



## ESTABLISHMENT OF AN ULTRASOUND PROTOCOL TO EVALUATE MUSCLE STRUCTURE AND FUNCTION BEFORE AND AFTER PULMONARY REHABILITATION IN PATIENTS WITH OBSTRUCTIVE PULMONARY DISEASE

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*Abstract:*

**BACKGROUND:** Pulmonary rehabilitation (PR) is fundamental for the management of patients with chronic respiratory diseases known for its many benefits, namely in patients' muscle strength. Although muscle strength is commonly measured in PR, much less is known about the changes occurring in muscles' structure and function. Ultrasound can contribute to knowledge in this field due to its accessibility, non-use of ionising radiation and low costs.

**OBJECTIVE:** This study aimed to establish and test a comprehensive US protocol to evaluate the effects of a PR program on the structure and function of the diaphragmatic, quadriceps and biceps muscles in patients with obstructive pulmonary disease.

**METHODS:** An US equipment with linear (11L) and convex (4C) probes was used. B-mode measurements of Rectus Femoris and Biceps Braquial thickness (RFTK, BBTK) and their cross-sectional areas (RFCSA, BBCSA) as well as right diaphragmatic thickness at maximal inspiration (DTKI) and end expiration (DTKE) were obtained. Diaphragmatic excursion was measured during normal breathing (DE\_NB) and maximal inspiration (DE\_max\_insp) using M-mode. Quadriceps and biceps muscle strength (QMS and BMS) was assessed with a hand-held dynamometer and exercise tolerance with the 6min walk test (6MWT) before (T0) and after (T1) a 12weeks PR program (1hour/session, 2times/week). The protocol was tested in 4 patients (3 male, 3 COPD/1 asthma, 70±8.5yrs; BMI=28.1±4.4 kg/m<sup>2</sup>)

**RESULTS:** Improvement from T0/T1 in QMS (29.90KgF±6.50; 36.20KgF±4.88), BMS (19.73KgF±6.30; 24.95KgF±3.82) and 6MWT (481.73m±68.61; 546.63m±63.71) and an increase in RFCSA (6.03cm<sup>2</sup> ±2.15; 6.61cm<sup>2</sup>±1.91) and BBCSA (8.41cm<sup>2</sup>±1.53; 9.09cm<sup>2</sup>±1.86) were observed after PR program. A slight increase in DE\_NB and DE\_max\_insp was verified.

**CONCLUSION:** The proposed protocol is feasible and the preliminary results are encouraging to enhance our knowledge of the effects of PR on the structure and function of several muscles. This protocol will be implemented in a larger sample and full data analysis will be performed.

