

Nurse' Performance Regarding Care of Patients with Chronic Obstructive Pulmonary Disease on Nebulizer Therapy

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Abstract

Background: Chronic obstructive pulmonary disease remains a major cause of mortality and morbidity in the intensive care unit, nebulizers is treat certain respiratory diseases through the use of compressed liquid drugs to relieve respiratory insufficiency due to bronchospasm. Nurses must be knowledgeable to support clinical practice toward nebulizer therapy for patient with COPD to achieve best outcomes for patients and successful treatment process. **Aim:** Assess nurses' performance regarding care of patients with chronic obstructive pulmonary disease on nebulizer. **Research Design:** A descriptive exploratory design was used. **Settings:** The study was conducted at medicine intensive care unit 2 affiliated to Ain Shams University hospital. **Sample:** A convenience sample of 30 nurses in the previous mentioned setting. **Tools for Data Collection:** data was collected by using Nurses' self-administered Questionnaire and Nurse's observational checklist. **Result:** the present study reveals that, 76.7% of studied nurses didn't attend training courses about nebulizer therapy, 53.3% of studied nurses were unsatisfactory level of knowledge, 66.7% of studied nurses were incompetent level of practice. Also, there were highly statistically significant correlation between total score of knowledge of the studied nurse's and their total score of practice. **Conclusion:** The study revealed that lack of nurses' knowledge and inadequate training regarding nebulizer therapy which affected negatively on their practice when caring patients with COPD. Additionally there were highly statistically significant correlation between total score of knowledge of the studied nurse's and total score of practice. **Recommendations:** Replication of the current study on large sample and different hospitals settings to be able to generalize the results.

Keywords: Chronic Obstructive Pulmonary Disease, Nurses Performance, nebulizer therapy such as cigarette smoke, biomass smoke exposure, and air pollution, although lung-function trajectories have a milder course in some patients (Rhee and Choi, 2020).

Introduction

Chronic obstructive pulmonary disease (COPD) is irreversible obstruction of the airway with progressive lung function decline, especially in patients with continuous exposure to risk factors

No cure for chronic obstructive pulmonary disease, but treatment can help slow the progression of the condition, control the symptoms,

reduce risk factors and prevent and treat exacerbations. The most important issues can take to reduce symptoms and improve quality of life supplemental oxygen, vaccines, such as flu and pneumonia vaccines, avoid tobacco smoke and other air pollutants (**Centers for Disease Control and Prevention, 2021**).

The standard treatment of acute exacerbations is with short acting Beta 2 agonist with/without short acting muscarinic antagonist. Glucocorticoids are added in case of repeated exacerbations decrease the overall duration of symptoms. Oxygen supplementation can be useful. Combination of inhaled corticosteroids and long acting beta 2 agonist which showed significant benefit in respiratory function and restricted activity days with a severe exacerbation antibiotics improve outcomes (**Vijay et al., 2019**).

Nebulizer therapy is frequently prescribed for management of chronic obstructive pulmonary disease (COPD) can greatly benefit. Aerosol must be delivered effectively to the airways as well as to produce a desired therapeutic effect. Medications that are inhaled in the form of a mist into the lungs to improve the breathing (**Jarab et al., 2018**).

Nurses play an importance role in nebulizer therapy for patient with COPD to achieve best outcomes for patients. Nurses provide complete nursing assessment, they provide patient receiving nebulized therapy an adequate support and instruction on the use, close observation and monitoring for

hemodynamic state before nebulizer therapy, avoid feeding before and after procedure, carefully monitor for adequate flow if oxygen is being delivered at the same time, training in diaphragmatic breathing, provide continuous oral hygiene to avoid infections, provide chest physiotherapy, cleaning and maintenance of nebulizers and compressors, Evaluate effectiveness of treatments and they should educate the patient regarding the smoking cessation and pulmonary rehabilitation (**Hinkle and Cheever, 2018**).

Significance of the Study:

The Global Burden of Disease Study estimation ranks COPD as the second most prevalent cause of death in 2017. This estimate already exceeds the World Health Organization's (WHO) projection of COPD being the third most important cause of death worldwide by 2030. More than 90% of COPD-related deaths occur in low- and middle-income countries. In 2017, 3.2 million people died from COPD (5.7% of global mortality) (**Adhikari et al., 2020**).

In another study: Egypt has a very high prevalence of chronic respiratory diseases, notably asthma and COPD. These patients are at risk of allergic, chronic, and invasive fungal disease. The rate of COPD is moderately high at 3.5% of the over-40-year-old age group, with a high rate of hospitalization of 20.3%. According COPD severity was GOLD class II in 25.0%, class III in 51.7% and class IV in 23.3%; and disease severity was significantly higher in patients with metabolic

syndrome (Al-Asmara et al., 2019 & McCarthy et al., 2020).

Nurses collectively play important roles in most aspects of COPD management. Also, nursing observation and monitoring during nebulizer therapy can improve patients' outcomes. So, nurses must be professional, knowledgeable and skillful to be able to provide excellence nursing intervention for these patients. So, it's important to assess the nurses' knowledge, practices and attitude to identify their actual performance during nebulizer therapy for patients with chronic obstructive pulmonary disease to determine weakness points for improvement and prevent complications.

Aim of the Study

This study aims to assess nurses' performance regarding care of patients with Chronic obstructive pulmonary disease on nebulizer therapy through the following:

1. Assesses nurses' level of knowledge regarding care of patients with Chronic obstructive pulmonary disease on nebulizer therapy.
2. Assesses nurses' level of practice regarding caring of patients with Chronic obstructive pulmonary disease on nebulizer therapy.

Research questions:

1. What are nurses' level of knowledge regarding care of patients with Chronic obstructive pulmonary disease on nebulizer therapy?
2. What are nurses' level of practice regarding care of patients with Chronic obstructive pulmonary disease on nebulizer therapy?

3. What is the relationship between nurses' performance and their demographic characteristics?
4. What is the relationship between nurses' level of knowledge and level of practice regarding care of patients with Chronic obstructive pulmonary disease on nebulizer therapy?

Subjects and Methods

The study will be portrayed under the four main designs as follows:

- i. Technical design.
- ii. Operational design.
- iii. Administrative design.
- iv. Statistical design.

I- Technical Design:

It includes study design, setting, subjects and tools for data collection.

Research Design:

Descriptive exploratory design is a type of research that describes a population, situation, or phenomenon that is being studied. It focuses on answering the *how, what, when, and where* questions. If a research problem, rather than the *why* (Hunter et al., 2019). It was used to conduct this study, it provides answers to the questions of who, what, when, where, and how associated with a particular research problem, it is used to obtain information concerning the current status of the phenomena and to describe " what exists " with respect to variables or conditions in a situation.

Settings:

The study was conducted at medical intensive care unit-2 affiliated to Ain Shams University hospitals. Medical intensive care

unit 2 contains 15 beds, 7 ventilators, 15 monitors and 2 emergency care, which are distributed in 2 sections. The unit also contains one room for nurses, one room for administering lectures, room for medication storage and preparation.

Subject:

A convenience sample of all available nurses (No-30 nurses) working at medical intensive care unit 2 at Ain Shams University hospital who have experiences more than 6 months in intensive care, from both genders, with different educational level and accepted participate in the study.

Tools of data collection:

The data were collected through using the following tools:

Tool 1: Nurses' Self-administered questionnaire (Appendix 1):

It was developed by the researcher based on the related literatures and written in simple Arabic language. It was divided into three parts as the following:

Part 1: It was used to assess demographic characteristic of the studied nurses as age, gender, level of education, years of experience and training courses.

Part II: It was developed by the researcher based on the related literature (*Aithal and Jagmohan, 2017; Gold, 2017; Douglas et al., 2019; Prassana et al., 2019*). It was used to assess nurse's level of knowledge regarding care of patients with chronic obstructive pulmonary disease on nebulizer therapy. It was filled by the studied nurses themselves. The questionnaire consisted of 39 questions

in the form of multiple choices and true / false questions.

This tool was divided into two sections as the following:

Section 1: It was used to assess nurses' level of knowledge regarding chronic obstructive pulmonary disease and nebulizer therapy. It included 20 questions which distributed to assess nurses' knowledge regarding COPD as the following: definition (1mcq), risk factors (1mcq), signs and symptoms (1mcq), complications (1mcq), investigation (1mcq), medications (4mcq). Also, it included, 3 yes and No questions and 8 mcq questions to assess nurses' knowledge regarding nebulizer therapy.

Section 2: It was concerned with the assessment of nurses' knowledge regarding nurses' role in caring patients with chronic obstructive pulmonary disease on nebulizer therapy. It included 19 questions which distributed into items as the following: nurses' role before nebulizer therapy (3 true false and 1 mcq questions), nurses' role during nebulizer therapy (3 true false and 2 mcq questions), nurses' role post nebulizer therapy (4 true false and 3 mcq questions), and on discharge (3 true and false).

Scoring system:

Each correct answer was given one degree and the incorrect answer was given zero. Total score was 39 degree. The total score of knowledge was 39 degree it was consider that:

- $\geq 85\%$ was satisfactory level of knowledge (33 degrees).
- $\leq 85\%$ was unsatisfactory level of knowledge (33 degrees).

1- Nurses' practice observational checklist (Appendix III):

It was developed by the researcher based on the related literature (*Gold, 2019; Prassana et al., 2019*). This tool was written in English language. It was used to assess nurses' level of practice regarding care of patients with chronic obstructive pulmonary disease on nebulizer therapy. It included 132 steps as the following:

- Assessment of respiratory status(5 steps).
- Nebulizer therapy (34 steps)
- Chest physiotherapy (84 steps)
 - Postural drainage(20 steps)
 - Percussion (19 steps)
 - vibration (18 steps)
 - deep breathing and cough exercise (17steps)
- Oxygen therapy (19 steps)

Scoring system:

Each correct step done was given one degree, while the step which was not done was given zero, total score was 132 degree, distributed as the following: Assessment of respiratory status(5 degree), Nebulizer therapy (34 degree), Chest physiotherapy (84 steps): divided into Postural drainage (20 degree), Percussion (19 degree), vibration (18 degree), deep breathing cough exercise (17 degree) and oxygen therapy (19 degree).

The total score of nurses ' practice was 132 degree, it was considered that:

- $\geq 85\%$ was satisfactory level of the nurses' practice (112 degrees).
- $\leq 85\%$ was unsatisfactory level of the nurses ' practice (< 112 degrees).

Operational design:

It included preparatory phase, content validity and reliability, pilot study and field work.

The preparatory phase:

It included reviewing of related literatures and theoretical knowledge of the various aspects of the study using books, articles, internet, periodicals and magazines to develop tools for data collection.

Content validity and reliability:

Testing validity of the tools by using face and content validity. Face validity aimed at inspecting the items to determine whether the tools measure what supposed to measure. Content validity was conducted to determine whether the content of the tools cover the aim of the study. Validity tested through a jury of 5 experts, one of them were professor and three assistant professors and one of them was lecturer of medical surgical nursing department at faculty of nursing Ain Shams University. The expertise reviewed the tools for clarity, relevance, comprehensiveness, simplicity and applicability, minor modifications are done.

Testing reliability of proposed tools was done statistically by alpha Cronbach test and score was (0.946, 0.768) for total knowledge and total practice respectively.

Pilot study:

A pilot study was conducted to test feasibility and applicability of the study tools used in this study. It was carried out on (5 nurses) of the studied nurses. No modifications done after pilot study so that, the pilot nurses were included in the main study group.

Field work:***Field work included the following:***

Data were collected from beginning of February 2021 to the end of June 2021. Permission to carry out the study from responsible authorities in the faculty of nursing at Ain Shams University after explanation of the purpose of the study was obtained. An interview was conducted with head nurses' of the previous mention settings to inform them about the purpose of the study and request their assistance to facilitate the work.

The researcher visited the study settings for two days weekly (Saturday and Sunday) from 8:00 AM to 4:00P. First, the researcher filled the observational checklist in the morning and afternoon shifts during actual nurses' work and documented steps of nurses' performance during nebulizer therapy for patients with chronic obstructive pulmonary disease. The observational checklist was filled prior to administration of the questionnaire to ensure the maximal realistic observation of the nurses' practice and minimize the possibility of bias. Each nurse was observed by the researcher during practice of the nursing procedures and it took about 10 minutes for each procedure. Then, the self administered questionnaire was filled by the nurses themselves in their free time and it took about 20-30 minutes. The answers were recorded by the nurses themselves regarding demographic characteristics in 5 minutes, and Knowledge in 25 minutes.

Ethical considerations:

The ethical research considerations in this study included the following: The

research approval of protocol was obtained from scientific research ethical committee in faculty of nursing at Ain - Shams University before starting the study. The researcher clarified the objective and aim of the study to the nurses included in the study. The researcher assured maintaining anonymity and confidentiality of the subject data. Nurses were informed that they allowed choosing to participate or not in the study and that they had the right to withdraw from the study at any time without giving any reasons. Ethics, values, culture and beliefs were respected.

2- Administrative design:

An official permission was obtained from Faculty of Nursing Ain Shams University to Medical Director and Nursing director of Intensive Care Unit, Ain shams university Hospitals in which the study was conducted.

Statistical analysis:

Recorded data were analyzed using the statistical package for social sciences, version 20.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean \pm standard deviation (SD). Qualitative data were expressed as frequency and percentage.

The following tests were done:

- The Comparison between qualitative data was done by using **Fisher's exact test** when the expected count in any cell less than 5.
- **Pearson's correlation coefficient (r)** test was used to assess the degree of association between two sets of variables.
- The confidence interval was set to 95% and the margin of error accepted was set

to 5%. So, the p-value was considered significant as the following:

- Probability (P-value)
 - P-value <0.05 was considered significant.

- P-value <0.001 was considered as highly significant.
- P-value >0.05 was considered insignificant.

Results

Part I: Demographic characteristics of study nurses:

Table (1): Frequency and percentage distribution of demographic characteristics for the studied nurses (n=30).

Items	No.	%
Age (years)		
<20 years	1	3.3
20-30 years	25	83.4
30-40 years	3	10.0
>40 years	1	3.3
Mean±SD	26.43±4.49	
Gender		
Male	9	30.0
Female	21	70.0
Marital status		
Single	20	66.7
Married	10	33.3
Educational level		
Nursing diploma	3	10.0
Nursing institute	12	40.0
Bachelor degree	14	46.7
Post graduate	1	3.3
Years of experience		
<1 year	11	36.7
1-<5 years	8	26.6
≥5 years	11	36.7
Training courses about nebulizer therapy		
Yes	7	23.3
No	23	76.7

Table 1 reveals that, 83.4% of the studied nurses were the age group 20-30 years and 70% are female. Additionally, 66.7% were single, regarding the educational level, it was noticed that 46.7% are bachelor degree, while 36.7% of them had ≥5 years experience and < 1 years. Finally, 76.7% didn't attend training courses about nebulizer therapy

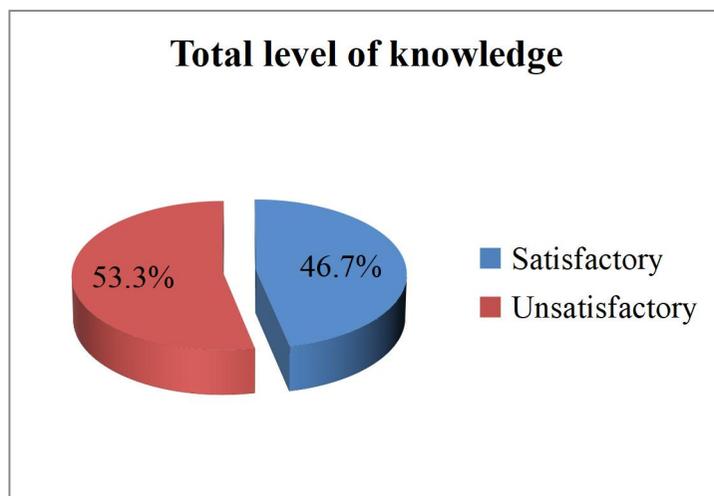


Figure (1): Percentage distribution of the studied Nurse's level of knowledge regarding to their care for patient with chronic obstructive pulmonary disease during nebulizer therapy (n=30).

Figure 1 reveals that, 46.7% of studied nurses had satisfactory total level of knowledge; meanwhile, 53.3% of them were unsatisfactory.

Table (2): Frequency and percentage distribution of the studied nurse's level of practice regarding care for patient with chronic obstructive pulmonary disease during nebulizer therapy (n=30).

Items	Competent		Not competent	
	No	%	No	%
Nebulizer therapy	19	63.3	11	36.7
Postural drainage	0	0.0	30	100.0
Percussion	15	50.0	15	50.0
Vibration	17	56.7	13	43.3
Deep breathing and cough percussion exercise	18	60.0	12	40.0
Oxygen therapy	24	80.0	6	20.0
Total practice	11	36.7	19	63.3

Table 2: It reveals that 80% of studied nurses had competent practice about oxygen therapy. While 100.0% of them their practice not competent about postural drainage.

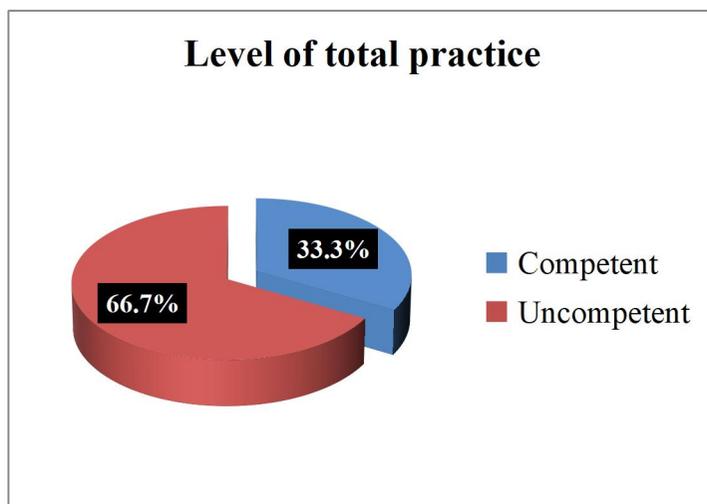


Figure (2): Percentage distribution of the studied Nurse's level of practice regarding to their care for patient with chronic obstructive pulmonary disease on nebulizer therapy (n=30).

Figure 2 reveals that 33.3% of studied nurses had competent about level of practice; meanwhile, 66.7% of them had not competent.

Table (3): Relation between nurses' total level of knowledge about chronic obstructive pulmonary disease on nebulizer therapy and their demographic data (N=30).

Demographic data	Total level of knowledge				Fisher's Exact	
	Satisfactory (n=14)		Unsatisfactory (n=16)		FE	p-value
	No.		No.			
Age (years)						
<20 years	0	0.0	1	3.3		
20-30 years	11	36.7	14	46.7	2.571	0.462
30-40 years	2	6.7	1	3.3		
>40 years	1	3.3	0	0.0		
Gender						
Male	4	13.3	5	16.7	--	0.802
Female	10	33.3	11	36.7		
Marital status						
Single	9	30.0	11	36.7	--	0.897
Married	5	16.7	5	16.7		
Educational level						
Nursing diploma	0	0.0	3	10.0	13.833	<0.001**
Nursing institute	2	6.7	10	33.3		
Bachelor degree	11	36.7	3	10.0		
High education	1	3.3	0	0.0		
Years of experience						
<1 year	1	3.3	10	33.3	10.093	0.006*
1-<5 years	6	20.0	2	6.7		
≥5 years	7	23.3	4	13.3		
Training courses						
Yes	7	23.3	0	0.0	--	0.005*
No	7	23.3	16	53.3		

Using: Fisher's Exact test

p-value > 0.05 NS; **p-value* < 0.05 S; ***p-value* < 0.001 HS

Table 3: presents that, there highly statistically significant relation between level of nurse's total knowledge and educational level. Also, there statistically significant relation between level of total knowledge and their years of experience and training courses. While, there are no significant relation between level of total knowledge and their age, gender, marital status.

Table (4): Relation between level of total practice about chronic obstructive pulmonary disease on nebulizer therapy according to their demographic data (N=30).

Socio-Demographic data	Level of Total Practice				Fisher's Exact	
	Satisfactory (n=10)		Unsatisfactory (n=20)		FE	p-value
	No.		No.			
Age (years)						
<20 years	0	0.0	1	3.3		
20-30 years	8	26.7	17	56.7	2.52	0.472
30-40 years	2	6.7	1	3.3		
>40 years	0	0.0	1	3.3		
Gender						
Male	3	10.0	6	20.0	--	0.673
Female	7	23.3	14	46.7		
Marital status						
Single	5	16.7	15	50.0	--	0.338
Married	5	16.7	5	16.7		
Educational level						
Nursing diploma	0	0.0	3	10.0	10.446	0.015*
Nursing institute	1	3.3	11	36.7		
Bachelor degree	8	26.7	6	20.0		
High education	1	3.3	0	0.0		
Years of experience						
<1 year	0	0.0	11	36.7	10.106	0.006*
1-<5 years	3	10.0	5	16.7		
≥5 years	7	23.3	4	13.3		
Training courses						
Yes	5	16.7	2	6.7	FE	0.047*
No	5	16.7	18	60.0		

Using: Fisher's Exact test

p-value > 0.05 NS; **p-value* < 0.05 S; ***p-value* < 0.001 HS

Table 4: presented that, there are statistically significant relation between level of nurse's total practice and their years of experience, educational level and training courses. While, there are no significant relation between level of total knowledge and their age, gender, marital status.

Table (5): Relation between total score of knowledge among studied nurses about chronic obstructive pulmonary disease on nebulizer therapy according to their total score practice (N=30).

		Total score of practice
Total score knowledge	r-value	0.687
	p-value	<0.001**
	N	30

**Highly statistical significant differences ($p < 0.001$).

*A statistical significant difference ($p < 0.05$)

r-Pearson Correlation Coefficient

Table 5: presents that, there were highly statistically significant correlation between total score of knowledge of the studied nurse's according to their total score of practice.

Discussion

COPD is a common disease and frequently occurring all over the world. Relevant studies have shown that COPD patients account for 8.2% of people over 40 years of age. In addition to the characteristics of high incidence, COPD also has the characteristics of high mortality, poor prognosis, and the patient population is mainly elderly patients, which seriously affects the health and daily life of the individuals. The course of COPD is long, and the patients are prone to recurring attacks. It mostly occurs in elderly patients. The disease is divided into acute attack stage and stable stage. Therefore, in clinical treatment, effective and continuous nursing care is the key to treating COPD and maintaining a good prognosis (Chen & Pan (2021)).

Part I: demographic characteristics of studied nurses

Regarding to demographic characteristics of study nurses the present study results demonstrated that, majority of the studied nurses were in

the age group 20-30 years. These results were matching with *Aithal et al. (2017)* who conducted studied entitled "Knowledge and Attitude of Nursing Staff Towards Nebulization Therapy in a Tertiary Care Hospital" and mentioned that the most of nurses were between 26-30 years old.

The present study also showed that less than three quarters of the nurses are female. In the same line with *Shakor, (2019)* who conducted studied entitled "Knowledge and practices of Nurses Regarding Nebulization Therapy in Kirkuk city Hospitals" and mentioned that less than three quarters of nurses were female less. This might be due to the nurse profession in Egypt was for women only and recently become for both genders.

As regard marital status two thirds of studied nurses were single. From investigator point of view due to they young and newly graduate.

Regarding the educational level, the present study noticed that less than half of study nurses were bachelor degree,

and two fifth of them were graduated from nursing institute. The result disagree with *Sawant et al. (2020)*, who conducted studied entitled "To Assess Effectiveness of Planned Teaching Program on Knowledge and Skills of Staff Nurses with Regard to Use of Devices in Chronic Obstructive Pulmonary Disease Management" and reported that more than three quarters of the staff nurses had done bachelor nursing.

The present study also showed that more than one third of them had ≥ 5 years' experience and < 1 years. disagreement with *Saddon & Hassan, (2017)* who conducted studied entitled "Effectiveness of an Educational Program on Nurses' Knowledge toward Nursing Management of Chronic Obstructive Pulmonary Disease (COPD) Patients at Al-Sader Teaching Hospital" and mentioned that most of nurses have 1-5 years. This might e due to in the ICU have a variety of nurses with different years of experience to fulfill different duties required in this specialized unit.

The present study also showed that more than three quarters of them didn't attend training courses about nebulizer therapy. Contrasted with *Harris, (2020)* who conducted studied entitled "Emergency triage nurses' knowledge of Chronic Obstructive Pulmonary Disease" and demonstrated that most of nurses didn't attended training courses about nebulizer.

Regarding to Nurse's total level of knowledge regarding to their care for patient with chronic obstructive

pulmonary disease on nebulizer therapy, the current study mentioned that more than half of them had unsatisfactory total level of knowledge.

The present study result is in accordance with *Godoy and Nogueira., (2016)* who conducted studied entitled "Nurses' knowledge and abilities gaps concerning health care of COPD patients" and reported that less than half of nurses have gaps in their knowledge.

From investigator's point view studied nurse had unsatisfactory knowledge related to nebulizer therapy this may be due to don't attending training courses or programs related to this topic

Regarding to nurse's level of practice regarding care for patient with chronic obstructive pulmonary disease during nebulizer therapy the current study mentioned that most of studied nurses had competent practice about oxygen therapy. While all of them their practice not competent about postural drainage. This result is matching with *Mohamed et al., (2017)* who conducted a study entitled "Effect of care protocol on the knowledge, practice and clinical outcomes of patients with chronic obstructive pulmonary disease" and mentioned highly statistically significant differences between mean scores of the pre test regarding to diaphragmatic breathing, pursed lip breathing, coughing exercise and use of inhaler.

Regarding to Nurse's total level of practice in relation to their care for patient with chronic obstructive

pulmonary disease on nebulizer therapy the present study reported that one third of studied nurses had competent about level of practice; meanwhile, two thirds of them had not competent.

These results matching with *Sawant et al., (2020)* who conducted a study entitled "To Assess Effectiveness of Planned Teaching Program on Knowledge and Skills of Staff Nurses with Regard to Use of Devices in Chronic Obstructive Pulmonary Disease Management" and mentioned that one tenth of o the studied sample in pretest had inadequate skills.

Regarding to Relation between nurses' total level of knowledge about chronic obstructive pulmonary disease on nebulizer therapy and their demographic data the current study mentioned that there highly statistically significant relation between level of nurse's total knowledge and educational level. Also, there statistically significant relation between level of total knowledge and their years of experience and training courses. While, there are no significant relation between level of total knowledge and their age, gender, marital status. From investigator's point view its might be due to level of education of most studied nurses had bachelor degree lead to increase level of knowledge.

These present study results in the same line with *Aithal et al., (2017)* who conducted studied entitled "Knowledge and attitude of nursing staff towards nebulization therapy in a tertiary care hospital" and reported that there was no significant difference in nurses' total

knowledge score with age while **disagree** with his result that there was no significant difference in nurses' total knowledge score with years of experience.

Regarding to Relation between level of total practice about chronic obstructive pulmonary disease on nebulizer therapy according to their demographic data the current study mentioned that there are statistically significant relation between level of nurse's total practice and their years of experience, educational level and training courses. While, there are no significant relation between level of total practice and their age, gender, marital status.

The current study results matching with *Shakor, (2019)* who conducted studied entitled "Knowledge and practices of nurses regarding nebulization therapy" and illustrated that there was no significant correlation between the total practices score and demographic data.

Regarding to Relation between total score of knowledge among studied nurses about chronic obstructive pulmonary disease on nebulizer therapy according to their total score practice the present study mentioned that there were highly statistically significant correlation between total score of knowledge of the studied nurse's according to their total score of practice.

These findings were matching with *Khodish et al., (2014)* who conducted studied entitled "Knowledge and performance of critical care nurses toward nebulizer therapy in the

intensive care unit at Assiut University Hospital" and mentioned that there was a positive strong relationship between knowledge and performance regarding nebulizer therapy ($r=0.277$, $p=0.013$).

Conclusion

In the light of the current study findings, it can be concluded that:

- The study revealed that lack of nurses' knowledge and inadequate training regarding nebulizer therapy which affected negatively on their practice when caring patients with COPD.
- There are highly statistically significant relation between level of nurse's total knowledge and educational level. Also there are statistically significant relation between level of nurse's total practice and their years of experience, educational level and training courses. Additionally, there were highly statistically significant correlation between total score of knowledge of the studied nurse's and total score of practice.

Recommendations

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

1. Educational program for improving nurses' knowledge and practices about care for patient with chronic obstructive pulmonary disease and nebulizer therapy, must be held.

2. Develop practical guideline for nurses to apply during care of patient with COPD on nebulizer therapy.

Further researches

- Future studies on a larger sample are highly recommended to achieve generalization of the results.

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