EDITORIAL

Effects pulmonary rehabilitation on musculoskeletal dysfunctions in patients with COPD

Esmaeil Alibakhshi PhD

Alibakhshi E. Effects pulmonary rehabilitation on musculoskeletal dysfunctions in patients with COPD. Chest Lung Res. 2017;1(1):1-2.

Chronic Obstructive pulmonary diseases (COPD) patients have abnormal peripheral body composition and they can't induce the best performance in muscle strength; which influences their quality of life and causes mortality. In patients with chronic obstructive pulmonary disease, changes in peripheral body composition are very important for their quality of life. In a research study, it was mentioned initially reversible body mass loss is ensuing. As energy stores per weight unit in fat tissue are about two-fold larger as in muscle tissue, and since physical activity, the main anabolic trigger is diminishing, skeletal muscle is depleting faster than fat tissue. Patients with respiratory chronic airway disease present systemic consequences that alter muscle function and mass, which are attributed to factors such as systemic inflammation, hypoxia, atrophy of type I and IIa muscle fibers, reduced fiber capillarization and oxidative enzyme capacity. In other study, researchers mentioned that muscle weakness special in muscle major in femoral and leg is multi and importance factorial, disuse is likely to be the major reversible factor with loss of strength most pronounced in the muscles of locomotion and performance that COPD patients used of that for more daily activities. Pulmonary rehabilitation has clearly been demonstrated to reduce dyspnea and hospital length of stay, increase exercise capacity and improve quality of life in these patients, and is indicated for persons who remain symptomatic despite optimal pharmacological therapy.

Some researchers mentioned that exercise training, nutritional support, education and behavior change and techniques to improve self-management and physiological support are therapies frequently included in pulmonary rehabilitation programs. That is based on an assessment of the integrated health status of the individual patient, and addresses and treats systemic effects and comorbidities of the disease.

Systemic effects in patients with COPD

Systemic effects in COPD patients are abnormal weight loss and skeletal musculoskeletal disorder that extends beyond the lung. Chronic systemic inflammation associated with COPD may also develop or extend disease-related diseases such as cardiovascular disease, osteoporosis, anemia, type 2 diabetes, lung cancer and depression, and one of its main mechanisms are the extra pulmonary effects (1,2). As a result, patients with COPD are inactive due to systemic symptoms. Systemic disorder in COPD patients, which is a peripheral muscle disorder due to physical inactivity and systemic inflammation, can eventually result in hypoxemia, nutritional deficiencies, oxidative stress, and Systemic corticosteroid treatment are observed in them (3). This impairment in peripheral muscular function is associated with various pathophysiological changes in skeletal muscle, which is the reduction of oxidative power with early lactic acidity and oxidative stress, reduction of muscle fiber mass, fiber re-conversion (shift type 1 to type 2 fibers) and changing the capillarization of these fibers can be of such a kind. These changes lead to an increase in the concentration of lactate for a particular task, which stimulates ventilation, stimulates dynamic penetration and increases the ventilation load, and will breathe these patients. In addition, they increase the susceptibility to muscle fatigue and the premature loss of exercise effects (3,4).

Consequences of skeletal muscle dysfunction in patients with COPD

Traditionally, and usually, the limitations of exercise performance in COPD patients were due to respiratory tract obstruction and reduced ventilation. However, several studies have shown that lung function alone can't reduce exercise performance, as well as the weakness of the peripheral muscle and respiratory muscles, as well. Organoleptic tolerance has a major impact on the patient's COPD health status, as physical burnout can lead to a significant reduction in the patient's ability to perform daily life activities, resulting in a decrease in QoL (5). Muscle weakness can also be related to the high utilization of health care resources. In fact, poor communication between muscle weakness and the use of medications (including steroid therapy) has been identified, although the cause of this relationship should be further investigated. When these data are combined, it shows that the burden of muscle arousal in COPD is significant (6).

Management of skeletal muscle dysfunction: role of exercise training

Regarding the effects of peripheral and respiratory muscle weakness in exercise restrictions, muscle training is an integral part of pulmonary rehabilitation programs. In fact, regular and controlled exercises have shown that it improves the ability to exercise in COPD patients. In addition, preparation exercises have a minor improvement in oxidative capacity and exercise performance in the peripheral muscle. However, other studies have shown how a large fraction of patients (more than one-third) are not able to respond to a regular training program. Patients who respond to the training program may be related to their circulating blood cytokines levels, but identifying non-respondent characteristics is necessary to determine the mechanisms of non-response to treatment and should be treated appropriately (7,8).

Respiratory muscle training

Respiratory muscle training (RMT) is not recommended as a routine component of a pulmonary rehabilitation program but should be presented in patients with COPD with ventilator muscle weakness. Normocapnic resistance training and load ventilation thresholds are described as important educational methods. It is recommended to use a ventilatory threshold loading device for the training of inflammatory muscles in these patients. In addition, in a meta-analysis of 25 studies that evaluated the efficacy of RMT in patients with stable COPD, a significant increase in inflammatory muscle strength, exercise capacity, and a quality of life score, and a significant reduction in airway obstruction which is noteworthy (9).

Pulmonary rehabilitation

Pulmonary rehabilitation interventions have been considered to be irreversible in order to improve the outcomes of the disease, weight loss, and long-standing muscle. However, in several reports, this suggests that efforts have been made to find effective ways to overcome nutritional disorders and improve muscle performance. Pulmonary rehabilitation programs have been developed in patients with COPD and the primary goal is to increase exercise tolerance and improve quality of life. The main components of these

[1]*Rehabilitation & Pneumology Department, Parc Sanitari Sant Joan de Deu (PSSJD) Department, Faculty of Medicine, Barcelona University, Spain;* [2]*Exercise Physiology Research Center (EPRC), Baqiyatallah University of Medical Science, Iran*

Correspondence: Esmaeil Alibakhshi, Ph.D, Rehabilitation & Pneumology Department, Parc Sanitari Sant Joan de Deu (PSSJD) Department, Faculty of Medicine, Barcelona University, Spain. email:ealibaal7@alumnes.ub.edu

Received: September 18, 2017, Accepted: September 20, 2017, Published: October 01, 2017

programs are exercise and muscle training, and nutritional supplements that should be treated regularly (9,10).

REFERENCES

1. Corhay LJ, Dang NG, Cauwenberge HV, et al. Pulmonary rehabilitation and COPD: Providing patients a good environment for optimizing therapy. Int J Chron Obstruct Pulmon Dis.2014;9:27-39.
2. Alibakhshi E, Shirvani H. Nutritional status in patients with chronic obstruction pulmonary disease (COPD): Review article. EC Nutr. 2015;2(1):267-74.
3. Alibakhshi E, Lores L, Fiorillo R. Physiological factors relevant to exercise tests in cardiopulmonary rehabilitation of COPD patients. J Sports Med Doping Stud. 2015;6(1).
4. Agusti A, Soriano JB. COPD as a systemic disease. COPD. 2008;5(2):133-8.
5. Barnes PJ, Celli BR. Systemic manifestations and comorbidities of COPD. Eur Respir J. 2009;33(5):1165-85.
6. Fabbri LM, Rabe KF. From COPD to chronic systemic inflammatory syndrome? Lancet. 2007;370(9589):797-9.
7. Qaseem A, Snow V, Shekelle P, et al. Clinical efficacy assessment subcommittee of the American College of Physicians, diagnosis and management of stable chronic obstructive pulmonary disease: A clinical practice guideline from the American College of Physicians. Ann Intern Med. 2007;147(9):633-8.
8. Hill K, Cecins NM, Eastwood PR, et al. Inspiratory muscle training for patients with chronic obstructive pulmonary disease: A practical guide for clinicians. Arch Phys Med Rehabil. 2010;91(9):146-7.
9. Geddes EL, O'Brien K, Reid WD, et al. Inspiratory muscle training in adults with chronic obstructive pulmonary disease: An update of a systematic review. Respir Med. 2008;102(12):1715-29.
10. Gosker HR, Wouters EF, van der Vusse GJ, et al. Skeletal muscle dysfunction in chronic obstructive pulmonary disease and chronic heart failure: underlying mechanisms and therapy perspectives. Am J Clin Nutr. 2000;71:1033-47.