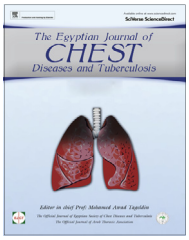
Egyptian Journal of Chest Diseases and Tuberculosis (2012) **61**, 89–93

The Egyptian Society of Chest Diseases and Tuberculosis

Egyptian Journal of Chest Diseases and Tuberculosis

www.elsevier.com/locate/ejcdt
www.sciencedirect.com



ORIGINAL ARTICLE

Effect of upper limb, lower limb and combined training on exercise performance, quality of life and survival in COPD

Ahmed S. Elmorsy [a], **Ahmed E. Mansour** [a,*], **Amr E. Okasha** [b]

[a] *Department of Thoracic Medicine, Mansoura University, Mansoura 35516, Egypt*
[b] *Department of Physical Medicine, Rehabilitation and Rheumatology, Mansoura University, Mansoura 35516, Egypt*

Received 10 June 2012; accepted 20 June 2012
Available online 27 February 2013

KEYWORDS

COPD;
Quality of life;
Lower limb training;
Upper limb training;
Survival

Abstract *Background:* Because there are differences between the upper limb (UL) and lower limb (LL) muscles in terms of the morphological and functional adaptations in COPD patients, specific protocols for strength training and endurance should be developed and tested for the corresponding muscle groups.

Aim: To elucidate the potential effects of unsupported UL and/or LL exercise training in patients with COPD. The 6-min walking distance (6-MWD), unsupported upper limb endurance (UULE) time, St. George's Respiratory questionnaire (SGRQ), BODE index and pulmonary function tests are used as outcome measures.

Methods: A prospective, randomized controlled study of patients with COPD. Patients were randomly assigned to one of 4 groups, group A received UL training, group B received LL training, group C received both UL and LL training and group D received no training (controls). Patients in group A, B, and C underwent exercise training 3 times weekly for 8 weeks. The outcome measures were carried out at study entry and after 8 weeks.

Results: 78 patients completed the study: 20 patients in group A, 21 in group B, 19 in group C and 18 in group D. Upper limb training significantly increased UULE time without affecting 6-MWD while LL training significantly increased 6-MWD without changing UULE time. Combined UL and LL training significantly increased both UULE time and 6-MWD. Significant reductions in the scores of SGRQ and BODE index were observed in groups A, B and C but not group D (control). No changes were found in pulmonary function in all groups at the end of the study.

* Corresponding author. Address: Faculty of Medicine, Mansoura University, Mansoura 35516, Egypt. Tel.: +20 01223836717.
E-mail address: Khaledmohamed@hotmail.com (A.E. Mansour).

Peer review under responsibility of The Egyptian Society of Chest Diseases and Tuberculosis.

ELSEVIER Production and hosting by Elsevier

0422-7638 © 2012 The Egyptian Society of Chest Diseases and Tuberculosis. Production and hosting by Elsevier B.V.
Open access under CC BY-NC-ND license. http://dx.doi.org/10.1016/j.ejcdt.2012.10.008

Conclusion: In patients with COPD, combined UL and LL training significantly enhanced the exercise tolerance and quality of life and reduced the risk of death (BODE index) without any change in the pulmonary function.

© 2012 The Egyptian Society of Chest Diseases and Tuberculosis. Production and hosting by Elsevier B.V.
Open access under CC BY-NC-ND license.

Introduction

Systemic effects of COPD involve respiratory and skeletal muscles with loss of myosin heavy chain and elevated level of ubiquitin-conjugated proteins, suggesting accelerated muscle protein degradation [1]. The remaining contractile proteins in these fibres are dysfunctional, and the calcium sensitivity of force generation is reduced. These abnormalities could all contribute to muscle weakness [1].

Although patients with COPD have been reported to present with impaired lower limb (LL) and upper limb (UL) muscles, the morphological and functional adaptations appear to differ between these muscles. Celli et al. [2] were the first to compare LL and UL activities in patients with COPD showing that unsupported UL activities in COPD ended before LL exercises did. Patients with COPD frequently experience marked dyspnea and fatigue when performing simple UL activities [3]. Upper limb activities commonly require unsupported arm exercise, which poses a unique challenge for patients with COPD, whose UL muscles are required to act as accessory muscles of respiration. During unsupported arm exercise, the participation of the accessory muscles in ventilation decreases, and there is a shift of respiratory work to the diaphragm. This is associated with thoracoabdominal dyssynchrony, severe dyspnea, and termination of exercise at low workloads [4]. Regarding the lower limbs, reduced muscle strength and endurance are related to decreased muscle mass, decreased aerobic capacity, a predominance of glycolytic metabolism, and rapid accumulation of lactate during exercise, factors that might be responsible for early muscle fatigue in COPD patients [5].

The effectiveness of LL exercise training for patients with COPD has been well documented, with consistent clinically significant improvements in exercise capacity, symptoms, and quality of life [6]. Moreover; it has been seen that UL exercise training for patients with COPD increases UL work capacity, improves endurance, and reduces oxygen consumption at a given workload [7–9]. The benefits of combined UL and LL training, however, are less well defined. Therefore, the aim of this study was to measure exercise performance, quality of life and functional outcome by combining UL with LL exercises in patients with COPD.

Patients and methods

The patients were selected based on the criteria of the American Thoracic Society (ATS) for COPD: a history of smoking, X-ray findings, a medical history, and physical examination consistent with the diagnosis of COPD. Pulmonary function tests confirmed irreversible airflow obstruction, as measured by a forced expiratory volume in 1 s (FEV_1) $< 80\%$ of the predicted normal value [16] and a FEV_1/forced vital capacity (FVC) ratio $< 70\%$. All patients had a stable clinical condition at the time of study. Patients with coexistent diseases, such as cardiovascular disease, diabetes, dementia, musculoskeletal problems, or vision difficulty, were excluded.

Protocol

A prospective, randomized controlled trial. Patients were randomly assigned to one of 4 groups, group A receiving UL training, group B receiving LL training, group C receiving both UL and LL training and group D receiving no exercise training (control group). Patients in group A and B underwent exercise training 3 times weekly for 8 weeks while patients in group C had UL and LL exercise training on alternate days.

1. *Upper limb exercise (30 min):* This involved a 10-min warm-up period, 10-min of aerobic activity and 10-min cool-down. The aerobic activity included diagonal arm raises, arm abduction and elevation and reverse, and arm abduction, forward flexion, and reverse; and straight arm rises.
2. *Lower limb exercise (30 min):* This involved a 10-min warm up, 10-min of cycling on an ergometric bicycle and 10-min cool down.
3. *Combined upper and lower limbs exercise:* This involved UL and LL exercise training on alternate days using the same protocols.

Outcome assessment

The followings were measured just before enrollment and at the end of the study:

1. *Unsupported upper limb endurance (UULE) time:* This was measured as previously described [10]. In breif; the patient was seated erect in a straight-backed chair with both feet on the floor facing the wall on which a chart was mounted. The chart consisted of eight horizontal colored strips of paper, the distance between the centers of the strips was 0.15 m. Each strip also had a clearly visible stage number. The first level was adjusted to be at the level of patient's knees by altering the position of the chart on the wall. The highest level the patient could reach was recorded. The patient held a light plastic bar (0.2 kg) and moved it during the exercise test. The test began with the patients lifting the bar from a neutral position to the first level, then the vertical amplitude of the lift increased by 0.15 m every minute as the patient progressed through the stages of the test. Once the patient reached maximum vertical height, the weight of the bar was progressively increased by 0.5 kg every minute to a maximum weight of 2 kg. Heart rate, dyspnea, and partial oxygen saturation were measured before and after the test. The test was terminated if the patient experienced dyspnea or arm fatigue at the maximum position reached. The endurance time was recorded.
2. *6-minutes walking distance (6-MWD):* This was conducted in a hospital corridor as previously described [11]. During the test the patient was instructed to walk as fast as possible

Download English Version:

https://daneshyari.com/en/article/3400386

Download Persian Version:

https://daneshyari.com/article/3400386

Daneshyari.com