.7
Master of Nursing Sciences	4	1.3
Current job:		
Nurse	230	76.7
Supervision	70	23.3

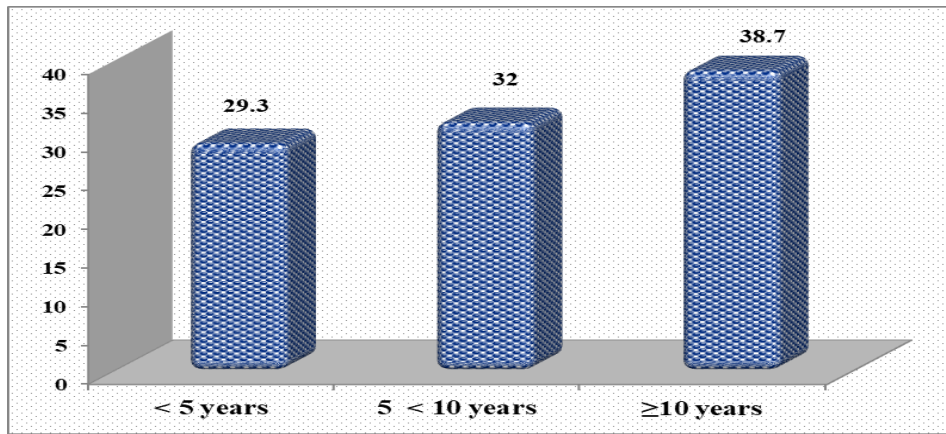


Figure 1: Frequency distribution of the studied nurses according to their years of experience (n=300)

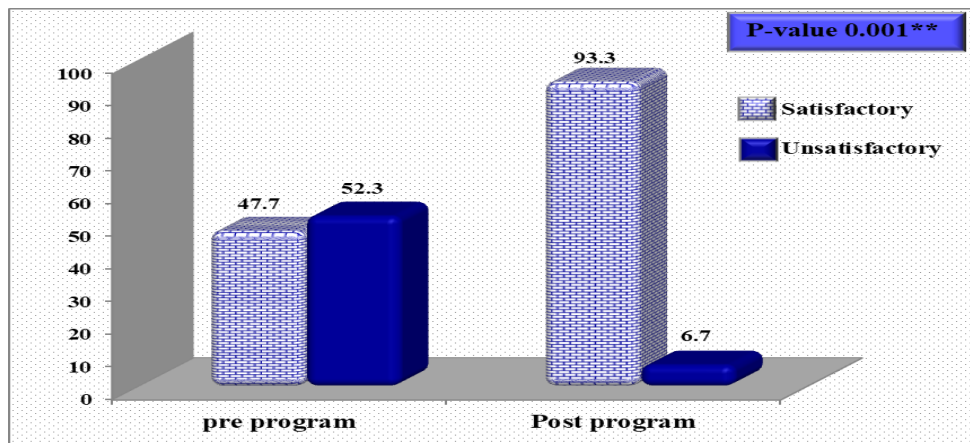
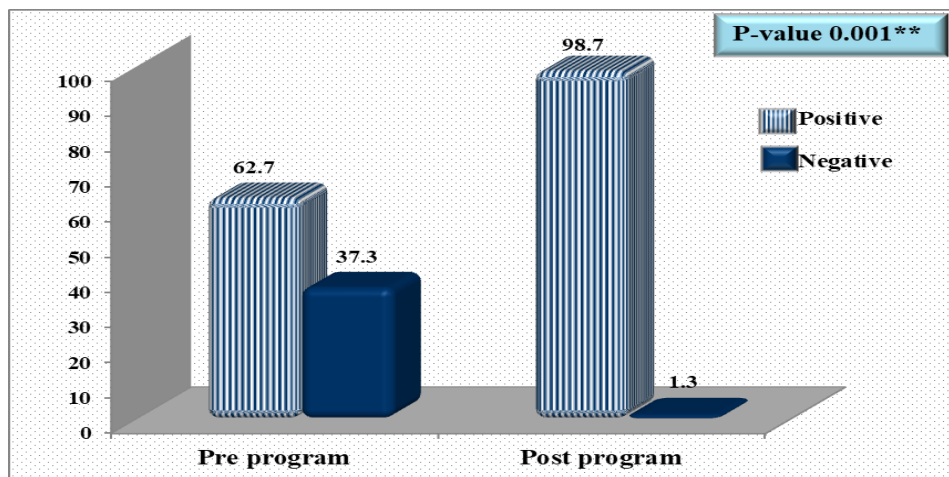
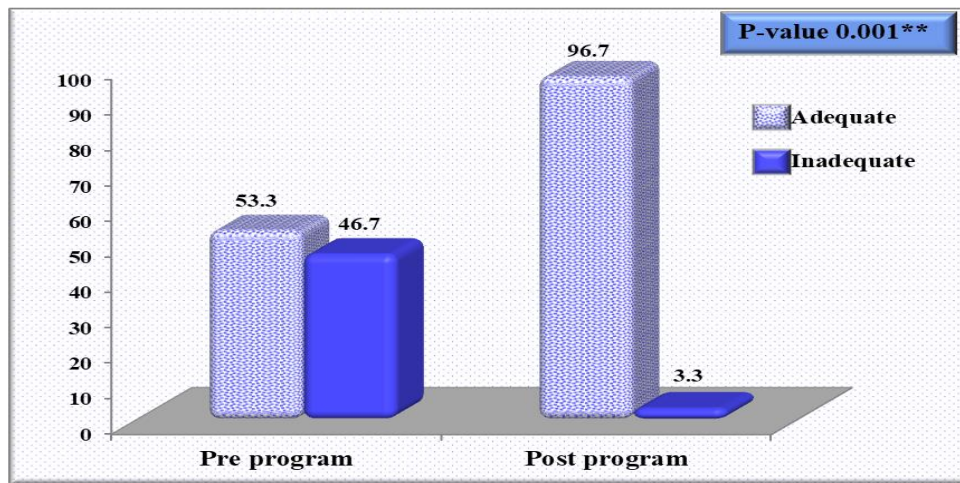


Figure 2: Total knowledge level of the studied nurses' about Covid -19 at pre and post program (n=300)



(**) highly statistical significant difference (p-value <0.01)

Figure 3: The studied nurses' total attitude level toward Covid-19 in pre and post program (n=300)



(**) highly statistical significant difference (p-value <0.01)

Figure 4: The studied nurses’ total reported practices level toward covid–19 in at pre and post program (n=300)

Table 2: Correlation between the studied nurses’ total knowledge level, attitude and total reported practices level before and after program (n=300)

Variable	Total knowledge level before program		Total knowledge level after program		Total practices level before program		Total practices level after program	
	R	P	R	P	R	P	R	P
Total practices level before program	.140	.016*						
Total attitude level before program	.162	.005**			0.045	0.434		
Total practices level after program			.005	.935				
Total attitude level after program			.041	.482			.034	.556

5-Conclusion

In the light of the current study findings, it can be concluded that: Nurses' knowledge, attitude and reported practice regarding prevention and control COVID- 19 improved after inservice training program. Moreover, less than half of the studied nurses had a satisfactory level of knowledge pre-program which improved to be the majority of them had satisfactory knowledge at post program, with highly statistical significant difference between pre and post program. Less than two thirds of the studied nurses had a positive attitude toward Covid-19 at pre-program which improved to be the majority of them had positive attitude post program, with highly statistical significant difference between pre and post program. More than half of the studied nurses had adequate reported practice level at pre-program which improved to be the majority of them had adequate reported practice post program, with highly statistical significant difference between pre and post program. Additionally, there were positive correlation between total

knowledge level, attitude and total reported practices level post program.

6. Recommendation

Based on the current study finding the following recommendations were proposed:

- Developing health educational program and workshops regarding covid -19 for nurses to increase awareness and practices to control and prevention of covid 19.
- Disseminate booklets & poster about covid-19 among nurses.
- Further research on a large sample and other settings need.

References

- [1] M. A. Abd ElAziz, N.G. Abd Elhafez, S.Y. & Sayed. (2021). Effect of Nursing Educational Program on Nurses' Knowledge and Practices regarding Pandemic Covid-19 in Isolation Unit. *Egyptian Journal of Health Care*. 12(4), 248-63.
- [2] W.Y. Abdel Wahed, E.M. Hefzy, M.I. Ahmed & N.S. Hamed. (2020). Assessment of knowledge, attitudes, and perception of health care workers regarding COVID-19, a cross-sectional study from Egypt. *Journal of community health*. 45(6), 1242-1251.
- [3] M. Abd-Elhamed & M. H. Allah. (2022). Effect of Educational Program on Nurses' Knowledge, Practice and Attitude Regarding Covid -19 at Maternity Care Units. *International Egyptian Journal of Nursing Sciences and Research (IEJNSR)*.2(2):432-445. DOI:10.21608/ejnsr.2021.107069.1128
- [4] M. Adane, A. Ademas & H. Kloos. (2022). Knowledge, attitudes, and perceptions of COVID-19 vaccine and refusal to receive COVID-19 vaccine among healthcare workers in northeastern Ethiopia. *BMC Public Health*. 22(1), 1-14.
- [5] R. Al-Dossary, M. Alamri, H. Albaqawi, K. Al Hosis, M. Aljeldah, M. Aljohan, K. Aljohani N. Almadani, B. Alrasheadi, R. Falatah & J. Almazan. (2020). Awareness, Attitudes, Prevention, and Perceptions of COVID-19 Outbreak among Nurses in Saudi Arabia. *International Journal of Environmental Research and Public Health*. 2020 Nov 9;17(21): 8269. DOI:10.3390/ijerph17218269.PMID:33182352; PMCID: PMC7664870.
- [6] S.A. Ammar & S. Ramadan. (2020). Effect of Implementing Distance Learning on Nurses Knowledge and Practice Regarding Covid-19 Pandemic. *International journal of Nursing Didactics*. 10(12), 01-09.
- [7] M.A. Asemahagn. (2020). Factors determining the knowledge and prevention practice of healthcare workers towards COVID-19 in Amhara region, Ethiopia: a cross-sectional survey. *Tropical medicine and health*. 48(1): 1–11. Pmid: 32839649.
- [8] K.W. Choi, Y. Kim & H.J. Jeon. (2020). Perception and Conceptual Consideration of Health Care Workers Regarding COVID19. *Advances in Experimental Medicine and Biology*.2020;1191:219–235.doi: 10.1007/978-981-32-9705-0_14.
- [9] M. Elhadi, A. Alsoufi, A. Alhadi, A. Hmeida, E. Alshareea, M. Dokali, A. Msherghi. (2021). Knowledge, attitude, and acceptance of healthcare workers and the public regarding the COVID-19 vaccine: a cross-sectional study. *BMC public health*. 21(1), 1-21.
- [10] H. Elshenawie, H. El Sayed & E. AAR Dabou. (2020). Impact of Educational Program Regarding Safety Measures Guidelines on Nurses' Knowledge, Attitude and Practice toward COVID-19 Patients. *Egyptian Journal of Health Care*. 11(3), 612-627.
- [11] W. Gomaa Abdallah, A.K. Mohamed & G.S. Hassan. (2021). Training Program for Nurses to Enhance Competence Level Regarding COVID 19 Prevention. *Egyptian Journal of Health Care*. 12(2), 1964-1978.
- [12] International Council of Nurses. (2020). Available at <https://www.icn.ch/news/global-virtual-gathering-nursesand-midwives-outlines-actions-be-taken-protect-individual>.
- [13] O. Kamacooko, J. Kitonsa, U.M. Bahemuka, F.M. Kibengo, A. Wajja, V. Basajja & E. Ruzagira. (2021). Knowledge, Attitudes, and practices regarding COVID-19 among healthcare workers in Uganda: A cross-sectional survey. *International journal of environmental research and public health*. 18(13), 7004.
- [14] P. Kundu, B. De & L. Pandit. (2023). Attitude of the staff nurses toward COVID care and work challenges faced by them. *Indian Journal of Public Health*. 67(1), 61-65.
- [15] T.K. Alkan, N. Taşdemir & D.Y. Tank. (2022). The Relation Between Fear of COVID-19, Burnout Levels of Intensive Care Nurses. *OMEGA-Journal of Death and Dying*. 00302228221123154.
- [16] C.N.P. Mbachu, C.M.C. Azubuike, I.I. Mbachu, C.I. Ndukwu, A.Y.A. Ezeuko, I.B. Udigwe & E.N. Orji-Ifeanyi. (2020). COVID-19 infection: Knowledge, attitude, practices, and impact among healthcare workers in a South-Eastern Nigerian state. *The Journal of Infection in Developing Countries*. 14(09), 943-952.
- [17] Ministry of Health and Population Egypt "MOHP". (2020). COVID-19 in Egypt. Available at <https://www.care.gov.eg/EgyptCare/index.aspx>.
- [18] L. M. Nahal, A. Mirzaei & M.J. Khezeli. (2022). Evaluation of COVID-19 Patient Safety Compared to Non-COVID-19 Patients and Predisposing Factors of Nursing Errors. *Aquichan*. 22(3).
- [19] N. M. Elpasiony, M.F. Mostafa & W.F. Gabr. (2021). Efficacy of COVID-19 Prevention Educational Program on Nurses' knowledge and Practices at Hemodialysis Unit. *Egyptian Journal of Health Care*. 12(1), 1689-1703.
- [20] M. Nemati, B. Ebrahimi & F. Nemati. (2020). Assessment of Iranian Nurses' Knowledge and Anxiety Toward COVID-19 During the Current Outbreak in Iran. *Archives of Clinical Infectious Diseases*. 15(COVID-19): e102848: pp1-5.
- [21] T.M. Nguyen, Y. Zhang & P.P. Pandolfi. (2020). Virus against virus: A potential treatment for -nCov (SARS-CoV-2) and other RNA viruses. *Cell Research*.30,189–190.[Google Scholar] [CrossRef][PubMed][Green Version].
- [22] T. Qadah. (2020). Knowledge and attitude among healthcare workers towards COVID-19: a cross sectional study from Jeddah city, Saudi Arabia. *The Journal of Infection in Developing Countries*. 14(10), 1090-1097.
- [23] M. Saqlain, M. Munir, S. Rehman, A. Gulzar, S. Naz, Z. Ahmed, A. Tahir & M. Mashhood. (2020). Knowledge, attitude, practice and perceived barriers among healthcare workers regarding COVID-19: a cross-sectional survey from Pakistan. *Journal of Hospital Infection*. 105 (3) 419-423 <https://doi.org/10.1016/j.jhin.2020.05>. (Last accessed at July 01, 2020).
- [24] R. Semerci A. Kudubes & F. Eşref. (2020). Assessment of Turkish oncology nurses' knowledge regarding COVID- 19 during the current outbreak in Turkey. *Support Care Cancer*. 22;1-8. DOI: 10.1007/s00520-020-05700-w. last accessed 26/8/2020. At 12.30PM.
- [25] P. Srichan, T. Apidechkul, R. Tamornpark, F. Yeemard, S. Khunthason & S. Kitchanapaiboon. (2020). Knowledge, Attitude and Preparedness to Respond to the 2019 Novel Coronavirus (COVID-19) Among the Bordered Population of Northern Thailand in the Early Period of the Outbreak: A Cross-Sectional Study. *SSRN Electronic Journal*. 10.2139/ssrn.3546046.

- [26] T.Q. Tien, T. T. Tuyet-Hanh, T. N.Q. Linh, H. Hai Phuc & H.V. Nhu. (2021). Knowledge, attitudes, and practices regarding COVID-19 prevention among Vietnamese healthcare workers in 2020. *Health Services Insights*. 14, 11786329211019225.
- [27] J. Wang, M. Zhou & F. Liu. (2020). Reasons for healthcare workers becoming infected with novel coronavirus disease 2019 (COVID-19) in China. *Journal of Hospital Infection*. 105(1), 100-101. doi: 10.1016/j.jhin.2020.03.002.
- [28] World Health Organization. (2020). Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected, World Health Organization: Geneva (2020). Retrieved May 10, 2020 from <https://www.who.int>.
- [29] World Health Organization. (2020). Coronavirus Disease 2019(COVID-19) Situation Report—208. situation reports /20200815-covid-19-sitrep-208. <https://www.who.int/docs/defaultsource/coronavirus/situation-reports/20200815-covid-19-sitrep-208.pdf?sfvrsn=9dc4e959-2>.
- [30] World Health Organization. (2020). 2019-nCoV outbreak is an emergency of international concern. (3) 2020 [cited 2020 June 02]. Available from: <http://www.euro.who.int/en/healthtopics/health-emergencies/international>.
- [31] A. Zegarra, B. Chino & R. Ames. (2020). Knowledge, perception and attitudes in Regardto COVID-19. Pandemic in Peruvian Population. 2020. 10.31234.
- [32] B. Zhong, W. Luo, H. Li, Q. Zhang, X. Liu, W. Li & Y. Li. (2020). Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. *International Journal of Biological Sciences*. 2020; 16(10): 1745-1752.
- [33] M. Zhou, F. Tang & Y. Wang. (2020). Knowledge, attitude and practice regarding COVID-19 among health care workers in Henan, China. *Journal of Hospital Infection*. S0195-6701(20)30187-0. 10.1016/j.jhin.2020.04.01.
- [34] N. Zhu, D. Zhang, W. Wang, X. Li, B. Yang, J. Song, X. Zhao, B. Huang, W. Shi, R. Lu, P. Niu, F. Zhan, X. Ma, D. Wang, W. Xu, G.Wu, G.F. Gao, W. Tan, W & C.N.C.I.R. Team. (2020). A novel coronavirus from patients with pneumonia in China, 2019. *The New England Journal of Medicine*. 382(8), 727-733. 10.1056/NEJMoa200101.