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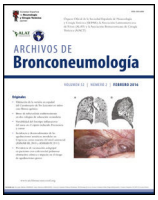

Editorial

Physical Activity in COPD. Significance, Prognosis, Measurement and Therapeutic Interventions☆

Actividad física en la EPOC. Relevancia, factor pronóstico, herramientas para medirla e intervenciones terapéuticas para su mejoría

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Patients with COPD have reduced levels of physical activity (PA) in daily life[1] regardless of the degree of severity of their disease.[2] This is possibly the most powerful predictor of mortality in COPD, more so even than lung function parameters, symptoms, exercise tolerance, and quality of life.[3]

These patients usually adopt a sedentary lifestyle to avoid the sensation of dyspnea during activities of daily living.

PA is characterized by the type, intensity, duration and pattern of activity, and activity-related symptoms. An individual is considered active when (a) they do at least 30 min of moderately intense activity (e.g., 3–6 METs), or (b) 20 min of vigorous activity (e.g., >6 METs), or c) the equivalent in intervals of no less than 10 min. Sedentarism is not the same as inactivity, but instead depends on the number of hours a day that a patient spends sitting or lying down. Thus, a patient can meet the pre-defined criteria for activity but yet be sedentary if they are inactive most hours of the day (sitting or lying down).

PA levels can be measured with subjective and objective tools. The subjective tools include questionnaires administered at a specific time in the life of a subject and diaries in which the subject collects information over a period of time. These methods depend on the ability of the patient to record their activities, the design of the questionnaires, and the characteristics of the patient and the interviewer. Patients tend to overestimate their PA levels, thus compromising the accuracy of these methods.[4]

As regards objective methods, direct measurement is complex and intrusive, and as such, unworkable in practice. Measurement of energy consumption during activity using indirect calorimetry, such as the doubly labeled water method, is very costly, so it is generally reserved for research studies. Moreover, the typically low mechanical efficiency of these patients (high energy expenditure for the same level of activity as a healthy subject) carries the risk of overestimating the PA levels measured with these methods.

Motion sensors (pedometers and accelerometers, commonly called "PA monitors"), are a reasonably inexpensive alternative method for the objective quantification of PA levels.

Pedometers are economically more accessible, although they tend to underestimate PA levels compared to accelerometers. Accelerometers, while being more expensive than pedometers, quantify the amount and intensity of the movement on 1, 2, or 3 axes (*X*, *Y*, *Z*), and can provide information on the position of the body, quantification of PA, and energy consumption during PA, based on acceleration in the available axes. Two recent studies provide data on the validity of these devices in COPD patients, and evaluate the validity, usability, and acceptance of 6 monitors,[5,6] 3 of which were identified as having specific validity criteria in COPD.

Objective methods, then, are preferable to subjective methods, and accelerometers (preferably validated in COPD) are a good compromise between reliability and cost. It is also advisable to measure PA as mean activity over a minimum of 4 days,[7] excluding weekends,[2] and during at least 8 hours a day[7] to get an accurate picture of the subject's PA levels.

Finally, 2 tools have recently been created that combine a questionnaire with the objective measurement of PA using accelerometers. These are the patient reported outcomes (PRO) instruments created by the PROactive consortium (PROactive Physical Activity COPD [PPAC]). Two versions are available, the patient diary (D-PPAC) and the clinical instrument (C-PPAC). The first is used to collect information over a progressive period of days (similar to diaries), while the second is used to collect information at a specific moment in the patient's life,[8,9] a strategy which is useful for comparing 2 moments in the patient's life separated by a period of time or a therapeutic intervention, to assess disease progression and response to a particular treatment. These PRO tools provide information on 2 different PA domains, amount (PPAC-amount) and difficulty (PPAC-difficulty), which can also be combined in an overall score (PPAC-total). The higher the score (0–100), the more positive the patient's PA experience.

Increasing PA levels in these patients may be associated with improved disease prognosis, as has been demonstrated in other diseases.[10] A recent review of the literature describes diverse

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strategies, both pharmacological and non-pharmacological, to increase PA levels in COPD patients.[11]

The review[11] concludes that although rehabilitation can improve exercise tolerance,[12] it is debatable whether this actually increases PA levels.[11] For this reason, strategies specifically aimed at increasing PA by using monitors that can provide information in real time to modify this pattern of behavior are more beneficial,[11] particularly if they are combined with rehabilitation, and even more so if the programs are long-term and high-intensity.[11]

In conclusion, PA levels are reduced in COPD patients, impacting negatively on their disease prognosis. Monitoring of PA levels (preferably with objective or hybrid methods [PROactive]) and the implementation of therapeutic strategies (aimed at improving PA), are important objectives in the management of these patients. Combining rehabilitation programs with interventions using PA monitors, that provide patients with real-time information, is a promising approach in this area.

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