Evaluation of Regular Physical Activity in COPD Patients With an Accelerometer and a Questionnaire: A Pilot Study

To the Editor: The study of regular physical activity in patients with chronic obstructive pulmonary disease (COPD) has attracted growing interest in recent years, with 1 study reporting reduced hospitalization and mortality in COPD patients who exercised regularly.[1] Few studies have evaluated the use of accelerometers for this purpose and all except one have been conducted outside Spain (Belgium and United States of America).[2] The Spanish study, which was recently published in this journal, analyzed both agreement between different measurements of regular physical activity in COPD patients taken in the same week and the medium-term repeatability of these measurements.[3] Accelerometer output was measured in vector magnitude units and no data was provided on energy expenditure. Our group has launched a study aimed at analyzing regular physical activity in a large cohort of patients with COPD. We present the results of a pilot study of a convenience sample of 9 patients with COPD. The aims of the study were to evaluate the feasibility of recording regular physical activity using an accelerometer (SenseWear Pro Armband, BodyMedia, Pittsburgh, Pennsylvania, USA; validated in young adults[4]) and to analyze the agreement between accelerometer output and the results of a Spanish version of the Yale Physical Activity Survey (validated in elderly Spanish patients[5]) administered by trained personnel.

The research team informed the patients about the study, obtained their consent, and provided them with written and verbal instructions on how to use the accelerometer. The patients attached the device to the arm to record daytime physical activity for 7 full consecutive days and nighttime activity for 1 night. They were asked to remove the apparatus when there was a risk of contact with water. They were also instructed to use a special form to record, in as much detail as possible, connection and disconnection times, temporary disconnections (time and activity), and the night they connected the accelerometer. A telephone number was made available to resolve doubts and problems. An exhaustive analysis of the forms completed by the patients and the accelerometer measurements showed that all 9 patients had completed the full week (and night). The mean duration of daytime recording was 15 hours; the mean duration of nighttime recording was 7 hours. All the forms had been completed correctly and included details of connection and disconnection times, temporary disconnections, the night the accelerometer had been worn, and any problems or discomfort experienced. Problems or doubts were resolved by telephone. Only 1 patient developed pruritus at the accelerometer attachment site, and 2 patients had doubts about how to attach it during the test week. We analyzed agreement between the 2 methods (accelerometer and questionnaire) using the κ statistic. We established 2 categories for each of the study variables, using clinical and statistical criteria, to express each patient's level of physical activity (low or high). (These figures are shown along with patient characteristics in the Table.) Observed agreement was good for time spent doing intense physical activity (κ=0.61) and time spent walking (κ=0.72), moderate for time spent doing physical activity (κ=0.55), and poor for energy expenditure while active (κ=0.34).

Our pilot study shows that using an accelerometer to measure regular physical activity is not disagreeable for patients with COPD, and the method is feasible if the patients are correctly instructed beforehand, even in the case of elderly patients with a low socioeconomic and cultural level. Despite the

Patient Characteristics (n=9) and Accelerometer and Questionnaire Agreement Statistics*

Variables	Values ± SD /n, %
Age, y	68 (11)†
Females, n (%)	1 (11)
Actively employed, n (%)	2 (22)
Body mass index, kg/m^2	25.9 (3.8)†
Socioeconomic level IV-V‡, n (%)	7 (78)
Primary education or lower, n (%)	6 (67)
FEV1, % predicted,	43 (17)†
Agreement statistics§,	κ
Physical activity time‖	0.55
Intense physical activity¶	0.61
Steps#	0.72
Energy expenditure during physical activity**	0.34

*FEV1 indicates forced expiratory volume in 1 second.
†Data are expressed as means (SD).
‡According to British Registrar General classification of social classes.
§Questionnaire cutoff points were established based on population medians, as described below:
‖Accelerometer: > or≤ 7 h/wk of physical activity > 3 metabolic equivalent tasks (MET) and questionnaire: > or ≤50 h/wk of physical activity of any intensity.
¶Accelerometer:> or ≤ 1 h/wk of physical activity > 6 METs and questionnaire: < or ≤ 2 h/wk of nonintense physical activity.</≤ 1 h/wk of physical activity >6 METs and questionnaire: ≥ or < 2 h/wk of non-intense physical activity.
#Accelerometer: > or ≤35000 steps/wk, and questionnaire: ≥ or <2 h/wk walking.
**Accelerometer: > or ≤1200 h/wk of physical activity >3 METs and questionnaire: >/≤ 10000 h/wk of physical activity of any intensity.

small sample size, agreement between the questionnaire and the accelerometer was good for variables related to the duration and intensity of physical activity.

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