sciences

Physical activity profile of patients with COPD before entering Pulmonary Rehabilitation programmes

Joana Cruz
Alda Marques
School of Health Sciences, CINTESIS, University of Aveiro

Abstract

Reduced physical activity (PA) levels have been associated with a higher risk for hospitalisations and mortality in patients with Chronic Obstructive Pulmonary Disease (COPD). Pulmonary rehabilitation (PR) has the potential to improve these patients' PA levels. However, before patients engage in PR programmes, it is important to determine their baseline PA levels and how these are related to other health measures. Overall, results showed that patients present low PA levels, independently of the disease severity, which are related to poorer health outcomes.

Findings provide the first insight into the PA profile of patients with COPD entering PR programmes, which are of great value for health professionals to implement these interventions.

Background and aims

Patients with Chronic Obstructive Pulmonary Disease (COPD) are markedly inactive in daily life. Reduced physical activity (PA) levels have been associated with a higher risk for hospitalisations and mortality in this population.[1,2] Thus, improving patients' daily PA has become a topic of increasing clinical interest. Pulmonary rehabilitation (PR) is the cornerstone of COPD management and it has been identified as a potential good candidate to improve the PA levels of patients with COPD.[3] However, little is known about the PA levels of patients entering these programmes and how they are related to other health measures.

This study aimed to: (1) describe the PA profile of patients with COPD entering in community-based PR programmes; (2) assess whether patients' PA levels differ according to COPD severity and (3) explore the association between PA levels and other health measures.

Methods

Forty-four patients with COPD (n=44; 16 with mild, 17 with moderate and 11 with severe-to-very-severe COPD) wore an activity monitor (Actigraph GT3X+) for 4 consecutive days before entering a community-based PR programme. Activity monitors recorded PA data, specifically: minutes/day spent in moderate-to-vigorous physical activities (MVPA), light physical activities (LPA) and sedentary activities (SA), and number of steps per day. The following health measures were also collected: dyspnoea using the modified Medical Research Council (mMRC) dyspnoea scale; exercise capacity with the six-minute walk test (6MWT); knee extensor muscle strength with the 1-repetition maximum; and health-related quality of life (HRQOL) with the St. George's Respiratory Questionnaire (3 domains – symptoms, activity, impact, and global score; higher scores indicating poorer HRQOL).

Descriptive statistics were used to characterise the sample, one-way ANOVAs were performed to compare the PA levels of patients with different COPD grades, and correlations (Pearson's r or Spearman) were carried out to explore the association between patients' PA levels and health measures.

Results

Participants' characteristics are presented in Table 1. Patients with COPD spent 32.6±25.6 min/day in MVPA, 214.4±89.2 min/day in LPA and 571.9±108.6 min/day in SA, and walked 6976.5±2812.8 steps/day. When the PA levels of patients with different COPD grades were compared, no significant differences were observed (p>0.05; Graphs 1, 2 and 3) except for the number of daily steps (p=0.011, Graph 4), with patients with severe-to-very-severe COPD walking fewer steps/day than those with mild (-3092.9 steps/day, p=0.011) and moderate (-2540.2 steps/day, p=0.038) COPD. Only 6 patients (13.6%; n=3 mild COPD, n=3 moderate COPD) walked at least 10 000 steps/day and 4 patients (9.1%; n=2 mild COPD, n=2 moderate COPD) engaged in at least 80 min/day of non-bout MVPA (which corresponds to the MVPA bout target of 30 min/day),[4] following the international recommendations.

Patients who walked more steps/day and/or who spent more time engaged in MVPA presented a better exercise capacity (r=0.432 p=0.007 and r=0.509 p=0.010, respectively) and improved HRQOL (activity r=-0.343 p=0.022 and r=-0.405 p=0.006; impact r=-0.482 p=0.001 and r=-0.412 p=0.006; global score r=-0.428 p=0.004 and r=-0.408 p=0.006). Dyspnoea was reduced in patients who spent more time engaged in MVPA (r_s=-0.345, p=0.022) and increased in more sedentary patients (r_s=-0.338 p=0.025).

Conclusion

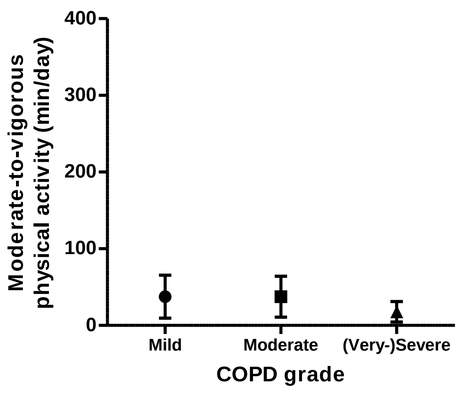
Overall, patients with COPD have low PA levels before entering PR programmes, independently of the grade of the disease. These patients should be encouraged to adopt a more active lifestyle during PR, since higher PA levels were related to better health outcomes.

(Ref. SFRH/BD/81328/2011)

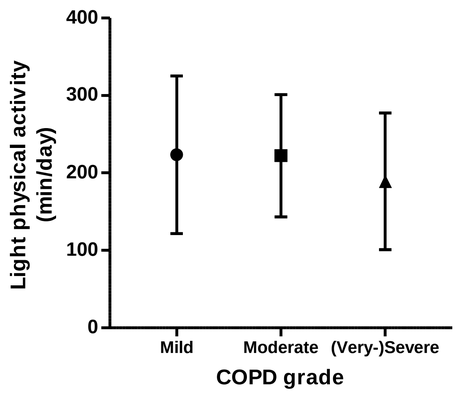
Table 1. Patients' characteristics.

	Total sample (n=44)	Mild COPD (n=16)	Moderate COPD (n=17)	(Very-)severe COPD (n=11)	p-value
Age (years), mean	65.3±8.4	66.8±8.5	62.9±9.1	66.7±7.0	0.363
Sex (male), n(%)	31 (70.5%)	9 (56.2%)	12 (70.6%)	10 (90.9%)	0.180
Educational level, n(%)					
Primary	14 (31.8%)	5 (31.2.%)	4 (23.5%)	5 (45.5%)	0.761
Secondary	9 (20.5%)	3 (18.8%)	3 (17.6%)	3 (27.3%)	
High school	16 (36.4%)	6 (37.5%)	7 (41.2%)	3 (27.3%)	
University	5 (11.4%)	2 (12.5%)	3 (17.6%)	0	
Current occupation, n(%)					
Retired	34 (77.3%)	13 (81.2%)	11 (64.7%)	10 (90.9%)	0.422
Employed	6 (13.6%)	1 (6.2%)	4 (23.5%)	1 (9.1%)	
Unemployed	4 (9.1%)	2 (12.5%)	2 (11.8%)	0	
BMI (kg/m2)	28.8±5.4	27.2±4.9	29.1±3.9	30.5±7.8	0.286
mMRC, M (IQR)	2 [1–2.75]	1.5 [1–2]	1 [1–2]	3 [1–3]	0.093
6MWD (m)	490.1±82.2	498.1±95.5	504.7±42.7	453.9±101.9	0.321
Muscle strength (kg)	32.3±10.6	30.1±10.8	33.9±10.8	33.1±10.6	0.445
SGRQ (score)					
Symptoms	43.3±23.6	37.3±24.0	44.9±24.0	49.7±22.3	0.393
Activities	49.9±21.7	45.1±18.6	44.0±23.0	65.9±17.1	0.014*
Impact	24.8±19.0	17.4±14.7	24.4±18.4	36.4±21.2	0.034*
Global score	35.6±18.9	29.4±16.0	33.7±19.4	47.6±18.1	0.039*

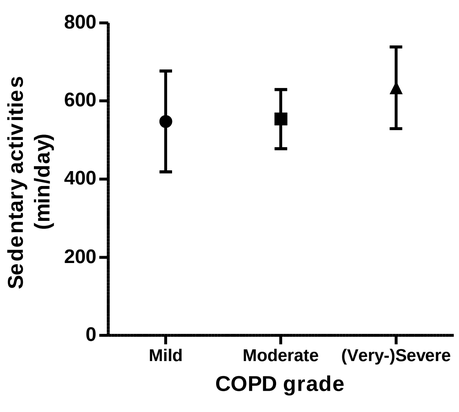
Data are presented as mean±standard deviation, unless otherwise indicated. Abbreviations: BMI, body mass index; IQR, interquartile range, M, median; mMRC, Modified British Medical Research Council dyspnea scale; SGRQ, St. George's Respiratory questionnaire; 6MWD, six-minute walking distance.



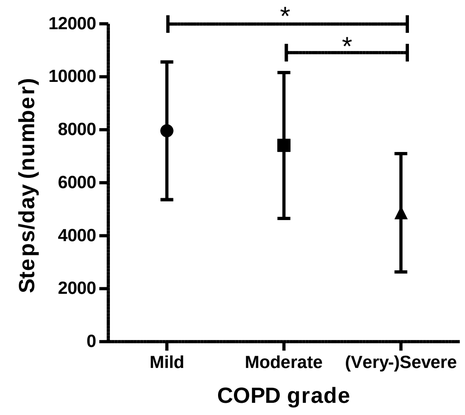
Graph 1. Time spent in moderate-to-vigorous physical activity, according to disease severity.



Graph 2. Time spent in light physical activity, according to disease severity.



Graph 3. Time spent in sedentary activities, according to disease severity.



Graph 4. Number of daily steps, according to disease severity.

References

1. Waschki B, Kirsten A, Holz O, et al. (2011), "Physical activity is the strongest predictor of all-cause mortality in patients with COPD: a prospective cohort study", Chest, Vol.140, No. 2, pp. 331-342.
2. Garcia-Rio F, Rojo B, Casitas R, et al. (2012), "Prognostic value of the objective measurement of daily physical activity in patients with COPD", Chest, Vol. 142, No. 2, pp. 338-346.
3. Spruit MA, Singh SJ, Garvey C, et al. (2013), "An official American Thoracic Society/European Respiratory Society statement: key concepts and advances in pulmonary rehabilitation", Am J Respir Crit Care Med, Vol. 188, No. 8, pp. e13-64.
4. van Remoortel H, Camillo CA, Langer D, et al. (2013) "Moderate Intense Physical Activity Depends on Selected Metabolic Equivalent of Task (MET) Cut-Off and Type of Data Analysis", PLoS ONE, Vol. 8, No. 12, p. e84365.