

# Effect of Inspiratory Muscle Training on Blood Gases in Patients with Chronic Obstructive Lung Disease

Farag A. Aly, Akram A. El-Saed and Al-Sayed A. Shanub

Physical Therapy Department for Cardiopulmonary Disorders and Geriatric, Faculty of Physical Therapy, Cairo University.

## ABSTRACT

**Purpose:** The aim of this study was to detect the efficacy of inspiratory muscle training (IMT) on the arterial blood gases in chronic obstructive pulmonary diseased patients (COPD). **Materials and Methods:** Forty patients with COPD participated in this study. They had been equally divided into two groups: Group I: Included twenty patients who received medical treatment only. Group II: included twenty patients who applied the inspiratory muscle trainer for two months. Three times per week for ten to fifteen minutes per session in addition to the same medical treatment. **Results:** There were significant improvements in the arterial blood gases ( $PaO_2$ ,  $PaCO_2$ , PH) after two months from inspiratory muscle trainer intervention. **Conclusion:** So the threshold inspiratory muscle trainer can be applied as a method of treatment for patients with COPD to improve their arterial blood gases (PH,  $PaO_2$  and  $PaCO_2$ ), inspiratory muscle strength and endurance. **Key words:** Threshold Inspiratory Muscle Trainer - Arterial Blood Gases - COPD.

## INTRODUCTION

Breathing techniques are included in the rehabilitation program of patients with COPD. Breathing techniques relief symptoms and ameliorate adverse physiological effects by increasing strength and endurance of the respiratory muscles, optimizing the pattern of thoraco-abdominal motion, reducing dynamic hyperinflation of the rib cage and improving gas exchange. Evidence existed to support the effectiveness of pursed lips breathing, forward leaning position, active expiration, inspiratory muscle training and diaphragmatic breathing.

Pulmonary diseases are considered as important causes of morbidity and mortality in the modern world. COPD being the most common and a major cause of lung related death and disability. Pulmonary rehabilitation

has emerged as a recommended standard care for patients with COPD. In the United States COPD is ranked as the fourth-leading cause of death.

Pulmonary rehabilitation is an evidence-based, multidisciplinary, and comprehensive intervention for patients with chronic respiratory diseases who are symptomatic. They often have decreased daily life activities. Pulmonary rehabilitation is designed to reduce symptoms, optimize functional status, increase participation, and reduce health care costs through stabilizing or reversing systemic manifestations of the disease. Rehabilitation programs for patients with COPD are well established as a mean of enhancing standard therapy to control and alleviate symptoms and optimize functional capacity. The primary goal is to restore the patient to the highest possible level of independent function, which is

accomplished by helping patients to learn more about their treatment.

The major abnormality of respiratory muscle function of these patients is thought to be the mechanical disadvantage caused by this hyperinflation. In addition, structural changes that presumably represent adaptive effects were shown in the respiratory muscles of patients with COPD. The respiratory muscles showed an increase of type-1 fibers, whereas the length of the sarcomere was decreased. Dynamic hyperinflation breathing to higher ranges of the vital capacity where the elastic load to breathing is increased and hyperinflation induces intrinsic positive end expiratory pressure which generates and inspiratory threshold load.

Arterial blood gases provide the essential information for the care of patients with critical illness and COPD. Spirometry and maximal respiratory pressures are commonly used pulmonary function parameters to evaluate respiratory function. Prediction values are available for conventional lung function devices using a standard tube or flanged type of mouthpiece connection. Inspiratory muscle weakness would be expected to increase the intensity of dyspnea for a given minute ventilation, since greater molar outflow is required for a given pressure generation by the muscles. The sensation of dyspnea seems to originate with the activation of involved sensory systems with respiration.

Patients with COPD take quick, small, shallow breaths. Breath training can help them to take deep breaths and reduce breathlessness. They must practice breath training regularly to do it well. Three basic breath training methods are diaphragmatic breathing, pursed-lip breathing, and breathing during bending forward.

It is possible that the effects of inspiratory muscle fatigue may have disrupted

the relation between dyspnea and resting inspiratory muscle strength. Some patients with COPD develop weakness of their chest and diaphragmatic muscles that are used to inspire air. This sometimes contributes to chronic shortness of breath, or an impaired capability to exercise or otherwise exert them. If this weakness is substantial, then the technique of inspiratory muscle training (IMT) may be beneficial. Several authors have shown the targeted IMT may enhance respiratory muscle function and reduce dyspnea in patients with moderate to severe COPD. Breathing techniques and body positions improve the length-tension relationship or geometry of the respiratory muscles (in particular of the diaphragm) or increase strength and endurance of the inspiratory muscles. According to the length-tension relationship, the output of the muscles increases when operating at a greater length, for the same neural input.

Respiratory muscle training using adequate loads improves the strength of the inspiratory muscles in patients with COPD; however, it remains unclear whether this improvement results in decreases in symptoms, disability, or handicap. Although improvement in inspiratory muscle strength is accompanied by decreased breathlessness and increased respiratory muscle endurance, the benefits have not been well established. Regular exercises can improve and decrease shortness of breathing. If the patient stays active, he or she may develop fewer complications and has a better attitude about his or her life. Exercise training for COPD often includes aerobic exercise, such as walking or using a stationary bike, and muscle – strengthening exercises for arms and legs.

## SUBJECTS, MATERIALS AND METHODS

### Subjects

Forty male subjects had participated in this study they were diagnosed clinically and radio logically to have moderate COPD ( $FEV_1/FVC < 70\%$ ,  $50\% < FEV_1 < 80\%$  predicted). Their age ranged from 45 to 60 years old. They were selected from chest department of alkasr El-Aini Hospital, Cairo university. All the subjects had signed a written informed consent before participating in this study. They were divided randomly into tow equal groups: Group I: Twenty COPD patients who received the medical treatment only Group II: Twenty COPD patients who received the designed physical therapy program and the medical treatment. Patients who had ischemic heart disease, corpulmonal, pulmonary hypertension, and any of the restrictive lung diseased had been excluded form participating in this study.

### Materials

#### A- Evaluative equipment

- 1- Arterial Blood gases analyzer: was used to measure ( $PaO_2$ ,  $PaCO_2$  and PH).
- 2- Spirometry with Mouth Pressure: (Vmax 2130 V6200 Autobox USA was only used to select the patients that match with the inclusion criteria).

#### B- Therapeutic equipment: Threshold Inspiratory muscle trainer:

The threshold inspiratory muscle trainer (TIMT) (Health scan Products Inc., Cedar Grove, New Jersey) provides a constant and specific training workload, regardless of how fast or slowly you breathe.

### Procedures

#### *Evaluative procedure:*

The assessment was done before starting and immediately after the end of the training program:

- 1- Arterial puncture and Blood gases analysis: Arterial blood samples were drawn from radial or brachial site from each patient before and after the training program to determine partial pressure of oxygen ( $paO_2$ ), partial pressure of carbon dioxide ( $paCO_2$ ) the percentage of hemoglobin saturated with oxygen ( $O_2$  sat), and the power of hydrogen (pH). Normal ranges values of arterial blood gases are PH (7.35-7.45),  $paO_2$  (80-100 mmHg) and  $paCO_2$  (35-45mmHg).
- 2- Measurement of the maximal inspiratory pressure: Spirometry is the most reliable way to determine reversible airway obstruction. Each patient inhales as deeply as possible and forms a seal around the tube with their mouth. Then each patients exhales, as forcefully and rapidly as he can, until he cannot exhale more for at least another 6 seconds. The most commonly parameters used for interpretation are the forced expiratory volume after 1 second ( $FEV_1$ ), the forced vital capacity (FVC), and the forced expiratory flow at 25%-75% of maximal lung volume (FEF25-75).

#### *Treatment procedure:*

Each patient of group II trained by using the threshold inspiratory muscle trainer (TIMT) three times/week for 10-15 minutes/session for two months. Verbal explanation about the importance of the treatment program was explained to each patient. The Maximum Inspiratory Presure (MIP) test measures the strength of the inspiratory muscles. Patients with MIP of less than 60 cm  $H_2O$  pressure is most likely to benefit from Inspiratory Muscle Training. The training resistance should be set at about 30% of the MIP. Initially, he may not be able to exercise for a full five minutes without excessive fatigue. After about five days he should be feeling more comfortable, and then

he try to exercise for 1/2 minute for a few days. Gradually he work up to a full five minute session. When he is comfortable with that full five minute session, then increase his work load by about 5cm H<sub>2</sub>O. and start again to build up to a comfortable five minute exercise time. Note, initially his weak muscles may also require him to lower your inspiratory load about 5cm H<sub>2</sub>O or more as well as reducing your work time.

### ***Inspiratory Muscle Training***

The threshold inspiratory muscle trainer (IMT) provides a constant and specific training worklod, regardless of how fast or slowly you breathe. The adjustable and calibrated spring-loaded valve blocks air flow until he can produce enough inspiratory pressure to overcome the spring force. Inspiratory muscles work harder and get stronger over time. The IMT is easy to use. With the mouthpiece removed, twist the control knob so the indicator points to the pressure number. Use the nose clip to insure that you are breathing entirely through your mouth. Patients were shown the IMT device, and the threshold effect was explained to standardize the patients breathing pattern during each session.

Patients received IMT for 10 to 15 min 3 times per week, for two months. Each patient started breathing at a resistance equal to 15% of their maximum inspiratory pressure for one week. The resistance then was increased

incrementally 5 to 10% each session, to reach 30% of their maximum inspiratory pressure. At the end of the first month of training, IMT then were continued at 30% of the maximum inspiratory pressure till the end of the 8<sup>th</sup> week of training. Loaded breathing was intermittent for 3-minute periods with a two minutes rest period in between. Once the patient is able to produce adequate force to open the valve, the subsequent breaths are generally more forceful, and the patient typically can complete the set. Attempts to inhale against the resistance that produced only instantaneous opening of the valve were not counted as a training breath, and the patients were encouraged to intensify their contraction to sustain a high quality breath to keep the valve open for one to two seconds.

### **Statistical analysis:**

The collected data were statistically analyzed by using t-test to detect significance within each group and between both groups.

## **RESULTS**

Table (1) the general characteristics of the patients included in group I, and II. There were a non significant differences noted between them regarding the age, weight, height, and BMI (P-value>0.05).

**Table (1): General characteristics of the subjects.**

Variables	Group I	Group II	MD	t-value	P-value
	$\bar{X} \pm SD$	$\bar{X} \pm SD$			
Age (years)	55.4±5.26	56.4±4.05	-1	0.67	0.5
Weight (Kg)	72.95±10.84	74.8±7.83	-1.85	0.61	0.54
Height (cm)	166.75±5.68	165.1±5.62	1.65	0.92	0.36
BMI (Kg/m <sup>2</sup> )	26.15±2.98	27.4±2.14	-1.25	1.52	0.13
FEVI (L/m)	1.84±0.34	1.81±0.27	0.03	0.23	0.8
FEVI/FVC%	63.07±7.65	65.48±6.71	-2.41	1.05	0.2

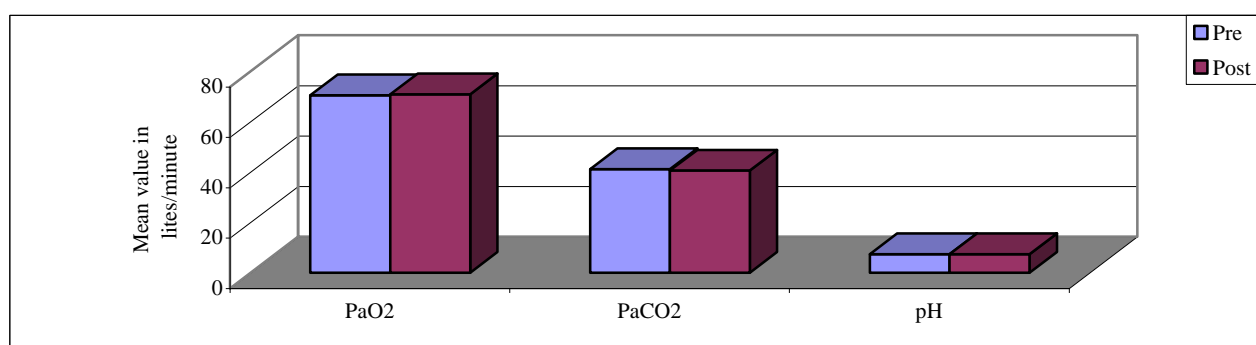
Table 2 and figure (1) show the mean values of the blood gases parameters before and after the medical treatment in group-I. there were a non-significant differences (P-

value > 0.05) in the mean values of the (PaO<sub>2</sub>, PaCO<sub>2</sub> and pH) before and after the medical treatment in group-I.

**Table (2): The mean values of blood gases parameters (PaO<sub>2</sub>, PaCO<sub>2</sub> and pH), before and after medical treatment in group-I.**

	PaO <sub>2</sub>		PaCO <sub>2</sub>		PH	
	Pre	Post	Pre	Post	Pre	Post
Mean	70.55	70.95	41.17	40.64	7.44	7.43
± SD	± 8.14	± 7.41	± 3.1	± 3.44	± 0.024	± 0.027
T-Value	1.56		1.67		0.96	
P-Value	0.13 †		0.11 †		0.34	

† Non significant P-value > 0.05- PaO<sub>2</sub>: partial pressure of oxygen  
PaCO<sub>2</sub>: Partial pressure of carbon dioxide- PH: power of hydrogen.



PaO<sub>2</sub>: partial pressure of oxygen- PaCO<sub>2</sub>: partial pressure of carbon dioxide- PH: power of hydrogen.

**Fig. (1): The mean values of blood gases parameters (PaO<sub>2</sub>, PaCO<sub>2</sub> and pH), before and after medical treatment in group I.**

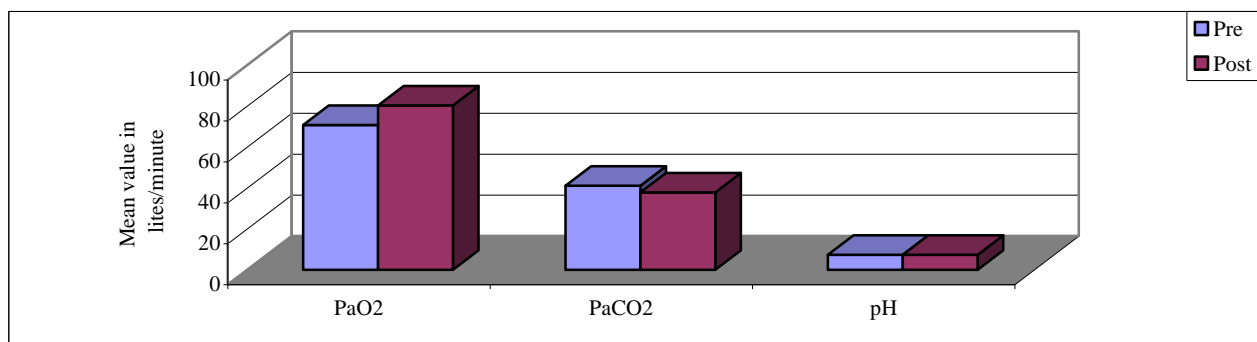
Table 3 and figure 2 show the mean values of the blood gases parameters before and after the medical treatment in addition to the inspiratory muscle training in group – II. There were significant differences (P-value > 0.05)

in the mean values of the PaO<sub>2</sub>, PaCO<sub>2</sub> and pH between before and after the inspiratory muscle training in addition to medical treatment in group-II.

**Table (3): The mean values of blood gases parameters (PaO<sub>2</sub>, PaCO<sub>2</sub> and pH), before and after medical treatment and inspiratory training in group II.**

	PaO <sub>2</sub>		PaCO <sub>2</sub>		PH	
	Pre	Post	Pre	Post	Pre	Post
Mean	70.85	80.4	41.17	37.85	7.43	7.39
± SD	± 6.22	± 6.13	± 4.82	± 3.61	± 0.03	± 0.02
t-Value	7.69		5.02		4.66	
P-Value	0.001*		0.001*		0.001*	

\*Significant (P-value < 0.05)



PaO<sub>2</sub>: partial pressure of oxygen- PaCO<sub>2</sub>: partial pressure of carbon dioxide- PH: Power of hydrogen

**Fig. (2): The mean values of blood gases parameters (PaO<sub>2</sub>, PaCO<sub>2</sub> and pH), before and after medical treatment and inspiratory training in group II.**

### Comparison between both groups

The mean values of the PaO<sub>2</sub> before the study in Gorup-I and II were (70.55 ± 8.14) and (70.85 ± 6.22) mmHg respectively. There were non-significant differences between them (P-value >0.05), but the mean values of the PaO<sub>2</sub> after the study for group-I and II were (70.95 ± 7.41) and (80.4 ± 6.13) mmHg respectively. There were significant difference between them (P-value < 0.01) for PaO<sub>2</sub>.

The mean values of PaO<sub>2</sub> before the study in group – I and II were (41.17 ± 3.1) and (41.17 ± 4.82) mmHg respectively without significant difference (P>0.05). the mean values of PaO<sub>2</sub> after the study in group I and II were (40.64 ± 3.44) and (37.85 ± 3.61) mmHg respectively with a significant difference between them (P-value < 0.05). The mean values of pH in group-I and II before the study were (7.44 ± 0.024), and (7.43 ± 0.03) respectively without significant differences (P-value > 0.05). the mean values of pH in group I and II after study were (7.43 ± 0.027) and (7.39 ± 0.02) respectively with a significant difference between them (P-value < 0.05).

## DISCUSSION

The results of this study showed that there were significant improvements of the

arterial blood gases after the application of IMT. These results may be due to the increase of both muscle strength and endurance. The improvement in the inspiratory muscle performance is associated with improved exercise performance. These results were supported by other studies stated that the improvement in the Patients' breathing patterns reflect the increase in inspiratory force and duration of intolerance, and increased mortality risk in patients with COPD. Maximum inspiratory pressure (MIP) is an indicator of inspiratory muscle strength and a determinant of vital capacity (VC). Decline in MIP is known to be decreased in pulmonary diseases such as COPD, degenerative neuromuscular diseases, congestive heart failure and during long –term corticosteroid treatment.

This study contributes with additional information to the knowledge regarding the effect of inspiratory muscle training (IMT) on inspiratory muscle strength and arterial blood gases.. These results were supported with the findings of the Meta-analysis by Lotter and his colleagues that IMT significantly increased inspiratory muscle strength and endurance. IMT significantly improved dyspnea related to ADLs and exercise performance with

consistent improvements in inspiratory muscle function and reduction in dyspnea.

Inspiratory muscle weakness found in majority of patients with significant COPD. Patients with COPD must breath at high lung volumes to maintain potency of their narrowed airways. The major abnormality of respiratory muscle function in these patients is thought to be the mechanical disadvantage caused by this hyperinflation. Hyperinflation depresses the dome of the diaphragm, shortens its fibers, and forces it to work on an ineffective portion of its length/tension curve. This study suggested that inspiratory muscle training in patients with COPD improves arterial blood gas tensions by decreasing lung hyperinflation with the consequent reduction in inspiratory loads and changes in ventilatory pattern.

These improvements in the blood gases may be explained by improvement in the patient's breathing patterns (i.e., slow deep breathing versus rapid, shallow breathing) that may have resulted from IMT. When patients breath against a resistance they cannot overcome. They increase their effort in an attempt to breath to fulfill their physiological requirements. Because the resistance settings that had been used in this study were about 30% of MIP, the patients were able to open the valve even though initially it may have appeared to be difficult for some of them. All patients were encouraged to sustain the required force production for the duration of their inspiration, which led to a standardized training breath.

The improvement in inspiratory muscle strength and in arterial blood gases in the current study following the basic training, was significant but did not exceed the minimal clinically-important difference (>20%). These improvements may be explained by decreasing lung hyperinflation with the consequent reduction in inspiratory loads and changes in

ventilatory pattern. In the current study the maintenance training should be applied. Otherwise, the useful benefit of the intensive basic training is not maintained. There is a scientific evidence to support the use of IMT as a routine component in the treatment programs for patients with COPD, and should be administered on an individual basis. The result of this study, along with those of other studies, have shown the improvements in dyspnea and exercise tolerance in addition to the arterial blood gases with the use of IMT. It was concluded that IMT is a meaningful addition to the pulmonary rehabilitation programs directed towards patients with COPD with inspiratory muscle weakness. One of the important outcomes of the current study is that IMT may be performed at home for patients with significant COPD under some supervision with relatively good compliance and low costs.

## REFERENCES

- 1- Alba, A.S., Kim, H., Whiteson, J.H. and Bartels, M.N.: Cardiopulmonary rehabilitation and cancer rehabilitation. Pulmonary rehabilitation review. Arch Phys Med Rehabil; (3): S57-64, 2006.
- 2- American Thoracic Society and European Respiratory Society: ATS/ERS statement on pulmonary rehabilitation. Am J Resir Crit Care Med; (173): 1390-1413, 2006.
- 3- Andrew, L., Ries., Gerene, S. and Brian, W.: Pulmonary Rehabilitation Executive Summary: Joint ACCP/AACVPR Evidence – Based Clinical Practive Guidelines. Chest, 5: (131): 4S- 42S, 2007.
- 4- Andrews, P., Azoulay, E. and Antonelli, M.: Year in review in intensive care medicine. Acute respiratory failure renal failure. Intensive Care Med. 32(2): 207-216, 2006.
- 5- Bateman, E.D., Feldman, C. and O'Brien, J.: Guideline for the management of chronic

- obstructive pulmonary disease (COPD). *Afr. Med J*; 94(2): 559-575, 2004.
- 6- Butcher, S.J. and Jones, R.L.: The impact of exercise training intensity on change in physiological function in patients with chronic obstructive pulmonary disease. *Sports Med*; 36(4): 307-325, 2006.
  - 7- Carlson, D.J., Ries, A.L. and Kaplan, R.M.: Prediction of maximum exercise tolerance in patients with COPD. *Chest*; (100): 307-311, 1991.
  - 8- Emam, R.H., Hatem, A.M., Shalaby, A.O. and Ali, Y.M.: Spirometry as a predictor of exercise tolerance in COPD patients. Unpublished M.D. Thesis, Cairo University, faculty of medicine, chest diseases; (10807): 30-32, 2003.
  - 9- Ferreira, G., Feuerman, M. and Spiegler, P.: Results of an 8- week, outpatient pulmonary rehabilitation program on patients with and without chronic obstructive pulmonary disease. *J Cardiopulmonary Rehabil*; 26(1): 54-60, 2006.
  - 10- Fischbach, F.T. and Dunning, M.B.: Manual of laboratory and diagnostic tests. 7<sup>th</sup> edit. Philadelphia; 50-58, 2004.
  - 11- Hanneke, A.C., van Helvoort and Yvonne, F.: Six-Minute Walking Induced Systemic Inflammation and Oxidative Stress in Muscle – Wasted COPD Patients. *Chest*; 131: 439-445, 2007.
  - 12- Hill, N.S.: Pulmonary rehabilitation. *Proc Am Thorac Soc*; 66-74, 2006.
  - 13- Kleinman, B.S., Frey, K., VanDrunen, M., Sheikh, T., Dipinto, D., Mason, R. and Smith, T.: Motion of the diaphragm in patients with chronic obstructive pulmonary disease while spontaneously breathe versus during positive pressure breathing after anesthesia and neuromuscular blockade. *Anesthesiology*; 97: 298-305, 2002.
  - 14- Lippincott Williams. and Wilkins: Respiratory muscle training in chronic obstructive pulmonary disease. *Pulmonary medicine*; (11): 140-144, 2005.
  - 15- Lippincott Williams And Wilkins: Evidence – Based Approach to Acute Exacerbations of COPD. *Pulmonary Medicine*, 2: 117-124, 2003.
  - 16- Lotters, F., Van Tol, B., Kwakkel, G. and Gosselink, R.: Effects of controlled inspiratory muscle training in patients with COPD: a meta-analysis. *Eur Respir J.*, 20: 570-576, 2002.
  - 17- Marin, J.M., De Oca, M.M. and Rassulo, J.: Ventilatory drive at rest and perception of exertional dyspnea in severe COPD. *Chest*; 115: 1293-1300, 1999.
  - 18- Nishimura, Y.M., Tsutsum, H., Nakata, T., Tsunenari, Maeda, H. and Yokoyama, M.: Relationship between respiratory muscle strength and lean body mass in men with COPD. *Chest*; (107): 490-495, 1995.
  - 19- Diaz, O., Villafranca, C. and Ghezzi, H.: Breathing pattern and gas exchange at peak exercise in COPD patients with and without tidal flow limitation at rest. *Eur Respir J*; (17): 1120-1127, 2001.
  - 20- O'Donnell, D.E. and Parker, C.M.: COPD exacerbations. *Path physiology. Thorax Apr*; (61): 354-61, 2006.
  - 21- O'Donnell, D.E.: Assessment and management of dyspnea in chronic obstructive pulmonary disease. In Similowski T, Whitelaw WA, Derenne, J-P, eds. *Clinical management of chronic obstructive pulmonary disease*. New York: Marcel Dekker Inc; (1): 13-70, 2002.
  - 22- Paltiel Weiner., M.D., Rasmi Magadle, M.D. and Marinella Eckerman, M.D.: Comparison of specific expiratory, inspiratory, and combined muscle training programs in COPD *Chest*; (124): 1357-1364, 2003.
  - 23- Ramirez-Sarmiento, A., Orozco-Levi, M. and Guell, R.: Inspiratory muscle training in patients with chronic obstructive pulmonary disease. Structural adaptation and physiologic outcomes. *Am J Respir Crit Care Med*, 166: 1491-97, 2002.
  - 24- Reardon, J., Casaburi, R. and Morgan, M.: Pulmonary rehabilitation for COPD. *Respir Med*; 99 Suppl B: S19-27, 2005.
  - 25- Robert, L., Susan, J. and Richard, L.: Interpretation of blood gases in clinical assessment of respiratory care. 4<sup>th</sup> edit., Mosby. Year Book. In C; 119-139, 2000.



- 26- Samuel S.S. and Phillip, D.H.: Use of Inspiratory Strength Training to Wean Six Patients Who Were Ventilator- Dependent. *Phyther*. 83; (2): 171-181, 2003.
- 27- Sanchez Riera, H., Motemayor Rubio, I. and Ortega Ruiz, F.: Inspiratory muscle training in patients with COPD: effect on dyspnea, exercise performance and quality of life. *Chest*; 120: 748-756, 2001.
- 28- Scherer, T.A., Spengler, C.M. and Owassapian, D.: Respiratory muscle endurance training in chronic obstructive pulmonary disease. Impact on exercise capacity, dyspnea, and quality of life. *Am J Respir Crit Care Med*; 162: 1709-1714, 2000.
- 29- Troosters, T., Gosselink, R. and Decramer, M.: Short-and long-term effects of outpatient rehabilitation in patients with chronic obstructive pulmonary disease: a randomized trial . *Am J Med*; 109: 207-212, 2000.
- 30- Weiner, P.R., Magadle, M., Beckerman, Weiner, M. and Berar-Yanay N.: Maintenance of inspiratory muscle training in COPD patients : one year follow – up. *Eur respire J*; (23): 361-365, 2004.
- 31- Weiner, P., Azgad, Y. and Weiner, M.: Inspiratory muscle training during treatment with corticosteroids in humans. *Chest*; 107: 1041-1044, 1995.
- 32- Wohlgenuth, E.L., Van Der Kooi, J.C., Hendriks, G.W., Padbergand, H.T. and Folgering: Face masks spirometry and respiratory pressures in normal subjects. *Eur Respir J*; (22): 1001-1006, 2003.

### الملخص العربي

#### تأثير برنامج تدريب عضلة الشهيق علي غازات الدم في مرضي السدة الرئوية المزمنة

أجريت هذه الدراسة لمعرفة مدي تأثير برنامج تدريب عضلة الشهيق علي غازات الدم في مرضي السدة الرئوية المزمنة . أجريت الدراسة علي أربعين مريضاً يعانون من مرضي السدة الرئوية المزمنة تتراوح أعمارهم ما بين خمسة وأربعين وستين عاماً. تم تقسيم المرضي إلي مجموعتين متساويتين: المجموعة الأولى تلقت فقط العلاج الدوائي ، المجموعة الثانية أدت برنامج تدريب عضلة الشهيق بالإضافة إلي تناول العلاج الدوائي. وكان البرنامج لمدة شهرين بمعدل ثلاث جلسات أسبوعياً لمدة خمسة عشرة دقيقة للجلسة وقد تم قياس غازات الدم الشرياني قبل بدء وبعد الانتهاء من البرنامج للمجموعتين . وقد أظهرت النتائج وجود فروق ذات دلالة معنوية تشير إلي وجود تحسن ملحوظ في غازات الدم الشرياني للمجموعة الثانية مع عدم وجود فروق ذات دلالة إحصائية ايجابية للمجموعة الأولى الضابطة. لذلك يوصي بتطبيق برنامج تدريب عضلة الشهيق لتحسين غازات الدم الشرياني في مرضي السدة الرئوية المزمنة .