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TAKING CHARGE OF COPD: EVALUATING SELF-MANAGEMENT PROGRAMS' EFFECTIVENESS IN ELDERLY PATIENTS

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Abstract: Chronic obstructive pulmonary disease (COPD) is a progressive, inflammatory lung condition characterized by chronic airflow limitation, primarily caused by obstructive bronchitis and emphysema. This debilitating disease predominantly affects the elderly population, becoming more prevalent in individuals aged over 60. It is a leading chronic disease in this demographic, impacting around 16% of those over 65 years globally. COPD poses a significant threat to elderly individuals' health and quality of life, ranking as the fourth leading cause of death and the twelfth leading cause of disability in this age group. The World Health Organization predicts that by 2020, COPD will become the third leading cause of death and the fifth leading cause of disability worldwide. Elderly COPD patients face various physical and psychosocial challenges that substantially affect their quality of life. Physically, symptoms like dyspnea, cough, fatigue, and sleep disturbances are common and contribute to disability, limiting their motivation, concentration, and daily activities. These limitations extend to activities of daily living, household chores, and social and leisure activities. Psychosocially, feelings of depression and anxiety are prevalent in these patients, often accompanied by social issues like a loss of social role and a tendency to avoid interactions and recreational activities. These problems have a profound impact on their physical functioning, independence, overall well-being, and health outcomes.

Keywords: COPD, elderly, quality of life, physical limitations, psychosocial impact.

Introduction

Chronic obstructive pulmonary disease (COPD) is a disease state characterized by airflow limitation that is not fully reversible. The airflow limitation is usually both progressive and associated with an abnormal inflammatory response of the lung to noxious particles or gases. (1,2) The chronic airflow limitation is caused by a mixture of small airway disease (obstructive bronchitis) and parenchymal destruction (emphysema), the relative contribution of which vary from person to person.(3)

Original Article

The prevalence of COPD increases in the sixth decade of life, thus making it a disease of the elderly. (4) It is one of the most common chronic diseases affecting elderly people allover the world. It affects approximately 16% of people over the age of 65 years worldwide. (5) COPD is one of the leading causes of mortality and disability among elderly both in developed and developing countries. (6) It is ranked the fourth cause of death for people over the age of 65 years. Furthermore, it is currently the twelfth leading cause of disability worldwide. (7) The World Health Organization (WHO) estimated that by the year 2020 COPD will be the third leading cause of death and the fifth cause of disability worldwide. (8)

Elderly patients with COPD experience a succession of distressing physical and psychosocial changes that affect significantly QOL. (9) Physically, dyspnea, cough, fatigue and sleep disturbance are the most common problems associated with COPD and contributor to disability and poor QOL through the limitations they impose on motivation, concentration and everyday activities including activities of daily living, household chores and social and leisure pastimes. Psychosocially, feeling of depression and anxiety are frequently reported by elderly patients with COPD. Also COPD is associated with several social problems as loss of social role and a tendency to avoid social interaction and recreational activities. These problems influence physical functioning, independency, perceived wellbeing and health outcomes. (9-10)

An important component in the international treatment guideline for COPD is the recommendation for patients' education and regular medical review. [(11)] Patients may be limited to perform a given behavior because of knowledge and skill deficits. Education is considered to be necessary to help patients gain the motivation, skills and confidence to control their COPD.[(12)] Improving knowledge is necessary, but insufficient alone.

Patients need to know less about the pathophysiology of their disease and more about how to integrate the demands of the disease into their daily routine. [(13)] Lifestyle and behaviors modification implies the appropriate use of many disease-related skills. Although knowledge acquisition and behavior and lifestyle modification are important, exercise is remaining the core element of effective rehabilitation. [(14)] The latest ERS guidelines on PA in COPD emphasize that social support and the use of specific techniques for behavior modification are essential for achieving better contact with patients and higher motivation for change, and as such, are core elements for making behavioral interventions more effective. [(15)] In this respect, gerontological nurse has a critical role in helping elderly patient with COPD learn to adjust and adapt to life with a chronic illness. The nurse can assist the patient to develop skills of self-awareness regarding particular symptoms, self-monitoring and health status change identification. [(16)]

Self-management can be described as set skilled behaviors and refers to the various tasks that a person carries out for management of their condition. The benefits of self-management have been measured by changes in health status and the use of health services. [(17)] The number of published trials on self-management in COPD is limited. Therefore, the aim of this study was to evaluate the impact of self-management program on clinical outcomes of elderly patients with COPD.

Aim of the Study:

The aim of the present study was to evaluate the impact of self-management program on clinical outcomes of elderly patients with COPD.

Materials and Method:

Design: Quasi-experimental research design was used in this study.

Settings:

This study was carried out at the chest diseases department of Mansoura University Hospital.

Subjects:

The study subjects comprised all available elderly patients with COPD of both sexes admitted to the above mentioned setting during a period of six months and fulfilling the following criteria: Aged 60 years and above,

clinically stable with no exacerbation in the last month, Had COPD diagnosed according to the criteria of Gold, 2010 [(1)] (irreversible obstructive airway disease i.e. FEV1/FVC < 70%) and < 12% improvement in FEV1 expressed as percentage of predicted after inhalation of Beta 2 agonists and had COPD staged according to GOLD 2010 [(1)]; Stage 2: moderate COPD (50% ≤ FEV1 < 80% predicted), Stage 3: sever COPD (30% ≤ FEV1 < 50% predicted) and Stage 4: very severe COPD (FEV1 < 30% predicted), and free from any other respiratory or associated disorders as heart failure, coronary artery diseases and asthma that may interfere with the prime diagnosis, prognosis or participation in the program.

Their number amounted to 54 elderly patients with COPD. They were randomly assigned into two equal groups: the control group received the usual hospital care only and the study group received the usual hospital care and the self-management program.

Study Tools:

Tool I: Elderly Patient's Knowledge about COPD: Structured Interview Schedule:

It was developed by the researcher and consisted of two parts. **Part 1**: "Socio-demographic data and health profile of elderly", this part concerned with socio-demographic characteristics of the study sample, medical history and patient exposure to risk factors as smoking, environmental and occupational exposures. **Part 2**: "Patient's knowledge about COPD and its management", it was developed by the researcher based on review of relevant literature [(10-14)] to assess patient knowledge on his admission to identify his learning needs as pre-requisites for planning of self-management program. It included a set of questions about the following:

- Respiratory system and COPD nature.
- COPD medications.
- Healthy behaviours and lifestyle pattern related to COPD namely nutrition, energy conservation techniques, healthy sleep, dyspnea management, influenza and pneumococcal vaccine, measures to reduce risk of infection and airway irritants, smoking cessation, periodic medical follow up and exercises.

Scoring system of patient's knowledge was done as follows, each question had a group of answer points, each correct answer was given one grade, while no answer or did not know was scored zero.

The scores obtained for each set of questions was summed up to get the total score for patient's knowledge. The total score was computed out of 179.

Tool II: Elderly Skills Performance: Observational Checklists:

This tool was developed by the researcher after extensive literature review [(10-14)] to assess the elderly performance of the following skills on his admission to hospital and after application of sessions:

- Inspiratory muscle training technique.
- Breathing retraining exercise.
- Stretching and strengthening exercise for upper and lower extremities.
- Airway clearance techniques. Using inhaler.

Scoring of the checklist of each item was made using 3-point likert scale ranging from 0 to 2, where "0" indicates that the skill was not done,"1" incompletely done and "2" completely done. Each technique was assigned a score, with a total score of 162.

Tool III: Pulmonary Function Test:

It was used to evaluate the obstructive ventilatory defect. Forced Expiratory Volume in first second (FEV_1) was measured. It was measured by the spirometer (spirolab II, Rome, Italy). The result was then expressed as percentage of predicated normal value for each subject after adjustment for age, sex and height.

Tool IV: Modified Borg Dyspnea Scale:

Modified Borg Scale was developed by **Borg (1982).** Itis a numerical scale for rating perceived dyspnea immediately after a 6 min walk test. Patient was instructed to indicate the level of his dyspnea on a 10-point

horizontal line after 6min of walking. Higher score indicates severe dyspnea. Ratings pre and post program were compared.

Tool V: Arterial Blood Gases Results Sheet:

Arterial samples were taken while the patient breathing the room air and was resting in sitting position. Samples were analyzed using an Ecosyst II blood gas analyzer (Eschweiler Ecosys //, Germany) to obtain PH, arterial carbon dioxide partial pressure ($PaCO_2$), arterial oxygen partial pressure (PaO_2), CO_3 and arterial oxygen saturation (SaO_2). The results were compared against normal values.

Tool VI: Self-management program:

It was developed by the researcher based on review of current literature [10-19-20] and the educational needs of patients identified from assessment part of the study.

Method:

Permission to carry out the study was obtained from the responsible authorities at the chest diseases department of Mansoura University Hospital after explanation the aim of the study.

1. The study tools I (Elderly Patient'sKnowledge about COPD: Structured Interview Schedule) and II (Elderly Skills Performance: Observational Checklists) were developed by the researcher after thorough review of current literature.
2. Tool IV (Modified Borg Scale) were translated by researcher into Arabic.
3. Study tools I, II, IV, and VI revised by jury to ensure the content validity. Suggestions of the jury members were followed and the tools were modified as indicated.
4. Tool IV was tested for its reliability. Test-retest measurement was used. The reliability was assured by means of Cronbach's coefficient alpha. It indicated that the tool has a reliability of 0.88.
5. A booklet containing the components of the program was designed and written in a simple Arabic language and supplemented by photos and illustrations.
6. Verbal consent from the elderly patients to participate in the study was obtained after explanation of the study purpose and its potential benefits.
7. Privacy of the study sample and confidentiality of the collected data were assured throughout the study.
8. A pilot study was conducted on 10 elderly patients with COPD from chest diseases department of Mansoura University Hospitals in order to evaluate the clarity and applicability of the tools. These patients were not included in the study sample. Following this pilot study, the final form of tools were reconstructed and made ready for use.
9. The first 27 elderly patients with COPD admitted to the chest diseases department at the time of data collection and fulfilled the study criteria were considered as the control group who were managed according to the usual hospital care.

The next admitted 27 elderly patients with COPD constituted the study group who were submitted to the self-management program beside the usual hospital care.

10. Chest radiograph report, chest computed tomography report and electrocardiogram (ECG) for each patient in control and study groups were revised by the researcher to confirm the diagnosis and exclude any coexisting lung pathology or complications.
11. Simple audio-visual materials were designed by the researcher and reviewed by the supervisors to facilitate transmission of ideas and keep interest of the study group.
12. Each elderly patient in both control and study groups was interviewed individually on admission and immediately before applying program to collect the baseline patient's data using study tools (I, II, III, IV, and V).
13. The developed self-management program was implemented on study group and conducted in 8 sessions over 2 weeks.

Original Article

Each session took about 30 minutes.

14. Each patient in the study group was subjected to two types of sessions: educational and training sessions. Educational sessions: were carried out in 4 sessions. It included information about the following:

- Respiratory system, COPD process and its management.
- Behaviour and lifestyle modification related to proper nutrition, energy conversation techniques, healthy sleep, dyspnea management, flu and pneumococcal vaccine, measures to reduce risk of infection and airway irritants, smoking cessation, periodic medical follow up and exercises.

Training sessions: were carried out in 4 sessions. Training sessions included the following:

- Inspiratory muscle training by using incentive spirometer.
- Breathing retraining (pursed lip breathing and diaphragmatic breathing)
- Stretching and strengthening exercise for upper and lower extremities with using dumbbells (1 and 2 Kgs).
- Airway clearance techniques (deep breathing and coughing exercise and chest percussion and vibration).

1. The instructional booklet was given to each patient in the study group to attract his attention, motivate him, and help for reviewing at home and support teaching and practicing at home. Incentive spirometery and dumbbells were also given by the researcher to each patient in the study group to help him in practice of inspiratory muscle training and exercises at hospital and at home after discharge.
2. Telephone visits were provided twice a week during 2 months after discharge from hospital by the researcher for the study group to check with them their consistency with intervention. Problems and concerns in performing the intervention were discussed.
3. Data collection covered a period of 12 months started from the first of October 2018 to the end of September 2019.

Evaluation of the program:

- Each patient of both control and study groups was interviewed immediately after applying the sessions to reassess his knowledge and practice using the study tools I (part 2) and II.
- After two (post 1) and six months (post 2) of discharge from the hospital and applying the sessions, evaluation for both study and control groups was done at the chest diseases department of Mansoura University Hospital (post1) to determine the effect of self-management program on clinical outcomes using the study tools: III, IV and V.

Results

Table (1) revealed that the mean age of the patients of the study group was 65.26 □ 4.40 years, while it was 64.81 □ 5.23 years for those in the control group. Males were more prevalent in the studied sample. They constituted (85.2%) of the study group, and (81.5 %) of the control group. The majority of the study and control groups (81.5 % and 77.8% respectively) were married. Illiteracy was prevailing among 74.1 % of the study group and 77.8% of the control group. The mean monthly incomes for elderly patients of the study group was 300.74□111.94 L.E. / month, while it was 299.63□109.17 L.E. / month for those in the control group. No significant differences were detected with regard socio-demographic characteristics between two groups.

Table (1): Socio-demographic characteristics of the study and control groups:

Items	Study group		Control group		Pearson Chi-Square X^2 test (P)
	N= (27)	%	N= (27)	%	

Age (in years)					
60-	11	40.7	15	55.6	
65-	11	40.7	7	25.9	1.504 (0.471)
75+	5	18.5	5	18.5	
Mean □ SD	65.26□ 4.40		64.81□ 5.23		
Sex					
Male	23	85.2	22	81.5	0.133 (0.715)
Female	4	14.8	5	18.5	
Marital status					
Married	22	81.5	21	77.8	1.423 (0.491)
Widow	4	14.8	6	22.20	
Divorced	1	3.7	0		
Educational level					
Illiterate	20	74.1	21	77.8	
Read and write	3	11.1	1	3.7	1.358 (0.929)
Primary	2	7.4	2	7.4	
Secondary & over	2	7.4	3	11.1	
Monthly income (L.E.)					
100-	2	7.4	4	14.8	
200-	14	51.9	9	33.3	2.114 (0.348)
300+	11	40.7	14	51.9	
Mean □SD	300.74□111.94		299.63□ 109.17		

Table (2) illustrates knowledge of the study and control groups before and immediately after training sessions. The table revealed that, the scores for total and all items of knowledge including respiratory system and COPD nature, COPD medications, and healthy behaviors and lifestyle pattern of the study group differed significantly after applying sessions where P values were found to be (0.000). Moreover, the scores for total and all items of knowledge of control group were slightly increased but the differences were not statistically significant as shown in table (2). In addition, there were no statistical significant differences were detected between two groups before applying sessions regarding the scores for total and all items of knowledge. On the other hand, after applying sessions, the differences between scores for total and all items of knowledge of the study and control groups were statistically significant as revealed in table (2).

Table (2): Knowledge of the study and control groups before and immediately after training sessions:

Knowledge	**Study group**		**Control group**		*U Test(P)*[a]	*U Test(P)*[b]
	Before sessions	**After sessions**	**On admission**	**On discharge**		

	Median (Min-Max)	**Median (Min-Max)**	**Median (Min-Max)**	**Median (Min-Max)**		
Respiratory system and COPD process	5.0 (2.0-16.0)	10.0 (5.0-23.0)	6.0 (1.0-18.0)	6.0 (1.0-18.0)	334.500 (0.600)	146.000 (0.000)*
Z Test (P)[1]	4.470 (0.000)*		1.414 (0.157)			
2. COPD medications	5.0 (1.0-15.0)	8.0 (3.0-24.0)	4.0 (1.0-18.0)	4.0 (1.0-19.0)	324.000 (0.481)	168.500 (0.001)*
Z Test (P)[1]	4.476 (0.000)*		1.414 (0.157)			
Healthy behaviors and lifestyle pattern	29.0 (14.0-62.0)	60.0 (39.0-102.0)	29.0 (13.0-72.0)	29.0 (13.0-74.0)	331.000 (0.562)	39.500 (0.000)*
Z Test (P)[1]	4.543(0.000)*		1.857 (0.063)			
Total knowledge score	39.0 (21.0-93.0)	78.0 (50.0 149.0)	36.0 (17.0 108.0)	36.0 (17.0-109.0)	332.000 (0.574)	58.500 (0.000)*
Z Test (P)[1]	4.542 (0.000)*		2.232(0.056)			

Wilcoxon Signed Ranks Z Test (P) [1]: comparing before and after in each group.
Mann-Whitney U Test (P) [a]: comparing study and control groups before sessions (on admission). *Mann-Whitney U Test (P)* [b]: comparing study and control groups after sessions (on discharge).
*Significant, at P≤ 0.05

Table (3) shows practice of the study and control groups before and immediately after training sessions. The table clarifies that there were significant differences between scores of the study group before and after applying sessions in relation to the total and all items of practice including inspiratory muscle training, breathing retraining, stretching and strengthening exercises, chest clearance techniques, and using inhaler where P=(0.000). Moreover, the scores for total and all items of practice of control group did not show any statistical significant difference as revealed in table (3). Regarding before applying sessions the table reveals that, the differences between scores of study and control groups were not statistically significant in all items of practice. Also there was no statistical significant differences were detected regarding the total score of practice between two groups before applying sessions (Z= 340.000, P= 0.671).

On the other hand, differences between scores for total and all items of practice of the study and control groups after applying sessions were statistically significant where P=(0.000).

Original Article

Table (3): Practice of the study and control groups before and immediately after training sessions:

Practice	Study group		Control group		*U Test (P)*[a]	*U Test (P)*[b]
	Before sessions	**After sessions**	**On admission**	**On discharge**		
	Median (Min-Max)	**Median (Min-Max)**	**Median (Min-Max)**	**Median (Min-Max)**		
Inspiratory muscle training	5.0 (0.0-10.0)	9.0 (4.0-16.0)	5.0 (0.0-10.0)	5.0 (0.0-11.0)	363.500 (0.986)	87.000 (0.000)*
Z Test (P)[1]	4.472 (0.000)*		0.000 (1.000)			
Breathing retraining	0.0 (0.0-9.0)	11.0 (5.0-17.0)	0.0 (0.0-7.0)	0.0 (0.0-7.0)	299.500 (0.206)	4.000 (0.000)*
Z Test (P)[1]	4.579 (0.000)*		1.000 (0.317)			
Stretching& strengthening exercise	4.0 (0.0-8.0)	36.0 (30.0-58.0)	4.0 (3.0-7.0)	4.0 (3.0-7.0)	360.000 (0.934)	0.000 (0.000)*
Z Test (P)[1]	4.545 (0.000)*		0.816 (0.414)			
4. Chest clearance techniques	5.0 (0.0-14.0)	22.0 (14.0-30.0)	5.0 (0.0-18.0)	5.0 (0.0-18.0)	357.500 (0.903)	10.500 (0.000)*
Z Test (P)[1]	4.544 (0.000)*		1.450 (0.147)			
ing inhaler	13.0 (7.0-23.0)	23.0 (17.0-32.0)	13.0 (9.0-26.0)	13.0 (8.0-29.0)	347.500 (0.767)	51.000 (0.000)*
Z Test (P)[1]	4.551(0.000)*		0.868 (0.385)			
Total practice scor	**e** 31.0 (14.0-60.0)	97.0 (74.0-153.0)	30.0 (14.0-65.0)	30.0 (14.0-69.0)	340.000 (0.671)	0.000 (0.000)*
Z Test (P)[1]	4.542 (0.000)*		1.677 (0.094)			

Wilcoxon Signed Ranks Z Test (P) [1]: comparing before and after in each group.
Mann-Whitney U Test (P) [a]: comparing study and control groups before sessions (on admission). *Mann-Whitney U Test (P)* [b]: comparing study and control groups after sessions (on discharge).
*Significant, at P≤ 0.05

Figure (1 and 2) reveals correlation between study group's total score of knowledge and total score of practice before and immediately after training sessions. It is noticed that, there were significant positive correlations between total score of knowledge and total score of practice of study group before and after applying sessions where p =0.000.

Figure 1: Correlation between total score of knowledge and total score of practice of study group before training sessions

Original Article

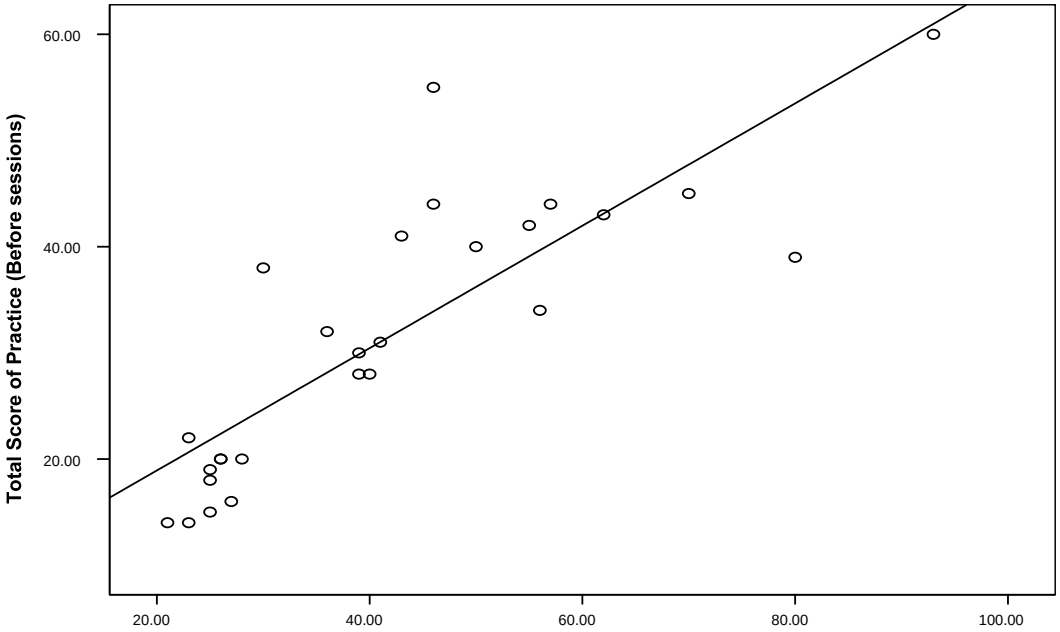

Figure 2: Correlation between total score of knowledge and total score of practice of study group immediately after training sessions.

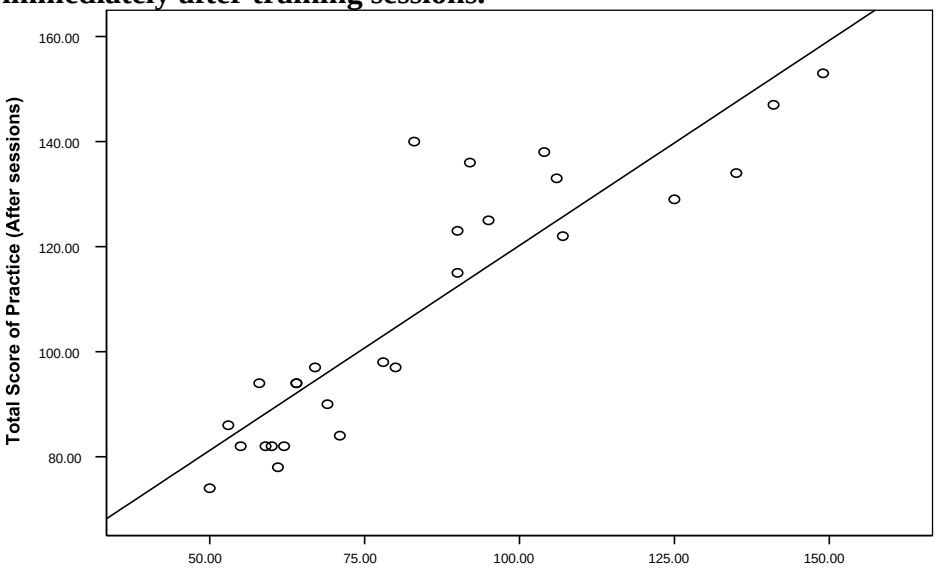

Table (4) portrays clinical outcomes of the study and control groups at three different intervals. Although FEV_1 (% of predicted) did not differ significantly between study and control groups either pre or post program, significant improvement was detected in the study group at both 2 and 6 months post program.

Table (4): Clinical outcomes of the study and control groups at three different intervals:

Clinical outcomes	**Study group**	**Control group**	*t-test*	*t-test (P)*[b]	*t-test (P)*[c]

	Pre program.	**2months Post program (post 1)**	**6 months Post rehab. (post 2)**	**On admission**	**2 months Post discharge (post 1)**	**6 months Post discharge (post 2)**	*(P)*[a]		
	Mean SD	**Mean SD**	**Mean SD**	**Mean SD**	**Mean SD**	**Mean SD**			
Pulmonary function test (FEV_1)	44.74 14.35	45.51 14.91	45.17 14.76	46.43 15.81	45.89 15.74	45.02 15.27	0.412 (0.682)	0.091 (0.928)	0.038 (0.970)
(%Pred.)									
t-test (P)[1]	3.091 (0.005)*			2.354 (0.026)*					
t-test (P)[2]	1.398 (0.174)			4.689 (0.000)*					
perceived dyspnea (Borg Scale)	5.15 2.78	3.04 2.19	3.89 2.26	4.93 2.45	5.11 2.36	5.93 2.23	0.312 (0.757)	3.347 (0.002)*	3.331 (0.002)*
t-test (P)[1]	8.563 (0.000)*					2.431 (0.022)*			
t-test (P)[2]	5.625 (0.000)*					9.367 (0.000)*			
PaO2 (mm Hg)	67.87 9.92	68.97 10.38	68.04 11.06	68.54 8.18	67.64 8.35	66.54 8.19	0.274 (0.785)	0.519 (0.606)	0.568 (0.573)
t-test (P) [1]	2.640 (0.014)*					2.449 (0.021)*			
t-test (P)[2]	0.261 (0.796)					3.755 (0.001)*			

$PaCO_2$ (mm Hg)	44.10 □ 8.41	43.47 □ 7.55	42.47 □ 6.35	42.20 □ 8.12	43.03 □ 8.02	43.59 □ 7.47	0.843 (0.403)	0.210 (0.835)	0.593 (0.556)
t-test (P)[1]	1.177 (0.250)			3.209 (0.004)*					
t-test (P) [2]	2.187 (0.038)*			3.292 (0.003)*					
SaO_2 (%)	92.39 □ 3.57	92.69 □ 3.24	93.06 □ 3.32	93.19 □ 4.20	93.03 □ 3.74	93.17 □ 4.21	0.761 (0.450)	0.366 (0.716)	0.108 (0.915)
t-test (P) [1]	1.675 (0.106)			0.377 (0.709)					
t-test (P)[2]	1.571 (0.128)			0.032 (0.974)					

t-test (P)[1]: comparing pre-program and 2 months post-program (post 1) in each group. *t-test (P)[2]*: comparing pre-program and 6 months post-program (post 2) in each group. *t-test (P)[a]*: comparing study and control groups pre-program. *t-test (P)[b]*: comparing study and control groups 2 months post-program. (post 1). *t-test (P)[c]*: comparing study and control groups 6 months post-program. (post 2). *Significant, at P≤ 0.05

Regarding perceived dyspnea the results revealed that, patients in the study group showed significant decrease (improvement) in their ratings of perceived dyspnea at both 2 and 6 months post self-management program, while perceived dyspnea increased significantly for those in the control group in both evaluations. In addition, 2 and 6 months post program, the ratings of perceived dyspnea were significantly different between study and control groups where P value was found to be **(0.002)**.

In relation to arterial blood gases, the table showed that, O_2 levels of study group increased post program and the increase was statistically significant at 6 months post program while CO_2 levels for the study group decreased and the differences were significant at 2 months post program. On the other hand, O_2 levels of patients in the control group decreased significantly at 2 and 6 months post program while CO_2 levels increased significantly at both evaluations. Neither study nor control group showed any significant change in O_2 saturation at the two evaluation times. All results of arterial blood gases did not show any significant differences between study and control group either pre or post self-management program.

Table (5) shows the correlation between study group's total score of knowledge and total score of practice immediately after sessions and related clinical outcomes. **As regard to pulmonary function tests**, it was observed that, both total knowledge score and total practice score of study group correlated significantly and positively with FEV1 (% of predicted) at both evaluation times.

Original Article

Table (5): Spearman's correlation between study group's total score of knowledge and total score of practice after sessions and their clinical outcomes 2 months and 6 months post self-management program:

Clinical outcomes	Knowledge		Practice	
	2 months Post program (post 1)	6 months Post program (post 2)	2months Post program (post 1)	6 months Post program (post 2)
Pulmonary functions				
FEV_1	0.518 (0.006)*	0.512 (0.006)*	0.614 (0.001)*	0.611 (0.001)*
Perceived dyspnea	- 0.623 (0.001)*	- 0.621 (0.001)*	- 0.764 (0.000)*	- 0.776 (0.000)*
Arterial blood gases				
$PaCO_2$	-0.123 (0.542)	- 0.164 (0.413)	- 0.364 (0.062)	- 0.383 (0.058)
PaO_2	0.450 (0.018)*	0.498 (0.008)*	0.549 (0.003)*	0.610 (0.001)*
SaO_2	0.498 (0.008)*	0.543 (0.003)*	0.634 (0.000)*	0.621 (0.001)*

*Significant, at $P \leq 0.05$

Regarding perceived dyspnea, the table showed that, negative significant correlations were noticed between both total knowledge score and total practice score of study group and their perceived dyspnea in both evaluations as shown in table (5).

Concerning arterial blood gases, it was noticed that, there were significant correlation between both total knowledge score and total practice score of study group and their arterial blood gases results (PaO_2 and O_2 saturation) as revealed in table (5).

Discussion

Regarding the knowledge and practice of the study and control groups, the findings of the present study showed that, the total knowledge and practice median levels before sessions were (39.0, 31.0 respectively) for study group and (36.0, 30.0 respectively) for control group with no statistical significant differences between groups **(Table 2, 3)**. A study done by Hernandez et al (2009) to determine COPD patients' perceptions and education regarding their disease, its severity and treatment revealed that patients claimed to be well informed about COPD; however, their knowledge was poor in several domains including the causes of COPD, the consequences of inadequate therapy, and the management of exacerbations [(21)].

The present study revealed that there was a significant improvement in the knowledge and practice of the study group after applying sessions, in comparing with control group (Table 2, 3). This is in accordance with a study carried out by Rootmensen et al (2008) [(22)] who found that there was a significantly higher increase in knowledge

Original Article

mean percentage scores in the intervention group who received a protocol-based education program offered by pulmonary nurse than control group who received only usual hospital care. Nault et al (2000) [23] and Dang-Tan (2001) [24] stated that, self-management programs specific to COPD patients increase knowledge and skills as the patients needs to treat their own illness. In the same direction Hill et al (2010) [25] showed that experimental group who received 2 hours of education delivered by a certified COPD educator had increased total mean score of knowledge including the importance of smoking cessation, correct inhaler technique and recognition of an acute exacerbation (from 27.6 8.7 to 36.5 7.7; P=0.001) which was greater than any seen in the control group (29.6 7.9 to 30.2 7.2; P= 0.51) who received usual care.

Concerning pulmonary function tests, the present study portrays that study group showed significant improvement in FEV_1 (% of predict) yet, the differences between the study and control groups did not differ significantly **(Table 4)**. These results are supported by research done by **Akinci and Olgun** [26]who concluded that the nurse-led, home-based pulmonary rehabilitation which includes education about disease, breathing exercises, and lower-and upper- extremity aerobic exercises produced meaningful improvement in pulmonary function tests, arterial blood gases, QOL, dyspnea, and functional capacity of experimental group and no meaningful change was observed in the control group. In the same direction, **Ergün et al.** [27] added that the possible explanation of the improvement in pulmonary function was based on the treatment compliance as during their comprehensive pulmonary rehabilitation program, adherence to prescribed therapy and medication advice were the main topics of the patient education sessions. In contrast, **Karapolat et al.** [28] demonstrated that the training benefits of rehabilitation are independent of underlying airflow limitation and rationalized that COPD is a chronic and progressive disease that results in no improvement in pulmonary function and arterial oxygenation with rehabilitation program.

Concerning the perception of dyspnea, the results of present study revealed that patients in the study group showed significant decrease (improvement) in their ratings of perceived dyspnea while it increased significantly for those in the control group **(Table 4)**. It has been proved previously that patient who received high dose of steroids for several weeks as patients with COPD developed inspiratory muscle weakness. Inspiratory muscle training prevented completely the adverse effect of the corticosteroid on the inspiratory muscles [29]. Moreover, there is some evidence that inspiratory muscle training leads to decrease in the intensity of dyspnea [30]. Additionally, upper extremities exercise training resulted in improvement of dyspnea and functional outcomes as it can augment the strength and endurance of the arms and shoulder girdle muscles and thereby enhance inspiration [30].

Arterial blood gases of the study group also changed considerably **(Table 5)**. A study conducted in Japan by Takigawa et al (2007) [31] confirmed that patients with COPD had benefited from rehabilitation regardless of disease severity. The effects included improvement in pulmonary function, arterial blood gas analysis, respiratory muscle strength and activities of daily living. The same results reported by Akinci and Olgun (2011) [26].

Finally, it should be pointed out that, the gains obtained in pulmonary function tests, perceived dyspea and arterial blood gases were maintained as shown by the results 6 months after sessions. This may be due to the fact that, the program in which the intensity of training is controlled by the individual patient may improve the sense of self-efficacy about the program and lead to continuous performance of the program. This is in accordance with Corhay et al.[32] who concluded that benefits of the pulmonary rehabilitation program were maintained at 6 months even with such a simple intervention as a monthly telephone call. Lee et al.[33] added thatCOPD is a progressive deteriorating lung disease and patients may be prone to exacerbations which can cause interruption to their daily routine including newly acquired exercise behaviors.

Conclusions:

Based on the present study findings, it can be concluded that knowledge and practice scores of the study group were improved significantly after applying sessions. As well as, self-management program improved significantly pulmonary function tests, perceived dyspnea and arterial blood gases. Furthermore, these improvements were maintained at 6 months post program. It can also be concluded that total knowledge and practice scores of COPD elderly patients in the study group correlated significantly to related clinical outcomes after applying sessions.

Recommendation:

Based on the results of the present study, the following recommendations were suggested:

1. Elderly patients with COPD should be given a written instruction plan for daily self-management measures.
2. In - service training to all nurses in chest department and outpatients clinics to update their knowledge and increase their ability to care for elderly patients with COPD.
3. Self-management programs should be integrated within the plan of care for elderly patients with COPD. These programs should emphasize patient education about the disease process, COPD medication, behavior and lifestyle modification, inspiratory muscles training, breathing retraining, upper and lower extremities exercise, airway clearance techniques, psychosocial support, different relaxation techniques and effective coping behaviors that the patients can incorporate into their lifestyle.

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