Daily physical activity in subjects with newly diagnosed COPD

Rationale  Information about daily physical activity levels (PAL) in subjects with undiagnosed chronic obstructive pulmonary disease (COPD) is scarce. This study aims to assess PA and to investigate the associations between PA and clinical characteristics in subjects with newly diagnosed COPD.

Methods  Fifty-nine subjects with a new spirometry-based diagnosis of mild (n=38) and moderate (n=21) COPD (63±6 years, 68% male) were matched with 65 smoking controls (62±7 years, 75% male). PA (daily steps, time spent in moderate-to-vigorous intense physical activities (MVPA) and PAL) was measured by accelerometry. Dyspnoea, complete pulmonary function tests, peripheral muscle strength and exercise capacity served as clinical characteristics.

Results  PA was significantly lower in COPD versus smoking controls (7986±2648 vs 9765±3078 steps, daily time spent in moderate-to-vigorous intense physical activities (MVPA) (B) 64 (27–120) vs 110 (55–164) min of MVPA, 1.49±0.21 vs 1.62±0.24 PAL respectively, all p<0.05). Subjects with COPD with either mild symptoms of dyspnoea (mMRC 1), those with lower diffusion capacity (TL,co), low 6 min walking distance (6MWD) or low maximal oxygen uptake (VO2 peak) had significantly lower PA. Multiple regression analysis identified 6MWD and TL,co as independent predictors of PA in COPD.

Conclusions  The reduction in PA starts early in the disease, even when subjects are not yet diagnosed with COPD. Inactivity is more pronounced in subjects with mild symptoms of dyspnoea, lower levels of diffusion capacity and exercise capacity.

The detection of an inactive lifestyle in patients with chronic obstructive pulmonary disease (COPD) is increasingly important since inactivity predicts prognosis in COPD and may even impact on the rate of lung function decline. Data on daily physical activity levels (PAL) are lacking regarding patients unaware of their disease in whom the diagnosis of COPD is based on spirometry screening (preclinical stage). We aimed to objectively investigate daily PALs and to investigate the association between physical activity and different clinical characteristics in subjects with newly spirometry-based diagnosis of COPD.

Hundred and twenty-four (ex-) smokers were recruited from a population-based sample (see online supplementary figure S1). Fifty-nine subjects with a new spirometry-based diagnosis of mild (n=38) and moderate (n=21) COPD (63±6 years, 68% male) were matched with 65 smoking controls (62±7 years, 75% male). Detailed characteristics of the study subjects are summarised in online supplementary table S1. Physical activity (daily steps, time spent in moderate-to-vigorous intense physical activities (MVPA) and PAL) was measured by a multi-sensor activity monitor (SenseWear Pro 3 Armband). Dyspnoea, complete pulmonary function tests, peripheral muscle strength and exercise capacity served as clinical characteristics. Additional information on material and methods is available in the online supplementary.

We found that physical activity was significantly lower in COPD compared to smoking controls (figure 1). Subjects with COPD with either mild symptoms of dyspnoea (mMRC 1), those with lower diffusion capacity (TL,co), low 6 min walking distance (6MWD) or low maximal oxygen uptake (VO2 peak) had significantly lower PALs (see online supplementary figure S2–S5). COPD subjects and smoking controls with lower levels of isometric quadriceps force did not show lower daily PALs. Multiple regression analysis identified 6MWD and TL,co as independent predictors of physical activity in COPD (see online supplementary table S2).

Our data support the recent advice of Centers for Disease Control and Prevention that physical activity is an important vital sign, even in patients with mild disease.

Several cross-sectional studies found that patients with an established diagnosis of mild-to-moderate COPD, recruited in hospital outpatient settings, were physically inactive compared to a (non-) smoking control group. This is the first study that showed that early reduction in physical activity is already present in subjects with mild-to-moderate COPD who did not previously present to healthcare services (ie, preclinical stage). Of importance to clinicians is the finding that some clinical characteristics (mild symptoms of dyspnoea, low values of diffusion capacity and exercise capacity) may identify the inactive subjects. In this group, early therapeutic interventions such as activity counselling programmes could be helpful in preventing deterioration of the PALs, and by consequence, other clinical outcomes such as comorbidity and disease progression. We conclude that the reduction in physical activity starts early in the disease, even when subjects are not yet diagnosed with COPD.

Figure 1  Daily physical activity levels (PAL) in subjects with and without chronic obstructive pulmonary disease (COPD); daily steps (A) 7986±2648 vs 9765±3078 steps, daily time spent in moderate-to-vigorous physical activity (MVPA) (B) 64 (27–120) vs 110 (55–164) min of MVPA and daily PAL (C): 1.49±0.21 vs 1.62±0.24 PAL. *p<0.05 COPD versus smoking controls.
diagnosed with COPD, especially in those with mild symptoms of dyspnoea, lower levels of diffusion capacity and exercise capacity.

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**Acknowledgements** The authors would like to thank Geert Celis and co-workers (Respiratory Division, ES02, University Hospital Gasthuisberg, Leuven, Belgium) for their assistance with the lung function tests. Kristien De Bent, Laurence Vanricken, Erica Balligand, Claudia Carremans and Laura Jacobs (Clinical Trial Unit, University Hospital Gasthuisberg, Leuven, Belgium) are acknowledged for their assistance in patient recruitment and data collection. Kristof Van Eyken is acknowledged for his help in the data collection by creating a database. The Nelson team (department of Thoracic Surgery, UZ Gasthuisberg, Leuven, Belgium) is acknowledged for providing patient contacts.

**Contributors** HVR contributed to the protocol development, collected the data, performed data analysis and wrote the manuscript. MH contributed to the protocol development, collected the data, performed data analysis and wrote the manuscript. HD contributed to the statistical analysis, assisted in the data collection and critically reviewed the manuscript. DL contributed to the protocol development, assisted in the data collection and critically reviewed the manuscript. CB, DL contributed to the protocol development, assisted in the data collection and critically reviewed the manuscript. MD contributed to the protocol development and critically reviewed the manuscript. RG contributed to the protocol development and critically reviewed the manuscript. WI provided the study idea, contributed to the protocol development and critically reviewed the manuscript. TT provided the study idea, contributed to the protocol development and critically reviewed the manuscript.

**Funding** This work was supported by Research Funds Flanders (G05.98.09N).

**Competing interests** None.

**Ethics approval** The study was approved by the local ethics committee (Medical Ethical Board of the University Hospitals Leuven, Belgium, approval number B32220096387).

**Provenance and peer review** Not commissioned; internally peer reviewed.

Additional material is published online only. To view please visit the journal online (http://dx.doi.org/10.1136/thoraxjnl-2013-203534).

**REFERENCES**


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To cite Van Remoortel H, Hornikx M, Demeyer H, et al. Thorax Published Online First: [please include Day Month Year] doi:10.1136/thoraxjnl-2013-203534

Received 8 March 2013
Accepted 22 March 2013

Thorax 2013;00:1–2.

doi:10.1136/thoraxjnl-2013-203534
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Thorax published online April 20, 2013

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